



# **Adipositas Leitlinie**

**Evidenz-basierte Leitlinie zur Behandlung der Adipositas in  
Deutschland**

Prof. Dr. med. Dr. sc. Karl Lauterbach  
Institut für Gesundheitsökonomie und Klini-  
sche Epidemiologie  
(IGKE)  
der Universität zu Köln

Prof. Dr. rer. nat. Joachim Westenhöfer  
Fachbereich Ökotrophologie  
Fachhochschule Hamburg

Prof. Dr. med. Alfred Wirth  
Teutoburger-Wald-Klinik  
Bad Rothenfelde

Prof. Dr. med. Hans Hauner  
Klinische Abteilung  
Diabetes-Forschungsinstitut  
an der Heinrich-Heine-Universität  
Düsseldorf

Die Aktualisierung dieser Leitlinie erfolgt bis September 2000. Ergeben sich in diesem Zeitraum wissenschaftlich und klinisch relevante Erkenntnisse, die die Therapieempfehlungen dieser Leitlinie widerlegen oder überflüssig machen, werden kurzfristig entsprechende Informationen durch das Institut für Gesundheitsökonomie und Klinische Epidemiologie der Universität zu Köln erstellt.

Anfragen zur Methodik sowie Anforderung von Exemplaren der Leitlinie (Experten-, Anwender-, Patientenversion) bitte an:

*Institut für Gesundheitsökonomie und Klinische Epidemiologie  
der Universität zu Köln  
Prof. Dr. med. Dr. sc. Karl W. Lauterbach  
Gleuelerstraße 176-178  
50935 Köln*

Anfragen zum Inhalt der Leitlinien sowie Anregungen und Kommentare bitte an:

*Diabetes-Forschungsinstitut an der Heinrich-Heine-Universität Düsseldorf  
Prof. Dr. med. Hans Hauner  
Auf'm Hennekamp 65  
40225 Düsseldorf*

Die multidisziplinäre Entwicklung der Evidenz-basierten Leitlinie zum Management der Adipositas in Deutschland erfolgte unter Beteiligung folgender Institutionen und Personen:

*Institut für Gesundheitsökonomie und Klinische Epidemiologie  
der Universität zu Köln  
Prof. Dr. med. Dr. sc. Karl W. Lauterbach  
Gleuelerstr. 176-78  
50935 Köln*

Dr. med. Christiane Fuchs  
Dr. med. Afschin Gandjour, MBA  
Dipl. rer. pol. Elke Hunsche  
Uta Kautz-Segadlo, Ärztin  
Dr. med. Thomas Kurscheid, MPH  
Romy Maringer, Ärztin  
Dipl. stat. Michael Mayer  
Dr. med. Sibylle Steiner, MBA  
Prof. Dr. med. Dr. sc. Karl W. Lauterbach

*Fachbereich Ökotrophologie, Fachhochschule Hamburg  
Prof. Dr. rer. nat. Joachim Westenhöfer  
Lohbrügger Kirchstr. 65  
21033 Hamburg*

*Teutoburger-Wald-Klinik, Bad Rothenfelde,  
Prof. Dr. med. Alfred Wirth  
Teutoburger-Wald-Str. 33  
49214 Bad Rothenfelde*

*Diabetes-Forschungsinstitut an der Heinrich-Heine-Universität Düsseldorf  
Prof. Dr. med. Hans Hauner  
Auf'm Hennekamp 65  
40225 Düsseldorf*

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Das Diabetes-Forschungsinstitut an der Heinrich-Heine-Universität Düsseldorf führt in Zusammenarbeit mit dem Institut für Gesundheitsökonomie, Medizin und Gesellschaft an der Universität zu Köln und der Knoll Deutschland GmbH eine Kosteneffektivitätsstudie des Wirkstoffs Sibutramin durch. Professor Wirth ist Leiter einer klinischen Prüfung zur Wirksamkeitsprüfung von Sibutramin.

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## **Vorwort**

Vor dem Hintergrund knapper werdender Ressourcen und variierender Behandlungsqualität im Gesundheitssystem werden zunehmend Evidenz-basierte Behandlungsleitlinien etabliert und in der klinischen Praxis eingesetzt. Evidenz-basierte Leitlinien sprechen Handlungsempfehlungen aufgrund wissenschaftlicher Erkenntnis, also Evidenz, aus. Die Handlungsempfehlungen basieren auf den "besten, verfügbaren Beweisen (englisch „evidence“) aus systematischer, klinisch relevanter und patientenzentrierter Forschung" (Sackett).

Charakteristisch für die Evidenz-basierte Entwicklung von Empfehlungen ist die Art der Auswertung der wissenschaftlichen Studien: diese Studien werden gewichtet auf der Grundlage ihres Studiendesigns. Dabei werden die Kriterien angewendet, die von den Arbeitsgruppen für Evidenz-basierte Medizin, zum Beispiel der Cochrane Collaboration Group oder der Agency for Health Care Policy and Research, für die Klassifizierung von Studiendesigns empfohlen wurden.

Das vorliegende Buch enthält die erste Evidenz-basierte Leitlinie zur Behandlung der Adipositas in Deutschland und ist gleichzeitig der erste Band einer geplanten Buchreihe des Institutes für Gesundheitsökonomie und Klinische Epidemiologie (IGKE) der Universität zu Köln zum Thema „Evidenz-basierte Leitlinien“. Sie entstand durch die Zusammenarbeit des IGKE mit drei der führenden Adipositasexperten Deutschlands, den Professoren Hans Hauner, Alfred Wirth und Joachim Westenhöfer.

Köln, im Oktober 98

Karl Wilhelm Lauterbach

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## 1. Einleitung

International, vor allem in den USA, Kanada und Großbritannien, werden zunehmend Evidenz-basierte Behandlungsleitlinien etabliert und in der klinischen Praxis eingesetzt. Das vorliegende Dokument stellt die erste Evidenz-basierte Leitlinie zur Behandlung der Adipositas in Deutschland dar. Dies bedeutet, daß die aufgezeichneten Behandlungsmöglichkeiten fast ausschließlich auf der Grundlage einer systematischen Literaturbewertung entstanden sind. Wissenschaftlich begründete Leitlinien zur Adipositastherapie sind in Schottland, England und den USA erstellt worden bzw. in Vorbereitung (Scottish Intercollegiate Guidelines Network [SIGN], 1996; National Heart, Lung, and Blood Institute [NHLBI], 1998). Auf diese wird wiederholt ausdrücklich Bezug genommen.

Darüber hinaus wird derzeit von der World Health Organisation (WHO) auf Vorschlag der International Obesity Task Force ein Bericht zur Adipositas erstellt (WHO, 1998, in Vorbereitung).

Die Initiative zur Entwicklung dieser Leitlinie ging aus von Herrn Prof. Dr. H. Hauner, Klinische Abteilung des Diabetes-Forschungsinstituts an der Heinrich-Heine-Universität Düsseldorf, Herrn Prof. Dr. K. Lauterbach, Institut für Gesundheitsökonomie, Medizin und Gesellschaft an der Universität zu Köln, Herrn Prof. Dr. J. Westenhöfer, Fachbereich Ökotrophologie an der Fachhochschule Hamburg und Herrn Prof. Dr. A. Wirth, Teutoburger-Wald-Klinik Bad Rothenfelde.

Leitlinien werden definiert als „systematisch entwickelte Empfehlungen, die Entscheidungen von Ärzten und Patienten über eine im Einzelfall angemessene gesundheitliche Versorgung ermöglichen sollen“ (Field et al., 1990). Auf der Grundlage dieser Definition wurden die Zielvorgaben der hier vorliegenden Evidenz-basierten Leitlinie zur Behandlung der Adipositas in Deutschland wie folgt festgelegt: sie sollen

- das Bewußtsein für das Gesundheitsproblem „Adipositas“ in Deutschland stärken,
- Ärzten und Patienten eine orientierende Hilfe sein,
- auf der Grundlage wissenschaftlicher Publikationen oder Literatur krankheitsspezifische Informationen und Empfehlungen zu Prävention und Therapie der Adipositas an alle im Gesundheitswesen tätige Personen, an alle Einrichtungen des Gesundheitswesens, an die Betroffenen und die Gesundheitspolitik vermitteln.

Die 1995 publizierten „Richtlinien zur Therapie der Adipositas“ der Deutschen Adipositas-Gesellschaft (DAG) stellen Konsensus-basierte Leitlinien einer Expertenkommission dar. Im Unterschied dazu beruht die hier vorliegende Leitlinie streng auf einem Evidenz-basierten Ansatz. Die verfügbaren klinischen Studien reichten allerdings nicht aus, die Empfehlungen ausschließlich auf diesem Evidenz-basierten Ansatz zu entwickeln. Daher sollten Konsensus- und Expertenempfehlungen (DAG), bereits publizierte Leitlinien [Scottish Intercollegiate Guidelines Network, (SIGN), 1996] und Evidenz-basierte Leitlinien einander ergänzen mit dem Ziel, ärztliche Entscheidungsprozesse im Rahmen einer leistungsfähigen Versorgung von Patienten zu erleichtern und somit die Betreuungsergebnisse zu verbessern.

## 2. Methodik



Das methodische Vorgehen bei der Entwicklung dieser Leitlinie zur Behandlung der Adipositas erfolgte in mehreren Schritten:

In einem ersten Schritt wurde der grundsätzliche Bedarf für Leitlinien zu präventiven und therapeutischen Behandlungsmaßnahmen bei der Adipositas analysiert. Dies setzte eine Beschäftigung mit der Frage voraus, inwieweit die Adipositas als Gesundheitsproblem von zunehmender Bedeutung allgemein anerkannt wird und wie dieses Problem in der Praxis angegangen wird. Hierbei wurde angestrebt, einen Überblick über publiziertes Informationsmaterial wie klinische Standards, Leitlinien (Handlungsanweisungen) und sonstige Expertenempfehlungen zu bekommen. Zum anderen wurden Diskussionen geführt, sowohl innerhalb der mit der Erstellung dieser Leitlinie beauftragten Arbeitsgruppe, als auch mit externen klinischen Experten, die sich mit dem Problem Adipositas, ihren Komplikationen und ihrer Behandlung beschäftigen.

Es ist Aufgabe von Leitlinien, zur Verbesserung der Versorgungsergebnisse beizutragen, Risiken zu minimieren, Therapiesicherheit und Wirtschaftlichkeit zu erhöhen, sowie nicht-indizierte Diagnose- und Behandlungsverfahren zu vermeiden (Ärztliche Zentralstelle Qualitätssicherung, 1997; Lauterbach et al., 1997). Deshalb wurde mit den oben beschriebenen Verfahren angestrebt, Versorgungsprobleme in der Prävention, in der Diagnose und in der Therapie der Adipositas zu analysieren. Dabei ergaben sich folgende Aspekte:

- Die Adipositas und ihre spezifischen Komplikationen werden unterschätzt bzw. vernachlässigt. Es herrscht ein erheblicher Mangel an adäquaten Betreuungsangeboten, die den üblichen Qualitätsstandards genügen. Erschwerend kommt hinzu, daß es eine Fülle von nicht wissenschaftlich abgesicherten Therapieverfahren und –empfehlungen gibt.
- Inzidenz und Prävalenz der Adipositas steigen kontinuierlich (u.a. Döring et al., 1992; Kuczmarski et al., 1994; Galuska et al., 1996), so daß eine Zunahme der Versorgungsengpässe mit hoher Wahrscheinlichkeit angenommen werden muß.
- Bei zunehmender Verbreitung des Gesundheitsproblems Adipositas steigen folglich auch die damit verbundenen Kosten.
- Leitlinien wurden in verschiedenen Ländern bereits entwickelt und ansatzweise implementiert. Sie werden zunehmend auch im deutschsprachigen Raum erstellt (Makela, 1997; Ollenschläger et al., 1996; Ollenschläger, 1996; Reinauer, 1997). Die Akzeptanz und Implementierung von Leitlinien ist in Deutschland, meist bedingt durch die unterschiedliche Qualität ihres methodischen Ansatzes, gering. Ihre Relevanz für die Sicherstellung von Qualitätsstandards in Diagnostik und Therapie ist aber auch hierzulande erkannt. Zur Evaluation der Qualität von Leitlinien wurden und werden Kriterien und Standards erstellt (u.a. aus dem U.S. Department of Health and Human Services die Agency for Health Care Policy and Research (AHCPR), 1992; Ollenschläger, 1996; Lauterbach et al., 1997). Für die Entwicklung der vorliegenden Leitlinie wurden die Qualitätskriterien der Agency for Health Care Policy and Research zugrundegelegt (AHCPR, 1992). Leitlinien zur Adipositas sind bereits in Schottland (Scottish Intercollegiate Guidelines Network, 1996 [SIGN], England (Royal College of Physicians, 1997a) und den USA (National Heart, Lung, and Blood Institute, NHLBI Obesity Education Initiative, 1998) nach diesem methodischen Ansatz erstellt worden.
- Zur Entwicklung der vorliegenden Leitlinie haben deutsche Adipositas-Experten, die gleichzeitig führende Mitglieder der Deutschen Adipositas-Gesellschaft sind, maßgeblich beigetragen.

Die Erstellung der Leitlinie erfolgte auf der Grundlage einer systematischen Recherche der Literatur zum Thema Adipositas. Folgende Datenbanken und Quellen wurden dabei herangezogen:

### **Hauptsuchverfahren:**

Eine umfassende Medline-Recherche für den Zeitraum Juli 1992 bis Juli 1997 wurde mit Hilfe des Knowledge-Finders durchgeführt. Bei einem Relevanzfilter von 50% dienten die Begriffe „obesity“ und „overweight“ als Deskriptoren. Im Rahmen einer genaueren Spezifizierung dieser Suchformulierung wurden die Studienkategorien „in vitro“, „animals“ und „case reports“ ausgeschlossen. Studien, die weder englisch- noch deutschsprachig waren, wurden nur dann berücksichtigt, wenn es sich dabei um randomisierte, klinische Studien oder deren Metaanalysen handelte.

Desweiteren wurde die recherchierte Literatur (ca. 1600 Quellen) im Hand-Searching-Verfahren selektiert. Studien zur Ätiologie wurden ausgeschlossen, ausgenommen jene, die einen Zusammenhang zwischen Adipositas und Adipositas-assoziierten Risikofaktoren und Komorbiditäten beschrieben.

Dieses Verfahren ermöglichte die Identifikation der wichtigsten Quellen zu Epidemiologie, Prävention, Diagnostik, Therapie, Komorbiditäten und Kosten des Gesundheitsproblems Adipositas. Es mußte jedoch von einer unvollständigen Recherche ausgegangen werden, so daß die folgenden Nebensuchverfahren angewandt wurden:

### **Nebensuchverfahren:**

- a) Die Referenzen der schottischen bzw. der englischen Leitlinie zur Adipositas-Prävention und Behandlung (SIGN, 1996 und Royal College of Physicians, 1997a) wurden herangezogen. Diese Quellen wurden als relevant erachtet, da diese Leitlinien nach dem Evidenz-basierten Ansatz erstellt wurden. Zusätzlich wurden Informationen aus dem bislang nicht veröffentlichten Konsensuspapier der World Health Organization (WHO, 1998) mit angegebenen Referenzen verwendet. Ergänzt wurde diese Recherche durch das ebenfalls gut vorbereitete Reviewpapier des Institute of Medicine (1995). Rationale dieser Vorgehensweise war, die eigene Recherche zu vervollständigen und gleichzeitig deren Relevanz zu kontrollieren.
- b) Zusätzlich wurde die Literaturliste, besonders für Studien aus dem deutschsprachigen Raum, durch Hinweise aus der eigenen Arbeitsgruppe bzw. den oben erwähnten Expertenkreisen vervollständigt. Die Expertenbefragung nach relevanter Literatur wird fortgeführt.

Insgesamt wurden im Rahmen dieser Literaturrecherche 972 relevante Literaturstellen ausgewählt und bewertet.

Nach Auswertung dieser Literaturstellen wurden die Empfehlungen der Leitlinie auf der Basis wissenschaftlich verfügbarer Erkenntnisse entwickelt. Von besonderem Interesse waren dabei die Interventionsstudien zu Prävention und Therapie der Adipositas. Die Einteilung der für die ausgesprochenen Therapieempfehlungen herangezogenen Studien und Expertenmeinungen erfolgte entsprechend ihrer Evidenz (U.S. Agency of Health Care Policy and Research (AHCPR), 1992) in die Evidenzklassen I-IVb. Dabei bedeutet Klasse Ia, daß dies der Studientyp mit der größten Aussagekraft bezüglich der methodischen Qualität ist. Metaanalysen randomisierter, kontrollierter Studien entsprechen dieser Anforderung (Tab. 1).

Metaanalysen fassen systematisch Ergebnisse vergleichbarer Studien mittels statistischer Methoden zusammen. Mit Hilfe einer korrekt durchgeführten Metaanalyse können aufgrund der i.d.R. hohen akkumulierten Fallzahlen präzise Antworten zu

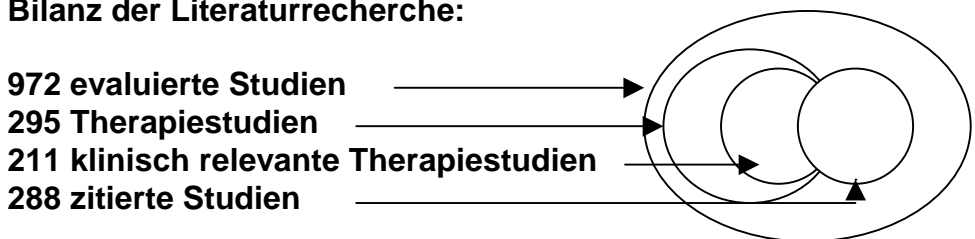
einer bestimmten Fragestellung gegeben werden. Dementsprechend ist eine auf diesem Studientyp basierende Empfehlung als am besten wissenschaftlich begründet anzusehen. Mit dem Absinken der Evidenzklassen (von Ia über Ib nach IV) nimmt auch die wissenschaftliche Begründbarkeit einer ausgesprochenen Empfehlung ab. In Literaturübersichten werden Studienergebnisse als gegenwärtiger Wissensstand zusammengestellt, wobei hier nicht statistische Methoden, sondern Konsensfindung im Vordergrund stehen. Dies entspricht einer Evidenzklasse IV.

Die für die klinische Praxis bedeutsamen Interventionsempfehlungen wurden zusätzlich gewichtet. Daraus ergibt sich eine Bewertung nach Empfehlungsgraden A bis C. (siehe Tab. 1).

Tab.1: Bewertung der publizierten Literatur gemäß ihrer wissenschaftlichen Aussagekraft nach Evidenzklassen und Gewichtung in Empfehlungsgrade (zitiert nach SIGN, 1996; AHCPR 1992)

Grad der Empfehlung	Evidenzklasse	
<b>A</b>	Ia	Evidenz aufgrund von Metaanalysen von randomisierten, kontrollierten Studien
	Ib	Evidenz aufgrund von mindestens einer randomisierten, kontrollierten Studie
<b>B</b>	IIa	Evidenz aufgrund mindestens einer gut angelegten, kontrollierten Studie ohne Randomisierung
	IIb	Evidenz aufgrund mindestens einer gut angelegten, quasi-experimentellen Studie
	III	Evidenz aufgrund gut angelegter, nicht-experimenteller, deskriptiver Studien, wie z.B. Vergleichsstudien, Korrelationsstudien und Fall-Kontroll-Studien
<b>C</b>	IV	Evidenz aufgrund von Berichten der Experten-Ausschüsse oder Expertenmeinungen und/oder klinischer Erfahrung anerkannter Autoritäten

**Bilanz der Literaturrecherche:**



Um die Kriterien der Reproduzierbarkeit und Transparenz zu erfüllen, werden in dieser Leitlinie die Abstracts sowohl der zitierten Literatur als auch der evaluierten Publikationen zur Adipositas therapie zur Verfügung gestellt. Es handelt sich insgesamt um 475 Abstracts. Die vollständige Version der Leitlinie soll (mit Hyperlinks zwischen zitierter Literatur und Abstracts) im Internet abgrufbar sein.

Der erste Entwurf der Leitlinie wurde in einer Auflage von ca. 900 Exemplaren an Vertreter aller interessierten Berufsgruppen und Anwender im Gesundheitswesen mit der Bitte um kritische Kommentierung hinsichtlich Validität, praktische Anwendbarkeit, Flexibilität, Klarheit und Multidisziplinarität (Field und Lohr, 1992) verteilt. Am 19.9.97 wurde diese Leitlinie auf dem „Kölner Symposium zur Adipositas“ präsentiert und zur Diskussion gestellt. Anschließend wurden eingegangene Verbesserungsvorschläge und die zusätzlich zu unserer Aufmerksamkeit gebrachten relevanten Studi-

en in die Leitlinie eingearbeitet. Um die Akzeptanz der Leitlinie bei den Anwendern zu erhöhen, wurde eine Kurzversion erstellt. Darüber hinaus wurde eine Patientenversion erarbeitet, da es Aufgabe von Leitlinien ist, die informierte Entscheidung von Patienten bei der Wahl von Therapiealternativen zu unterstützen (Lauterbach et al., 1997).

Zur Dokumentation der Leitlinienentwicklung wurde eine Literaturdatenbank erstellt, die kontinuierlich auf den neuesten Stand gebracht wird.

Da mit der Veröffentlichung von Ergebnissen relevanter Studien gerechnet werden muß, ist eine Neubearbeitung in spätestens zwei Jahren vorgesehen. Durch ein solches Vorgehen wird angestrebt, die Leitlinie einer kontinuierlichen Qualitätsverbesserung im Sinne eines Ansatzes zum Total Quality Management zu unterziehen.

Das Kapitel über die ökonomischen Aspekte des Gesundheitsproblems Adipositas in Deutschland nimmt insofern eine Sonderstellung innerhalb der Leitlinie ein, da

1. kaum prospektive Kosten-Nutzen-Studien existieren und
2. sich auf die vorhandenen Studien oben genannte Kriterien der AHCPR nicht anwenden lassen.

Die vorhandenen Kosten-Nutzen-Studien berücksichtigen nur Teilaspekte der Adipositas-Therapie. Die für Deutschland bislang veröffentlichten Ergebnisse implizieren jedoch eine Unterschätzung der volkswirtschaftlichen Kosten, da die Diagnose "Adipositas" nur selten gestellt wird und nur wenige aktuelle statistische Daten vorhanden sind. Folglich besteht Bedarf an prospektiven ökonomischen Kostenschätzungen, die das gesundheitsökonomische Problem der Adipositas in Deutschland verdeutlichen. Die beiden für diese Leitlinie zugrundegelegten Ansätze der Kostenschätzung werden im Anhang detailliert beschrieben.

### **3. Definitionen und Klassifikation der verschiedenen Grade der Adipositas**

#### **3.1. Body Mass Index und Klassifikation der Adipositas**

Adipositas ist definiert als eine über das Normalmaß hinausgehende Vermehrung des Körperfetts. Berechnungsgrundlage für die Klassifizierung der Adipositas ist der Körpermassenindex [Body Mass Index (BMI)]. Der BMI ist der Quotient aus Gewicht und Körpergröße zum Quadrat:

$$BMI = \frac{\text{Gewicht} \left[ \frac{kg}{m^2} \right]}{(\text{Größe})^2}$$

Der BMI wird als das relativ beste anthropometrische Maß zur indirekten Erfassung der Körperfettmasse beurteilt (siehe u.a. Kato et al., 1996; Hauner, 1997). Trotz gewisser Limitation hat sich der BMI weltweit durchgesetzt und war auch für die WHO Grundlage für die Klassifikation der Adipositas (Tab. 2) (WHO/46 press release, 1997).

Tab.2: Klassifikation des Übergewichts bei Erwachsenen anhand des BMI (WHO/46 press release, 1997)

<b>Gewichtsklasse</b>	<b>BMI (kg/m<sup>2</sup>)</b>
Normalgewicht	18.5-24.9
Übergewicht	≥25
Präadipositas	25.0-29.9
Adipositas Grad I	30.0-34.9
Adipositas Grad II	35.0-39.9
Adipositas Grad III (morbide A.)	40 oder mehr

Diese Klassifikation teilt Übergewicht in Präadipositas und verschiedene Grade der Adipositas ein. Übergewicht wird definiert als BMI  $\geq 25$  und Adipositas als BMI  $\geq 30$  kg/m<sup>2</sup>. Eine Klassifikation der Adipositas ist notwendig, da sich das Morbiditäts- und Mortalitätsrisiko mit dem Grad der Adipositas erhöht (siehe u.a. Manson et al., 1990 und 1995).

### 3.2. Erfassung des Fettverteilungsmusters

Eine stammbetonte Fettverteilung und insbesondere Vergrößerung des viszeralen Fettdepots weist auf ein erhöhtes Risiko für metabolische und kardiovaskuläre Komplikationen hin. Der Taillenumfang ist mit der abdominellen Fettmasse assoziiert und stellt damit ein klinisch einfach anwendbares Maß zur Risikoabschätzung und Verlaufskontrolle unter Therapie dar (Pouliot et al., 1994, Evidenzklasse III, Empfehlungsgrad B). In Tabelle 3 sind die geschlechtsspezifischen Grenzwerte aufgeführt, die mit einem erhöhten Risiko Adipositas-assoziiierter metabolischer Störungen einhergehen (Lean et al., 1995, Evidenzklasse III).

Zur Erfassung des Fettverteilungsmusters kann auch der Quotient aus Taillen- und Hüftumfang in cm (T/H-Quotient oder Waist-Hip-Ratio, WHR) verwendet werden. Er ist ebenfalls ein praktikables Maß, um eine abdominelle Adipositas (WHR  $>1.0$  bei Männern und  $>0,85$  bei Frauen) zu erfassen (Seidell, 1996a, Evidenzklasse IV).

Tab.3: Geschlechtsspezifische Grenzwerte des Taillenumfangs für ein erhöhtes Risiko Adipositas-assoziiierter Stoffwechselerkrankungen (Lean et al., 1995).

	<b>Erhöhtes Risiko</b>	<b>Deutlich erhöhtes Risiko</b>
Männer	>94 cm	>102 cm
Frauen	>80 cm	>88 cm

### **3.3. Weitere Methoden zur Abschätzung und Erfassung der Körperfettmasse**

Neben den genannten anthropometrischen Methoden stehen weitere, teilweise technisch aufwendige und kostspielige Methoden zur genaueren Charakterisierung der Körperfettmasse zur Verfügung. Beispielsweise kann mit der Computertomographie- oder NMR-Diagnostik die anatomische Verteilung des Körperfetts detailliert dargestellt werden. Nach Auffassung der Autoren sind diese Methoden für die Bearbeitung wissenschaftlicher Fragestellungen sehr wertvoll, liefern aber für die Betreuung adipöser Menschen keine klinisch relevante Zusatzinformation, so daß sie im klinischen Alltag als entbehrlich angesehen werden können. Die Nutzung dieser zusätzlichen diagnostischen Mittel wird durch strenge Indikationsstellung, aufwendige Durchführung und hohe Kosten auf einen speziellen Personenkreis beschränkt. Lediglich die Bioimpedanzanalyse hat aufgrund ihrer schnellen und einfachen Anwendung eine gewisse praktische Bedeutung erlangt. Sie stellt ein indirektes Verfahren zur Bestimmung des Körperfetts dar, ihre Aussagekraft ist aber begrenzt (Deurenberg, 1996).

### **3.4. Definition der Adipositas im Kindes- und Jugendalter**

Für Kinder und Jugendliche existiert bislang keine allgemein akzeptierte Definition bzw. Klassifikation der Adipositas. Die verfügbaren Referenzwerte sind in verschiedener Hinsicht problematisch. Da sich der BMI bei Kindern und Jugendlichen in Abhängigkeit vom Alter ändert, sollten nur altersbezogene Referenztabellen verwendet werden. Eine internationale Expertengruppe erarbeitet derzeit Empfehlungen zur Definition und Klassifikation der Adipositas im Kindes- und Jugendalter auf der Basis des BMI, die in Zukunft auch eine internationale Vergleichbarkeit der Daten ermöglichen sollen.

## **4. Adipositas in Deutschland**

### **4.1. Prävalenz**

Die Prävalenz der Adipositas ( $BMI \geq 30$ ) wurde zwischen 1984 und 1991 in Deutschland in drei bevölkerungsrepräsentativen Studien bestimmt: Nationale Gesundheitssurveys der Deutschen Herz-Kreislauf-Präventionsstudie mit einem Stichprobenumfang von 15.735 Probanden im Alter von 25 bis 69 Jahren; Verbundstudie, Ernährungserhebung und Risikofaktorenanalytik [VERA-Studie aus der Nationalen Verzehrsstudie] mit einem Stichprobenumfang von 2.006 Probanden im Alter von 18 bis 88 Jahren und MONICA-Projekt der WHO mit einem Zufallsstichprobenumfang von 1866 Probanden in der Stadt Augsburg und 2118 in Augsburg-Land im Alter von 25 bis 64 Jahren.

In der VERA-Studie wurde im Zeitraum 1987 bis 1988 ein Anstieg der Präadipositasprävalenz ( $25 \leq BMI < 30$ ) von 15% in der jüngsten Altersgruppe (18 bis 24 Jahre) auf 50% in der Gruppe der über 55-Jährigen ermittelt.

Die Adipositasprävalenz ( $30 \leq \text{BMI} < 40$ ) stieg in diesen Altersgruppen von 3% auf 17 % und für Adipositas Grad III ( $\text{BMI} \geq 40$ ) wurde in der Studienpopulation eine Prävalenz von 0,4 % gefunden. Die Adipositasprävalenz lag insgesamt bei den Männern bei 10,6% und bei den Frauen bei 11,6 % (Deutsche Gesellschaft für Ernährung, 1992; Heseker et al., 1995).

Im Rahmen des internationalen MONICA-Projektes wurde in der Studienregion Augsburg 1984/85 in einer Zufallsstichprobe der Bevölkerung der Stadt Augsburg eine Adipositas ( $\text{BMI} \geq 30$ ) bei 16% der 25-64 jährigen Männer und 13% der gleichaltrigen Frauen festgestellt; in Augsburg-Land fielen 17% der Männer und der Frauen dieser Altersgruppe in diese Kategorie. Die Prävalenz stieg erwartungsgemäß mit dem Alter an (Döring, 1992). Nach den Daten des WHO MONICA-Projektes liegt Deutschland damit auch im europäischen Vergleich im vorderen Drittel (World Health Statistics Quarterly, 1988).

In der Deutschen Herzkreislauf-Präventionsstufe (DHP) wurde die Adipositasprävalenz in den beteiligten Regionen zu drei Zeitpunkten erhoben. Zwischen 1984 und 1991 wurde sowohl in den Interventionsregionen als auch in der Referenzregion ein Prävalenzanstieg beobachtet (Abb. 1 und 2).

Abb.1: Entwicklung der geschlechtsspezifischen Prävalenz des BMI  $\geq 25$  kg/m<sup>2</sup> in Deutschland in der Altersgruppe 25-69 Jahre (Referenzregion der DHP) (nach Hoffmeister et al., 1996)

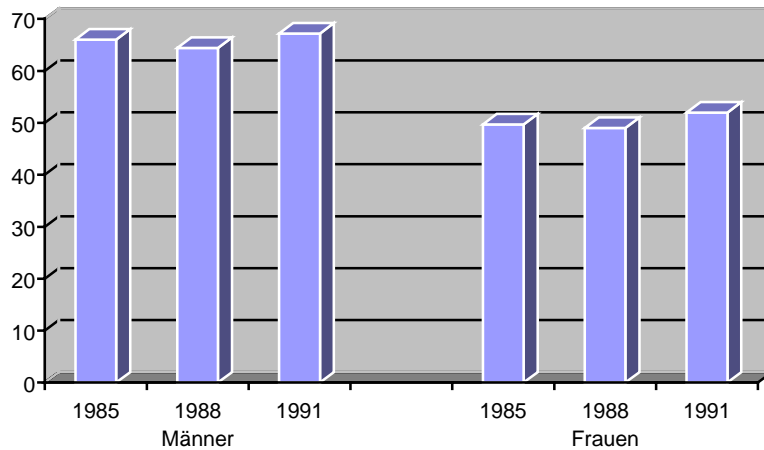
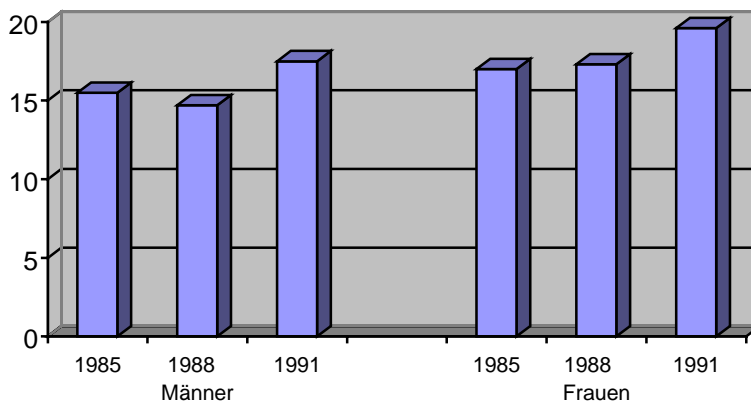


Abb.2: Entwicklung der geschlechtsspezifischen Prävalenz des BMI  $\geq 30$  kg/m<sup>2</sup> in Deutschland in der Altersgruppe 25-69 Jahre (Referenzregion der DHP) (nach Hoffmeister et al., 1996)



## 4.2. Morbidität und Mortalität

### Morbidität

Das Morbiditätsrisiko für Adipositas-assoziierte Begleit- und Folgeerkrankungen erhöht sich kontinuierlich bei BMI-Werten zwischen 25 und 30 und steigt bei höherem BMI noch wesentlich stärker an. Die Komplikationen der Gewichtszunahme sind vielfältig (siehe Kapitel 6: Begleiterkrankungen). Tabelle 4 nennt das relative Risiko für eine Reihe Adipositas-assoziiierter Gesundheitsstörungen.



Tab.4: Relatives Risiko (RR) von Adipositas-assoziierten Gesundheitsstörungen in den Industrienationen (nach Dunaif, 1992; Pi-Sunyer, 1993; Shaw et al., 1996; Wolf and Colditz, 1998 und Expertenmeinung\*)

<b>Mäßig bis stark erhöht (RR &gt; 2)</b>	<b>Leicht erhöht (RR 1-2)</b>
Gonarthrose	Bestimmte maligne Erkrankungen (Brustkrebs bei postmenopausalen Frauen, Colon-Ca.)
Diabetes, Dyslipoproteinämie (Hypertriglyceridämie, niedriges HDL-Cholesterin)	Syndrom der polyzystischen Ovarien
Hyperurikämie und Gicht*	Eingeschränkte Fruchtbarkeit*
Gallenblasenerkrankungen	Fetale Defekte als Folge mütterlicher Adipositas
KHK, Schlaganfall	Schmerzen im LWS-Bereich*
Insulin-Resistenz*	Hypercholesterinämie
Kurzatmigkeit*	erhöhtes Operations-Risiko*
Schlaf-Apnoe*	
Herzinsuffizienz	
Arterielle Hypertonie	
Endometrium-Carcinom	

Die PROCAM-Studie (Prospective Cardiovascular Münster Study) hat sich umfassend mit der Prävalenz kardiovaskulärer Risikofaktoren in Abhängigkeit vom Körpergewicht befaßt. Diese Studie, deren Teilnehmer ausschließlich Angehörige großer Betriebe waren, wurde in Nordrhein-Westfalen durchgeführt. Die Teilnahmequote betrug jedoch lediglich zwischen 40 und 80%. Die Ergebnisse sind somit nicht repräsentativ. Auffallend war jedoch, daß sowohl bei den Männern als auch bei den Frauen die Prävalenz der wichtigsten kardiovaskulären Risikofaktoren wie Hypertonie, Hyperurikämie, Typ-2-Diabetes mellitus und Dyslipidämie bereits bei Präadipositas ( $25 \leq \text{BMI} < 30$ ) um ein Mehrfaches anstieg. 74% aller Normalgewichtigen ( $20 \leq \text{BMI} < 25$ ) hatten keinen der oben erwähnten kardiovaskulären Risikofaktoren, während nur 38% der Präadipösen ( $25 \leq \text{BMI} < 30$ ) und sogar nur 22% der Adipösen ( $\text{BMI} \geq 30$ ) keine kardiovaskulären Risikofaktoren aufwiesen (Assmann et al., 1994).

In den Nationalen Gesundheitssurveys wurde das Krankheitsrisiko adipöser Personen ( $\text{BMI} \geq 30$ ) mit dem Normalgewichtiger ( $\text{BMI} < 25$ ) verglichen. Im Vergleich zu Normalgewichtigen war das Risiko für adipöse Personen, an Diabetes mellitus bzw. Hyperurikämie zu erkranken, um das 2,25-fache bzw. dreifache höher. 32% der Adipösen litten an Hypertonie. In der Gruppe der Normalgewichtigen waren es 17%. Diese Befragung ergab für Diabetes mellitus, Angina pectoris, Hyperurikämie und Bandscheibenschäden bei altersspezifischer Darstellung eine bei adipösen im Vergleich zu normalgewichtigen Personen um 20 bis 100% höhere Prävalenz (Hoeltz et al., 1990). Hierbei handelt es sich um Prävalenz-Daten. Diese beruhen auf Querschnitterhebungen und werden von Krankheitsinzidenz und -dauer beeinflusst. Inzidenz-Daten dagegen berücksichtigen die Anzahl der Neuerkrankungsfälle pro Beobachtungszeitraum. Studien, die Prävalenz-Daten liefern, erlauben nur eine Schätzung des relativen Risikos, was je nach Datenlage zu einer Unterschätzung führen

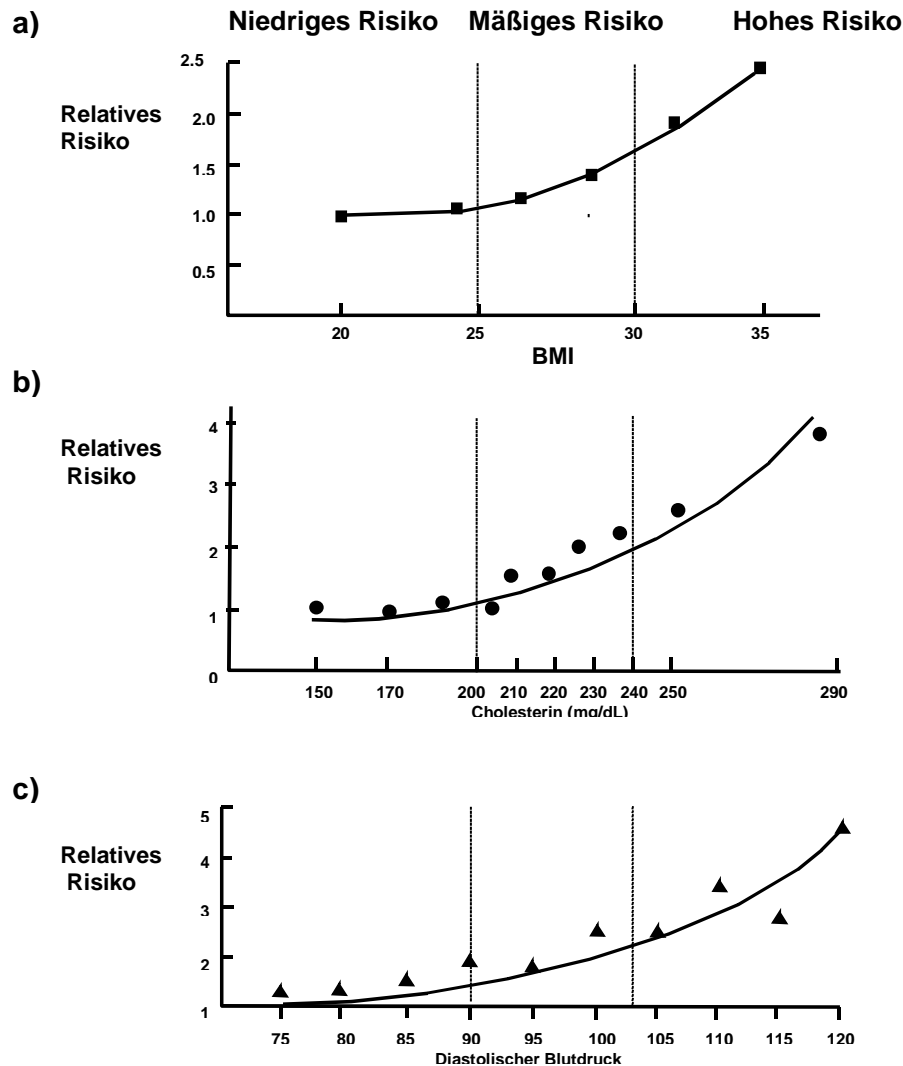
kann. Dies kann die Diskrepanz zwischen deutschen und internationalen Daten erklären. Da prospektive Kohorten-Studien in Deutschland nicht verfügbar sind, sei auf die Daten der Nurses' Health Study, einer sowohl hinsichtlich Anzahl der Studienteilnehmer als auch des Beobachtungszeitraums sehr groß angelegten Studie, verwiesen (Colditz et al., 1990a, b; Manson et al., 1995). Es ist anzunehmen, daß diese Daten im wesentlichen auch auf die Verhältnisse in der Bundesrepublik übertragbar sind. In Untersuchungen mit langer Beobachtungsdauer wie der Framingham-Studie (Hubert et al., 1983) oder in großen Populationsstudien wie der American Cancer Society Study (Lew et al., 1979) und der Nurses' Health Study (Manson et al., 1990) wurde übereinstimmend festgestellt, daß Adipositas per se als unabhängiger Risikofaktor für eine erhöhte kardiovaskuläre Morbidität und Mortalität zu bewerten ist.

## **Mortalität**

Das Statistische Bundesamt weist für das Berichtsjahr 1994 insgesamt 884.661 Todesfälle in Deutschland aus. Fast jeder zweite Todesfall ist auf Krankheiten des Herz-Kreislaufsystems zurückzuführen, also Krankheiten, die mit der Adipositas eng zusammenhängen können (Schneider, 1996). Internationale Langzeitstudien haben eine exponentielle Zunahme der Mortalität nicht nur bei hohem, sondern auch bereits bei sehr niedrigem Gewicht nachgewiesen, was zu einer U- bzw. J-förmigen Beziehung zwischen BMI und relativem Mortalitätsrisiko führte (u.a. Allison et al., 1997; Wirth, 1997). Auch die US Nurses' Health Study (Manson et al., 1995) zeigte bei Betrachtung aller Fälle zunächst einen J-förmigen Kurvenverlauf. Wurden jedoch Raucherinnen und Frauen, die in den ersten 4 Jahren starben, aus der Analyse eliminiert, fand sich eine lineare Beziehung zwischen BMI und relativem Mortalitätsrisiko. Dies bedeutet, daß bereits bei leichtem Übergewicht (BMI 25-26.9) die Mortalität 1,3-fach erhöht war, bei deutlicher Adipositas (BMI > 32) 2,2-fach. Die Beobachtungen der Cancer Society Study (Lew et al., 1979) ergaben, daß die kardiovaskuläre Mortalität bei Personen mit mindestens 20% Übergewicht (entspricht etwa BMI > 30) im Vergleich zu Normalgewichtigen über einen Beobachtungszeitraum von 12 Jahren um das Doppelte erhöht ist. Nach den Ergebnissen verschiedener prospektiver Studien kommt es bei einem BMI zwischen 27 und 32 zu einem signifikanten Anstieg der Mortalität (Troiano et al., 1994; Hauner, 1996).

Als chronische Erkrankung weist die Adipositas eine Reihe von Gemeinsamkeiten mit Hypertonie und Hypercholesterinämie auf. Abbildung 3 zeigt das relative Mortalitätsrisiko in Abhängigkeit vom Schweregrad der Risikofaktoren. In den drei Darstellungen ist ein nahezu identischer Kurvenverlauf zu erkennen. Nach allgemein akzeptierten Grenzwerten werden drei Risikokategorien definiert: Kategorie geringes, mäßiges und hohes Risiko. Die Kategorie „mäßiges Risiko“ läßt erkennen, daß die Erhöhung nur eines Risikofaktors mit einem signifikanten Anstieg des Mortalitätsrisikos einhergeht. Von einem Public Health-Standpunkt aus betrachtet, ist diese Kategorie von beträchtlicher Relevanz, da der Hauptteil der Bevölkerung darunter fällt (Bray, 1996c). Ähnlich wie bei der Hypertonie und Hypercholesterinämie läßt sich auch für das Übergewicht kein Grenzwert definieren. Es ist aber unübersehbar, daß es mit steigendem BMI zum exponentiellen Anstieg des Mortalitätsrisikos kommt. Die Abbildungen basieren auf Daten von Stamler et al. (1986, 1989) (Cholesterin, diastolischer Blutdruck) und auf Daten der „American Cancer Society Study“ (Lew et al., 1979) (BMI).

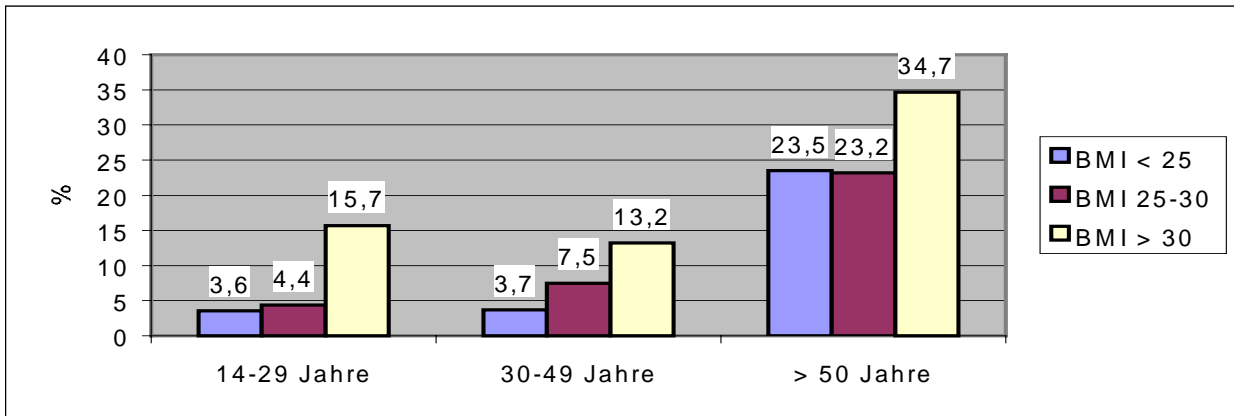
Abb.3: Relatives Mortalitätsrisiko in Abhängigkeit von a) BMI b) Cholesterin und c) diastolischem Blutdruck (Bray et al., 1996c)



### 4.3. Inanspruchnahme medizinischer Leistungen

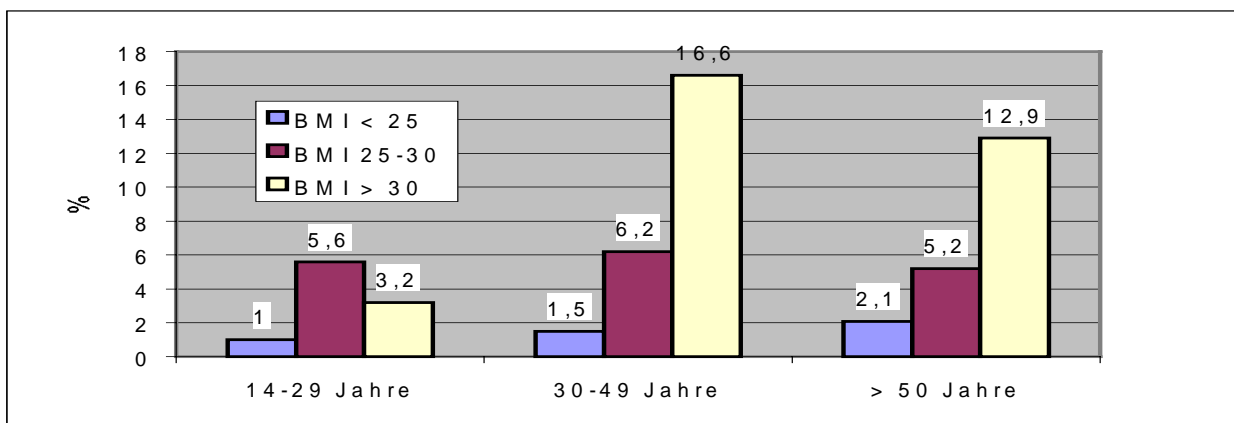
Eine Infratest-Erhebung aus dem Jahre 1994 (Schneider, 1996) zeigte, daß adipöse Patienten den Allgemeinarzt wesentlich häufiger in Anspruch nehmen als normalgewichtige. Bereits in der Altersklasse 14 - 29 Jahre suchten innerhalb der letzten 12 Monate etwa 16 von 100 adipösen Personen (BMI > 30) regelmäßig (d.h. > 7x/Jahr) einen Allgemeinarzt auf. Von den Normalgewichtigen waren es dagegen nur 4 von 100. Insgesamt ergab diese repräsentative Untersuchung einen linearen Trend des Inanspruchnahmeverhaltens in Abhängigkeit von BMI und Alter (Abb.4).

Abb.4: Regelmäßige Inanspruchnahme des Allgemeinarztes (>7mal/Jahr) im Jahr 1994 in Abhängigkeit von BMI und Alter (Infratest-Erhebung 1994, n=5000)



In der gleichen Untersuchung wurde erfaßt, wieviel Frauen - in Abhängigkeit von Alter und BMI - bereits an Gewichtsreduktionsprogrammen teilgenommen bzw. Ernährungsberatungen erhalten hatten. Dabei stellte sich heraus, daß Gewichtsreduktionsprogramme vor allem von adipösen Frauen im Alter von 30 Jahren und darüber genutzt werden (Abb. 5). Für die Inanspruchnahme einer Ernährungsberatung fand sich dagegen kein sicherer Zusammenhang mit dem BMI (Schneider, 1996).

Abb.5: Teilnahme an Gewichtsreduktions-Programmen durch Frauen in Abhängigkeit von BMI und Alter (Infratest-Erhebung 1994, n=2635)



In einer Analyse von Krankenkassendaten einer repräsentativen Stichprobe aller Versicherten der AOK Dortmund aus dem Jahr 1990 war nur bei 6,2% der Untersuchten die Diagnose „Adipositas“ oder „Übergewicht“ auf ärztlichen Abrechnungsscheinen vermerkt. Angesichts der tatsächlichen Prävalenz der Adipositas zeigt dieses Ergebnis, daß die Mehrzahl der Fälle von den niedergelassenen Ärzten nicht wahrgenommen wurde. Die Versicherten mit der Diagnose „Adipositas“ hatten 1990 um ca. 50% mehr Praxiskontakte, medizinische Leistungen und Verordnungen als Kontrollpersonen ohne diese Diagnose. Gleichzeitig hatten die „adipösen“ Versicherten mehr Begleiterkrankungen als die Kontrollgruppe und fehlten häufiger am Arbeitsplatz bzw. wiesen längere Arbeitsunfähigkeitszeiten auf (Hauner et al., 1996).

#### 4.4. Kosten der Adipositas in Deutschland

Die Adipositas verursacht aufgrund ihrer Komorbiditäten hohe Krankheitskosten, die nicht nur die Sozialversicherungsträger, sondern auch die Patienten selbst belasten. Die Adipositas-assoziierten Kosten resultieren dabei zum einen aus der Inanspruchnahme medizinischer Leistungen des ambulanten und stationären Sektors und zum anderen aus krankheitsbedingten Arbeitsausfällen. Hinzu kommen die Ausgaben, die die Patienten selbst tätigen, z.B. für Gewichtsabnahmeprogramme, Diätprodukte oder Schlankheitsmittel.

Die gesundheitspolitische Bedeutung der Adipositas läßt sich anhand einer Krankheitskostenschätzung veranschaulichen. Bei der Kalkulation der Kosten, d.h. dem bewerteten Verbrauch von Ressourcen, sind die folgenden Komponenten zu berücksichtigen:

- direkte Kosten, die in unmittelbarem Zusammenhang mit der Erkrankung stehen. Hierzu zählt zum einen der Verbrauch von Gesundheitsleistungen und -gütern, z.B. Kosten von Prävention, Diagnostik, Therapie und Rehabilitation, zum anderen der Ressourcenverbrauch im privaten Sektor, z.B. für Fahrten zu Gesundheitseinrichtungen, spezielle Kostformen und eigenfinanzierte Therapien.
- indirekte Kosten, bedingt durch den Ressourcenverlust infolge von Arbeitsunfähigkeit, vorzeitiger Berentung oder vorzeitigem Tod. Es entstehen Kosten, da weniger Güter und Dienstleistungen produziert werden können. Zu erfassen sind hierbei auch: geringere berufliche Aufstiegschancen oder der Zeitaufwand der Angehörigen für die Versorgung des erkrankten Angehörigen.
- intangible Kosten, die durch die psychosozialen Auswirkungen der Erkrankung, wie z.B. Schmerz, verminderte Lebensqualität, soziale Abhängigkeit, verursacht werden. Diese betreffen sowohl den Patienten selbst als auch dessen Angehörige.

In den bislang durchgeführten internationalen Krankheitskosten-Studien wurden die direkten Behandlungskosten und die indirekten Kosten unvollständig, intangible Kosten nicht berücksichtigt. Es ist somit von einer systematischen Unterschätzung der adipositasbedingten Kosten auszugehen. Eine detaillierte Darstellung der ökonomischen Aspekte der Adipositas in Deutschland inklusive der Methodik von Krankheitskostenstudien, z.B. Prävalenz- versus Inzidenzansatz oder Bewertung indirekter Kosten, sowie eine Übersicht über die internationalen Studien sind dem Anhang zu entnehmen („Ökonomische Aspekte der Adipositas in Deutschland“).

Für Deutschland existiert bislang nur eine Veröffentlichung zu den Krankheitskosten der Adipositas (Schneider, 1996), die jedoch nur eingeschränkt aussagefähig ist. Die gesundheitsökonomische Bedeutung der Adipositas wird hier unterschätzt, da zum einen nicht alle Komorbiditäten der Adipositas erfaßt worden sind und zum anderen einige Kostenkomponenten nicht berücksichtigt werden konnten. Da für Ostdeutschland keine Daten vorlagen, wurde eine Extrapolation der westdeutschen Kostenschätzung vorgenommen.

Aufgrund der mangelhaften Datenlage zu den Prävalenzen der Begleit- und Folgeerkrankungen und den attributablen Risiken wurden von Schneider et al. die Kosten auf der Basis zweier Modellvarianten geschätzt. Im Modell I wurde eine vorsichtige Schätzung der relativen und attributablen Risiken zugrunde gelegt, das Modell II basierte hingegen auf aus der Literatur bekannten höheren Angaben. Die aus den beiden Modellvarianten resultierenden Kostenschätzungen sind, bezogen auf das Jahr

1990, in der Tabelle 5 dargestellt. Eine ausführliche Erläuterung dazu findet sich im Anhang.

Tab.5: Adipositas-bezogene Kosten in Deutschland - unter Berücksichtigung der wichtigsten Komorbiditäten (Schneider, 1996)

Modell	I		II	
	a	b	a	b
Variante				
Adipositasprävalenz	12%	18%	12%	18%
Attributables Risiko				
Koronare Herzkrankheit	70%		70%	
Hypertonie	66%		77%	
Diabetes mellitus	66%		94%	
Gallenerkrankungen	50%		90%	
Gicht	60%		60%	
Fettstoffwechselstörungen	33%		33%	
Prostatakarzinom	0%		90%	
Brustkrebs	17%		23%	
Endometriumkarzinom	0%		30%	
Dickdarmkrebs	23%		23%	
Alte Bundesländer				
Kosten (in Mio. DM)				
direkte Kosten	4.143	5.533	6.101	7.691
indirekte Kosten	4.490	5.989	5.713	7.338
gesamt infolge Adipositas	8.633	11.523	11.814	15.030
Anteil an Gesamtkosten	3,1%	4,2%	4,3%	5,5%
Neue Bundesländer				
Kosten (in Mio. DM)				
direkte Kosten	1.206	1.611	1.776	2.239
indirekte Kosten	1.261	1.682	1.609	2.066
gesamt infolge Adipositas	2.467	3.293	3.385	4.305
Anteil an ernährungsabhängigen Gesamtkosten	5,9%	7,9%	8,2%	10,4%

Die Ergebnisse dieser Schätzung stimmen relativ gut mit internationalen Krankheitskostenstudien zur Adipositas überein (siehe Anhang), in denen ein Anteil der Adipositas-bezogenen Kosten an den gesamten Gesundheitsausgaben zwischen 2% und 6% ermittelt wurde.

## 5. Ursachen der Adipositas

Übergewicht ist die Folge einer langfristig positiven Energiebilanz. Meist interagieren mehrere Faktoren miteinander und tragen so zur positiven Energiebilanz bei. Eine Nahrungsaufnahme, die den Verbrauch nur um 2% für längere Zeit übersteigt, kann zu einer erheblichen und progressiven Gewichtszunahme führen. So kann eine moderate, aber kontinuierliche Akkumulation von 190 kcal wöchentlich über einen Zeitraum von 10 Jahren zu einer Gewichtszunahme von 14,5 kg führen bis der zusätzliche metabolische und physikalische Energieaufwand auf diesem Gewichtsniveau die erhöhte Zufuhr ausgleicht. Somit stabilisiert sich das Gewicht erneut, jedoch auf ei-

nem höheren Niveau (Diaz et al., 1992). Ein Übergewicht von 10 kg bedeutet, daß ca. 70.000 kcal zusätzlich gespeichert sind (Leibel et al., 1995).

Nach einer Gewichtszunahme ist ein spontaner Gewichtsverlust ohne zugrundeliegende Krankheit unterhalb eines Alters von 65 Jahren ungewöhnlich. Der Organismus scheint sich gegen eine Gewichtsabnahme zu wehren. Dies wurde in Studien an adipösen Patienten nachgewiesen: Der Energieverbrauch sinkt bei Patienten während Diäten mit ausgeprägtem kalorischen Defizit erheblich (Leibel et al., 1995; Weigle et al., 1988). Nach Beendigung der Fastenperiode wird schon bei normokalorischer Ernährung eine Gewichtszunahme beobachtet (Porikos et al., 1982). Diese Veränderungen verdeutlichen die Schwierigkeiten einer erfolgreichen Gewichtsabnahme selbst bei hochmotivierten Patienten. Um das erreichte Niveau nach Gewichtsabnahme von 10% aufrecht zu erhalten, ist eine dauerhafte Minusbilanz der Kalorienaufnahme von 15% erforderlich, d.h. eine ursprüngliche Gesamtkalorienzahl von beispielsweise 2500 kcal muß um 375 kcal/Tag verringert werden (Leibel et al., 1995). Die wichtigsten Ursachen der Adipositas werden im folgenden näher beschrieben.

### **5.1. Familiäre Disposition und genetische Ursachen**

Inzwischen ist aus Zwillingsexperimenten, Adoptionsstudien und Familienuntersuchungen gut belegt, daß genetische Faktoren für eine Gewichtszunahme mitverantwortlich sind. Schätzungen über den genetischen Anteil am Gewichtsverhalten schwanken zwischen 25% und 70% (Bouchard, 1990; Sorensen, 1995a). Die genetische Prädisposition zur bevorzugten intraabdominellen Fettansammlung liegt bei > 60%. Es muß berücksichtigt werden, daß sowohl Alkohol, Rauchen und körperliche Inaktivität per se ein abdominelles Fettverteilungsmuster begünstigen (SIGN, 1996).

### **5.2. Ernährung, Bewegung und Psychosoziale Faktoren**

- Soziokulturell bedingte Verhaltensänderungen
- Veränderungen der Nährstoffzusammensetzung mit zu hohem Fettanteil: Fett erhöht den Energiegehalt der Nahrung wesentlich. Fette haben ein geringeres Sättigungspotential als Kohlenhydrate (Blundell, 1993). Zudem steigert Fettaufnahme im Gegensatz zu Proteinen oder Kohlenhydraten die Thermogenese nur minimal (Lawton et al., 1993). Infolge des Nahrungsmittelübergebots in den Industrienationen wurden Lebensmittel billiger (vor allem fetthaltige wie z.B. Sahne, Schweinefleisch), leichter verfügbar und begünstigen damit eine überkalorische Ernährung mit konsekutiver Gewichtszunahme („Wohlstands-Syndrom“). Ähnliche Beobachtungen wurden auch bei Naturvölkern und Populationen in Entwicklungsländern gemacht, die innerhalb kurzer Zeit Lebensstil und Ernährung geändert haben (Popkin et al., 1995a; Carter et al., 1989; McKeigue, 1991).
- Veränderungen der Eßgewohnheiten (z.B. „Fast-Food“ und der Verlust regelmäßiger gemeinsamer Mahlzeiten) werden zu den Ursachen der Adipositas gezählt (Jeffrey und French, 1998; Braddon et al., 1986).
- Veränderung der Trinkgewohnheiten: erhöhter Alkoholkonsum fördert aufgrund des hohen Brennwertes die Gewichtszunahme (SIGN, 1996). Zusätzlicher Konsum energiereicher Getränke verschärft das Problem der Gewichtszunahme.
- Bewegungsmangel ist ein wesentlicher Faktor für die Entwicklung von Übergewicht. Inaktive 65-jährige Menschen verbrauchen im Vergleich zu jungen, sportlich aktiven Menschen durchschnittlich 700 kcal/d weniger. Sie passen jedoch in

der Regel die Ernährung ihrer reduzierten körperlichen Aktivität nicht ausreichend an. Die Kalorienbilanz wird daher positiv (James et al., 1989).

- Abnehmende körperliche Fitness (z.B. bei Krankheit oder nach einer Sportverletzung), Umfeldveränderungen (z.B. Berufswechsel oder Heirat) und verändertes Freizeitverhalten (Fernsehen) begünstigen in unterschiedlichem Ausmaß die Entwicklung der Adipositas.
- Streß wird häufig als wichtiger Faktoren angeführt, der zur Gewichtszunahme beitragen kann. Systematische Analysen sehen diese Annahme eher kritisch (Sarlio-Lähteenkorva et al., 1995).

### 5.3. Sonstige Ursachen

In seltenen Fällen führen folgende Ursachen zur Adipositas:

- Endokrine Ursachen wie z.B. Schilddrüsenunterfunktion, Klinefelter-Syndrom oder Morbus Cushing sind sehr seltene Ursachen einer Gewichtszunahme, ebenso einige chromosomale Störungen (z.B. Prader-Willi Syndrom) und hypothalamische Tumoren.
- Medikamentöse Behandlung z.B. mit trizyklischen Antidepressiva, Insulin und Sulfonylharnstoffen, hormonellen Kontrazeptiva, Kortikosteroiden, Valproat.
- Aufgabe des Rauchens führt zum Absinken des Grundumsatzes und zur vermehrten Nahrungsaufnahme und damit häufig zum Gewichtsanstieg (Hofstetter et al, 1986).
- Immobilisierung (z.B. Unfallverletzungen oder Arthrosen) kann das Gewicht über eine Reduktion der körperlichen Aktivität erhöhen.
- Starke Gewichtszunahme in der Schwangerschaft führt häufig zu einer bleibenden Gewichtserhöhung nach der Entbindung. Dieses Phänomen kann bei jeder Schwangerschaft erneut auftreten. Die Ursachen der Gewichtszunahme in der Schwangerschaft sind komplex und noch nicht ausreichend geklärt (Ohlin et al., 1990; Williamson et al., 1994).
- Sozioökonomische Faktoren: In den westlichen Industrienationen geht ein niedriger sozioökonomischer Status mit einer erhöhten Prävalenz der Adipositas einher (Stunkard et al., 1993; Sobal and Stunkard, 1989, Evidenzklasse IV). Auch für Deutschland lassen Resultate der Deutschen Herz-Kreislauf-Präventionsstudie (DHP) die Schlußfolgerung zu, daß verhaltensbezogene Risikofaktoren wie Zigarettenrauchen und Übergewicht deutlich sozialschichtabhängig sind (Helmert et al., 1988).
- Mentale Erkrankungen werden als Faktoren angeführt, die zur Gewichtszunahme beitragen können. Systematische Analysen sehen diese Annahme ebenfalls eher kritisch (Sarlio-Lähteenkorva et al., 1995).
- Binge-eating-disorders, d. h. Eßanfälle mit heimlichem und nächtlichem Essen treten häufig bei adipösen Erwachsenen auf. Eßanfälle können durch ungeeignete Abmagerungsmaßnahmen und durch rigide Eßkontrolle ausgelöst bzw. verstärkt werden und können eine weitere Gewichtszunahme fördern (Loro et al., 1981).

## 6. Komorbiditäten und Komplikationen der Adipositas



Eine Vielzahl von Erkrankungen kommt bei Adipositas gehäuft vor (Hauner, 1996; Berrios et al., 1997). Adipositas-assoziierte Folgeerkrankungen korrelieren mit dem Ausmaß des Körpergewichts, der Dauer des Übergewichts und dem Fettverteilungsmuster (Bray, 1996c). In Tabelle 4 sind die relativen Risiken von Adipösen im Vergleich zu normalgewichtigen Personen für die nachfolgend genannten Adipositas-assoziierten Gesundheitsstörungen aufgeführt.

## **6.1. Das Metabolische Syndrom**

Das klinische Vollbild des Metabolischen Syndroms ist durch ein Bündel gemeinsam auftretender Gefäßrisikofaktoren charakterisiert. Diese sind Übergewicht mit abdomineller Fettverteilung, pathologische Glucosetoleranz und Insulinresistenz, Hypertonie, Dyslipoproteinämie mit erniedrigtem HDL-Cholesterin und Hypertriglyceridämie, sowie Gicht. Damit ist wahrscheinlich eine erhöhte Inzidenz von arteriosklerotischen Gefäßerkrankungen verbunden. Der Begriff des Metabolischen Syndroms wurde in Deutschland erstmals von der Düsseldorfer Arbeitsgruppe um K. Jahnke (1969), später von M. Hanefeld und Mitarbeitern in Dresden verwendet. Weitere Bezeichnungen dafür sind: Syndrom X (Reaven, 1988), Wohlstandssyndrom (Mehnert, 1968), Deadly Quartet (Kaplan, 1989), Insulinresistenz-Syndrom (De Fronzo, 1991). In Deutschland hat sich der Begriff „Metabolisches Syndrom“ durchgesetzt.

Allen Einzelkomponenten des Metabolischen Syndroms, mit Ausnahme der Hyperurikämie, ist eine Insulinresistenz der Muskulatur gemeinsam, die kompensatorisch zur chronischen Hyperinsulinämie führt. Verhaltensbedingte Faktoren für die Entstehung des Metabolischen Syndroms sind in erster Linie Fehlernährung und Bewegungsmangel. Übergewicht, speziell die abdominelle Adipositasform, wird bei entsprechender genetischer Disposition als pathogenetischer Promotor für die Manifestation des Metabolischen Syndroms angesehen. Die intraabdominelle Fettmasse spielt in der Genese der Insulinresistenz eine zentrale Rolle. Da mit zunehmender Adipositas auch die intrabdominellen Fettdepots wachsen, wird bei der morbidem Adipositas sehr häufig eine Insulinresistenz beobachtet. Jede einzelne Facette des Metabolischen Syndroms gilt als kardiovaskulärer Risikofaktor; liegen mehrere Komponenten gleichzeitig vor, potenziert sich das kardiovaskuläre Risiko (Hauner, 1997; Wirth, 1997).

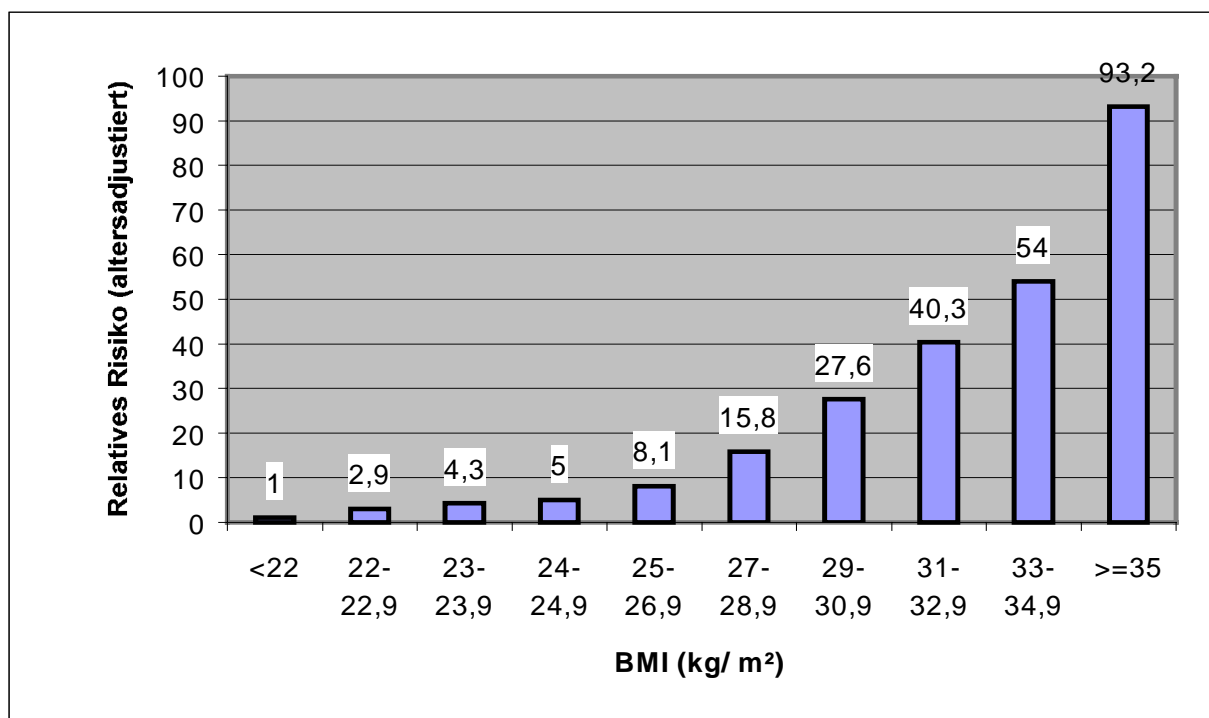
### **6.1.1. Arterielle Hypertonie**

Der epidemiologische Zusammenhang zwischen Adipositas und Hypertonie ist vielfach dokumentiert: sowohl der systolische als auch der diastolische Blutdruck steigen mit zunehmendem BMI. Adipöse Patienten haben ein größeres Hypertonierisiko als schlanke Personen (Stamler et al., 1978; Stamler et al., 1989). Die Prävalenz der Hypertonie liegt bei adipösen Personen um den Faktor 2,9 höher als bei normgewichtigen (van Itallie, 1985). Das Risiko, eine Hypertonie zu entwickeln, ist bei übergewichtigen 20-44-jährigen 5,6-fach höher als bei Schlanken gleichen Alters. Das Hypertonierisiko ist selbst bei adipösen 45-74-jährigen immer noch doppelt so hoch wie bei schlanken Personen dieser Altersgruppe (Pi-Sunyer, 1991). Die Nurses' Health Study zeigte darüber hinaus, daß eine Gewichtszunahme das Hypertonierisiko erhöht (Huang et al., 1998).

### 6.1.2. Typ-2-Diabetes mellitus (NIDDM)

Der Zusammenhang zwischen Adipositas und der Entwicklung eines Typ-2-Diabetes ist durch zahlreiche Studien belegt. Bei jedem zweiten Mann und jeder dritten Frau über 50 Jahre entwickelt sich, falls eine Adipositas besteht, im Laufe des Lebens ein Typ-2-Diabetes (u.a. Wirth, 1997). Circa 80% aller Typ-2-Diabetiker sind adipös. Der Zusammenhang zwischen Körpergewicht und Diabetes-Risiko wurde zuletzt in der Nurses` Health Study eindrucksvoll dokumentiert (Colditz et al., 1990a, 1995). Im Vergleich zu einer schlanken Referenzgruppe mit BMI < 22 kg/m<sup>2</sup> zeigte sich bereits im höheren Normalgewichtsbereich ein Anstieg der Diabetesinzidenz (Abb. 6).

Abb.6: Relatives Risiko für Typ-2-Diabetes mellitus in Abhängigkeit vom BMI bei 30-55-jährigen U.S.-amerikanischen Frauen im Beobachtungszeitraum 1976-1990 (Colditz et al., 1995).



Das erhöhte Erkrankungsrisiko korreliert auch positiv mit der Dauer der Adipositas. Diese Aussagen treffen ausschließlich für den Typ-2- und nicht für den Typ-1-Diabetes zu. Die Entwicklung des Typ-2-Diabetes wird vor allem von der stammbetonten Adipositasform gefördert (Ohlson et al., 1985).

### 6.1.3. Dyslipidämie

Bei der Adipositas sind vorwiegend die Triglyceride erhöht und das HDL-Cholesterin erniedrigt. Hinter dieser Konstellation verbirgt sich ein potenter atherogener Risikofaktor. Bei vermehrter intraabdomineller Fettmasse ist die Beziehung zwischen Triglyceriderhöhung und HDL-Cholesterinerniedrigung ausgeprägter (Despres, 1991). Je stammbetonter die Fettverteilung ist, desto niedriger ist das HDL<sub>2</sub>-

Cholesterin, eine HDL-Fraktion mit besonders antiatherogener Wirkung (Ostlund et al., 1990).

#### **6.1.4. Hyperurikämie**

Eine weitere Adipositas-assoziierte Stoffwechselstörung ist die Hyperurikämie, die für das Auftreten einer Gicht prädisponiert. Die Inzidenz der Gicht ist bei Adipösen generell deutlich erhöht. Ein stammbetontes Fettverteilungsmuster erhöht besonders bei Frauen das Risiko, an Gicht zu erkranken (Felson et al., 1992; Davis et al., 1990a, b; Roubenoff et al., 1991).

#### **6.1.5. Störungen der Gerinnung und Fibrinolyse**

Verschiedene Studien befaßten sich mit der Beziehung zwischen abdomineller Adipositas bzw. Metabolischem Syndrom einerseits und hämorheologischen Parametern andererseits. Dabei fand sich eine Assoziation zwischen abdomineller Adipositas bzw. Insulinresistenz und einer erhöhten Blutviskosität, einem weiteren kardiovaskulären Risikofaktor (Ernst et al., 1987; Meade et al., 1993; Department of Health, 1994b). Besonders für die Koagulationsfaktoren VII und X, die eine Thrombusbildung fördern (Meade et al., 1987) und damit eine Erhöhung des Infarkttrisikos zur Folge haben (Böttiger, 1982), wurde eine direkte positive Beziehung zur Höhe des BMI nachgewiesen (Ernst et al., 1987).

Desweiteren wurden bei stammbetonter Adipositas eine gestörte fibrinolytische Aktivität sowie erhöhte Fibrinogenkonzentrationen beobachtet (Landin et al., 1990; Juhán-Vague et al., 1991). Diese Befunde sind deshalb klinisch relevant, da bei Patienten mit koronarer Herzkrankheit sowohl erhöhte Spiegel von Plasminogenaktivator-Inhibitor 1 (PAI-1) als auch von Fibrinogen gefunden wurden und beide Parameter als primäre Risikofaktoren für den Myokardinfarkt gelten (Hamsten et al., 1985; Wilhelmsen et al., 1984a, b). Störungen des fibrinolytischen Systems werden daher ebenfalls zu den Komponenten des Metabolischen Syndroms gezählt (Reaven, 1993).

### **6.2. Kardiovaskuläre Erkrankungen**

Die kardiovaskulären Erkrankungen umfassen die koronare Herzkrankheit (KHK), zerebrovaskuläre Erkrankungen und die periphere arterielle Verschlusskrankheit (pAVK). KHK und Schlaganfall sind für einen großen Teil der Todesfälle in den Industrienationen verantwortlich. Die Adipositas prädisponiert nicht nur für eine Reihe von kardiovaskulären Risikofaktoren, sondern ist darüber hinaus selbst ein wichtiger, unabhängiger Risikofaktor für die KHK-Morbidität und -Mortalität (Hubert et al., 1983; Willett et al., 1991).

Die Framingham-Studie benennt das Körpergewicht als drittwichtigsten Prädiktor für KHK nach dem Alter und der Dyslipidämie. In ähnlicher Weise wurde in der Nurses' Health Study eine positive Korrelation zwischen BMI und KHK-Risiko beobachtet. Gewichtszunahme erhöhte dieses Risiko (Manson et al., 1995). Diese Daten stimmen mit Studienergebnissen aus anderen Ländern gut überein (Jousilahti et al., 1996). Aufgrund der Ergebnisse großer prospektiver Studien kann man davon ausgehen, daß das Ausmaß des Übergewichts mit der Inzidenz der KHK positiv korreliert (Kannel et al., 1996).

Das KHK-Risiko bei Adipositas ist bei Jüngeren und bei Personen mit abdomineller Fettverteilung größer als bei Älteren und bei Personen mit gynoider Fettverteilung (Han et al., 1995a, b). Darüber hinaus hat sich gezeigt, daß das Mortalitätsrisiko der KHK schon bei einem Übergewicht von nur 10% ansteigt (Willett et al., 1995). Zum Zusammenhang von Adipositas und Schlaganfall gibt es nur wenige Daten. In einer Studie an 1163 nichtrauchenden Männern im Alter zwischen 55 und 68 Jahren wurde gefunden, daß ein erhöhter BMI mit einem erhöhten Schlaganfallrisiko einhergeht (Abbot et al., 1994). In der Nurses' Health Study waren Adipositas und Gewichtszunahme im 16-jährigen Beobachtungszeitraum unabhängige Risikofaktoren für das Auftreten ischämischer Schlaganfälle, nicht dagegen hämorrhagischer Schlaganfälle (Rexrode et al., 1997). Zusätzlich wird angenommen, daß sich eine lebenslang bestehende Adipositas stärker auf das Schlaganfallrisiko auswirkt als ein erst im mittleren Lebensalter auftretendes Übergewicht (Shaper, 1996). Nach den Ergebnissen zweier prospektiver Studien aus Göteborg könnte allerdings das Fettverteilungsmuster für das Auftreten von Schlaganfällen bedeutsamer sein als der BMI (Larsson et al., 1984; Lapidus et al., 1984).

### **6.3. Gelenkbeschwerden**

Adipöse Personen konsultieren den Hausarzt häufig wegen Probleme, die ihre subjektive Lebensqualität einschränken. Diese sind oft „mechanischer Art“. Adipositas bedingt eine erhebliche Mehrbelastung der Gelenke und des Achsenskelettes und kann Gonarthrosen und Lumboischalgien begünstigen bzw. verstärken (Davis et al. 1990a, b; Wirth, 1997).

### **6.4. Karzinome**

Verschiedene Studien fanden einen positiven Zusammenhang zwischen Adipositas und Karzinomrisiko. Eine prospektive Studie (American Cancer Society, Lew und Garfinkel, 1979) verfolgte 750.000 Männer und Frauen 12 Jahre lang und erbrachte, daß das relative Risiko, an bösartigen Erkrankungen zu sterben, bei adipösen Frauen um 55% und bei adipösen Männern um 33% erhöht ist. Bei adipösen Frauen war insbesondere das Risiko für bösartige Erkrankungen des Endometriums, der Zervix, der Ovarien und für postmenopausalen Brustkrebs, bei adipösen Männern das Risiko für Prostata- und kolorektale Karzinome erhöht. Eine erhöhte Karzinominzidenz wurde vor allem bei Adipösen mit erhöhter WHR beobachtet und wird als direkte Folge der assoziierten hormonellen Veränderungen gesehen. Manson et al. (1995) berichteten kürzlich über eine Verdoppelung der Karzinommortalität bei adipösen Frauen. Ungeklärt ist bislang, inwieweit das gehäufte Auftreten von kolorektalen Karzinomen und Mammakarzinom auf die fettreiche, ballaststoffarme Ernährung adipöser Menschen oder auf die Adipositas per se zurückzuführen ist. Zu dieser Frage sind weitere Studien dringend erforderlich.

### **6.5. Hormonelle Störungen**

Neuere Untersuchungen weisen darauf hin, daß Adipozyten gleichzeitig endokrin aktive Zellen sind, die viele lokal und an anderen Organen wirksame Hormone produzieren und selbst Zielzellen für viele Hormone sind (Löffler, 1997). Speziell bei adipösen Patienten mit zentralem Fettverteilungsmuster wurden veränderte Hormonspiegel beobachtet (Kissebah et al., 1989; Seidell et al., 1990). Häufige hormonelle Störungen bei der Adipositas sind in Tabelle 6 aufgeführt.

Tab.6: Häufige hormonale Störungen bei Adipositas mit zentralem Fettverteilungsmuster (Seidell et al., 1990; Kirschner et al., 1982; Galvao-Teles et al., 1976)

- Insulinresistenz
- erhöhte Kortison-Produktion, besonders unter Streßbedingungen
- erhöhtes freies Testosteron bei erniedrigtem Geschlechtshormonbindenden Globulin (SHBG) bei Frauen
- erniedrigte Progesteron-Spiegel bei Frauen
- erniedrigte Testosteron-Spiegel bei Männern

In der Reproduktionsendokrinologie wurden vor allem bei androïdem Fettverteilungsmuster positive Korrelationen zwischen übermäßigem Körperfett und einer ovariellen Dysfunktion, insbesondere einer Hyperandrogenämie, beschrieben (Kirschner et al., 1982). Das Syndrom der polyzystischen Ovarien, die häufigste endokrine Ursache von Fertilitätsstörungen, ist häufig mit einer abdominellen Adipositas assoziiert (Dunaif, 1992). Die hormonellen Störungen und Zyklusunregelmäßigkeiten adipöser Frauen mit polyzystischen Ovarien werden durch Gewichtszunahme verschlechtert und durch Gewichtsabnahme zumindest teilweise gebessert (Kiddy et al., 1992).

## 6.6. Pulmonale Komplikationen

Adipositas kann die pulmonale Funktion einschränken. Dabei kann es zu Folgen wie Ruhe- und Belastungs-Dyspnoe, Hypoventilations- oder Schlafapnoe-Syndrom kommen (Tucker und Siecker, 1960; Holley et al., 1967; Don et al., 1971; Vgontzas et al., 1994). Das Schlafapnoe-Syndrom geht häufig mit Störungen wie arterieller Hypoxämie, Sympathikusaktivierung, pulmonaler und systemischer Hypertonie sowie Herzrhythmusstörungen einher und ist mit einer erhöhten kardiovaskulären Morbidität assoziiert. Bei übergewichtigen Kindern und Jugendlichen wurde kürzlich eine erhöhte Prävalenz des Asthma bronchiale beobachtet (Luder et al., 1998).

## 6.7. Erkrankungen der Gallenblase

Inzidenz und Prävalenz von Gallenblasenerkrankungen steigen mit zunehmendem Gewicht, vor allem bei Frauen. Gallensteine kommen bei Adipösen 3-4 mal häufiger vor als bei Normalgewichtigen. Da eine Cholecystolithiasis die Neigung der Gallenblase zu Entzündungen verstärkt, sind akute und chronische Cholezystitiden bei Übergewichtigen häufiger. Nach der Nurses' Health Study erhöht selbst geringes Übergewicht das Risiko für Cholezystitiden signifikant (Maclure et al., 1989).

## 6.8. Psychosoziale Konsequenzen

### 6.8.1. Vorurteile und Diskriminierung

Adipöse werden in westlich orientierten Ländern meist negativ beurteilt. Dieses negative „Image“ bezieht sich nicht nur auf das Aussehen, sondern auch auf die Einschätzung der charakterlichen Eigenschaften übergewichtiger Menschen. Bereits sechsjährige Kinder assoziieren mit der Silhouette eines dickleibigen Kindes Adjektive wie „faul, dreckig, dumm und unansehnlich“ (Staffieri, 1967). Adipöse Patienten erleben häufiger Diskriminierungen und Vorurteile. Die Auswertung großer Studien

ergab, daß Adipöse im Vergleich zu Schlanken die Schule kürzer besuchen, wesentlich seltener in Eliteschulen akzeptiert werden und seltener in attraktive berufliche Stellungen aufsteigen. Darüber hinaus verdienen junge übergewichtige Frauen in England und den USA deutlich weniger als gesunde schlanke Frauen oder solche mit chronischen Gesundheitsproblemen (Gortmaker et al., 1993). Vorbehalte der medizinischen Berufe (Ärzte, Krankenschwestern, Diätberater und Medizinstudenten) gegenüber Adipösen sind von besonderer Bedeutung (DeJong et al., 1986). Viele Ärzte erwarten bei Adipösen eine mangelnde Compliance. Für übergewichtige Patienten ist die Wahrscheinlichkeit, einen Lipidsenker verordnet zu bekommen, wesentlich niedriger als für normgewichtige Patienten, z.B. Raucher (Evans et al., 1995).

### **6.8.2. Unzufriedenheit mit dem äußeren Erscheinungsbild**

Ein Großteil der adipösen Personen empfindet selbst sein körperliches Erscheinungsbild als unattraktiv und befürchtet Vorurteile und Benachteiligungen. Diese Personen sind oft vollkommen auf ihr Übergewicht fixiert und leiden unter Minderwertigkeitsgefühlen. Diese Störung ist häufig bei jungen Frauen in mittleren und höheren sozioökonomischen Schichten zu beobachten sowie bei Personen, die seit der Kindheit übergewichtig sind.

### **6.8.3. Depressive Störungen**

Adipositas ist mit depressiven Störungen assoziiert. Dies wurde in Studien deutlich, die die Lebensqualität adipöser Patienten vor und nach einer Gewichtsabnahme erfaßten. Nach chirurgischer Adipositas-Therapie wurden z.B. in der schwedischen SOS-Studie signifikante Verbesserungen bei adipösen Patienten mit reaktiven depressiven Störungen beschrieben. Fünf Jahre nach Gewichtsabnahme war dieser positive Effekt immer noch feststellbar (Karlsson et al., 1998).

In einer Studie von Ross (1994) wurde der Zusammenhang zwischen Adipositas und depressiven Störungen detailliert untersucht. Es wurde beobachtet, daß Übergewicht depressives Verhalten hervorrufen kann, und daß dieser Effekt besonders ausgeprägt ist bei Adipösen aus gehobenen sozialen Schichten, mit höherem Bildungsniveau und Einkommen, bei Frauen, Weißen und jüngeren Menschen, also sozialen Gruppen, in denen der Anteil Adipöser geringer ist und die Anpassung an Norm- bzw. Idealvorstellungen stärker verbreitet ist. Die Interpretation der Ergebnisse mehrerer Studien zeigt, daß Adipositas per se nicht gehäuft mit depressiven Störungen assoziiert ist. Abnormes Diätverhalten und Gesundheitsstörungen - zwei Faktoren, die unabhängig von Adipositas mit Depressionen assoziiert sind und gleichzeitig häufiger bei Adipösen auftreten - können reaktive depressive Störungen auslösen (Ross, 1994).

### **6.8.4. Eßstörungen**

Die Eßstörung Bulimia nervosa ist gekennzeichnet durch wiederholtes Auftreten von Eßepisoden (Eßanfall oder Heißhungerattacke), Verlust der Kontrolle während des Eßanfalls und unangemessenes Kompensationsverhalten, um einen Gewichtsanstieg zu vermeiden. Dazu dienen selbst herbeigeführtes Erbrechen, Mißbrauch von Abführmitteln, Diuretika, Einläufen oder anderen Medikamenten, Fasten oder exzes-

siver Sport. (American Psychiatric Association, 1994, zitiert nach Westenhöfer, 1996a, b). Das Gewicht der Patienten mit Bulimia nervosa (zu 90 bis 95% sind Frauen betroffen) liegt häufig im Normbereich. Jedoch weist die Gewichtsanamnese dieser Patienten deutliche Gewichtsschwankungen infolge von unangemessenem Diät- und Kompensationsverhalten auf (Paul et al., 1984).

Die Binge Eating Disorder (BED) ist die häufigste Eßstörung überhaupt und kommt bei bis zu 30% der Übergewichtigen vor, die an Gewichtsreduktionsprogrammen teilnehmen. Diese Eßstörung ist ebenfalls durch erhebliche Gewichtsschwankungen gekennzeichnet. Die Eßanfälle bei der BED unterscheiden sich von denen bei der Bulimia nervosa im wesentlichen durch folgende Merkmale:

Die Nahrung wird alleine, schneller und in größeren Mengen verzehrt als normalerweise. Es entsteht ein Völlegefühl mit anschließendem Selbstwertverlust und Schuldbewußtsein. Die Eßanfälle sind nicht mit der regelmäßigen Anwendung von unangemessenem Kompensationsverhalten (abführende Maßnahmen, Fasten oder exzessiver Sport) verbunden und treten nicht im Verlauf einer Anorexia nervosa oder Bulimia nervosa auf (American Psychiatric Association, 1994, zitiert nach Westenhöfer, 1996a, b).

Das „Nacht-Eßsyndrom“ ist definiert durch die Aufnahme von mindestens 25% - nach manchen Autoren sogar von mindestens 50% - der täglichen Energiezufuhr nach dem Abendessen. Dieses Phänomen scheint im Zusammenhang mit Schlafstörungen zu stehen, wie z.B. der Schlafapnoe. Als Ursachen werden eine veränderte zirkadiane Rhythmik mit gestörter Nahrungsaufnahme und Schlafdefizit-induzierten Stimmungsschwankungen diskutiert (Winkelman, 1998).

## **6.9. Körperliche Beschwerden und Symptome**

Verschiedene Studien zeigen darüber hinaus, daß viel Menschen mit einem BMI  $\geq$  30 an zahlreichen lästigen Beschwerden leiden, die sich auf das erhöhte Körpergewicht zurückführen lassen. Dazu zählen Belastungsdyspnoe, rasche Ermüdbarkeit bei körperlicher Belastung, starkes Schwitzen und eingeschränkte körperliche Beweglichkeit (Seidell et al., 1986).

## **7. Gewichtsabnahme und ihre Auswirkungen**

Die Empfehlung für eine Gewichtsabnahme ist immer individuell und differenziert abzuwägen. Daher ist die Kenntnis wichtig, welche Vor- und Nachteile eine Gewichtsreduzierung mit sich bringen kann. Dies wird im Folgenden dargelegt. Eine gesonderte Betrachtung erfordert die Gewichtsabnahme in der Gravidität.

### **7.1. Vorteile**

Der Effekt einer moderaten Gewichtssenkung über einen längeren, zumindest mehrmonatigen Zeitraum äußert sich in der Verbesserung der Komorbiditäten. Günstige Wirkungen finden sich bei allen metabolisch-endokrinologischen Parametern, für die Herz-Kreislauffunktionen, aber auch im psychosozialen Bereich. Ferner gibt es Hinweise, daß auch die bei Adipositas erhöhte Mortalität abnimmt.

SIGN (1996) postulierte auf der Grundlage der verfügbaren Fachliteratur, daß eine stabile Reduktion des Ausgangsgewichts um 10 kg folgende Konsequenzen hat (siehe Tab.7).

Tab.7: Gesundheitliche Konsequenzen einer Gewichtsabnahme von 10 kg (SIGN, 1996)

Mortalität	<ul style="list-style-type: none"><li>- Senkung der Gesamtmortalität um &gt;20%</li><li>- Senkung der Diabetes - assoziierten Mortalität um &gt;30%</li><li>- Senkung der Adipositas-assoziierten Karzinomtodesfälle um &gt;40%</li></ul>
Blutdruck	<ul style="list-style-type: none"><li>- Senkung um 10mmHg systolisch</li><li>- Senkung um 20mmHg diastolisch</li></ul>
Diabetes	<ul style="list-style-type: none"><li>- Senkung des Nüchternblutglukosewerts um 50%</li></ul>
Blutfette	<ul style="list-style-type: none"><li>- Senkung des Gesamtcholesterin um 10%</li><li>- Senkung der LDL-Fraktion um 15%</li><li>- Senkung der Triglyceride um 30%</li><li>- Zunahme der HDL-Fraktion um 8%</li></ul>

### 7.1.1. Gesamtbefinden und Lebensqualität

Eine Verringerung des Ausgangsgewichts um 5-10 kg kann zu einer signifikanten Verbesserung des Gesamtbefindens führen. Zum Beispiel wirkt sich ein Gewichtsverlust positiv aus auf Atemnot, Schlafapnoe, Rücken- und Gelenkschmerzen (Goldstein, 1992; Pories et al., 1992; Sjöström et al., 1995). Wenngleich weniger gut dokumentiert, läßt sich auch ein positiver Einfluß auf die Lebensqualität nennen.

### 7.1.2. Stoffwechselstörungen

Untersuchungen bei übergewichtigen Patienten mit Typ-2-Diabetes zeigten markante Verbesserungen des Blutzuckers. Nach einer Gewichtsreduktion von 10-20% konnte dabei auch eine eindrucksvolle Verminderung der Insulinresistenz mit einer Verbesserung der muskulären Glukoseaufnahme beobachtet werden. Ebenso nahm die Glukoseproduktion in der Leber ab. Allein durch gesteigerte körperliche Aktivität lassen sich Insulinsensitivität und Glukosetoleranz verbessern. Bei 75% aller neu diagnostizierten adipösen Typ-2-Diabetikern scheint ein Gewichtsverlust im ersten Jahr nach Diagnosestellung die Diabetes-bedingte Erhöhung der Mortalität zu senken (Lean et al., 1990). Bei einer Gewichtsreduktion von 3-8 kg tritt ein signifikanter Abfall des glycosylierten Hämoglobins (Hb<sub>A1c</sub>) auf (Wing et al., 1993). Die Reduzierung des viszeralen Fettgewebes scheint dabei der entscheidende Faktor für die Verbesserung der Diabeteseinstellung zu sein (Seidell et al., 1990). Einschränkend gilt, daß nicht alle adipösen Diabetiker auf eine Gewichtsabnahme mit einer Verbesserung des Glukosestoffwechsels reagieren.

Erwähnenswert ist außerdem, daß bei vielen Typ-2-Diabetikern schon bei einer kalorienreduzierten, diabetesgerechten Kost, unabhängig von einer Gewichtsabnahme, ein positiver Effekt auf den Glukosestoffwechsel zu beobachten ist.



Bei gleichzeitigem Vorliegen einer Hyper- bzw. Dyslipidämie können pathologische Plasmalipidwerte durch diätetische Maßnahmen verbessert werden. Selbst bei Patienten mit einer familiären Hypercholesterinämie führen diätetische Maßnahmen zu einer Senkung der Cholesterinwerte, auch wenn in der Regel eine Kombination mit Medikamenten erforderlich ist (Mensink et al., 1992). Umfassende Metaanalysen zeigen die Wirksamkeit von diätetischen Maßnahmen im Sinne einer Senkung der Plasmalipidwerte und gleichzeitig des KHK-Risikos (Law et al., 1994). Daher empfiehlt das SIGN (1996), daß adipöse Patienten mit Hyper- bzw. Dyslipidämie sowohl mit Ernährungsberatung als auch mit langfristigen Gewichtsmanagement-Programmen behandelt werden sollten. Üblicherweise kommt es bereits nach moderatem Gewichtsverlust zu einem Abfall der Triglyceride und einer Erhöhung der HDL-Fraktion. Pro 1 kg Gewichtsverlust wird auch ein Abfall des LDL-Cholesterins um 1% erreicht (Dattilo et al., 1992). Eine Studie an adipösen Jugendlichen ergab, daß eine Gewichtsabnahme von ca. 16% zu einem Abfall der Triglyceride und des Plasmainsulins und einem Anstieg der HDL-Fraktion des Cholesterins im ersten Jahr führte. Im nachfolgenden Jahr kam es zu einer Stabilisierung dieser Werte. Nach weiteren 5 Jahren lag das Gewicht immer noch 13% unter dem Ausgangsgewicht, das Plasmainsulins war annähernd normalisiert und die HDL-Fraktion weiter angestiegen (Knip et al., 1993).

### **7.1.3. Kardiovaskuläre Erkrankungen**

Eine Gewichtsreduktion geht mit einer Blutdrucksenkung einher. Bei adipösen Hypertonikern wurde in randomisierten, kontrollierten Studien zur Gewichtsreduzierung demonstriert, daß Gewichtsverluste in der Größenordnung von 2-5 kg den mittleren Blutdruck um ca. 10-13 mmHg senken, falls eine Gewichtsstabilisierung auf lange Sicht erreicht werden kann (Stamler et al., 1980). Bereits bei einer Reduktion von 1% des Ausgangswerts kommt es zum Abfall des Blutdrucks um 1 mmHg systolisch und 2 mmHg diastolisch (Reisin et al., 1978; Rissanen et al., 1985; Tuck et al., 1981). Vorteilhaft erweist sich dabei bereits eine moderat kalorienreduzierte Kost mit Verringerung des Gesamtfettanteils und einer Veränderung der Fettsäurezusammensetzung zugunsten der ungesättigten Fettsäuren. Zusätzliche Verringerung der Salz- und Alkoholaufnahme verstärkt die blutdrucksenkende Wirkung einer Gewichtsabnahme (Law et al., 1991; Elliott et al., 1996). Bei adipösen Jugendlichen mit arterieller Hypertonie kann bereits durch einen Gewichtsverlust von 3% eine signifikante Blutdrucksenkung herbeigeführt werden (Rocchini et al., 1988). Langzeitstudien, in denen Ernährungstherapie, Nikotinabstinenz und vermehrte körperliche Aktivität über einen Beobachtungszeitraum von zehn Jahren kombiniert wurden, wiesen bei Personen mit milder Hypertonie eine signifikante Gewichts- und Blutdrucksenkung nach. Dieser Status konnte über 10 Jahre aufrecht erhalten werden und verringerte den Bedarf an medikamentöser Therapie (SIGN, 1996).

Nach Daten der Framingham-Studie (Lauer et al., 1991) und anderer Studien ist die Adipositas mit einer linksventrikulären, vorwiegend konzentrischen Hypertrophie vergesellschaftet. Unter einer Reduktionskost kommt es nicht nur zum Absinken des Blutdruckes und damit der Herzarbeit, sondern auch zu einer Abnahme der linksventrikulären Muskelmasse. In der Untersuchung von MacMahon et al. (1986) wurde bei adipösen Hypertonikern im Rahmen einer 21wöchigen 1000 kcal-Kost mit durchschnittlicher Gewichtsreduktion von 8,3 kg eine Reduktion der Septumdichte von 14% und der linksventrikulären Hinterwand um 11% beobachtet. Nach einer Studie von Wirth und Kröger (1995) reduziert eine Gewichtsabnahme von 10 kg die linksventri-

kuläre Muskelmasse um ca. 40 g. Zur klinisch wichtigen Frage, welche Auswirkungen eine Gewichtsreduktion auf die kardiovaskuläre Morbidität und Mortalität hat, gibt es mit Ausnahme der Studie von Williamson et al. (1995) keine aussagefähigen Daten.

#### **7.1.4. Sonstige Funktionsstörungen**

Adipöse Frauen mit Hirsutismus und polyzystischen Ovarien zeigen bei einem Gewichtsverlust von 5% eine Verbesserung der ovariellen Funktion. Bei vielen übergewichtigen Patientinnen mit sekundärer Amenorrhoe setzen die Menses nach Gewichtsabnahme erneut ein (SIGN, 1996).

#### **7.1.5. Psychosoziale Auswirkungen**

Der überwiegende Teil der Studien, die sich mit der Lebensqualität adipöser Patienten vor und nach Gewichtsreduktion befaßten, wurde im Zusammenhang mit chirurgischen Interventionen durchgeführt. Beispielsweise zeigte eine schwedische Studie eine Verbesserung der sozialen Interaktionen, der Depressivität, des seelischen Wohlbefindens und einen Verlust von Angst, wenn der Gewichtsverlust über 5 Jahre konstant blieb (Karlsson et al., 1998). Klem et al. (1997) berichteten erstmals, daß eine langfristige Gewichtsabnahme, die mit konservativen Maßnahmen (Diät und Aktivitätssteigerung) erzielt wurde, ebenfalls zu einer Verbesserung der allgemeinen Grundstimmung und Anhebung des Selbstvertrauens führte.

Häufig werden während einer Reduktionskost ungünstige psychische Effekte bemerkt, die auch Depressionen, Nervosität und Reizbarkeit einschließen. In Studien zeigte sich jedoch, daß die Gewichtsabnahme insbesondere dann mit einer Verbesserung der Depressivität einhergeht, wenn die Gewichtsabnahme durch eine Verhaltensänderung erzielt wurde (Smoller et al., 1987; Kunesova et al., 1996).

Ein sehr eindrucksvolles Beispiel für den Einfluß einer Gewichtsreduktion auf die Psyche lieferten Studien von Rand et al. (1990, 1991) bei morbid adipösen Patienten nach Gastroplastik. Vor der Operation fühlte sich ein Großteil der Teilnehmer unattraktiv und als Opfer übler Nachrede. Sie vermuteten Diskriminierung im Arbeitsleben und bei der Stellenvergabe sowie Benachteiligungen von Seiten der Ärzte und des Pflegepersonals. Nach einem Gewichtsverlust von 50 kg zogen diese Patienten – vor eine hypothetische Wahl gestellt - jede andere Erkrankung einer erneuten Gewichtszunahme vor. Bei der Wahl zwischen Normalgewicht und 1 Million Dollar entschieden sich alle spontan für die erste Alternative (Rand et al., 1990, 1991).

#### **7.1.6. Mortalität**

Die Datenlage zur Beziehung zwischen Gewichtsreduktion und Senkung der Gesamtmortalität ist sehr dürftig. In einer 12-jährigen Studie an weißen U.S.-Amerikanerinnen mit Adipositas-assoziierten Komorbiditäten wurde beobachtet, daß bei einer Gewichtsreduktion von 0,5-9,0 kg eine Verringerung der Gesamtmortalität von 20% auftrat (Williamson et al., 1995). Aufgeschlüsselt nach den assoziierten Erkrankungen wurden 40-50% weniger Karzinom- und 30-40% weniger Diabetesbedingte Todesfälle verzeichnet. Es steht außer Frage, daß ein dringender Bedarf an

geeigneten Studien besteht, die den Effekt einer Gewichtssenkung auf die Mortalität überprüfen.

## **7.2. Nachteile**

Eine Gewichtsreduktion kann auch mit Nachteilen verbunden sein. Im Folgenden soll auf die beiden häufigsten Nebenwirkungen einer Gewichtsreduktion eingegangen werden.

Bei Gewichtsabnahme besteht ein erhöhtes Risiko für Gallensteinerkrankungen. Infolge erhöhten Fettabbaus wird vermehrt Cholesterin mobilisiert, wodurch es zur Erhöhung des lithogenen Index der Galle kommt. Die Gallensteinbildung ist umso häufiger, je schneller und ausgeprägter die Gewichtsabnahme ist. Prämenopausal besteht ein besonderes Risiko für Gallensteinleiden im Gefolge einer Gewichtsabnahme, weil die hohen Östrogenspiegel die biliäre Sekretion von Cholesterin steigern (Everhart, 1993; Maclure et al., 1989).

Eine andere unerwünschte Folge eines Gewichtsverlustes bei adipösen Patienten, insbesondere in Zusammenhang mit drastischer Kalorienreduktion, ist die Abnahme der Knochendichte. Bei weißen Frauen, die nach dem 50. Lebensjahr eine Gewichtsabnahme begannen, wurde eine erhöhte Inzidenz von Hüftfrakturen festgestellt (Langlois et al., 1996). Der Einfluß von Gewichtsschwankungen auf die Knochendichte gilt allerdings als noch nicht ausreichend untersucht.

Versuche, das Körpergewicht zu reduzieren, können außerdem zur Entstehung von gestörtem Eßverhalten beitragen, wenn die Gewichtsreduktion mit ungeeigneten Maßnahmen angestrebt wird. Bei der Entstehung der Binge Eating Disorder, aber auch der Bulimie spielen Diätversuche und gezügeltes Eßverhalten eine wichtige Rolle (Agras, 1995; Loro et al., 1981; Garfinkel et al., 1980; Pyle et al., 1981). Insbesondere ein rigide kontrolliertes Eßverhalten korreliert mit der Häufigkeit und Schwere von Eßanfällen (Westenhöfer, 1996a, b).

## **7.3. Vor- und Nachteile der Gewichtsreduktion bei graviden Frauen**

Gewichtsabnahme während einer Gravidität sollte vermieden werden. Bei adipösen Graviden wird jedoch empfohlen, die schwangerschaftsbedingte Gewichtszunahme zu begrenzen, um das Risiko einer Hypertonie, einer Präeklampsie und eines Gestationsdiabetes zu verringern (SIGN, 1996). Bei glukoseintoleranten, adipösen Schwangeren sollte die Entwicklung einer Makrosomie durch strikte Normalisierung der Blutglukosewerte verhindert werden.

Gewichtsreduktion ohne begleitende professionelle Betreuung kann zu stärkeren Defiziten in der Energiebilanz führen, die potentiell mit negativen Auswirkungen auf die kindliche Entwicklung während des ersten Trimenon einhergehen (z.B. begünstigt Folsäuremangel das Auftreten von Neuralrohrdefekten). Übergewichtige Gravide mit vorbestehender Adipositas haben ein erhöhtes Risiko für eine spätere Fötensterblichkeit bei einer niedrigeren Rate Neugeborener, die für ihr Gestationsalter zu klein sind (Cnattingius et al., 1998). Bei Graviden mit ausgeprägter Adipositas sollte die Gewichtszunahme in der Schwangerschaft nach Möglichkeit 12 kg nicht überschreiten (Edwards et al., 1996). Eine Gewichtsreduktion sollte vor einer Konzeption und nur in besonderen Ausnahmefällen während der Gravidität angestrebt werden (SIGN, 1996, Empfehlungsgrad C).

## **8. Prävention der Adipositas**

### **8.1. Bedeutung der Prävention**

Aus mehreren Gründen ist eine Prävention der Adipositas vorteilhaft:

- mit zunehmender Dauer und Ausprägung wird die Behandlung der Adipositas immer schwieriger und komplexer. Zahlreiche Studien haben gezeigt, daß die große Mehrheit der Adipositasbehandlungsformen keine Langzeiterfolge erzielt (Garner et al., 1991; Weintraub et al., 1992a, b; Kayman et al., 1990);
- die gesundheitlichen Folgeerscheinungen der Adipositas sind möglicherweise nach Gewichtsverlust nicht immer reversibel (Pi-Sunyer, 1993; Higgens et al., 1993);
- die Prävalenz der Adipositas ist mittlerweile in den meisten Industrienationen so hoch, daß nicht mehr ausreichend Ressourcen in den Gesundheitssystemen vorhanden sind, um allen Betroffenen eine Behandlung anzubieten (James, 1996).

### **8.2. Evidenz für die Wirksamkeit von Präventionsmaßnahmen**

Die Tatsache, daß die Prävalenz der Adipositas in den letzten Jahrzehnten stetig gestiegen ist (u.a. Kuczmarski et al., 1994), wirft die Frage nach sinnvollen Präventionsmaßnahmen und ihrer Effektivität auf. Allerdings haben sich bisher nur wenige Forschungsvorhaben mit dieser Frage beschäftigt. Es besteht Evidenz, daß Kinder eine primäre Zielgruppe für die Prävention der Adipositas sein sollten. So zeigen Studien bei adipösen Kindern, daß ein langfristiges effektives Gewichtsmanagement den Anteil der Kinder verringert, die als Erwachsene adipös bleiben (Epstein et al., 1994; Flodmark et al., 1993; Dietz, 1993; Davis et al., 1994). Wurden Kinder gemeinsam mit ihren Eltern behandelt, waren sie erfolgreicher, auch auf lange Sicht ihr Gewicht zu reduzieren bzw. zu halten (Epstein et al., 1994).

### **8.3. Indikation und Ziele**

Da in Deutschland das mittlere Körpergewicht Erwachsener bis zu einem Alter von 65 Jahren kontinuierlich zunimmt, wäre Gewichtsstabilisierung auf Bevölkerungsebene ein primäres Präventionsziel. Bei Präadipositas (BMI 25 bis 29,9) sollte nicht nur eine weitere Gewichtszunahme und damit ein Übergang in die Adipositas (BMI  $\geq$  30) verhindert werden, sondern bereits eine mäßige Gewichtssenkung angestrebt werden, um das Risiko für Komorbiditäten zu vermindern.

### **8.4. Screening auf Adipositas**

Eine bessere Kenntnis der Bedeutung des Body Mass Index und des Fettverteilungsmusters einschließlich der etablierten anthropometrischen Erfassungsmethoden (z.B. Taillenumfang) im primären Versorgungssektor und in der Öffentlichkeit würde die Durchführung von Präventions- und Gewichtsmanagement-Programmen erleichtern und positiv unterstützen (SIGN, 1996, Evidenzklasse IV, Empfehlungsgrad C).

Gegenwärtig ist der BMI immer noch zu wenig bekannt und wird viel zu selten zur Erfassung und Klassifizierung der Adipositas genutzt. Noch stärker gilt dies für das Fettverteilungsmuster. BMI und Taillenumfang sind einfach zu bestimmen und eignen sich besonders gut für Screening-Maßnahmen und deren standardisierter Dokumentation. Diese Forderung wird z.B. von SIGN (1996) und der Deutschen Adipo-

sitas-Gesellschaft (Empfehlungsgrad C) unterstützt, wobei Bedarf an wissenschaftlich begründeten Screeningprogrammen geltend gemacht wird (z.B. Zielgruppendefinition, Screeningintervalle). SIGN (1996) empfiehlt in der National Clinical Guideline „Obesity in Scotland“, daß BMI und Taillenumfang in mindestens dreijährigem Abstand gemessen und dokumentiert werden sollten.

Bei Kindern wird das Gewicht ebenfalls am besten anhand von BMI-Tabellen, die das Alter berücksichtigen, bewertet und verfolgt. Adipöse Säuglinge, Klein- und Vorschulkinder werden in den bereits etablierten Vorsorgeuntersuchungen erfaßt. Mit Beginn der Schulzeit wäre ein Monitoring des BMI im Abstand von 3 bis 4 Jahren im Rahmen von schulmedizinischen Untersuchungen wünschenswert.

Mit der Zunahme von Inzidenz und Prävalenz der Adipositas in Deutschland spielt die Prävention eine immer größere Rolle und sollte daher in die routinemäßige medizinische Versorgung der Bevölkerung aufgenommen werden. Es wird daher empfohlen (SIGN, 1996, Empfehlungsgrad C), daß alle Familien und Einzelpersonen mit erhöhtem Risiko für Gewichtszunahme oder mit bereits vorhandenem Übergewicht regelmäßig beraten werden. Dabei könnten vorhandene Strukturen genutzt werden, z.B. im Rahmen von Gesundheitsuntersuchungen zur Früherkennung von Krankheiten bei Erwachsenen (Ziffer 29 der Gebührenordnung für Ärzte, GOÄ 1996).

Die zu Screening und Prävention ausgesprochenen Empfehlungen sind im Flußdiagramm zur „Adipositas-Prävention und -Behandlung“ im Anhang enthalten.

## **9. Therapie der Adipositas**

### **9.1. Voraussetzungen und Diagnostik**

Die Behandlungsindikation gründet sich vor allem auf die hohe Begleitmorbidität, die Einbuße von Lebensqualität und die mögliche Verkürzung der Lebenserwartung. Es ist z.B. zu empfehlen, allen übergewichtigen bzw. adipösen Patienten mit einer Hypertonie (Stamler et al., 1980, Evidenzklasse IIb, Empfehlungsgrad B) bzw. mit zusätzlichen kardiovaskulären Riskofaktoren (Law et al., 1994, Evidenzklasse Ia, Empfehlungsgrad A) eine Gewichtsreduktion anzuraten.

Unbedingte Voraussetzung für eine erfolgreiche Therapie ist eine ausreichende Kooperationsfähigkeit und -bereitschaft des Patienten. Der Therapieerfolg hängt auch davon ab, wie umfassend der Patient über seine Erkrankung, deren Komplikationen und Behandlung informiert wird und ob die Behandlungsziele realistisch und den individuellen Voraussetzungen angepaßt sind. Daher sollten der betreuende Arzt und seine Mitarbeiter bzw. Partner besondere Erfahrungen und Kompetenz in der Betreuung adipöser Patienten besitzen. Um das individuelle Gesundheitsrisiko beurteilen und eine optimale Therapieplanung vornehmen zu können, sind nach Identifizierung eines adipösen Patienten eine sorgfältige Anamneseerhebung und bestimmte Untersuchungen vor Therapiebeginn unentbehrlich. Anamnese und Voruntersuchung sollten folgende Aspekte beinhalten:

Anamnese:

- Familienanamnese (Adipositas, Typ-2-Diabetes, Hypertonie, KHK, etc.)
- Beginn des Übergewichts bzw. größere Gewichtsveränderungen in der Vergangenheit und Begleitumstände (z.B. Schwangerschaft, Aufgabe von Sport, traumatische Erlebnisse)
- Bewegungsaktivität
- familiäre und berufliche Verhältnisse
- Ernährung, Eßverhalten und Eßstörungen

- frühere Therapieversuche und Gründe für deren Scheitern
- Gründe für den jetzigen Behandlungswunsch
- Motivation zur Gewichtsreduktion

Untersuchungen:

- Körpergröße und -gewicht, Blutdruck, Taillen- und Hüftumfang
- klinische Untersuchung
- Nüchternblutzucker, ggf. oraler Glukosetoleranztest
- Gesamt-, HDL- und LDL-Cholesterin, Triglyzeride
- Harnsäure\*
- Kreatinin, Elektrolyte, kleines Blutbild, BSG
- TSH und andere endokrinologische Parameter\*
- EKG\*, Herzecho\*, 24-Std.-RR-Messung\*
- Oberbauchsonographie\*, Doppler-Sonographie\*

## 9.2. Ziele der Adipositasbehandlung

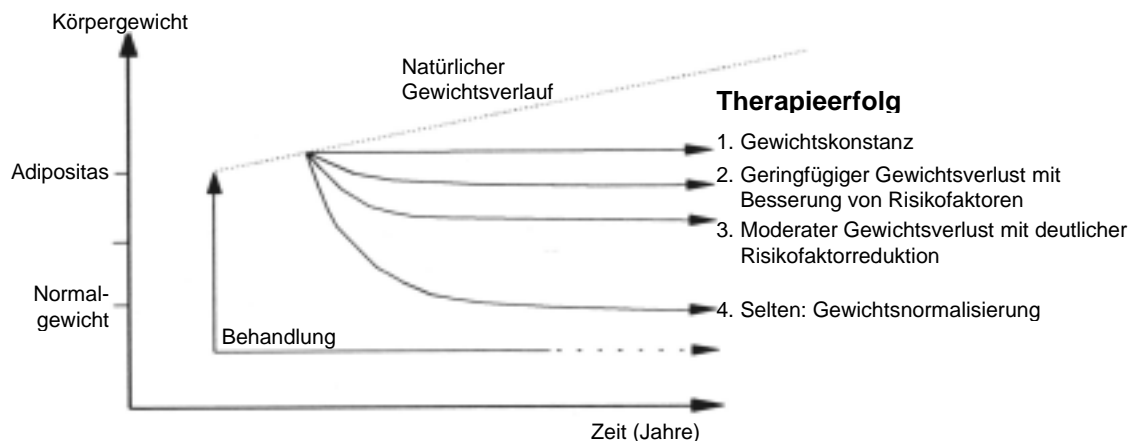
Da die Adipositas als chronische Störung mit hoher Rezidivneigung anzusehen ist, kommt es darauf an, über die eigentliche Phase der Gewichtsabnahme hinaus eine langfristige Gewichtskontrolle zu erreichen. Bei der Therapie adipöser Patienten (BMI  $\geq 30$ ) steht die moderate Gewichtsabnahme im Vordergrund (Empfehlungsgrad C). Das Erreichen des Normal- bzw. Idealgewicht ist als Behandlungsziel ungeeignet. In bestimmten Fällen genügt eine Gewichtsstabilisierung als Behandlungsziel. Ähnliche Empfehlung für die Behandlungsziele wurden von der SIGN (1996) ausgesprochen (Evidenzklasse IV).

Rössner (1992) hat die verschiedenen potentiellen Langzeitziele der Adipositas-therapie systematisiert. Das Erreichen des Normalgewichtes (4.) wird in den seltensten Fällen ein realistisches Therapieziel sein. Die dauerhafte, mäßige Reduktion des Körpergewichts mit einer Verbesserung Adipositas-assoziiierter Risikofaktoren (3.) kann als ein sehr guter Erfolg der Adipositas-therapie gewertet werden. Geringe dauerhafte Gewichtsabnahme (2.) oder lediglich Gewichtsstabilität (1.), bei der der normalerweise zu erwartende Gewichtsanstieg ausbleibt, können bereits Therapieerfolge darstellen, wenn eine stärkere Gewichtsreduktion im Einzelfall nicht erreicht werden kann (siehe Abb. 7).

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\* Hierbei handelt es sich um fakultative Untersuchungen. Sie dienen dazu, Komorbiditäten zu erfassen und Kontraindikationen gegen gewichtsreduzierende Therapiemaßnahmen zu erkennen (Hauner, 1997, Empfehlungsgrad C).

**Abb.7: Indikatoren für den Therapieerfolg nach Rössner (1992)**



Das Institute of Medicine (1995) sieht ebenfalls die Gewichtsstabilisierung und die Vermeidung von Gewichtszunahme als Hauptziel des Therapiemanagements bei adipösen Patienten und deren Familien (Evidenzklasse IV). Voraussetzung für den Erfolg eines jeden Gewichtsmanagementprogramms ist die enge Einbindung des Patienten in die Planung und Festlegung der individuell anzustrebenden Behandlungsziele.

Eine Gewichtsnormalisierung ist aufgrund folgender Argumente nicht erforderlich bzw. kontraproduktiv:

- Eine erhebliche Verbesserung des Risikofaktorprofils oder des Mortalitätsrisikos kann bereits durch eine mäßige Gewichtsabnahme in der Größenordnung von 5-10kg erreicht werden (Goldstein, 1992 und Williamson et al., 1995).
- Physiologische Reaktionen limitieren die Gewichtsabnahme, so daß Normalgewicht nur in den sehr seltenen Fällen erreicht wird, in denen Patienten sehr streng ihr Gewicht und Eßverhalten kontrollieren.
- Wiederholte Fehlversuche, das Normalgewicht zu erreichen, sind frustrierend und beeinträchtigen die Selbstachtung und Motivation der Patienten.
- Klinische Studien zeigen, daß die meisten Patienten über einen begrenzten Zeitraum von 6 Monaten Gewicht abnehmen und danach bestenfalls dieses Gewicht halten (James et al., 1997).

### 9.3. Behandlungsindikation

Die Deutsche Adipositas-Gesellschaft hat 1995 eine Expertenempfehlung erstellt, die die Indikationen für eine medizinische Behandlung adipöser bzw. präadipöser Menschen folgendermaßen festlegt (Empfehlungsgrad C):

- BMI  $\geq 30$
- BMI zwischen 25 und 29,9 und gleichzeitiges Vorliegen eines abdominellen Fettverteilungsmusters, übergewichtsbedingter Gesundheitsstörungen (z.B. Hypertonie, Typ-2-Diabetes), von Erkrankungen, die durch Übergewicht verschlimmert werden oder gleichzeitiges Vorliegen eines hohen psychosozialen Leidendrucks (Wechsler et al., 1997, Evidenzklasse IV, Empfehlungsgrad C).

## 9.4. Systematische Therapieansätze zur Adipositasbehandlung

Die zur Verfügung stehenden Therapiemaßnahmen für das Gewichtsmanagement sollten unter Berücksichtigung der individuellen Gegebenheiten differenziert eingesetzt werden. Im Flußdiagramm „Adipositasprävention und -therapie“ (siehe Anhang) sind die differentialtherapeutischen Empfehlungen zusammengefaßt.

## 9.5. Basisprogramm zum Gewichtsmanagement

Jedes Basisprogramm zum Gewichtsmanagement setzt sich zunächst aus drei Komponenten zur Lebensstiländerung zusammen: Ernährungs-, Verhaltens- und Bewegungstherapie (Hauner, 1997, Evidenzklasse IV, Empfehlungsgrad C). Anhand des BMI-Wertes, der Risikofaktoren und Komorbiditäten sowie der Motivation des Patienten wird die Behandlungsstrategie festgelegt. Der Patient muß in diese Überlegungen einbezogen werden, damit der Behandlungsplan optimal seinen Vorstellungen und Lebensgewohnheiten entspricht. Dieses Behandlungskonzept wirkt sich unabhängig von seiner Wirkung auf das Körpergewicht auch günstig auf verschiedene kardiovaskuläre Risikofaktoren wie z.B. Hypertonie und Dyslipidämie aus.

Ein bewährtes Vorgehen beim Gewichtsmanagement umfaßt ein 3-6-monatiges, multidisziplinäres Gewichtsreduktionsprogramm, gefolgt von einem mindestens 6-monatigen Programm zur Gewichtserhaltung. Eine weitere Gewichtsabnahme sollte erst nach dieser Stabilisierungsphase mit dem Patienten neu vereinbart werden (Hauner, 1997).

Die Beurteilung des Behandlungsergebnisses kann nicht an einer kurzfristig erreichten Gewichtsreduktion gemessen werden, sondern nur daran, wie gut der Behandlungsansatz geeignet ist, die Patienten bei der langfristigen Stabilisierung des (reduzierten) Gewichts zu unterstützen.

Im folgenden wird auf die einzelnen Therapiekomponenten des Basisprogramms eingegangen.

### Ernährungstherapie

Alle bisherigen Therapieempfehlungen von Expertengremien bezeichnen die Ernährungstherapie als Eckpfeiler im Langzeit-Gewichtsmanagement von adipösen Patienten (Deutsche Adipositas-Gesellschaft, 1995; SIGN, 1996; Royal College of Physicians, 1997a; National Institutes of Health (NIH), 1998).

Im Einzelnen werden hinsichtlich der Ernährungstherapie folgende Grundsätze empfohlen:

- Das gesamte Umfeld eines Patienten sollte in die Änderung der Ernährungsweise einbezogen werden, um die Compliance zu erleichtern und zu verbessern (Cousins et al., 1992, Evidenzklasse Ib, Empfehlungsgrad A). Diese Empfehlung ist durch die gesicherten Vorteile eines „Familienansatzes“ zur Ernährungsumstellung begründet. Neben dem Patienten wird seine gesamte Familie einbezogen. Dadurch ist eine wertvolle präventive Begleitkomponente realisiert, da Kinder übergewichtiger Patienten stärker zu Übergewicht neigen als Kinder nicht-adipöser Eltern (SIGN, 1996, Evidenzklasse IV).
- Alle adipösen Patienten, die ein strukturiertes Gewichtsmanagement-Programm beginnen, sollten in den Prinzipien der Ernährungsumstellung geschult werden (Empfehlungsgrad C). So konnte der positive Einfluß von strukturierten Schulungen auf die Qualität der Stoffwechseleinstellung bei Diabetikern vielfach belegt



werden (Brown, 1990). Neben einer besseren Stoffwechseleinstellung wurde u.a. auch eine Gewichtsreduktion beobachtet. Ein informierter Patient weist demnach eine höhere Compliance auf.

- Um einen Gewichtsverlust von 0,5 – 1,0 kg/Woche und insgesamt von 10% des Ausgangsgewichtes zu erzielen, ist ein tägliches Energiedefizit von 500 bis 1000 kcal nötig (Frost et al., 1991; Evidenzklasse IIb). Nach 3 bis 6 Monaten schwächt sich die Rate der Gewichtsabnahme ab und erreicht ein Plateau, da der Energieverbrauch während der Gewichtsabnahme zurückgeht (National Heart, Lung and Blood Institute (NHLBI), 1998). Der durchschnittliche Gewichtsverlust nach einem Jahr liegt bei 6% des Ausgangsgewichts und hängt von der Anwendung weiterer unterstützender Maßnahmen ab, z.B. Gruppensitzungen, Steigerung der körperlichen Bewegung und ärztliche Verlaufskontrollen, die insbesondere der Stabilisierung des Gewichtserfolgs dienen (Wadden et al., 1989, Evidenzklasse IIb).

Das Energiedefizit soll bevorzugt durch eine Verringerung der Fettaufnahme erreicht werden. Diese sollte auf etwa 30% der Gesamtkalorien begrenzt werden. So empfehlen die Deutsche Gesellschaft für Ernährung (DGE, 1995) und die Deutsche Adipositas-Gesellschaft für Übergewichtige eine energiereduzierte, fettarme, kohlenhydrat- und ballaststoffreiche Ernährung mit folgender Nährwertrelation: 15 bis 20% Eiweiß, 25 bis 30% Fett und 50 bis 60% Kohlenhydrate ((Wechsler et al., 1996b, Evidenzklasse IV, Empfehlungsgrad C).

#### Ernährung mit Fettreduktion ohne Kalorienbegrenzung:

Da viele epidemiologische Studien einen positiven Zusammenhang zwischen Fettverzehr und Körpergewicht belegen, wurde in den letzten Jahren verstärkt empfohlen, nur die Fettaufnahme zu reduzieren, die Kohlenhydrataufnahme aber „ad libitum“ zu erlauben. Damit sollte übergewichtigen Patienten die Einhaltung von Ernährungsempfehlungen erleichtert und die Langzeitcompliance verbessert werden. Die bisherigen Ergebnisse zeigen allerdings, daß damit nur ein bescheidener Gewichtsverlust zwischen 0,8 und 2,6 kg möglich ist (Katan et al., 1997, Evidenzklasse IV). Nach einer hypokalorischen Kost von  $\approx$  500 kcal/Tag erwies sich aber eine fettarme, kohlenhydratreiche („ad libitum“) Ernährung hinsichtlich Gewichtsstabilisierung und Langzeitergebnissen einer energiedefinierten Mischkost von  $\approx$  1800 kcal/Tag überlegen, so daß ein solches Ernährungsregime besonders für die Stabilisierung des Körpergewichtes und nach Gewichtssenkung zu empfehlen ist (Toubro et al., 1997, Evidenzklasse Ib, Empfehlungsgrad A).

#### Diäten mit sehr niedriger Kalorienzufuhr:

Drastisch kalorienreduzierte Ernährungsformen, z.B. Formula-Diäten, sehen eine Kalorienaufnahme von weniger als 800 bis 1000 kcal pro Tag in Form von definierten Nährstoff-Drinks oder einer drastisch energiereduzierten, meist proteinreichen Kost vor und induzieren eine rasche Gewichtsabnahme. Diese Diäten scheinen aber für eine langfristige Gewichtskontrolle wenig geeignet zu sein (Frost et al., 1991; James, 1984b; Royal College of Physicians of London, 1997a). Wegen des erheblichen Nährstoffdefizits kommt nur eine zeitlich begrenzte Anwendung (2 bis maximal 12 Wochen) in Betracht. Solche Diätprogramme sind nur bei stark adipösen Patienten indiziert, die aus medizinischen Gründen kurzfristig Gewicht verlieren sollten. Therapien mit drastischer Kalorienbegrenzung sollten wegen der nicht unerheblichen Nebenwirkungen besonders qualifizierten Therapeuten vorbehalten bleiben oder nur in entsprechenden Spezialeinrichtungen eingesetzt werden (Wadden et al., 1990b; Wadden,

1993). Formula-Diät-Produkte werden in verschiedenen kommerziellen Gewichtsreduktionsprogrammen angeboten. Die Verwendung ist nur sinnvoll, wenn sichergestellt ist, daß sich daran eine langfristige Ernährungsumstellung unter Einbeziehung von Verhaltensmodifikation und Bewegungssteigerung anschließt.

### **Verhaltensmodifikation**

Nach Langzeitstudien ist die Patientencompliance bezüglich der Beachtung von Ernährungsempfehlungen erhöht, wenn verhaltenstherapeutische Elemente als unterstützende Maßnahme angewandt werden (Jeffery, 1993, Evidenzklasse Ib). Es ist daher empfehlenswert, Techniken der Verhaltenstherapie in Gewichtsmanagement-Programmen einzusetzen (Empfehlungsgrad A). Diese umfassen Selbstbeobachtung, Stimuluskontrolltechniken, Verstärkungstechniken, Techniken zur kognitiven Umstrukturierung und Programme zur gezielten Rückfallprophylaxe. Ein wesentliches Charakteristikum verhaltenstherapeutischer Techniken ist, daß der Patient direkt zur Einübung neuer Verhaltensweisen angeleitet und dabei unterstützt wird. Durch diesen Lern- und Trainingsprozeß werden die Kompetenzerwartungen - eine wesentliche Voraussetzung für die Realisierung von gesundheitsbezogenem Verhalten (Schwarzer, 1996, Evidenzklasse IV) – des Patienten verstärkt, d.h. seine Überzeugung, die erlernten Verhaltensweisen in der Praxis einsetzen zu können. Gleichfalls wird in der Verhaltenstherapie die persönliche Verantwortung des Patienten für die Umsetzung des Gewichtsmanagement-Programms (Selbstkontrolle) in den Vordergrund gestellt (Wardle, 1996, Evidenzklasse IV). In den letzten Jahren wird darauf hingewiesen, daß Patienten lernen sollen, ihr Eßverhalten nicht rigide, sondern flexibel zu kontrollieren, da rigide Kontrolle mit einem höheren Risiko der Entwicklung von Eßstörungen einhergeht und nicht die langfristig erfolgreiche Gewichtsstabilisierung unterstützt (Westenhöfer und Pudiel, 1996; Pudiel und Westenhöfer, 1998; Evidenzklasse IV).

### **Bewegungstherapie**

Jedes Gewichtsmanagement-Programm sollte die Bewegungssteigerung als Therapiekomponente beinhalten, da die Kombination aus Bewegungs- und Ernährungstherapie effektiver ist als jede der beiden Therapieformen alleine (Skender et al., 1996, Evidenzklasse Ib, Empfehlungsgrad A). Regelmäßige körperliche Aktivität vermindert außerdem den diätetisch bedingten Verlust an Muskelmasse und damit das Absinken des Grundumsatzes (Garrow et al., 1995a; Wing, 1992; Skender et al., 1996). Der besondere Wert der Bewegung liegt in der Stabilisierung des Gewichtserfolges. Bewegungstherapie allein resultiert in einem maximalen Gewichtsverlust von ca. 5% (Wood et al., 1996; Royal College of Physicians of London, 1997a). Meist wird Ausdauersportarten, die den Einsatz möglichst vieler Muskelgruppen erfordern, der Vorzug gegeben. Sportarten mit hoher Gelenkbelastung oder hohen Geschicklichkeitsanforderungen sind weniger günstig einzuschätzen. Eine regelmäßige 30-60 minütige Bewegung mit einer Herzfrequenz von 180 minus Lebensalter an mindestens drei Tagen pro Woche wirkt sich positiv auf das Körpergewicht aus (siehe u.a. Epstein et al., 1996a; Harrell et al., 1996; Bueman et al., 1996; Hauner, 1997), bessert gleichzeitig – unabhängig vom Gewichtseffekt – begleitende Risikofaktoren und hat hohen präventiven Wert im Hinblick auf die Entstehung metabolischer und kardiovaskulärer Erkrankungen (Fletcher et al., 1996, Evidenzklasse IV).

## 9.6. Adjuvante medikamentöse Therapie

Die bisherigen Empfehlungen zu einer medikamentösen Therapie befürworten Pharmaka lediglich als adjuvante Maßnahme zum Basisprogramm (Deutsche Adipositas-Gesellschaft; SIGN, 1996; Royal College of Physicians of London, 1997a). Gemäß SIGN (1996) kann eine zusätzliche Pharmakotherapie zur Gewichtssenkung bei Übergewichtigen nur unter folgenden Voraussetzungen akzeptiert werden:

- Patienten mit einem BMI  $\geq 30$ , die mit dem Basisprogramm keinen ausreichenden therapeutischen Erfolg hatten, d.h. eine Gewichtsabnahme von  $< 5$ kg innerhalb von drei Monaten oder Wiedezunahme des Gewichts in dieser Zeit;
- Patienten mit einem BMI  $\geq 27$ , die zusätzlich gravierende Risikofaktoren und/oder Komorbiditäten aufweisen und bei denen Basis-Maßnahmen nicht erfolgreich waren (siehe oben). Die medikamentöse Therapie sollte nur dann fortgesetzt werden, wenn zusätzliche Risikofaktoren, wie z.B. Hypertonie, pathologische Glukosetoleranz oder Hyperlipidämie, signifikant gebessert wurden.

Da derzeit neue gewichtssenkende Medikamente vor der Zulassung stehen, bzw. zugelassen sind, und der Einsatz solcher Pharmaka kritisch diskutiert wird, soll das Thema Pharmakotherapie im Folgenden ausführlicher erörtert werden.

### **Zentralwirkende Medikamente:**

Sie beeinflussen Mechanismen, die Appetit, Sättigung und Energieverbrauch steuern:

Der Serotoninagonist Dexfenfluramin führt im Hypothalamus zu einer schnelleren Sättigung (Campbell, 1991; Dollery, 1991). Die Wirksamkeit wurde in randomisierten, placebo-kontrollierten, doppelblinden Studien nachgewiesen. Ungefähr 60% der Patienten, die mit einer Kombination aus Diät und Dexfenfluramin behandelt wurden, zeigten eine Gewichtsreduktion von mehr als 10 kg (Guy-Grand et al., 1989a; O'Connor et al., 1995). Diese Gewichtssenkung konnte in der Behandlungsgruppe über einen 12-monatigen Zeitraum aufrechterhalten werden (Guy-Grand et al., 1989a). Neben dem Gewichtsverlust war unter Dexfenfluramin auch eine Besserung von Hypertonie, Hyperglykämie und Dyslipoproteinämie zu verzeichnen (Bremer et al., 1994; Pfohl et al., 1994). Als gefährlichste Nebenwirkung von Dexfenfluramin gilt die pulmonale Hypertonie, die allerdings ein sehr seltenes Ereignis darstellt (Abenhaim et al., 1996; Curfman, 1997). Neuere Berichte lieferten Hinweise, daß vor allem bei der Kombinationstherapie mit Phentermin Herzklappenveränderungen auftreten können (Connolly et al., 1997). Cannistra et al. (1997) berichten außerdem über einen solchen Fall unter alleiniger Behandlung mit Dexfenfluramin. Bis Mai 1998 waren der amerikanischen Arzneimittelüberwachungsbehörde (Food and Drug Administration) 100 Berichte über Herzklappenveränderungen bei adipösen Patienten, die durchschnittlich über einen Zeitraum von 9 Monaten eine Kombination von Fenfluramin und Phentermin eingenommen hatten, zugegangen. Obwohl ein kausaler Zusammenhang zwischen dem Auftreten der Herzklappenveränderungen und der Einnahme von Fenfluramin, Phentermin oder Dexfenfluramin nicht gesichert ist, entschieden sich die Hersteller und Vertreiber von Dexfenfluramin zur weltweiten Rücknahme beider Substanzen bis zur Klärung des Sachverhaltes (Arzneimittelkommission der deutschen Ärzteschaft, 1997).

### **Sonstige Medikamente mit gewichtsenkendem Potential**

Substanzen wie Diuretika, menschliches Choriongonadotropin (HCG), Amphetamine, Dexamphetamin und Thyroxin kommen aus unterschiedlichen Gründen - Wirkungslosigkeit oder gefährliche Nebenwirkungen - für die Behandlung der Adipositas nicht in Frage und sollten daher in Gewichtsmanagement-Programmen nicht verwendet werden. Metformin und Acarbose werden bei der Behandlung adipöser Typ-2-Diabetiker erfolgreich eingesetzt. Ein geringer gewichtsenkender Effekt ist durch Studien von Scheen et al. (1995) und Wolever et al. (1997) belegt, aber klinisch wahrscheinlich nicht bedeutsam. Fluoxetin, Sertralin und andere selektive Hemmer der Serotoninwiederaufnahme können in der Behandlung von Depressionen, die mit der Adipositas in Zusammenhang stehen, eingesetzt werden, für die alleinige Behandlung der Adipositas sind sie jedoch nicht geeignet und auch nicht zugelassen (Royal College of Physicians, 1997b).

Zur Zeit sind zwei Substanzen im Zulassungsverfahren bzw. zugelassen und sollen daher im Folgenden näher beschrieben werden.

#### Sibutramin

Bei Sibutramin handelt es sich um einen selektiven Serotonin- und Noradrenalin-Wiederaufnahmehemmer. Randomisierte, kontrollierte Studien haben bei adipösen Patienten eine dosisabhängige Gewichtsreduktion gezeigt (das Dosierungsoptimum lag bei 10-15 mg), die über einen Zeitraum von 12 Monaten aufrechterhalten werden konnte (Bray et al., 1994; Jones et al., 1995; Evidenzklasse Ib). Die Gewichtsabnahme war mit einer Abnahme des Quotienten aus Taillen- und Hüftumfang sowie einer Verbesserung der Plasmalipid- und Blutglucosewerte verbunden (Griffiths et al., 1995). Nebenwirkungen von Sibutramin sind Übelkeit, trockener Mund, Obstipation, Schwindel und Schlaflosigkeit. Geringe Erhöhungen der Blutdruckwerte (im Mittel 3 – 5 mm Hg) und der Herzfrequenz (im Mittel 4 – 5 Schläge pro Minute) wurden ebenfalls festgestellt. Dies erklärt sich aus dem Mechanismus der zentralen Sympatikusaktivierung. Die blutdrucksteigernde Wirkung der Substanz wird im Verlauf der Behandlung durch den gewichtsbedingten Abfall des Blutdrucks mehr als aufgehoben (Lean, 1997a). Die Zulassung von Sibutramin wurde beantragt.

#### Orlistat

Orlistat ist ein im Gastrointestinaltrakt wirkender Lipaseinhibitor (Hauptman et al., 1992). In einer 1-Jahres-Studie ermöglichte Orlistat eine Gewichtssenkung von 8,4% im Vergleich zu 2,6% in der Placebogruppe (James et al., 1997, Evidenzklasse Ib). Damit war eine Verbesserung verschiedener Parameter des Lipid- und Glucosestoffwechsels sowie eine geringe Blutdrucksenkung verbunden. Noch nicht endgültig geklärt ist die Frage, in welchem Umfang Orlistat die Absorption fettlöslicher Vitamine beeinträchtigt und inwieweit dieser Effekt physiologisch bedeutsam ist. In Einzelfällen war unter Orlistat-Therapie eine Supplementierung mit fettlöslichen Vitaminen erforderlich (James et al., 1997). Häufige, wenngleich nach allgemeiner Einschätzung harmlose Nebenwirkungen sind weiche Stühle, gesteigerter Stuhldrang, Meteorismus und Steatorrhoe.

In einer zum Zeitpunkt der Drucklegung publizierten 2-Jahres-Studie ermöglichte Orlistat eine zusätzliche Gewichtssenkung von im Mittel 4 kg (Sjöström et al., 1998, Evidenzklasse Ib). Die Absorption fettlöslicher Vitamine war bei weniger als 10% der Teilnehmer der Orlistat-Gruppe klinisch bedeutsam. Orlistat wurde im August 1998 zur adjuvanten medikamentösen Behandlung der Adipositas zugelassen. Als Be-

handlungsindikation gelten ein BMI  $\geq 30$  sowie ein BMI  $\geq 28$  mit Begleiterkrankungen wie Typ-2-Diabetes oder Hypertonie. Orlistat ist verschreibungspflichtig.

Da bisher für beide Substanzen nur begrenzte Erfahrungen vorliegen, sind derzeit keine detaillierten Empfehlungen für eine medikamentöse Behandlung der Adipositas möglich. Die klinischen Prüfungen erstreckten sich fast ausnahmslos über maximal zwei Jahre, so daß eine Therapie über mehr als 24 Monate nicht gerechtfertigt ist.

## 9.7. Chirurgische Therapie

Bei morbidem Adipositas (BMI  $\geq 40$ ) wurde in zahlreichen Studien eine ausgeprägte Minderung der Lebensqualität sowie eine deutliche Erhöhung der Morbiditäts- und Mortalitätsrate beschrieben (u.a. Metropolitan Life Insurance, 1959, zitiert nach Wirth, 1997; Manson et al., 1995; Pooling Project Research Group, 1978). Da bei so ausgeprägtem Übergewicht die konservativen Therapiemöglichkeiten in vielen Fällen keine ausreichende Gewichtsreduktion erlauben, wurden alternativ chirurgische Therapieformen entwickelt. Die chirurgische Intervention sollte spezialisierten Chirurgen vorbehalten sein und muß in Einrichtungen erfolgen, die Möglichkeiten zur postoperativen intensivmedizinischen Überwachung haben. Das Operationsrisiko ist in spezialisierten Abteilungen in Anbetracht der Multimorbidität der Patienten (perioperative Komplikationen 5-15%; perioperative Mortalität  $<0,5-1\%$ ) als relativ gering einzuschätzen (Martin et al., 1995; Husemann und Reiners, 1997). Unter ökonomischen Gesichtspunkten könnten nach ersten Studien die Kosten für die chirurgische Therapie der Adipositas Grad III niedriger ausfallen als die Kosten unter konservativer Therapie (Martin et al., 1995; SIGN, 1996, Evidenzklasse IV). Die Patientenauswahl sollte nach strengen Kriterien erfolgen (National Institute of Health Consensus Development Conference, 1992; SIGN, 1996, Evidenzklasse IV, Empfehlungsgrad C). Dementsprechend lassen sich die Voraussetzungen für eine operative Therapie der Adipositas wie folgt definieren:

- Der Patient sollte einen BMI  $\geq 40$  oder  $\geq 35$  mit erheblichen Komorbiditäten bzw. Risikofaktoren haben.
- Die konservativen Behandlungsmöglichkeiten unter ärztlicher Aufsicht müssen ausgeschöpft sein.
- Das Operationsrisiko darf nicht inakzeptabel hoch sein.
- Die Patienten müssen ausreichend motiviert und vollständig aufgeklärt sein sowie ihr Einverständnis gegeben haben.

Verfahren der Wahl sind derzeit Magenverkleinerungstechniken wie die vertikale Gastroplastik nach Mason und die Silikonbandtechnik nach Kuzmak, die laparoskopisch durchgeführt werden kann (siehe u.a. Husemann et al., 1996a; Hell et al., 1996; National Institute of Health Consensus Development Conference, 1992; Benotti et al., 1996, Evidenzklasse IIa/IIb).

## 9.8. Langfristige Gewichtsstabilisierung

Das Hauptproblem jeder Adipositastherapie ist die Stabilisierung des reduzierten Körpergewichts. Studien haben gezeigt, daß der Energieverbrauch bei Patienten während und nach hypokalorischer Diät sinkt (Leibel et al., 1995; Weigle et al., 1988). Daher bewirkt die Rückkehr zur früheren Ernährung nach einer hypokalorischen Kost eine rasche Gewichtszunahme (Porikos et al., 1982). Dieser Effekt kann

aber durch eine Intensivierung der körperlichen Aktivität kompensiert werden (Weigle et al., 1988, Evidenzklasse IIa). Mehrere Untersuchungen legen nahe, daß eine regelmäßige körperliche Aktivität die Gewichtsstabilisierung nach einer hypokalorischen Kost verbessert (Ewbank et al., 1995, Evidenzklasse III; Pavlou et al., 1989, Evidenzklasse Ib). Es handelt sich dabei allerdings um keine randomisierten, kontrollierten Studien. Von zentraler Bedeutung für eine langfristige Gewichtsstabilisierung hat sich die Fortführung des Kontaktes zwischen Therapeut und Patient erwiesen. Damit kann ein Patient immer wieder zur Fortführung des neu erworbenen Lebensstils einschließlich der neu erlernten Eß- und Bewegungsgewohnheiten motiviert werden. Günstig für eine Rückfallprophylaxe sind außerdem Einbindung in Selbsthilfegruppen und Unterstützung durch Familienangehörige oder sonstige Vertrauenspersonen (Perri et al., 1993, Evidenzklasse IV). Insgesamt hängt das Langzeitergebnis des Gewichtsmanagements von einem geplanten, langfristigen Betreuungskonzept ab.

### **9.9. Kriterien für den Behandlungserfolg**

Voraussetzung für einen Behandlungserfolg ist eine realistische Zielsetzung. Adipöse Patienten und auch medizinisches Personal streben häufig als Hauptziel das Erreichen des Ideal- oder Normalgewichts an (SIGN, 1996). Ein solches Behandlungsziel ist unrealistisch und außerdem nicht notwendig. Diesbezüglich ist ein Umdenken auf Seiten des Therapeuten und des Patienten erforderlich. Das Institute of Medicine hat 1995 auf der Grundlage der verfügbaren Studien den Behandlungserfolg bei der Adipositas folgendermaßen definiert: ein medizinischer Erfolg ist bereits dann erzielt, wenn sich die Einstellung eines Patienten zu beeinflussbaren Faktoren wie Rauchen, Ernährung und Bewegung in positivem Sinne verändert und damit Adipositas-assoziierte Risikofaktoren reduziert werden, ohne daß gleichzeitig eine Gewichtsreduktion stattfindet (Law et al., 1991 und Law et al., 1994). Schon mäßige Gewichtsverluste in der Größenordnung von 5-10% des Ausgangsgewichts bringen meßbare gesundheitliche Vorteile (Goldstein, 1992, Evidenzklasse IV). Ein langfristiges Gewichtsmanagement einschließlich einer Risikofaktorreduktion ist der massiven, kurzfristigen Gewichtsabnahme vorzuziehen (Goldstein, 1992; Institute of Medicine, 1995, Evidenzklasse IV, Empfehlungsgrad C).

### **9.10. Management von begleitenden Risikofaktoren**

Bei Therapiebeginn sollte auch ein eventuell erforderliches Management von beeinflussbaren Risikofaktoren, wie z.B. Rauchen, eingeplant werden. Eine große Zahl von Studien zeigt den beträchtlichen Einfluß des Rauchens auf Morbidität und Mortalität im Vergleich zu dem eines erhöhten BMI und die positiven Auswirkungen, wenn das Rauchen aufgegeben wird (Willett et al., 1987; Wannamethee et al., 1989; Fitzgerald et al., 1992). Daher sollte die Aufgabe des Rauchens Priorität haben, auch wenn es gleichzeitig Hinweise dafür gibt, daß dadurch der Appetit zunimmt und der Grundumsatz zurückgeht (Dallosso et al., 1984, Evidenzklasse IIb). Der Nikotinverzicht ist häufig mit einer Gewichtszunahme verbunden, so daß koordinierte Beratung bezüglich Rauchen und Ernährung notwendig wird (Williamson et al., 1991). Wenn einem Patienten der Rat gegeben wird, das Rauchen aufzugeben, sollte daher gleichzeitig ein Gewichtsmanagement-Programm angeboten werden. Die Ernährungsberatung sollte dabei die Prinzipien einer 'gesunden Ernährung' vermitteln. Im Fall einer signifikanten Gewichtszunahme sollte zusätzlich eine gezielte Reduktionskost initiiert werden (SIGN, 1996; Evidenzklasse IV).

## 10. Übergewicht und Adipositas im Kindes und Jugendalter

Bezüglich der Klassifizierung von Übergewicht und Adipositas im Kindesalter besteht zur Zeit im Vergleich zu Erwachsenen weniger Übereinstimmung. Bei Kindern korreliert der BMI stärker mit dem Alter als bei Erwachsenen: der BMI steigt während des ersten Lebensjahres stark an, fällt während der Vorschulzeit und steigt wieder bis zum Erwachsenenalter an (WHO 1998). Übergewicht und Adipositas im Kindesalter sind Risikofaktoren für die Entwicklung von Übergewicht und Adipositas im Erwachsenenalter (Whitaker et al., 1997). Wenigstens 30% aller übergewichtigen oder adipösen Kinder bleiben im Erwachsenenalter übergewichtig oder adipös (Dietz, 1993). Es gibt außerdem Daten, daß Übergewicht und Adipositas im Kindesalter das Mortalitäts- und Morbiditätsrisiko auch 50 Jahre später erhöhen (Must et al., 1992). Diese Wirkung scheint unabhängig von den Folgen des Übergewichtes und der Adipositas im Erwachsenenalter zu sein (Dietz, 1993; Must et al., 1992, Evidenzklasse III). Daraus folgt, daß das Mortalitäts- und Morbiditätsrisiko übergewichtiger Kinder erhöht ist, unabhängig davon, ob sie ihr Übergewicht verlieren oder nicht. Aus diesen Ergebnissen läßt sich Nutzen einer Therapie von Übergewicht und Adipositas im Kindesalter ableiten. Diesem Nutzen stehen folgende Risiken gegenüber:

- Risiko einer Fehlernährung. Da eine adäquate Ernährung essentiell für normales Wachstum ist, empfiehlt die WHO (1998) nur eine geringe Reduktion der Nahrungszufuhr.
- Risiko von Eßstörungen. Es ist wichtig, daß eine Nahrungsrestriktion nicht zur Entwicklung von Eßstörungen oder anderer psychogener Störungen führt (Wilson, 1993).
- Risiko einer Isolation. Es ist wichtig, daß übergewichtige oder adipöse Kinder sich weder zuhause noch in der Schule stigmatisiert fühlen (Dietz, 1992).

Es sollte individuell abgewogen werden, Übergewicht und Adipositas im Kindesalter zu behandeln. Auch bei der Behandlung übergewichtiger oder adipöser Kinder kommen die Komponenten des Basisprogramms mit Modifikationen in Betracht (Williams et al., 1997). Die Steigerung der körperlichen Aktivität sollte im Vergleich zur Ernährungsumstellung stärker im Vordergrund stehen (Epstein, 1995b, Evidenzklasse IV, Empfehlungsgrad C).

Die Arbeitsgruppe „Adipositas im Kindesalter“ der Deutschen Adipositas-Gesellschaft entwickelt derzeit detaillierte Empfehlungen zur Behandlung der Adipositas im Kindes- und Jugendalter.

# 11. Anhang

## 11.1. Flußdiagramm „Adipositasprävention und –therapie“

Folgende Zielbereiche sind anzustreben (WHO): BMI 18.5 – 24.9 kg/m<sup>2</sup>, für Männer: Taillenumfang ≤ 94 cm, für Frauen: Taillenumfang ≤ 80 cm.



Wie unter „Methodik“ beschrieben wurden Interventionsstudien evaluiert und mit Evidenzklassen (I bis IV) gemäß ihrer wissenschaftlichen Aussagekraft belegt. Die ausgesprochenen Handlungsempfehlungen der Grade A bis C wurden anhand der Evidenzklassen gewichtet. Für das stufenweise Vorgehen beim Übergewicht und einzelner Grade der Adipositas sowie beim Management von Risikofaktoren dienten Empfehlungen der SIGN (1996), des Royal College of Physicians (1997) und der WHO (1998).

<sup>1</sup> Gesunder Lebensstil entspricht im wesentlichen dem Basisprogramm

<sup>2</sup> Detaillierte Erläuterungen siehe nächste Seite

<sup>3</sup> Ggf. Überweisung an den Spezialisten (z.B. auf Adipositas spezialisierter Diabetologe, spezialisierter Chirurg)



## **1. Gewichtsmanagement:**

### **1.1. Basisprogramm**

- Ernährungstherapie (B, IIb)
- Verhaltensmodifikation (A, Ib)
- Bewegungssteigerung (A, Ib)

### **1.2. Adjuvante medikamentöse Therapie:**

Die zwei in Frage kommenden Substanzen, Sibutramin und Orlistat, befinden sich noch im Zulassungsverfahren bzw. wurden zum Zeitpunkt der Drucklegung zugelassen.

### **1.3 Chirurgische Therapie (B, IIa)**

## **2. Komorbiditäten der Adipositas:**

- Metabolische Störungen
- Arteriosklerotische Folgekrankheiten
- Erkrankungen der Gallenblase
- Karzinome
- Hormonelle Störungen
- Erkrankungen des Bewegungsapparates
- Pulmonale Komplikationen
- Psychosoziale Probleme

## **3. Risikofaktor-Management bezieht sich auf folgende Risikofaktoren und Erkrankungen:**

Kardiovaskuläre Risikofaktoren:

- Hypertonie
- Dyslipidämie
- Diabetes Mellitus
- Rauchen

Risikofaktoren für die Gewichtszunahme:

- Falsche Ernährung
- Falsche Eßgewohnheiten
- Bewegungsmangel
- Familiäre Prädisposition
- Ungünstiges soziales Umfeld

## 11.2. Ökonomische Aspekte der Adipositas in Deutschland

### 11.2.1. Methodik der Kostenschätzung

In den Industrienationen erlangt die Adipositas aufgrund ihrer steigenden Prävalenz und ihren schwerwiegenden Begleit- und Folgeerkrankungen zunehmend an gesundheitspolitischer Bedeutung. Die adipositas-assoziierten Krankheitskosten belasten nicht nur die Sozialversicherungsträger, sondern auch die Patienten und ihre Angehörigen.

Krankheitskosten-Studien sind für die Entscheidungsträger im Gesundheitswesen insofern von Bedeutung, als sie die Verteilung der verbrauchten Ressourcen und damit die auf die einzelnen Krankheiten entfallenden Kosten verdeutlichen. Auf der Basis der krankheitsspezifischen Daten über Prävalenz und Inanspruchnahmeverhalten kann beispielsweise beurteilt werden, ob ein neues effektives Therapiekonzept zu Kosteneinsparungen führt. Krankheitskosten-Studien liefern somit grundlegende Informationen für Wirtschaftlichkeitsdiskussionen und Kosten-Nutzen-Analysen, beinhalten jedoch auch die Gefahr, daß gesundheitspolitische Entscheidungen nicht auf der Basis der Kosten-Effektivität von Behandlungsalternativen getroffen werden, sondern aufgrund der gesamtwirtschaftlichen Kosten einer Krankheit.

Bei der Kalkulation der Kosten, d.h. dem bewerteten Verbrauch von Ressourcen, sind die folgenden Komponenten zu berücksichtigen:

- direkte Kosten, die in unmittelbarem Zusammenhang mit der Erkrankung stehen. Hierzu zählen zum einen der Verbrauch von Gesundheitsleistungen und -gütern, z.B. im Rahmen einer medikamentösen oder ärztlichen Behandlung, einer Diagnose, einer präventiven oder rehabilitativen Maßnahme, zum anderen der Ressourcenverbrauch im privaten Sektor, z.B. für Fahrten zu Gesundheitseinrichtungen, spezielle Kostformen und eigenfinanzierte Therapien.
- indirekte Kosten, bedingt durch den Ressourcenverlust infolge von Arbeitsunfähigkeit, vorzeitiger Berentung oder vorzeitigem Tod. Es entstehen Kosten, da weniger Güter und Dienstleistungen produziert werden können. Zu erfassen ist hierbei auch: geringere berufliche Aufstiegschancen, Zeitaufwand der Anhörigen für die Versorgung des erkrankten Angehörigen.
- intangible Kosten, die durch die psychosozialen Auswirkungen der Erkrankung, wie z.B. Schmerz, verminderte Lebensqualität, soziale Abhängigkeit, verursacht werden. Diese betreffen sowohl den Patienten selbst als auch dessen Angehörige.

In den bislang durchgeführten Krankheitskosten-Studien (vgl. Kapitel 4.4) wurden nur die direkten Behandlungskosten und die indirekten Kosten berücksichtigt. Die Kosten, die im privaten Bereich oder für die Angehörigen entstehen, wurden ebenso wenig quantifiziert wie die intangiblen Kosten. Zudem wurden häufig die direkten Kosten zusätzlicher Gesundheitsprogramme - innerhalb und außerhalb des Gesundheitssystems - ignoriert, wie z.B. Personalkosten bei Beratungs- und Gruppensitzungen. Dies impliziert eine systematische Unterschätzung der adipositasbedingten Kosten. Die meisten Krankheitskosten-Studien basieren auf dem Prävalenzansatz. Dabei werden alle direkten und indirekten Kosten dem Jahr zugerechnet, in dem sie aufgrund der Prävalenz der jeweiligen Krankheit und ihrer Folgen entstanden sind, unabhängig vom Beginn der Erkrankung. Des weiteren gibt es noch den Inzidenzansatz, bei dem nur die Kosten derjenigen Krankheitsfälle berücksichtigt werden, die in dem jeweiligen Berichtsjahr erstmalig festgestellt worden sind. Für diese Krankheitsfälle sowie ihre Folgen werden die direkten und indirekten Kosten bis zur Hei-

lung bzw. bis zum Tod ermittelt. Dieses Studiendesign eignet sich zur Evaluation von Präventionsstrategien sowie alternativen Diagnose-, Therapie- und Rehabilitationsverfahren. Demgegenüber vermitteln Studien nach dem Prävalenzansatz ein umfassendes Bild über die volkswirtschaftlichen Kosten einer Krankheit.

Die Berechnung der indirekten Kosten basiert in Krankheitskosten-Studien häufig auf dem Humankapitalansatz, der den Wert eines Menschen für die Gesellschaft nach seinem Produktionspotential bemißt. Unter der Annahme, daß die individuelle Leistung dem Erwerbseinkommen entspricht, wird der gesellschaftliche Nutzen eines Menschen anhand seines abdiskontierten zukünftigen Einkommens bestimmt. Kritik ist am Humankapitalansatz insofern zu üben, als er Nicht-Erwerbstätige (z.B. Kinder, Rentner, Hausfrauen) und Empfänger niedriger Einkommen diskriminiert. Des Weiteren impliziert eine Arbeitsunfähigkeit bei chronischer Arbeitslosigkeit, d.h. hoher Arbeitsmarkt-Elastizität, nicht unbedingt einen Ressourcenverlust.

### **11.2.2 Die Kosten der Adipositas in Deutschland**

Da bislang keine umfassende Analyse der Adipositas-bedingten Kosten für Deutschland existiert, ist lediglich eine konservative Schätzung der gesamtwirtschaftlichen Kosten möglich. Für West-Deutschland wurden die Kosten ernährungsabhängiger Krankheiten in einer vom Bundesministerium für Gesundheit in Auftrag gegebene Analyse für das Jahr 1990 (BMG, 1993) geschätzt. Dabei handelt es sich um einen Top-down-Ansatz, d.h. die gesamten Ausgaben für Gesundheit des Jahres 1990 wurden mittels relativer Risiken auf einzelne ernährungsabhängige Krankheiten (ICD-Dreisteller) aufgeteilt.

Die Kostenschätzung des BMG ist eher konservativ, da nur etwa 81% der gesamten direkten Kosten ernährungsabhängiger Krankheiten erfaßt werden konnten. Hinsichtlich der Kostenangaben dieser Studie ist anzumerken, daß als Grenzwert für das Vorliegen von Adipositas ein BMI  $> 29 \text{ kg/m}^2$  bei Frauen und  $> 30 \text{ kg/m}^2$  bei Männern angesetzt wurde.

Die in Tabelle I angeführten Ergebnisse der Studie des Bundesministeriums für Gesundheit (1993) unterschätzen die volkswirtschaftlichen Kosten massiv, da zum einen die Komorbiditäten der Adipositas nicht einbezogen wurden und zum anderen die Diagnose „Adipositas“ nur selten gestellt wird.

Für die neuen Bundesländer konnten die krankheitsspezifischen Kosten nur geschätzt werden, indem die Ergebnisse der alten Bundesländer bevölkerungsabhängig auf die neuen Bundesländer extrapoliert wurden. Dabei wurde die Annahme zugrunde gelegt, daß bereits 1990 eine Angleichung der demographischen, epidemiologischen, sozialen und wirtschaftlichen Lebensverhältnisse Ostdeutschlands an Westdeutschland bestand. Aufbauend auf den Ergebnissen des Bundesministeriums für Gesundheit wurde in einer Infratest-Erhebung (Schneider, 1996) versucht, die Kosten der Adipositas - einschließlich der mit ihr in epidemiologischem Zusammenhang stehenden Erkrankungen - zu schätzen. Es handelt sich dabei um einen Prävalenzansatz, in dem die relativen bzw. attributablen Risiken der Adipositas mitberücksichtigt wurden.

Tab.I: Adipositas-bezogene Kosten in Deutschland - ohne Berücksichtigung von Komorbiditäten (BMG, 1993)

Adipositas Kosten (in Mill. DM)	West-Deutschland	Ost-Deutschland
Direkte Kosten		
ambulante Behandlung	200	
Arzneien, Heil- und Hilfsmittel	1	
stationäre Behandlung	69	
stationäre Kurbehandlung	62	
gesamt	332	97
Indirekte Kosten	67	17
infolge Mortalität	150	44
infolge Arbeitsunfähigkeit	112	33
infolge Invalidität	328	93
gesamt		
Gesamtkosten	660	190

Das relative Risiko dient der Quantifizierung des Zusammenhangs zwischen Adipositas und Folgekrankheiten und wird bestimmt, indem die Erkrankungsraten in Relation zueinander gesetzt werden. Der sich ergebende Faktor gibt an, um wieviel höher oder niedriger das Erkrankungsrisiko einer Personengruppe mit Adipositas ist gegenüber einer Personengruppe, bei der diese Exposition nicht vorliegt. Ein relatives Risiko von kleiner bzw. größer als 1 bedeutet, daß Adipositas einen risikoreduzierenden bzw. risikoe erhöhenden Einfluß hat. Hinsichtlich Tabelle II ist zu berücksichtigen, daß die Angaben verschiedenen Untersuchungen, denen keine einheitlichen BMI-Grenzwerte zugrunde liegen, entnommen wurden.

Tab.II: Relative und attributable Risiken übergewichtiger Personen für ausgewählte Krankheiten (Schneider, 1996)

	Relatives Risiko	Attributables Risiko
Hypertonie	2,9	66%
Herzinfarkt	1,9	47%
Angina pectoris	2,5	60%
Schlaganfall	3,1	68%
Typ-2-Diabetes mellitus	2,9	66%
Hyperlipidämie	1,5	33%
Gicht	2,5	60%
Gallenerkrankungen/ Gallensteine	2,0	50%
Dickdarmkrebs	1,3	23%

Die Kostenschätzung der Untersuchung von Infratest basiert auf dem bevölkerungsbezogenen attributablen Risiko, das neben dem relativen Risiko auch die Prävalenz

der Adipositas berücksichtigt. Anhand dieses Faktors sind Angaben darüber möglich, welcher Prozentsatz an Erkrankungen in der Bevölkerung auf die Adipositas zurückzuführen ist. Die Berechnung erfolgt nach folgender Formel:

=

$$\text{Bevölkerungsbezogenes attributables Risiko} = \frac{\text{Prävalenz des Risikofaktors} \times (\text{Relatives Risiko} - 1)}{1 + [\text{Prävalenz des Risikofaktors} \times (\text{Relatives Risiko} - 1)]}$$

Die krankheitsspezifischen Kosten mit den bevölkerungsbezogenen attributablen Risiken gewichtet. Da nicht alle Komorbiditäten der Adipositas berücksichtigt wurden, handelt es sich um eine konservative Kostenschätzung. Zudem können die zugrundegelegten Prävalenz-Daten zu einer Unterschätzung der attributablen Risiken führen.

Da sowohl hinsichtlich der Prävalenzen als auch hinsichtlich der attributablen Risiken keine verlässlichen Daten existieren, wurden die Kosten auf der Basis zweier Modellvarianten geschätzt. Während im Modell I eine vorsichtige Schätzung der relativen und attributablen Risiken zugrunde gelegt wird, basiert das Modell II auf höheren, aus der Literatur bekannten Werten. Hinsichtlich der Prävalenzen wurden in beiden Ansätzen zwei alternative Prozentsätze verwendet: die Prävalenz von 12% basiert auf den Ergebnissen der VERA-Studie aus dem Jahre 1987/88 und diejenige von 18% auf den Daten des Nationalen Gesundheitssurveys des Jahres 1990/91.

Die aus den beiden Modellvarianten resultierenden Kostenschätzungen sind in Tabelle III dargestellt. In Abhängigkeit von den Modellannahmen ergeben sich - bezogen auf das Jahr 1990 - für die Adipositas und ihre Komorbiditäten Kosten zwischen 11,1 Mrd. DM und 19,3 Mrd. DM. Es handelt sich dabei um eine konservative Schätzung, da aufgrund der Gliederungstiefe der Primärdaten nicht alle Kosten krankheitsgruppenspezifisch zugeordnet werden konnten und nur Patienten mit einem BMI von mehr als 30 kg/m<sup>2</sup> in die Analyse einbezogen wurden.

Da die Ergebnisse auf den vom Bundesministerium für Gesundheit geschätzten Kosten basieren, unterliegen sie den bereits angeführten Fehlermöglichkeiten. Insbesondere stellen die Kosten für die neuen Bundesländer nur eine sehr grobe Schätzung dar.

Weitere Unsicherheiten resultieren aus den in der Untersuchung von Infratest zugrunde gelegten Annahmen. Beispielsweise wird eine Gleichverteilung der Kosten auf adipöse Patienten gemäß der attributablen Risiken unterstellt, so daß altersspezifische Unterschiede nicht berücksichtigt werden. Hinsichtlich der Risikofaktoren ist anzumerken, daß diese unterschiedlichen Untersuchungen entstammen, die z.T. verschiedene BMI-Grenzwerte verwenden. Desweiteren kann angenommen werden, daß die für Deutschland zugrundegelegten Prävalenz-Daten die tatsächliche Relevanz der Adipositas unterschätzen. Aufgrund dieser Fehlermöglichkeiten wurde eine Bandbreite für die Kosten der Adipositas berechnet.

Tab.III Adipositas-bezogene Kosten in Deutschland - unter Berücksichtigung der wichtigsten Komorbiditäten (Schneider, 1996)

Modell	I		II	
	a	b	a	b
Variante				
Adipositasprävalenz	12%	18%	12%	18%
Attributables Risiko				
Koronare Herzkrankheit	70%		70%	

In der Untersuchung von Infratest wurden zudem die für das Jahr 1990 ermittelten Kosten auf das Jahr 1995 extrapoliert, wobei eine pauschale Steigerungsrate der Gesamtkosten der Adipositas von 40% angenommen wurde. Nach dieser Rechnung ergeben sich geschätzte Kosten für 1995 zwischen 15,5 Mrd. DM und 27,1 Mrd. DM - in Abhängigkeit von der verwendeten Modellvariante.

Darüber hinaus wurde in der Studie versucht, die vermeidbaren Kosten der Adipositas in Deutschland zu schätzen. Dabei wurde ein Simulationsmodell zugrunde gelegt, anhand dessen der Effekt von Präventivmaßnahmen aufgezeigt werden kann. Unter der realistischen Annahme, daß die in den Nationalen Gesundheitssurveys beobachtete Prävalenz von 18% in den alten Bundesländern durch Gesundheitsprogramme auf 15% reduziert würde, hätten in der Modellvariante Ib im Jahre 1990 Kosten in Höhe von 2,5 Mrd. DM eingespart werden können.

### **11.2.3. Internationaler Kostenvergleich**

Die Kosten der Adipositas wurden auch für andere Länder auf der Basis des Prävalenzansatzes geschätzt. Der internationale Vergleich zeigt dabei relativ gute Übereinstimmungen, d.h. der Anteil der Adipositas-bezogenen Kosten an den Gesamtausgaben des jeweiligen Gesundheitssystems schwankt zwischen 2% und 6%.

Die erste grundlegende Kostenschätzung wurde für die USA vorgenommen (Col-ditz, 1992). In dieser Studie, die den Ausgangspunkt für viele der nachfolgenden Analysen darstellt, wurden die direkten und indirekten Kosten der Adipositas für das Jahr 1986 mit Hilfe eines Prävalenzansatzes berechnet. Dabei wurden folgende Komorbiditäten in die Schätzungen einbezogen: Typ-2-Diabetes mellitus, KHK, Bluthochdruck, Gallenblasenerkrankungen, Brust- und Darmkrebs. Die konservative Schätzung ergab, daß 1986 der Anteil der Adipositas-bezogenen Kosten an den gesamten Gesundheitsausgaben 5,5% betrug. In einer nachfolgenden Analyse, die auch muskulo-skeletale Erkrankungen berücksichtigte, wurde - bezogen auf das Jahr 1990 - der Anteil der direkten Kosten an den gesamten Gesundheitsausgaben sogar auf 6,8% geschätzt (Wolf et al., 1994).

Aufbauend auf den Ergebnissen dieser Studien wurde für das Jahr 1993 eine weitere Kostenschätzung durchgeführt, die zeigte, daß die direkten und die indirekten Kosten mit zunehmendem BMI bzw. mit der Gewichtszunahme anstiegen (Wolf et al., 1996).

In den Niederlanden wurde auf der Grundlage der Daten des Health Survey von 1991 der Anteil der direkten Kosten an den gesamten Gesundheitsausgaben auf 4% geschätzt (3% aufgrund der Adipositas und 1% aufgrund von Übergewicht). Diese Studie basierte nicht auf dem Prävalenzansatz, sondern auf einem Vergleich von Übergewichtigen mit Normalgewichtigen hinsichtlich der Inanspruchnahme ambulanter und stationärer Einrichtungen sowie Verschreibungen von Diuretika und Herz-Kreislauf-Präparaten (Seidell et al., 1995a).

Eine französische Studie ergab - auf der Grundlage des Prävalenzansatzes - für 1992 nur einen Anteil von 2% der direkten Kosten der Adipositas (BMI  $\geq$  27) an den gesamten Gesundheitsausgaben (Lévy et al., 1995). Die indirekten Kosten wurden nur annähernd bestimmt.

Für Australien wurde der Anteil der direkten Adipositas-bezogenen Kosten (BMI > 30) an den gesamten Gesundheitsausgaben des Jahres 1989 auf 2% geschätzt, wobei der Prävalenzansatz zugrunde gelegt wurde (Segal et al., 1994). Da der Einfluß der Arbeitsunfähigkeit auf die Produktion nicht genau bestimmbar ist, wurden die indirekten Kosten nicht ermittelt. Insgesamt ist die Kostenschätzung dieser Studie - ebenso wie die französische - als konservativ zu bezeichnen, da nicht alle Komorbiditäten sowie nur ein Teil der Gesundheitsleistungen einbezogen werden konnten.

In Tabelle IV sind die Ergebnisse der internationalen Studien zusammenfassend dargestellt.

Tab.IV: Internationaler Vergleich der Adipositas-bezogenen Kosten

Land	Jahr	BMI (kg/m <sup>2</sup> )	Anteil an den gesamten Gesundheitsausgaben (%)
USA	1986	> 29	5,5
USA	1990	> 29	6,8
Niederlande	1991	> 25 (30)	4 (3)
Frankreich	1992	> 27	2
Australien	1989	> 30	2





## 11.3. Literatur

### 11.3.1. Recherchierte Literatur

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973. Zurlo F, Lillioja S, Esposito-Del Puente A. Low ratio of fat to carbohydrate oxidation as predictor of weight gain: Study 24-RQ. *Am J Physiol* 1990;259(657):E650-657.

### 11.3.2. Zitierte, nicht evaluierte Literatur (mit Abstracts)

1. Abbott RD, Behrens GR, Sharp DS. Body mass index and thromboembolic stroke in non-smoking

men in older middle age. The Honolulu Heart Program. *Stroke* 1994;25:2370-6.

**BACKGROUND AND PURPOSE:** While evidence suggests that obesity has an independent relation to coronary artery disease, similar findings for stroke have not been established. The purpose of this study was to examine the relation between body mass index and the risk of thromboembolic stroke independently of other risk factors. **METHODS:** Since 1965, the Honolulu Heart Program has followed a cohort of men in a prospective study of cardiovascular disease. This article examines the relationship between the baseline measurement of body mass index and the risk of thromboembolic stroke in 1163 nonsmoking men in older middle age (55 to 68 years). Men who had an elevated risk of stroke due to hypertension, diabetes, and other risk factors were excluded from the analysis. **RESULTS:** After 22 years of follow-up, the rate of stroke increased significantly with increasing levels of body mass (P .01). In the bottom tertile of the body mass index, the rate of thromboembolic stroke was 28.7 per 1000 (11/383). In the middle tertile, the rate was increased by 40% to 40.7 per 1000 (16/393), and in the top tertile, the rate of thromboembolic stroke was 55.4 per 1000 (21/387), a twofold excess compared with the bottom tertile. After adjustment for age and the residual effects of confounding risk factors, including systolic blood pressure and serum glucose, the estimated relative risk of stroke for the average body mass index in the top tertile (26.6 kg/m<sup>2</sup>) compared with that in the bottom tertile (20.3 kg/m<sup>2</sup>) was 2.1 (95% confidence interval, 1.1 to 4.1). These findings were not affected by coronary events that occurred in the course of follow-up, nor did they appear to be influenced by deaths from other causes. **CONCLUSIONS:** We conclude that elevated body mass is associated with an increased risk of thromboembolic stroke in nonsmoking men in older middle age who are free of commonly observed conditions related to cardiovascular disease.

2. Adami GF, Gandolfo P, Scopinaro N. Binge eating in obesity. *Int J Obes Relat Metab Disord* 1996;20(8):793-4

**OBJECTIVE:** To investigate the influence of dieting and of body shape dissatisfaction on binge eating. **DESIGN:** Longitudinal study following biliopancreatic diversion (BPD), when the body shape has become normal or nearly normal, and any worries over weight, dieting and food have probably been abandoned completely. **SUBJECTS:** 65 severely obese patients, evaluated by clinical semistructured interview for occurrence of binge eating episodes prior to, and at one and at two years following BPD. **RESULTS:** Whereas preoperative binge eating had been reported by 65% of the obese individuals, at two years following BPD binge eating occurred only in 9.2% of them. **CONCLUSIONS:** Weight stabilization following BPD is associated with a sharp improvement in control over food intake, and this suggests the central role of dieting and/or of body dissatisfaction in causing binge eating episodes.

3. Aertzliche Zentralstelle Qualitätssicherung. Beurteilungskriterien für Leitlinien in der medizinischen Versorgung. *Deutsches Ärzteblatt* 1997;94(33):1622-23, kein Abstract.

4. Agras WS. *The Nature and Treatment of Binge Eating Disorder*. Münster: Verlag für Psychotherapie, 1995, Buch.

5. Allison D, MS F, M H, DP K. Hypothesis concerning the U-shaped relation between body mass index and mortality. *Am J Epidemiol* 1997;146(4):339-349

Numerous studies have documented a U- or J-shaped association between body mass index (BMI) (kg/m<sup>2</sup>) and mortality, such that increased mortality rate is associated with relatively low and high BMI values. It has been argued elsewhere that the elevated mortality rate observed at lower BMI values actually results from the effects of unmeasured confounding variables, in particular smoking status and preexisting disease. In this paper, the authors present an additional explanation for the phenomenon, i.e., nonspecific measurement. They propose that differential health consequences of fat mass and fat-free mass can be masked by the use of BMI when studied in relation to mortality. To illustrate this point, they use body composition data from 1,137 healthy adults and specify a hypothetical underlying BMI-mortality model in which the logit of death increased linearly with fat mass and decreased linearly with fat-free mass, and % fat increased monotonically with BMI. The results indicate that, even under these specifications, the authors can recover a U-shaped association between BMI and mortality. Consistent with previous suggestions in the literature, future epidemiologic studies that examine the association between adiposity and mortality should prioritize the use of body composition measures.

6. Allison DB, Faith MS, Nathan JS. Risch's lambda values for human obesity. *Int J Obes Relat Metab Disord* 1996;20(11):990-9 **OBJECTIVE:** Risch's lambda statistic (lambda R) is related to the heritability of traits and can be useful in several contexts, including the conduct of power analyses to determine sample size for gene mapping studies. However, values of lambda R have not been presented for human obesity. **DESIGN AND RESULTS:** Using both analytic and empirical approaches, the present study calculates estimates of lambda R. Examples are provided to illustrate the use of these estimates for determining sample size for genetic mapping studies.

7. Assmann G. *Lipid metabolism disorders and coronary heart disease*. München: MMV, 1994, Buch.

8. Assmann G, Schulte H. Relation of high-density lipoprotein cholesterol and triglycerides to incidence of atherosclerotic coronary artery disease (the PROCAM experience). Prospective Cardiovascular Munster study. *Am J Cardiol* 1992;70:733- 737

The incidence of atherosclerotic coronary artery disease (CAD) was assessed in 4,559 male participants (aged 40 to 64 years) from the Prospective Cardiovascular Munster study, over a 6-year follow-up period. During this time, 186 study participants developed atherosclerotic CAD (134 definite nonfatal myocardial infarctions and 52 definite atherosclerotic CAD deaths including 21 sudden cardiac deaths and 31 fatal myocardial infarctions). Univariate analysis revealed a significant association between the incidence of atherosclerotic CAD and high-density lipoprotein (HDL) cholesterol ( $p$  less than 0.001) and triglycerides ( $p$  less than 0.001). The relation to HDL cholesterol remained after adjustment for other risk factors. By contrast, the relation between the incidence of atherosclerotic CAD and triglycerides disappeared if, in a multivariate analysis by means of a multiple logistic function, cholesterol or HDL cholesterol were taken into account. However, the data suggested that hypertriglyceridemia is a powerful additional coronary risk factor, when excessive triglycerides coincide with a high ratio of plasma low-density lipoprotein cholesterol to HDL cholesterol (greater than 5.0). Even though the prevalence of this subgroup was only 4.3%, it included a quarter of all atherosclerotic CAD events observed.

9. Assmann G, Schulte H. The Prospective Cardiovascular Munster (PROCAM) study: prevalence of hyperlipidemia in persons with hypertension and/or diabetes mellitus and the relationship to coronary heart disease. *Am Heart J* 1988;116:1713-24

The ongoing Prospective Cardiovascular Munster (PROCAM) study was initiated in 1979. The objectives of this trial were to determine the prevalence of coronary heart disease (CHD) risk factors in the German population, improve the prediction and early detection of CHD, and derive recommendations for the primary prevention of vascular disease from the trial results. Of male PROCAM trial participants, ages 40 to 65 years, who had been free of myocardial infarction or stroke at the time of entry and had been followed up for 4 years, longitudinal data analysis shows that hypertension, diabetes mellitus, and hyperlipidemia are independent risk factors for CHD. The concomitant occurrence of these factors leads to a cumulative increase in CHD risk. Hyperlipidemia is a more significant risk factor for CHD than hypertension or diabetes mellitus. Ongoing data from 4043 men and 1333 women, ages 50 to 65 years, show that more than 50% of all diabetics are hypertensive. Cholesterol is slightly increased in male hypertensives and diabetics of either sex, whereas low-density lipoprotein cholesterol is slightly raised in male hypertensives and female diabetics only. The serum triglyceride concentrations are higher for hypertensives and markedly higher for diabetics of both sexes. High-density lipoprotein cholesterol concentrations are decreased in hypertensives, especially in hypertensive women, and even more so in diabetics. The European Consensus Conference for primary prevention of CHD has classified hyperlipidemia into five groups (A to E). For hypertensives, the proportion of patients in group D (cholesterol between 200 and 300 mg/dl and triglyceride levels between 200 and 500 mg/dl) is 20.4% for men and 6.2% for women, about twice as high as those in the control groups. The occurrence of combined (group D) or massive hyperlipidemia (group E: cholesterol greater than 300 mg/dl and/or triglycerides greater than 500 mg/dl) is prevalent in more than 30% of all diabetics: two to three times more frequently than in nondiabetic patients. When concomitant hypertension is included, this prevalence increases to more than 40% for diabetic men. Among those patients endangered by three risk factors, approximately 40% of all men and 60% of all women have the particularly atherogenic combination that includes lowered high-density lipoprotein cholesterol.

10. Berrios X, Koponen T, Huiguang T, Khaltayev N, Puska P, A. N. Distribution and prevalence of major risk factors of noncommunicable diseases in selected countries: the WHO Inter-Health programme. *Bulletin of the World Health Organization* 1997;75:99-108

The Inter-Health Programme was launched in 1986 by WHO, with the collaboration of a coordination centre (National Public Health Institute, Finland) to control and prevent chronic noncommunicable diseases (CNCDs) among adults. Programmes for action were organized based on the concept that most major CNCDs share common risk factors and that those that are lifestyle related are modifiable through efficient interventions using multifactorial strategies involving community participation and behaviour changes carried out at the primary health care level. Twelve countries from all WHO Regions have joined the programme. A baseline survey was undertaken in all countries with a common protocol, following the criteria and methods employed in the MONICA Project. Altogether 36815 men and women aged 35-64 years were included in the present analysis from the following Inter-Health countries: Chile, China, Cyprus, Finland, Lithuanian SSR, Malta, Mauritius, Russian SFSR, United Republic of Tanzania, and USA. In addition to individual country analysis, centralized analysis was carried out at the Finnish National Public Health Institute and the Department of Community Health, Kuopio University, Finland. Reported here are the mean values of blood pressure, body mass index, and serum total cholesterol as well as specific prevalences of smoking, hypertension, obesity, and hypercholesterolaemia.

11. Böttiger L, Carlson LA. Risk factors for death for males and females. A study of the death pattern in the Stockholm prospective study. *Acta Med Scand* 1982;211:437-42

In the Stockholm Prospective Study, 531 male and 163 female deaths had occurred during 14.5 years

of observation. Deaths were divided into three categories: "ischemic", "neoplastic" and "other" and their relations to entry characteristics were analyzed. For ischemic vascular deaths age, smoking, systolic blood pressure and triglycerides were independent risk factors for both sexes, while cholesterol and weight/height index were not. For neoplastic deaths age, smoking, systolic blood pressure and ESR were positively and cholesterol and weight/height index negatively associated. This negative association was found especially for colon carcinoma and not for, e.g. prostatic and bronchial carcinoma in men. For other deaths age, blood pressure and ESR were independent risk factors for men, and age, smoking and ESR for women.

12. Bouchard C, Tremblay A, Després JP. The response to long-term overfeeding in identical twins. *New Engl J Med* 1990;322:1477-1482

We undertook this study to determine whether there are differences in the responses of different persons to long-term overfeeding and to assess the possibility that genotypes are involved in such differences. After a two-week base-line period, 12 pairs of young adult male monozygotic twins were overfed by 4.2 MJ (1000 kcal) per day, 6 days a week, for a total of 84 days during a 100-day period. The total excess amount each man consumed was 353 MJ (84,000 kcal). During overfeeding, individual changes in body composition and topography of fat deposition varied considerably. The mean weight gain was 8.1 kg, but the range was 4.3 to 13.3 kg. The similarity within each pair in the response to overfeeding was significant (P less than 0.05) with respect to body weight, percentage of fat, fat mass, and estimated subcutaneous fat, with about three times more variance among pairs than within pairs (r approximately 0.5). After adjustment for the gains in fat mass, the within-pair similarity was particularly evident with respect to the changes in regional fat distribution and amount of abdominal visceral fat (P less than 0.01), with about six times as much variance among pairs as within pairs (r approximately 0.7). We conclude that the most likely explanation for the intrapair similarity in the adaptation to long-term overfeeding and for the variations in weight gain and fat distribution among the pairs of twins is that genetic factors are involved. These may govern the tendency to store energy as either fat or lean tissue and the various determinants of the resting expenditure of energy.

13. Braddon FEM, Rodgers B, Wadsworth MEJ, Davies JMC. Onset of obesity in a 36 year birth cohort. *Brit Med J* 1986;293:299-303

A large national cohort of children studied from birth to 36 years was used to test the predictive value of childhood obesity for obesity in adult life. Only 21% (39) of obese 36 year olds had been obese at age 11 years, and even when associated social factors were taken into account the correctly predicted percentage was much lower than the prediction rate achieved using body mass data from age 26 years. The comparatively poor predictive value of childhood obesity and the association of adult obesity with educational achievements and socioeconomic circumstances of family of origin emphasise the need for encouraging good nutritional and exercise habits rather than placing undue emphasis on the control of childhood obesity.

14. Brown SA. Studies of educational intervention and outcomes in diabetic adults: a meta-analysis revisited. *Patient Education and Counseling* 1990;16:189-215

This paper reports a follow-up of previous meta-analysis research conducted by the author on the effects of diabetes patient education on patient outcomes. An expanded sample of studies and psychological outcome variables were added to the previously studied variables of patient knowledge, self-care behaviors (compliance and skill performance) and metabolic control. The purpose was to determine: (1) the effects of patient education on specific outcome variables; and (2) the relationships between effects of education and characteristics of the studies and/or subjects. Following an extensive literature search, a total of 82 studies were found which met the inclusion criteria for this analysis; 68% were published and 32% were unpublished. Homogeneity analyses of specific patient outcome variables yielded the following results: knowledge effects ranged from 0.49 to 1.05; self-care behavior effects from 0.17 to 0.57, with insulin injection and weight loss associated with the smallest effect sizes; metabolic control from 0.16 to 0.41; and psychological outcomes 0.27. Mean age of the subjects was negatively correlated with knowledge and cholesterol, indicating that the older the mean age of the subjects, the lower the effects of patient education on these variables. Findings of this meta-analysis on the expanded data set were consistent with the previous meta-analysis and lend support to the effectiveness of diabetes patient education in improving patient outcomes.

15. Bundesministerium für Gesundheit. *Ernährungsabhängige Krankheiten und ihre Kosten*. Baden-Baden: Nomos Verlagsgesellschaft, ISBN: 3-7890-3199-2, 1993, Buch.

16. Campbell DB. Dexfenfluramine: an overview of its mechanisms of action. *Rev. Contemp. Pharmacother.* 1991;2:93-113

Dexfenfluramine has been successfully developed from racemic fenfluramine, producing a single enantiomer with a more specific activity on reducing food intake, and with fewer unwanted effects. This enhanced specificity has led to a greater understanding of nutrient selection, in particular the control of carbohydrate intake and associated intermeal snacks. In addition, dexfenfluramine has actions on many aspects of body weight regulation and this review attempts to bring these properties together.

The major effect of dexfenfluramine is to reduce food intake centrally. By increasing serotonin (5-HT) transmission in the paraventricular nucleus of the hypothalamus (PVN). At low doses (<2mmg/kg), this is achieved by inhibiting 5-HT uptake into the neurone or possibly by interacting directly with 5-HT<sub>1c</sub> (dexnorfenfluramine) or specific dexfenfluramine receptors. Higher non-pharmacological doses, 5-HT release and other 5-HT activities are found but these may have little relevance in the clinical situation. Not all food is equally affected and dexfenfluramine tends to reduce intermeal snacks rich in carbohydrates and fat, where overeating is common. Centrally mediated increase in thermogenesis occurs particularly after carbohydrate ingestion and alterations in stress responses (cortisol, ACTH), both of which may play an important role in longer term weight regulation. In addition, the improvement of peripheral fat and glucose metabolism due to reductions in absorption, synthesis and increased uptake and tissue oxidation, can be useful in obesity associated with diabetes and hyperlipidaemia. *Rev Contemp Pharmacol* 1991; 2: 93-113.

17. Carter J, Horowitz R, Wilson R, Sava S, Sinnock P, Gohdes D. Tribal differences in diabetes: prevalence among American Indians in New Mexico. *Public Health Report* 1989;104:665-669  
The prevalence of diagnosed diabetes among American Indians in New Mexico with varied genetic and cultural backgrounds is reported. Utilizing community-based registries, the prevalence in persons ages 35 years and older ranged from 9.8 percent among Jicarilla Apache Indians to 28.2 percent among Zuni Indians. All rates were significantly higher than the U.S. rate of 5.3 percent for the same age group. In addition, in three of the five tribal groups examined, the rates of diagnosed diabetes in Indians less than 35 years of age (range from 0.5 percent to 1.3 percent) were significantly higher than the U.S. rate of 0.4 percent for the same age group. The prevalence rates of diagnosed diabetes found in this study of American Indians in New Mexico were intermediate between those for the United States as a whole and the Pima Indians of southern Arizona. Reasons for the variations and the relative contribution of obesity, fitness, or genetic risk in the development of diabetes need further study.

18. Cnattingius S, Bergstrom R, Lipworth L, Kramer MS. Prepregnancy weight and the risk of adverse pregnancy outcomes. *N Engl J Med* 1998;338(3):147-52  
BACKGROUND: Obesity before pregnancy is associated with an increased risk of several adverse outcomes of pregnancy. The risk profiles among lean, normal, or mildly overweight women are not, however, well established. METHODS: We studied the associations between prepregnancy body-mass index (defined as the weight in kilograms divided by the square of the height in meters) and the frequency of late fetal death, early neonatal death, preterm delivery, and delivery of a small-for-gestational-age infant in a population-based cohort of 167,750 women in Sweden in 1992 and 1993. The women were categorized as follows, according to body-mass index: lean, less than 20.0; normal, 20.0 through 24.9; overweight, 25.0 through 29.9; and obese, 30.0 or more. The estimates were adjusted for maternal age, parity, smoking, education, whether the mother was living with the father, and maternal height. RESULTS: Among nulliparous women, the odds ratios for late fetal death were increased among women with higher body-mass-index values as compared with lean women, as follows: normal women, 2.2 (95 percent confidence interval, 1.2 to 4.1); overweight women, 3.2 (95 percent confidence interval, 1.6 to 6.2); and obese women, 4.3 (95 percent confidence interval, 2.0 to 9.3). Among parous women, only obese women had a significant increase in the risk of late fetal death (odds ratio, 2.0; 95 percent confidence interval, 1.2 to 3.3). Among nulliparous women, the risk of very preterm delivery (at < or =32 weeks' gestation) was significantly increased among obese as compared with lean women (odds ratio, 1.6; 95 percent confidence interval, 1.1 to 2.3), whereas among parous women, the risk was highest among those who were lean. The risk of delivering a small-for-gestational-age infant decreased more with increasing body-mass index among parous than among nulliparous women. CONCLUSIONS: Higher maternal weight before pregnancy increases the risk of late fetal death, although it protects against the delivery of a small-for-gestational-age infant.

19. Colditz G, Willett W, Rotnitzky A, Manson J. Weight gain as a risk factor for clinical diabetes mellitus in women. *Ann Intern Med* 1995;122:481-486

OBJECTIVE: To examine the relation between adult weight change and the risk for clinical diabetes mellitus among middle-aged women. DESIGN: Prospective cohort study with follow-up from 1976 to 1990. SETTING: 11 U.S. states. PARTICIPANTS: 114,281 female registered nurses aged 30 to 55 years who did not have diagnosed diabetes mellitus, coronary heart disease, stroke, or cancer in 1976. OUTCOME MEASURES: Non-insulin-dependent diabetes mellitus. RESULTS: 2204 cases of diabetes were diagnosed during 1.49 million person-years of follow-up. After adjustment for age, body mass index was the dominant predictor of risk for diabetes mellitus. Risk increased with greater body mass index, and even women with average weight (body mass index, 24.0 kg/m<sup>2</sup>) had an elevated risk. Compared with women with stable weight (those who gained or lost less than 5 kg between age 18 years and 1976) and after adjustment for age and body mass index at age 18 years, the relative risk for diabetes mellitus among women who had a weight gain of 5.0 to 7.9 kg was 1.9 (95% CI, 1.5 to 2.3). The corresponding relative risk for women who gained 8.0 to 10.9 kg was 2.7 (CI, 2.1 to 3.3). In contrast, women who lost more than 5.0 kg reduced their risk for diabetes mellitus by 50% or more.

These results were independent of family history of diabetes. CONCLUSION: The excess risk for diabetes with even modest and typical adult weight gain is substantial. These findings support the importance of maintaining a constant body weight throughout adult life and suggest that the 1990 U.S. Department of Agriculture guidelines that allow a substantial weight gain after 35 years of age are misleading.

20. Colditz GA, Willett WC, Stampfer MJ. Weight as a risk factor for clinical diabetes in women. *Am J Epidemiol* 1990b;132:501-13

To determine the relation of body mass index (weight/height<sup>2</sup>) with the risk of clinical non-insulin-dependent diabetes, the authors analyzed data from a cohort of 113,861 US women aged 30-55 years in 1976. During 8 years of follow-up (826,010 person-years), 873 definite cases were identified among women initially free from diagnosed diabetes. Among women of average body mass index, 23-23.9 kg/m<sup>2</sup>, the relative risk was 3.6 times that of women having a body mass index less than 22 kg/m<sup>2</sup>. The risk continued to increase above this level of body mass index. The authors observed a much weaker positive association with weight at age 18, and this association was eliminated after adjustment for current body mass index. Thus, weight gain after age 18 was a major determinant of risk. For an increase of 20-35 kg, the relative risk was 11.3, and for an increase of more than 35 kg, the relative risk was 17.3. Adjusting for family history did not appreciably alter the strong relation observed among women at average levels of body mass index. These data indicate that, at even average weight, women are at increased risk of clinical non-insulin-dependent diabetes and that the relation between body mass index and risk of diabetes is continuous.

21. Colditz GA, Willett WC, Stampfer MJ, Manson JE, Hennekens CH, Arky RA. Weight gain as a risk factor for clinical diabetes mellitus in women. *Am J Epidemiology* 1990a;132(3):501-513

To determine the relation of body mass index (weight/height<sup>2</sup>) with the risk of clinical non-insulin-dependent diabetes, the authors analyzed data from a cohort of 113,861 US women aged 30-55 years in 1976. During 8 years of follow-up (826,010 person-years), 873 definite cases were identified among women initially free from diagnosed diabetes. Among women of average body mass index, 23-23.9 kg/m<sup>2</sup>, the relative risk was 3.6 times that of women having a body mass index less than 22 kg/m<sup>2</sup>. The risk continued to increase above this level of body mass index. The authors observed a much weaker positive association with weight at age 18, and this association was eliminated after adjustment for current body mass index. Thus, weight gain after age 18 was a major determinant of risk. For an increase of 20-35 kg, the relative risk was 11.3 and for an increase of more than 35 kg, the relative risk was 17.3. Adjusting for family history did not appreciably alter the strong relation observed among women at average levels of body mass index. These data indicate that, at even average weight, women are at increased risk of clinical non-insulin-dependent diabetes and that the relation between body mass index and risk of diabetes is continuous.

22. Dallosso HM, James WPT. The role of smoking in the regulation of energy balance. *Int J Obes* 1984;8:365-75

Sixteen smokers (eight men and eight women) were studied before and six weeks after attending a series of anti-smoking clinics. Mean weight gain for the ten subjects who gave up smoking was 1.36 kg ( $P < 0.005$ ) and there was no significant change in body weight of subjects who did not give up smoking. There was a 4 per cent drop in resting metabolic rate of the smokers who successfully gave up ( $n=9$ ), but this was only significant when the data were expressed per kg body weight ( $P < 0.05$ ). Mean energy intake increased by 6.5 per cent but this change was not significant. Smoking a single cigarette significantly increased the metabolic rate for 30 min by 3 per cent compared with a control condition of sham smoking ( $n=15$ ). Thus the discrepancy in body weight between smokers and non-smokers appears to be due to a combination of reduced food intake and the thermogenic effects of smoking.

23. Davis M, Ettinger W, JM N. Obesity and osteoarthritis of the knee: evidence from the National Health and Nutrition Examination Survey (NHANES I). *Semin Arthritis Rheum* 1990b;20(3 Suppl 1):34-41

The importance of systemic/metabolic factors in the association of obesity with radiographic knee osteoarthritis (OA) was examined for 3,905 adults aged 45 to 74 from the United States National Health and Nutrition Examination Survey, 1971 to 1975 (NHANES I). Obesity was associated with both bilateral and unilateral OA, but more strongly with bilateral OA. Obesity was also associated with both symptomatic and nonsymptomatic knee OA. Controlling for age, sex, serum cholesterol, serum uric acid, diabetes, body fat distribution, bone density, and blood pressure did not significantly reduce the association between obesity and knee OA. Findings from these data are not supportive of a metabolic link between obesity and knee OA.

24. Davis MA, Neuhaus JM, Ettinger WH, Muller WH. Body fat distribution and osteoarthritis. *Am J Epidemiol* 1990a;132:701-7

The association of body fat distribution with single and combined site osteoarthritis was investigated using data from the US Health Examination Survey I 1960-1962 (HES I) and the first National Health and Nutrition Examination Survey I, 1971-1975 (NHANES I). The study included 1,636 adults aged 35-

79 years from HES I with hands and feet radiographs and four anthropometric fat distribution measures - subscapular and triceps skinfolds, waist girth, and seat breadth - and 3,885 adults aged 45-74 from NHANES I with knee radiographs and subscapular and triceps skinfold measures. Sex-specific data, adjusted for age, race, and body mass index, were analyzed using polychotomous logistic regression. There was a positive association of body mass index with knee osteoarthritis and with combined hands and feet osteoarthritis. A peripheral body girth pattern was associated with combined site osteoarthritis of the hands and feet; however, there was no consistent pattern of association of body fat distribution with knee osteoarthritis nor with osteoarthritis of the hands or feet only. These findings suggest that the central body fat pattern observed in previous studies to be associated with cardiovascular and gallbladder disease, and with diabetes, is not associated with osteoarthritis of the hands, feet, or knees.

25. De Jong W, Kreck RE. The social psychological effects of overweight. *Physical Appearance, stigma and social behaviour: The Ontario Symposium*, 1986:66-87, Report.

26. DeFronzo R, Ferrannini E. Insulin resistance. A multifaceted syndrome responsible for NIDDM, obesity, hypertension, dyslipidemia, and atherosclerotic cardiovascular disease. *Diabetes Care* 1991;14(3):173-94

Diabetes mellitus is commonly associated with systolic/diastolic hypertension, and a wealth of epidemiological data suggest that this association is independent of age and obesity. Much evidence indicates that the link between diabetes and essential hypertension is hyperinsulinemia. Thus, when hypertensive patients, whether obese or of normal body weight, are compared with age- and weight-matched normotensive control subjects, a heightened plasma insulin response to a glucose challenge is consistently found. A state of cellular resistance to insulin action subtends the observed hyperinsulinism. With the insulin/glucose-clamp technique, in combination with tracer glucose infusion and indirect calorimetry, it has been demonstrated that the insulin resistance of essential hypertension is located in peripheral tissues (muscle), is limited to nonoxidative pathways of glucose disposal (glycogen synthesis), and correlates directly with the severity of hypertension. The reasons for the association of insulin resistance and essential hypertension can be sought in at least four general types of mechanisms: Na<sup>+</sup> retention, sympathetic nervous system overactivity, disturbed membrane ion transport, and proliferation of vascular smooth muscle cells. Physiological maneuvers, such as calorie restriction (in the overweight patient) and regular physical exercise, can improve tissue sensitivity to insulin; evidence indicates that these maneuvers can also lower blood pressure in both normotensive and hypertensive individuals. Insulin resistance and hyperinsulinemia are also associated with an atherogenic plasma lipid profile. Elevated plasma insulin concentrations enhance very-low-density lipoprotein (VLDL) synthesis, leading to hypertriglyceridemia. Progressive elimination of lipid and apolipoproteins from the VLDL particle leads to an increased formation of intermediate-density and low-density lipoproteins, both of which are atherogenic. Last, insulin, independent of its effects on blood pressure and plasma lipids, is known to be atherogenic. The hormone enhances cholesterol transport into arteriolar smooth muscle cells and increases endogenous lipid synthesis by these cells. Insulin also stimulates the proliferation of arteriolar smooth muscle cells, augments collagen synthesis in the vascular wall, increases the formation of and decreases the regression of lipid plaques, and stimulates the production of various growth factors. In summary, insulin resistance appears to be a syndrome that is associated with a clustering of metabolic disorders, including non-insulin-dependent diabetes mellitus, obesity, hypertension, lipid abnormalities, and atherosclerotic cardiovascular disease.

27. Despres JP. Obesity and lipid metabolism: relevance of body fat distribution. *Current Opinion in Lipidology* 1991;2:5-15

This paper reviews the recently published literature on obesity, body fat distribution and lipid metabolism. Studies have emphasized the importance of visceral fat as a correlate of alterations in plasma lipid transport observed in abdominal obesity. Some of the mechanisms in the relation of fat distribution to lipid metabolism have been identified, but additional studies are needed.

28. Deurenberg P. Limitations of the bioelectrical impedance method for the assessment of body fat in severe obesity. *Am J Clin Nutr* 1996;64(3 Suppl):449S-452S

Bioelectrical impedance analysis enables a rapid and safe assessment of body water. When it is assumed that the hydration factor of the fat-free mass is constant and is not different in the obese state, then fat-free mass and thus body fat can be assessed with bioelectrical impedance. However, several factors limit the valid application of bioelectrical impedance analysis in the severely obese state. One is the assumption of a constant hydration factor. Furthermore, body geometry is different in the obese state and body water distribution may also be different. All these factors have an effect on the validity of the method in the severely obese state, for which the amount of body fat generally will be underestimated with use of prediction formulas developed in normal-weight subjects. I discuss these limiting factors and provide some theoretical background.

29. Deutsche Herz-Kreislauf-Präventionsstudie, Hoeltz J, Bormann C, Schroeder E. Subjektive Morbi-

dität, Gesundheitsrisiken, Inanspruchnahme von Gesundheitsleistungen.

Gesundheitsberichterstattung auf der Basis des 1. Nationalen Gesundheitssurvey der Deutschen Herz-Kreislauf-Präventionsstudie. München: Infratest Gesundheitsforschung München, 1990, Report.

30. Diaz EO, Prentice AM, Goldberg GR, Murgatroyd PR, Coward WA. Metabolic response to experimental overfeeding in lean and overweight healthy volunteers. *Am J Clin Nutr* 1992;56(4):641-55

Possible adaptive mechanisms that may defend against weight gain during periods of excessive energy intake were investigated by overfeeding six lean and three overweight young men by 50% above baseline requirements with a mixed diet for 42 d [6.2 +/- 1.9 MJ/d (mean +/- SD), or a total of 265 +/- 45 MJ]. Mean weight gain was 7.6 +/- 1.6 kg (58 +/- 18% fat). The energy cost of tissue deposition (28.7 +/- 4.4 MJ/kg) matched the theoretical cost (26.0 MJ/kg). Basal metabolic rate (BMR) increased by 0.9 +/- 0.4 MJ/d and daily energy expenditure assessed by whole-body calorimetry (CAL EE) increased by 1.8 +/- 0.5 MJ/d. Total free-living energy expenditure (TEE) measured by doubly labeled water increased by 1.4 +/- 2.0 MJ/d. Activity and thermogenesis (computed as CAL EE--BMR and TEE--BMR) increased by only 0.9 +/- 0.4 and 0.9 +/- 2.1 MJ/d, respectively. All outcomes were consistent with theoretical changes due to the increased fat-free mass, body weight, and energy intake.

There was no evidence of any active energy-dissipating mechanisms.

31. Dietz W. *Childhood obesity*. Lippincott, Philadelphia, 1992, Buch.

32. Dollery CT. *Therapeutic Drugs*. London: Churchill Livingstone, 1991, Buch.

33. Don H, Craig D, Wahba W, Couture J. The measurement of gas trapped in the lungs at functional residual capacity and the effects of posture. *Anesthesiology* 1971;35(6):582-590

Gas trapped in the lungs of normal subjects breathing at functional residual capacity (FRC) was measured by a modification of the closed-circuit helium technique. "Closing volume" (CV) was also measured, by the single-breath nitrogen method. Volumes of as much as 193 ml, representing 10 per cent FRC, were found trapped, and the amount trapped could be correlated with the relationship between "closing volume" and FRC. Significant volumes were trapped only when CV equalled or exceeded FRC. Compared with the sitting position, the supine position was associated with less FRC and greater VTG when CV was greater than FRC. It is concluded that the results are evidence of the reality of airway closure and the detrimental effect of gas exchange of the supine position. Altered relationships between FRC and CV may cause the hypoxemia associated with anesthesia and that which follows abdominal surgery.

34. Döring A, Hense HW, Stieber J, Keil U. Prävalenz des Übergewichts. *Munch med Wschr* 1992;134(30):480-482

Im Rahmen des internationalen Monica-Projektes wurde in der Studienregion Augsburg 1984/85 an einer Zufallsstichprobe der Bevölkerung im Alter von 25 bis 64 Jahren neben der Prävalenz der klassischen kardiovaskulären Risikofaktoren die Prävalenz von Übergewicht ermittelt. Starkes Übergewicht, definiert durch einen Body Mass Index (BMI) größer oder gleich 30 kg/m<sup>2</sup>, war sehr häufig - zwischen 5 und 34 % in den unterschiedlichen Alters- und Geschlechtsgruppen variierend - in der Bevölkerung anzutreffen. Ein Vergleich mit den Ergebnissen anderer deutscher Studien ergab, daß die Männer der beiden Augsburg umgebenden Landkreise die höchste Prävalenz des Übergewichts aufwiesen. Die Wahl einer geeigneten Definition des Übergewichts wird diskutiert.

35. Dunaif A. *Polycystic ovary syndrome and obesity*. Philadelphia: JP Lippincott, 1992, Buch.

36. Edwards LE, Hellerstedt WL, Alton IR, Story M, Himes JH. Pregnancy Complications and Birth Outcomes in Obese and Normal-Weight Women: Effects of Gestational Weight Change. *Obstetrics and Gynecology* 1996;87(3):389-394

OBJECTIVE: To compare the pregnancy course and outcomes in obese and normal-weight women and their associations with gestational weight change. METHODS: Multivariate logistic regression described the relation of weight change to pregnancy course and outcomes in a retrospective study of 683 obese and 660 normal-weight women who delivered singleton living neonates. RESULTS: Compared with normal-weight women, obese women gained an average of 5 kg (11 lb) less during pregnancy and were more likely to lose or gain no weight (11 % versus less than 1 %). Obese women were significantly more likely to have pregnancy complications, but the incidence of complications was not associated with weight change. Compared with obese women who gained 7-11.5 kg (15-25 lb), obese women who lost or gained no weight were at higher risk for delivery of infants under 3000 g or small for gestational age infants, and those who gained more than 16 kg (35 lb) were at twice the risk for delivery of infants who were 4000 g or heavier. CONCLUSION: Gestational weight change was not associated with pregnancy complications in obese or normal-weight women. To optimize fetal growth, weight gains of 7-11.5 kg (15-25 lb) for obese women and 11.5-16 kg (25-35 lb) for normal-weight women appear to be appropriate.

37. Elliott P, Stamler J, Nichols R, Dryer AR, Stamler R, Kesteloot H, et al. Intersalt revisited: further analyses of 24 hour sodium excretion and blood pressure within and across populations. *Brit Med J* 1996;312:1249-53

OBJECTIVES - To assess further the relation in Intersalt of 24 hour urinary sodium to blood pressure



of individuals and populations, and the difference in blood pressure from young adulthood into middle age. DESIGN - Standardised cross sectional study within and across populations. SETTING - 52 population samples in 32 countries. SUBJECTS - 10074 men and women aged 20-59. MAIN OUTCOME MEASURES - Association of sodium and blood pressure from within population and cross population multiple linear regression analyses with multivariate correction for regression dilution bias. Relation of sample median daily urinary sodium excretion to difference in blood pressure with age. RESULTS - In within population analyses (n=10 074) , individual 24 hour urinary sodium excretion higher by 10 mmol (for example, 170 v 70 mmol) was associated with systolic/diastolic blood pressure higher on average by 3/0 to 6/3 mm Hg (with and without body mass in analyses). Associations were larger at ages 40-59. In cross population analyses (n=52), sample median 24 hour sodium excretion higher by 100 mmol was associated with median systolic/diastolic pressure higher on average by 5-7/2-4 mm Hg, and estimated mean difference in systolic/diastolic pressure at age 55 compared with age 25 greater by 10-11/6 mm Hg. CONCLUSIONS - The strong, positive association of urinary sodium with systolic pressure of individuals concurs with Intersalt cross population findings and results of other studies. Higher urinary sodium is also associated with substantially greater differences in blood pressure in middle age compared with young adulthood. These results support recommendations for reduction of high salt intake in populations for prevention and control of adverse blood pressure levels.

38. Epstein LH, Myers MD, Anderson K. The association of maternal psychopathology and family socioeconomic status with psychological problems in obese children. *Obes Res* 1996c;4(1):65-74  
In an earlier study we found parental psychiatric symptoms to be a better correlate of behavioral problems in obese children than either child or parental obesity. This study sought to extend this research by assessing the association of general maternal distress, specific maternal psychopathology, family socioeconomic status and child obesity with the psychological problems of 152 children seeking treatment for obesity in two cohorts. Child psychological problems were measured using the Child Behavior Checklist/4-18 (CBCL) in each cohort. In sample 1 maternal general psychiatric symptoms were measured using the Cornell Medical Index (psychiatric subscales) and the Inventory of Interpersonal Problems whereas specific psychopathology was assessed with the Beck Depression Inventory and the Bulimia Test. In sample 2 the Symptom Checklist-90 and Binge Eating Scale provided general and specific measures of psychopathology. In the combined sample, 58% percent of the boys and 44% of the girls met criteria on at least one CBCL behavioral problem scale, with Social Problems the most prevalent problem in both boys and girls. For both samples, child obesity did not account for any variance in child psychosocial problems beyond that accounted for by maternal psychopathology and family SES. Family SES accounted for a significant increment in variance in child behavioral problems in only two scales. This study systematically replicates previous research, adding support for a broader conceptualization of factors that influence psychological problems in obese treatment-seeking children than one which focuses on child obesity.

39. Felson DT, Zhang Y, Anthony JM, Naimark A, Anderson JJ. Weight loss reduces the risk for symptomatic knee osteoarthritis in women. *The Framingham study. Ann Intern Med* 1992;116:535-9  
Objective: To evaluate the effect of weight loss in preventing symptomatic knee osteoarthritis in women. Design: Cohort analytic study. Setting: The Framingham Study, based on a sample of a defined population. Patients: Women who participated in the Framingham Knee Osteoarthritis Study (1983 to 1985): Sixty-four out of 796 women studied had recent-onset symptomatic knee osteoarthritis (knee symptoms plus radiographically confirmed osteoarthritis) were compared with women without disease. Measurements: Recalled date of symptom onset was used as the incident date of disease. Historical weight was defined as baseline body mass index up to 12 years before symptom onset. Change in body mass index was assessed at several intervals before the current examination. Odds ratios assessing the association between weight change and knee osteoarthritis were adjusted for age, baseline body mass index, history of previous knee injury, habitual physical activity level, occupational physical labor, smoking status, and attained education. Results: Weight change significantly affected the risk for the development of knee osteoarthritis. For example, a decrease in body mass index of 2 units or more (weight loss, approximately 5.1 kg) over the 10 years before the current examination decreased the odds for developing osteoarthritis by over 50% (odds ratio, 0.46; 95% CI, 0.24 to 0.86; P = 0.02). Among those women with a high risk for osteoarthritis due to elevated baseline body mass index ( $\geq 25$ ), weight loss also decreased the risk (for 2 units of body mass index, odds ratio, 0.41; P = 0.02). Weight gain was associated with a slightly increased risk for osteoarthritis, which was not statistically significant. Conclusion: Weight loss reduces the risk for symptomatic knee osteoarthritis in women.

40. Field M, Lohr, KN,, editor. *Guidelines for clinical practice. From development to use*. Washington: National Academy Press, 1992. Field M, Lohr, KN,, Buch

41. Field M, Lohr K. *Clinical practice guidelines. Directions for a new program*. Washington: National Academy Press, 1990, Buch, Evidenzklasse IV.

42. Fitzgerald AP, Jarrett RJ. Body weight and coronary heart disease mortality: an analysis in relation to age and smoking habit: 15 years follow up data from the Whitehall study. *Int J Ob* 1992;16:119-23

18403 male civil servants aged 40-64 years were examined in London between 1968 and 1970. Mortality from all causes and specifically from coronary heart disease (CHD) over 15 years of follow-up was initially analysed in relation to deciles of body mass index ( $BMI = \text{weight}/\text{height}^2$ ) at entry into the study. In older men all causes mortality tended to be higher in those with a low BMI, but this was not so for CHD mortality. The latter was further studied after dividing the population into sub-groups according to age and cigarette smoking. With BMI distribution divided into fifths and five year age groups there were significant positive trends of CHD mortality across the BMI distribution in all age groups except the youngest (40-44 years) and oldest (60-64 years). For analysis by smoking category - never, ex- and current cigarette smoker - three age-specific groups were used: 40-49, 50-59 and 60-64 years. In men aged less than 60 years there were significant positive trends of CHD mortality and BMI in five of the six age and smoking categories, the exception being ex-smokers aged 40-49 years. Associations were strongest in the current smokers. By contrast in men aged 60-64 years there was a significant association between BMI and CHD mortality only in ex-smokers and this was of low order ( $P=0.04$ ). The data are compatible with some reports of a lesser association of obesity with mortality risk in older persons and in this data set the observation is not confounded by smoking habit. Evidenzklasse III.

43. Food and Drug Administration. Questions and Answers about Withdrawal of Fenfluramine (Pondimin) and Dexfenfluramine (Redux), 1998, Report.

44. Galuska DA, Serdula M, Pamuk E, Siegel PZ, Byers T. Trends in overweight among US adults from 1987 to 1993: a multistate telephone survey. *Am J Public Health* 1996;86(12):1729-35

OBJECTIVES: Using data from the Behavioral Risk Factor Surveillance System, this study describes trends in the prevalence of overweight between 1987 and 1993. METHODS: Data were examined from 33 states participating in an ongoing telephone survey of health behaviors of adults ( $n = 387,704$ ). Self-reported weights and heights were used to calculate sex-specific prevalence estimates of overweight for each year from 1987 to 1993. Time trends were evaluated with the use of linear regression. RESULTS: Between 1987 and 1993, the age-adjusted prevalence of overweight increased by 0.9% per year for both sexes (from 21.9% to 26.7% among men and from 20.6% to 25.4% among women). The increasing linear trend was observed in all subgroups of the population but was most notable for Black men (1.5% per year) and men living in the Northeast (1.4% per year). Secular changes in smoking and leisure-time physical activity did not entirely account for the increase in overweight. CONCLUSIONS: The prevalence of overweight among American adults increased by 5% between 1987 and 1993. Efforts are needed to explore the causes of this adverse trend and to find effective strategies to prevent obesity.

45. Garfinkel PE, Moldofsky H, Garner DM. The heterogeneity of anorexia nervosa: Bulimia as a distinct subgroup. *Archives of General Psychiatry* 1980;37:1036-40

Bulimia is a poor prognostic sign in anorexia nervosa. This raised the question of whether bulimia represented an "end stage" of chronic anorexia nervosa or whether bulimic patients were a distinct subgroup. All subjects seen by us personally from 1970 to 1978 were included in this study provided they met modified criteria of Feighner et al. (1972). Of this group, 68 experienced bulimia and 73 did not (restricters). Bulimic patients had a history of weighing more and were more commonly pre-morbidly obese. Bulimic patients were those who vomited and misused laxatives. The bulimic group displayed a variety of impulsive behaviors, including use of alcohol and street drugs, stealing, suicide attempts, and self-mutilation. With regard to family history, the high frequency of obesity in the mothers of bulimic patients was noteworthy. The two groups share features common to patients with primary anorexia nervosa. However, these results suggest a different group of women are predisposed to have anorexia nervosa developed with bulimia.

46. Gortmaker SL, Must A, Perrin JM, Sobol AM, Dietz WH. Social and economic consequences of overweight in adolescence and young Adulthood. *N Eng J Med* 1993;329:1008-12

BACKGROUND AND METHODS: Overweight in adolescents may have deleterious effects on their subsequent self-esteem, social and economic characteristics, and physical health. We studied the relation between overweight and subsequent educational attainment, marital status, household income, and self-esteem in a nationally representative sample of 10,039 randomly selected young people who were 16-24 years old in 1981. Follow-up data were obtained in 1988 for 65 to 79 percent of the original cohort, depending on the variable studied. The characteristics of the subjects who had been overweight in 1981 were compared with those for young people with asthma, musculoskeletal abnormalities, and other chronic health conditions. Overweight was defined as a body-mass index above the 95th percentile for age and sex. RESULTS: In 1981, 370 of the subjects were overweight. Seven years later, women who had been overweight had completed fewer years of school (0.3 years less; 95 percent confidence interval, 0.1 to 0.6;  $P=0.009$ ), were less likely to be married (20 percent less likely; 95 percent confidence interval, 13 to 27 percent;  $P<0.001$ ), had lower household incomes (\$6,710 less per year; 95 percent confidence interval, \$3,942 to \$9,478;  $P<0.001$ ), and had higher rates of household poverty (10 percent higher; 95 percent confidence interval, 4-16 %;  $P<0.001$ ). than the women who had not been overweight, independent of their base-line socioeconomic status and aptitude-test

scores. Men who had been overweight were less likely to be married (11 % less likely; 95 percent confidence interval, 3 to 18 percent;  $P=0.005$ ). In contrast, people with the other chronic conditions we studied did not differ in these ways from the nonoverweight subjects. We found no evidence of an effect of overweight on self-esteem. **CONCLUSIONS:** Overweight during adolescence has important social and economic consequences, which are greater than those of many other chronic physical conditions. Discrimination against overweight persons may account for these results.

47. Hamsten A, Wiman B, de Faire U, Blombäck M. Increased plasma levels of a rapid inhibitor of tissue plasminogen activator in young survivors of myocardial infarction. *N Engl J Med* 1985;313(25):1557-1563

Certain risk factors for myocardial infarction have been linked with disturbances in fibrinolytic activity. The recent development in our laboratory of new sensitive and specific methods for determination of tissue plasminogen activator (t-PA) activity and antigen, as well as the discovery of a new rapid inhibitor of this enzyme, enabled us to study fibrinolytic function in detail in a representative population of postinfarction patients. Seventy-one patients (62 men and 9 women) who had survived a myocardial infarction before the age of 45 were compared with 50 healthy subjects of similar age, three years after the infarction. Low t-PA activity after venous occlusion, mostly explained by high plasma levels of the t-PA inhibitor and to some extent by impaired release of t-PA from the vessel wall, was a frequent finding in the patients. The level of t-PA inhibitor was positively and significantly correlated with levels of serum triglycerides. Our data suggest that reduced fibrinolytic capacity due to increased plasma levels of a rapid inhibitor of t-PA may have pathogenetic importance in myocardial infarction, particularly in patients with hypertriglyceridemia.

48. Han TS, van Leer EM, Seidell JC, Lean MEJ. Waist circumference action levels in the identification of cardiovascular risk factor: prevalence study in a random sample. *Bmj* 1995a;311:1401-1405

**OBJECTIVE:**To determine the frequency of cardiovascular risk factors in people categorised by previously defined "action levels" of waist circumference. **DESIGN:** Prevalence study in a random population sample. **SETTING--**Netherlands. **SUBJECTS:** 2183 men and 2698 women aged 20-59 years selected at random from the civil registry of Amsterdam and Maastricht. **MAIN OUTCOME MEASURES:** Waist circumference, waist to hip ratio, body mass index (weight (kg)/height (m<sup>2</sup>)), total plasma cholesterol concentration, high density lipoprotein cholesterol concentration, blood pressure, age, and lifestyle. **RESULTS:** A waist circumference exceeding 94 cm in men and 80 cm in women correctly identified subjects with body mass index of or = 25 and waist to hip ratios of or = 0.95 in men and or = 0.80 in women with a sensitivity and specificity of or = 96%. Men and women with at least one cardiovascular risk factor (total cholesterol or = 6.5 mmol/l, high density lipoprotein cholesterol or = 0.9 mmol/l, systolic blood pressure or = 160 mm Hg, diastolic blood pressure or = 95 mm Hg) were identified with sensitivities of 57% and 67% and specificities of 72% and 62% respectively. Compared with those with waist measurements below action levels, age and lifestyle adjusted odds ratios for having at least one risk factor were 2.2 (95% confidence interval 1.8 to 2.8) in men with a waist measurement of 94-102 cm and 1.6 (1.3 to 2.1) in women with a waist measurement of 80-88 cm. In men and women with larger waist measurements these age and lifestyle adjusted odds ratios were 4.6 (3.5 to 6.0) and 2.6 (2.0 to 3.2) respectively. **CONCLUSIONS:** Larger waist circumference identifies people at increased cardiovascular risks.

49. Hauner H. Gesundheitsrisiken von Übergewicht und Gewichtszunahme. *Deutsches Ärzteblatt* 1996;93:A-3405-9

Es ist lange bekannt, daß Übergewicht oder Adipositas zahlreiche Gesundheitsstörungen auslösen und verstärken kann. das Spektrum reicht von mannigfaltigen subjektiven Beschwerden über die Induktion von kardiovaskulären Risikofaktoren bis hin zur Förderung einer Vielzahl von Krankheiten einschließlich bestimmter Karzinome. Neue Studien legen darüberhinaus nahe, daß die Gesundheitsrisiken des Übergewichts in der Vergangenheit eher unterschätzt werden.

50. Hauner H, Koster I, von Ferber L. Frequency of 'obesity' in medical records and utilization of outpatient health care by 'obese' subjects in Germany. An analysis of health insurance data. *Int J Obes Relat Metab Disord* 1996;20(9):820-4

**OBJECTIVE:** The aim of this study was to assess the frequency of the diagnoses 'overweight' or 'obesity' in medical records and to examine the utilization of the out-patient health care system by 'obese' subjects. **DESIGN:** All claims-cards, prescriptions and other diagnosis-carrying medical certificates from 1990 of a representative sample of members of a large local health insurance were collected and analyzed anonymously in a patient-related approach. **SUBJECTS:** A 5% random sample ( $n = 6085$ ) of all members of the general local health insurance (AOK) in the city of Dortmund, Germany. **MEASUREMENTS:** The percentage of subjects carrying the diagnosis of 'overweight' and/or 'obesity' was determined. In addition, the utilization of medical services and the presence of comorbid conditions in the documents of the AOK was recorded. **RESULTS:** A total number of 377 'obese' subjects was identified corresponding with a prevalence rate of 6.2%. Among those, more women than men carried one of these diagnoses (240 vs 137, 7.3% vs 4.9%,  $p 0.01$ ). In comparison with an age- and sex-matched

control group (n = 1131) the 'obese' subjects had significantly more practice contacts (25.7 vs 17.5/year, p 0.01) and received more medical services (64.2 vs 43.0/year, p 0.01), including more prescriptions (20.9 vs 15.5/year, p 0.01). Furthermore, the 'obese' subjects had more additional diagnoses indicating a higher comorbidity and received more drugs for diseases and complications which are characteristic of obesity but also for other diseases. CONCLUSION: This data suggests that in view of its high prevalence in Germany obesity is perceived and documented by health professionals only in a minority of affected subjects indicating that this disorder is considerably under-estimated. It is also evident from the data that obesity is mainly noticed in those who have other serious health problems.

51. Hegsted DM. *Dietary fatty acids, serum cholesterol and coronary heart disease*: American Oil Chemists Society, 1991, Buch.

52. Helmert U, Greiser E. Soziale Schicht und Risikofaktoren für koronare Herzkrankheiten - Resultate der regionalen DHP-Gesundheitssurveys. *Sozial- und Präventivmedizin* 1988;33:233-40

Prior to the start of the intervention activities in the five study regions of the German Cardiovascular Prevention Study (GCP), health surveys of representative samples of the population (25 to 69 years) were carried out between 1984 and 1986. In all, 11,527 persons participated in the study. Important socio-structural differences existed between the five study regions. An ecological analysis relating social class characteristics to the prevalence of CHD-risk factors did not show any significant findings. However, a pooling of the data of the five study regions resulted in the demonstration, for both sexes, of a significant association of social class with cigarette smoking and overweight. Hypertension and hypercholesterolemia were not related to social class. The proportion of persons with three or more CHD-risk factors was clearly higher in lower social classes. These findings point to the need for risk factor intervention strategies focusing more on the lower social classes in order to achieve more adequate prevention of coronary heart disease.

53. Hesecker H, Hartmann S., Kubler W., Schneider R. An epidemiologic study of food consumption habits in Germany. *Metabolism* 1995;44((2 Suppl 2)):10-13

Food consumption habits were studied in subgroups of subjects in the German Nutrition Survey (Nationale Verzehrstudie [NVS]) on the basis of body weight. Our study was performed in an 18- to 88-year-old representative subgroup of 2,006 noninstitutionalized volunteers with no significant pathology (known as the Verbundstudie, Ernährungserhebung, and Risikofaktorenanalytik [VERA] subgroup). Using the German Food Code, food and nutrient intakes were calculated from 7-day dietary records. A stratification analysis was used to determine significant differences in food consumption habits of overweight subjects in comparison to normal-weight subjects. The results showed an increase in the prevalence of overweight (body mass index [BMI], 25 to 30) with age, from 15% in the group aged 18 to 24 years to 50% in the group aged more than 55 years. The prevalence of severe overweight (BMI, 30 to 40) increased from 3% to 17% in the same age groups, whereas morbid obesity (BMI, > 40) was found in only 0.4% of the study population. The calculated daily energy intake showed only a very weak correlation with BMI, probably because individual energy requirements and expenditures were not taken into account. However, differences were found between BMI subgroups in terms of the types of food consumed: a high BMI was associated with a higher consumption of meat and meat products but a lower consumption of milk and dairy products and bread and other cereal-based foods.

54. Higgins M, R DA, Kannel W, Cobb J. Benefits and Adverse Effects of Weight Loss: Observations from the Framingham Study. *Ann Intern Med* 1993;119:758-63

OBJECTIVE: To identify the benefits and adverse effects of weight loss. DESIGN: Longitudinal, epidemiologic study in a defined population. PARTICIPANTS: Men and women (n = 2500) who were between 35 and 54 years old at baseline, followed for 20 years in Framingham, Massachusetts. MEASUREMENTS: Height, weight, lipid levels, blood pressure, smoking status, diet, physical activity, prevalent and incident cardiovascular disease, diabetes, other diseases, and mortality rate were assessed. RESULTS: Compared with those whose body mass index (BMI) or weight changed least, men and women who lost weight during a 10-year period were older, heavier, and had higher blood pressures and cholesterol levels initially but had the smallest gains in blood pressure and cholesterol levels. However, rates of cigarette smoking were higher, and rates of smoking cessation were lower. During 20 years of further follow-up, death rates were highest in those whose BMI decreased and in those with the highest BMI at study entry. Relative risks for death from cardiovascular disease, coronary heart disease, and all causes were significantly greater by 33% to 61% in men whose BMI decreased after adjusting for age and risk factors for cardiovascular disease. In women, weight loss and weight gain were associated with higher relative risks for cardiovascular disease and coronary heart disease, but only the 38% increase in total mortality rate among women who lost weight was statistically significant after adjusting for age. CONCLUSIONS: Weight loss was associated with improvements in blood pressure and cholesterol levels but also with continued cigarette smoking, prevalent and incident cardiovascular disease, diabetes mellitus, other diseases, and higher death rates. Leanness and maintenance of stable weight were beneficial to risk factors, and to the prevention of morbidity, and death. Published erratum appears in *Ann Intern Med* 1993 Nov 15;119(10):1055.

55. Hoeltz J, Bormann C, Schroeder E. *Subjektive Morbidität, Gesundheitsrisiken, Inanspruchnahme von Gesundheitsleistungen. Gesundheitsberichterstattung auf der Basis des 1. Nationalen Gesundheitssurvey der Deutschen Herz-Kreislauf-Präventionsstudie*. ISSN 0937-3942 ed. München: Infratest Gesundheitsforschung, 1990, Buch.

56. Hoffmeister H, Mensing GBM, Stolzenberg H, Hoeltz L, Kreuter H, Laaser U, et al. Reduction of Coronary Heart Disease Risk Factors in the German Cardiovascular Prevention Study. *Preventive Medicine* 1996;25:135-45

BACKGROUND. In six regions of former West Germany, a community-oriented prevention program for coronary heart disease (CHD) was conducted over a 7-year period. METHODS. In the intervention regions, CHD prevention activities were performed with special emphasis on healthy nutrition, increased physical activity, and reduction of smoking, hypertension, and hypercholesterolemia. The impact of these activities on CHD risk factor trends was observed in three independent samples of the intervention regions. Three independent representative samples of the total West German population were used as a reference. Linear regression models with interaction terms to represent the intervention effects were used to test for differences in risk factor trends. RESULTS. In the pooled intervention regions, a net reduction in mean values of systolic (-2.0%) and diastolic (-2.0%) blood pressure, total serum cholesterol (-1.8%), as well as the percentage of smokers (-6.7%) was observed compared with the nationwide trend. From the major CHD risk factors, only body mass index was not influenced in the intervention population. CONCLUSIONS. The community-oriented German Cardiovascular Prevention program can effectively be used to reduce CHD risk factors in a broad population.

57. Hofstetter A, Schutz Y, Jequier E, Wahren J. Increased 24-hour energy expenditure in cigarette smokers. *New Engl J Med* 1986;314:79-82

Abstract we studied the effect of smoking on energy expenditure in eight healthy cigarette smokers who spent 24 hours in a metabolic chamber on two occasions, once without smoking and once while smoking 24 cigarettes per day. Diet and physical exercise (30 minutes of treadmill walking) were standardized on both occasions. Physical activity in the chamber was measured by use of a radar system. Smoking caused an increase in total 24-hour energy expenditure (from a mean value [ $\pm$ SEM] of 2230 $\pm$ 115 to 2445 $\pm$ 120 kcal per 24 hours;  $P < 0.001$ ), although no changes were observed in physical activity or mean basal metabolic rate (1545 $\pm$ 80 vs. 1570 $\pm$ 70 kcal per 24 hours). During the smoking period, the mean diurnal urinary excretion of norepinephrine ( $\pm$ SEM) increased from 1.25 $\pm$ 0.14 to 1.82 $\pm$ 0.28  $\mu$ g per hour ( $P < 0.025$ ), and mean nocturnal excretion increased from 0.73 $\pm$ 0.07 to 0.91 $\pm$ 0.08  $\mu$ g per hour ( $P < 0.001$ ). These short-term observations demonstrate that cigarette smoking increases 24-hour energy expenditure by approximately 10 percent, and that this effect may be mediated in part by the sympathetic nervous system. The findings also indicate that energy expenditure can be expected to decrease when people stop smoking, thereby favoring the gain in body weight that often accompanies the cessation of smoking.

58. Holley H, Milic-Emili J, Becklake M, Bates D. Regional distribution of pulmonary ventilation and perfusion in obesity. *J Clin Invest* 1967;46(4):475-481

Summary. Five women and three men, all obese and weighing 95 to 140 kg, were studied by routine pulmonary function tests and by a radioactive xenon technique, while seated upright at rest, to measure the regional ventilation and perfusion distribution in the lung. In four subjects in whom the expiratory reserve volume averaged 49% of predicted normal, the ventilation distribution as measured with <sup>133</sup>xenon was normal. In the remaining four subjects, in whom the expiratory reserve volume was reduced to less than 0.4 L and averaged only 21% of predicted values, the distribution of a normal tidal breath was predominantly to the upper zones. In all subjects the perfusion distribution was predominantly to the lower lung zones but was slightly more uniform than in normal nonobese subjects. During tidal-volume breathing, therefore, in four subjects the ventilation and perfusion distribution was substantially normal, whereas in the remaining four perfusion was maximal in the lower zones, to which ventilation was significantly reduced. These findings show that there may be significant ventilation/perfusion abnormality on a regional basis in obese subjects, this abnormality bearing a close relationship to the reduction in expiratory reserve volume, a finding predictable from recently published data on normal nonobese subjects (1). The abnormalities of ventilation/perfusion relationships that were demonstrated in four of the eight obese subjects could cause a reduction in arterial oxygen tension during resting tidal ventilation.

59. Hoskins PL, Fowler PM, Constantino M, Forrest J, Yue DK, Turtle J. Sharing the care of diabetic patients between hospital and general practitioners; does it work? *Diab Med* 1992;9:1-6, kein Abstract.

60. Huang Z, Willett W, Manson J, Rosner B, Stampfer M, Speizer F, et al. Body weight, weight change, and risk for hypertension in women. *Ann Intern Med* 1998;15(128(2)):81-88

BACKGROUND: Obesity increases the risk for hypertension, but the effects of modest long-term weight changes have not been precisely quantified. OBJECTIVE: To investigate body mass index (BMI) and weight change in relation to risk for hypertension. DESIGN: Cohort study. SETTING: General community. PARTICIPANTS: Cohort of 82,473 U.S. female nurses 30 to 55 years of age followed

every 2 years since 1976. The follow-up rate was 95%. MEASUREMENTS: Primary risk factors examined were 1) BMI at age 18 years and midlife and 2) long-term and medium-term weight changes. The outcome was incident cases of hypertension. RESULTS: By 1992, 16,395 incident cases of hypertension had been diagnosed. After adjustment for multiple covariates, BMI at 18 years of age and midlife were positively associated with occurrence of hypertension (P for trend < 0.001). Long-term weight loss after 18 years of age was related to a significantly lower risk for hypertension, and weight gain dramatically increased the risk for hypertension (compared with weight change < or = 2 kg, multivariate relative risks were 0.85 for a loss of 5.0 to 9.9 kg, 0.74 for a loss > or = 10 kg, 1.74 for a gain of 5.0 to 9.9 kg, and 5.21 for a gain > or = 25.0 kg). Among women in the top tertile of baseline BMI at age 18 years, weight loss had a greater apparent benefit. The association between weight change and risk for hypertension was stronger in younger (< 45 years of age) than older women (> or = 55 years of age). Medium-term weight changes after 1976 showed similar relations to risk for hypertension. CONCLUSIONS: Excess weight and even modest adult weight gain substantially increase risk for hypertension. Weight loss reduces the risk for hypertension.

61. Hubert HB, Feinleib M, McNamara PM, Castelli WP. Obesity as an independent risk factor for cardiovascular disease: a 26 year follow-up of participants in the Framingham Heart Study. *Circulation* 1983;67:968-77

SUMMARY The relationship between the degree of obesity and the incidence of cardiovascular disease (CVD) was reexamined in the 5209 men and women of the original Framingham cohort. Recent observations of disease occurrence over 26 years indicate that obesity, measured by Metropolitan Relative Weight, was a significant independent predictor of CVD, particularly among women. Multiple logistic regression analyses showed that Metropolitan Relative Weight, or percentage of desirable weight, on initial examination predicted 26-year incidence of coronary disease (both angina and coronary disease other than angina), coronary death and congestive heart failure in men independent of age, cholesterol systolic blood pressure, cigarettes, left ventricular hypertrophy and glucose intolerance. Relative weight in women was also positively and independently associated with coronary disease, stroke, congestive failure, and coronary and CVD death. These data further show that weight gain after the young adult years conveyed an increased risk of CVD in both sexes that could not be attributed either to the initial weight or the levels of the risk factors that may have resulted from weight gain. Intervention in obesity, in addition to the well established risk factors, appears to be an advisable goal in the primary prevention of CVD.

62. Jahnke K, Daweke H, Schilling W. Potential diabetes. *Med Klin* 1966;61(22), kein Abstract.

63. James WPT. The epidemiology of obesity. The origins and consequences of obesity. *Ciba Foundation Symposium* 1996;201(16):1-11; discussion 11-6, 32-6

An agreed definition of obesity as a body mass index (BMI) of 30 kg/m<sup>2</sup> or more seems to be accepted everywhere except in North America. Recent data confirm the importance of setting an upper individual BMI limit of 25 kg/m<sup>2</sup> and a population optimum of 20-23 kg/m<sup>2</sup>. Some adjustment of BMI should be made in individuals and populations with disproportionate shapes, e.g. short or long legs, and morbidity and mortality risks are especially important in those with a waist measurement of about 102 cm or more, the risk increasing from 88 cm. Waist measurements should probably now be substituted for the waist/hip circumference ratio. Diabetes is universally closely linked to increases in BMI, and cardiovascular disease is amplified by obesity, particularly in western societies where other dietary factors contribute substantially. Industrialization with reduced physical activity and higher fat diets lead to obesity first in middle-aged women, then in men, with younger adults and children eventually being affected. Physiological studies display the interaction of physical activity and energy dense, high fat diets and explain the secular, age- and social class-related trends throughout the world. Intergenerational amplification of obesity may be underway, so the public health implications of obesity are immense.

64. James WPT, Ralph A, Ferro-Luzzi A. *Energy needs of the elderly. A new approach*. New York & London: Plenum Press, 1989, Buch.

65. Jeffery R, French S. Epidemic obesity in the United States: are fast foods and television viewing contributing? *Am J Public Health* 1998;88(2):277-280

OBJECTIVES: This study examined the association between TV viewing, fast food eating, and body mass index. METHODS: Associations between hours of TV viewing, frequency of eating at fast food restaurants, body mass index, and behaviors were assessed cross sectionally and longitudinally over 1 year in 1059 men and women. RESULTS: Fast food meals and TV viewing hours were positively associated with energy intake and body mass index in women but not in men. TV viewing predicted weight gain in high-income women. CONCLUSIONS: Secular increases in fast food availability and access to televised entertainment may contribute to increasing obesity rates in the United States.

66. Jousilahti P, Tuomilehto J, Vartiainen E, Pekkanen J, Puska P. Body weight, cardiovascular risk factors and coronary mortality 15 year follow-up of middle-aged men and women in Eastern Finland. *Circulation* 1996;93:1372-9 BACKGROUND: Body weight is closely related to several known cardiovascular risk factors, but it may also have an independent effect on the risk of coronary heart disease

(CHD). In this study, we analyzed the association between body mass index (BMI) and smoking, serum cholesterol, and blood pressure at baseline, as well as how BMI and the other risk factors are related to CHD mortality. **METHODS AND RESULTS:** A total of 16 113 men and women aged 30 to 59 years were examined in eastern Finland in either 1972 or 1977. Serum cholesterol and blood pressure had a positive association and smoking had a negative association with BMI. During the 15-year prospective follow-up, mortality from CHD was positively associated with BMI. The BMI-associated risk ratio of CHD mortality, adjusted for age and study year, estimated from the Cox proportional hazards model was 1.04 (per kg/m<sup>2</sup>) (P .001) among men. Inclusion of smoking in the model increased the risk ratio for BMI, whereas inclusion of serum cholesterol and blood pressure decreased it. In the model that included age, study year, and all three major cardiovascular risk factors, the BMI-associated risk ratio was 1.03 (P = .027). Among women, the BMI-associated risk ratio of CHD mortality adjusted for age and study year was 1.05 (P = .023) and the multifactorial adjusted risk ratio was 1.03 (P = .151). **CONCLUSIONS:** Obesity is an independent risk factor for CHD mortality among men and also contributes to the risk of CHD among women. Part of the BMI-associated risk of CHD mortality is mediated through other known cardiovascular risk factors. By preventing overweight, a substantial part of CHD mortality may be prevented.

67. Juhan-Vague I, Alessi M, Vague P. Increased plasma plasminogen activator inhibitor 1 levels. A possible link between insulin resistance and atherothrombosis. *Diabetologia* 1991;34:457-462  
**Summary:** According to recent prospective studies, hypofibrinolysis due to elevated plasma plasminogen activator inhibitor 1 levels appears to be an independent risk factor for myocardial reinfarction in men, and hyperinsulinaemia, a major indicator of insulin resistance is considered as a risk factor for coronary disease. It has recently been shown that insulin resistance is accompanied by an increased plasma plasminogen activator inhibitor 1 concentration: A significant correlation coefficient was demonstrated between plasminogen activator inhibitor 1 and fasting plasma insulin in the normal population, in obese subjects, in Type 2 (non-insulin-dependent) diabetic patients and in angina pectoris. Attempts to decrease insulin resistance such as fasting, diet, or administration of an oral anti-diabetic drug such as Metformin induced a parallel decrease in plasma insulin and plasminogen activator inhibitor 1 levels. This inhibitor is produced by endothelial cells and by hepatocytes in culture. Plasminogen activator inhibitor 1 synthesis by hepatocytes in culture was stimulated by an increasing insulin concentration, or low density lipoproteins, whereas the endothelial cell synthesis was stimulated by very low density lipoproteins especially when they were obtained from hypertriglyceridaemic patients. Therefore, a direct effect of insulin or lipoprotein changes on the cells which synthesize plasminogen activator inhibitor 1 could be responsible for its increased plasma concentration in insulin resistance states. The increase in plasma plasminogen activator inhibitor 1 levels linked to hyperinsulinaemia is a tempting partial explanation for the association between insulin resistance and coronary disease.

68. Juhan-Vague I, Vague P. Hypofibrinolysis and insulin-resistance. *Diabete Metab* 1991;17:96-100  
A defect in the fibrinolytic system appears to be a risk factor for the development of cardiovascular disease. Such a defect is mainly characterized by increased plasma levels of an inhibitor of fibrinolysis the plasminogen activator inhibitor 1 (PAI-1).

PAI-1 levels are elevated in the common syndrome of insulin resistance as it is encountered in obese non diabetic and in non insulin dependent diabetic subjects. These levels are closely related to insulinaemia in cross sectional studies as well as in intervention studies. Although in vitro insulin stimulates the PAI-1 synthesis in hepatocyte, but not in endothelial cells, acute elevation of insulinaemia in vivo in man does not result in an increase in PAI-1 levels. The mechanisms linking insulin-resistance, insulin and PAI-1 levels in man are still not understood.

69. Kannel WB, RB DA, Cobb JL. Effect of weight on cardiovascular disease. *Am J Clin Nutr* 1996;63(suppl 4):19-22

Involuntary weight gains worsen all elements of the cardiovascular risk profile, including dyslipidemia, hypertension, insulin-resistant glucose intolerance, left-ventricular hypertrophy, hyperuricemia, and elevated fibrinogen. On the basis of data from the Framingham Heart Study and from other studies, it can be concluded that the degree of overweight is related to the rate of development of cardiovascular disease. After 26 y of follow-up in the Framingham study, each SD increment in relative weight was associated with 15% and 22% increases in cardiovascular events in men and women, respectively. Avoidance of weight gain after the age of 25 y is advisable to reduce cardiovascular mortality. There is a great potential benefit to weight loss, suggesting that weight control as a means for preventing and lessening cardiovascular disease become a national health priority. The optimal weight for avoidance of cardiovascular disease and prolonging life corresponds to a body mass index of 22.6 for men and 21.1 for women.

70. Kaplan N. The deadly quartet. Upper-body obesity, glucose intolerance, hypertriglyceridemia, and hypertension. *Arch Intern Med* 1989;149(7):1514-20

The contribution of obesity to cardiovascular risk has not been adequately appreciated because of a failure to recognize the involvement of upper-body predominance of body weight with hypertension,

diabetes, and hypertriglyceridemia even in the absence of significant overall obesity. This article examines the evidence that upper-body obesity, as usually induced by caloric excess in the presence of androgens, mediates these problems by way of hyperinsulinemia. Because of these interrelationships, there is a need to identify and prevent upper-body obesity or, failing that, to provide therapies that will control the associated problems without aggravating hyperinsulinemia.

71. Kassenärztliche Bundesvereinigung K, Krimmel L, Bundesärztekammer K, Hess R. *Gebührenordnung für Ärzte (GOÄ) Mit Gebührenverzeichnis für ärztliche Leistungen*. ISBN 3-7691-3074-X ed. Köln: Deutscher Ärzte-Verlag GmbH, Köln, 1996, Buch.

72. Kato M, Shimazu M, Moriguchi S, Kishino Y. Body mass index (BMI) is a reliable index to estimate obesity as a risk factor for deteriorating health. *Tokushima J Exp Med* 1996;43(1-2):1-6

The objective of this study was to find out what index is appropriate to evaluate obesity, by measuring body fat using bioelectrical impedance analysis (BIA). Subjects in this study were 74 women, aged 44 to 73, living in Tokushima prefecture. The means  $\pm$  standard deviation (SD) of Broca index, Body mass index (BMI) and body fat were  $103 \pm 14.3\%$ ,  $23.0 \pm 2.8 \text{ kg/m}^2$  and  $28.1 \pm 5.5\%$ , respectively. In addition, their clinical data such as blood pressure, glutamate-pyruvate transaminase activity (GPT), triglycerides (TG) and fasting blood sugar (FBS) were within normal ranges. When compared with correlation between obesity indices (Broca index or BMI) and height, there was a negative correlation between Broca index and height ( $= -0.447$ ). Furthermore, the number of obese subjects estimated by Broca index was less than that of obese subjects estimated by BMI. Although both Broca index and BMI showed higher correlations with body fat estimated by BIA, BMI ( $r = 0.927$ ) showed a higher correlation compared to that of Broca index ( $r = 0.875$ ). These results suggest that BMI is a reliable index to evaluate the body fat.

73. Kirschner MA, Schneider G, Ertel NH, Worton E. Obesity, androgens, oestrogens and cancer risk. *Cancer Research* 1982;42:3281-5

Obesity is associated with increased incidence of cancers arising from tissues responsive to estrogenic stimulation, including endometrium, breast, and prostate. We thus wished to explore estrogen production and its origin in obesity in an attempt to provide a possible hormonal link to explain increased cancer risk. Studies of the hormonal milieu of obese men and women revealed several abnormalities of sex hormone production and metabolism. (a) Androstenedione production rates are elevated and serve as prehormones of both testosterone and estrogens. (b) Extragonadal aromatization of androgens to form estrogens (androstenedione to estrone and testosterone to estradiol) is elevated, resulting in (c) increased production rates of estrogens. The obese person is thus chronically exposed to hyperestrogenemia. In addition, obesity is associated with other alterations of sex hormone-binding globulin and increased metabolic clearance rates of several hormones. After weight loss to ideal body weight, there appears to be normalization of androgen and estrogen production rates, as well as circulating hormone levels; however, metabolic abnormalities such as increased aromatization of androgens to estrogens and accelerated metabolic clearance rates of androstenedione remain abnormal.

74. Kissebah A, Peiris A. Biology of regional body fat distribution. Relationship to non-insulin dependent diabetes mellitus. *Diabetes Metab Rev* 1989;5:83-109

SUMMARY: The conclusions from our studies can be summarized as follows: (1) WHR is a strong predictor of abnormalities in the metabolic profile predisposing to NIDDM and cardiovascular disease, (2) the association of WHR with the metabolic abnormalities is independent of and additive to that of the degree of overweight, and (3) the correlative power of WHR is the result of its prediction of the abdominal visceral fat mass. Our studies suggest that abdominal and/or visceral adiposity accounts for most of the abnormal metabolic pathways present in NIDDM, particularly those leading to increased morbidity and mortality. This includes the marked peripheral insulin resistance, the abnormal insulin removal dynamics, and the disorders in lipoprotein and blood pressure regulation. Total body fat mass exerts synergistic effects via a mild decline in insulin sensitivity and increased pancreatic insulin production. The genetic predisposition to NIDDM precipitates overt hyperglycemia via unsuppressed hepatic glucose production. Whether this results from or leads to impaired pancreatic insulin secretory capacity and/or pulsatility is uncertain. A summary of this interaction is given in Table VII. Our studies support the view that body fat distribution and the accompanying metabolic abnormalities could be exacerbated by variability in the androgenic/estrogenic balance. Sensitivity to the androgenic milieu might be initiated by an early developmental aberration in sexual dimorphism. The possible direct and indirect sites of interaction between androgenic activity and the abnormal metabolic pathways in upper body obesity are summarized in Figure 19.

CONCLUSIONS: Increasing abdominal and/or visceral body fat is accompanied by progressively increasing plasma glucose, insulin, and triglyceride levels, decreasing HDL cholesterol concentration, and increasing blood pressure. The effects of abdominal fat are independent of and additive to those due to total body fat mass. Increasing abdominal and/or visceral adiposity accounts for most of the abnormal metabolic pathways predisposing to NIDDM, including the marked peripheral insulin resistance, the abnormal insulin removal dynamics, and the disturbances in lipoprotein and blood pressure



regulation. A major remaining question for future research is the possible mechanisms by which abdominal adiposity could initiate these metabolic sequences. The potential role of the androgenic/estrogenic activity and aberrant sexual dimorphism is currently under intense investigation. Since perinatal exposure to androgens is known to influence behavior and maturation of the hypothalamic-hypophyseal-gonadal axis, it is possible that the psychological maladjustments to stress and the neuroendocrine disorders accompanying this form of obesity could be part of an aberrant sexual dimorphism. Furthermore, perinatal overexposure to androgens might result from a genetic disorder, and the possible occurrence of genetic linkages associating sex hormone balance, body fat distribution, and the metabolic sequelae has to be considered. These exciting possibilities deserve further examination, and they can be addressed more systematically now that the major metabolic pathways are known.

75. Klem M, Wing R, McGuire M, Seagle H, Hill J. A descriptive study of individuals successful at long-term maintenance of substantial weight loss. *Am J Clin Nutr* 1997;66(2):239-246

The National Weight Control Registry (NWCR) is, to the best of our knowledge, the largest study of individuals successful at long-term maintenance of weight loss. Despite extensive histories of overweight, the 629 women and 155 men in the registry lost an average of 30 kg and maintained a required minimum weight loss of 13.6 kg for 5 y. A little over one-half of the sample lost weight through formal programs; the remainder lost weight on their own. Both groups reported having used both diet and exercise to lose weight and nearly 77% of the sample reported that a triggering event had preceded their successful weight loss. Mean (+/-SD) current consumption reported by registry members was 5778 +/- 2200 kJ/d, with 24 +/- 9% of energy from fat. Members also appear to be highly active: they reported expending approximately 11830 kJ/wk through physical activity. Surprisingly, 42% of the sample reported that maintaining their weight loss was less difficult than losing weight. Nearly all registry members indicated that weight loss led to improvements in their level of energy, physical mobility, general mood, self-confidence, and physical health. In summary, the NWCR identified a large sample of individuals who were highly successful at maintaining weight loss. Future prospective studies will determine variables that predict continued maintenance of weight loss.

76. Kopelman P, Keable-Elliott D. An inner city district diabetic care scheme. *Diab Med* 1990;7:558-560  
kein Abstract.

77. Kreuter H, Klaes L, Hoffmeister H, Laaser U. *Prävention von Herz-Kreislaufkrankungen. Ergebnisse und Konsequenzen der Deutschen Herz-Kreislauf-Präventionsstudie (DHP)*. Weinheim und München: Juventa Verlag, 1995, Buch.

78. Kuczmarski RJ, Flegal KM, Campbell SM, Johnson CL. Increasing prevalence of overweight among US adults. The National Health and Nutrition Examination Surveys 1960 to 1991. *Jama* 1994;272:205-211

OBJECTIVE: To examine trends in overweight prevalence and body mass index of the US adult population. DESIGN: Nationally representative cross-sectional surveys with an in-person interview and a medical examination, including measurement of height and weight. SETTING/PARTICIPANTS: Between 6000 and 13000 adults aged 20 through 74 years examined in each of four separate national surveys during 1960 to 1962 (the first National Health Examination Survey (NHESI)), 1971 to 1974 (the first National Health and Nutrition Examination Survey (NHANES I)), 1976 to 1980 (NHANES II), and 1988 to 1991 (NHANES III phase 1). RESULTS: In the period 1988 to 1991, 33.4% of US adults 20 years of age or older were estimated to be overweight. Comparisons of the 1988 to 1991 overweight prevalence estimates with data from earlier surveys indicate dramatic increases in all race/sex groups. Overweight prevalence increased 8 % between the 1976 to 1980 and 1988 to 1991 surveys. During this period, for adult men and women aged 20 through 74 years, mean body mass index increased from 25.3 to 26.3; mean body weight increased 3,6 kg. CONCLUSIONS: These nationally representative data document a substantial increase in overweight among US adults and support the findings of other investigations that show notable increases in overweight during the past decade. These observations suggest that the Healthy People 2000 objective of reducing the prevalence of overweight US adults to no more than 20 % may not be met by the year 2000. Understanding the reasons underlying the increase in the prevalence of overweight in the United States and elucidating the potential consequences in terms of morbidity and mortality present a challenge to our understanding of the etiology, treatment, and prevention of overweight.

79. Kunesova M, Hainer V, Parizkova J, Stich V. Predictors of the weight loss in morbidly obese women: one year follow up. *Int J Obes* 1996;4:59

We studied 85 morbidly obese women who initiated their weight reduction regimen with 4-week treatment by very low calorie diet (VLCD) and who were followed at the obesity unit as outpatients for one-year. Daily energy intake during initial VLCD period was 1.6 MJ while low energy diet 5-6 MJ per day under conditions of regular behavioral group intervention was recommended for the subsequent period. Weight loss at lower follow-up was partly influenced by the initial VLCD-induced weight loss, but neither age nor initial weight and body mass index affected weight loss after one year. Patients regai-

ning weight consumed significantly more fat, protein and esp. animal protein in the pretreatment period. Those subjects who planned lower energy and relatively higher protein intake at the end of initial VLCD period succeeded to lose more weight but, surprisingly, planned consumption of fat did not influence final weight loss. Higher restrained score in the Stunkard's Eating Inventory and lower score on measures of depression in the Beck Inventory predicted better long-term outcome in the weight reduction regimen. In conclusion, long-term outcome in the weight reduction regimen has been shown to be influenced by the pretreatment dietary habits, current dietary planning, initial response to VLCD and by both restrained score and score of depression.

80. Landin K, Stigendal L, Eriksson E, Krotkiewski M, Risberg B, Tengborn L, et al. Abdominal obesity is associated with an impaired fibrinolytic activity and elevated plasminogen activator inhibitor-1. *Metabolism* 1990;39(10):1044-48

Recent epidemiologic studies have shown that abdominal obesity, characterized by a high waist to hip circumference ratio (WHR), is associated with increased cardiovascular morbidity and mortality. The present study examines components of the fibrinolytic system in obese and lean middle-aged women with a high and low WHR. Ten women in each group were carefully matched with respect to age, body weight, lean body mass, and body fat. Fibrinogen and endothelial type of plasminogen activator inhibitor -1 (PAI-1) were significantly elevated in the obese women with a high WHR compared with the obese women with a low WHR or with both groups of lean women. In addition, obese women with a high WHR exhibited a greater metabolic risk profile (elevated glucose, insulin, and triglyceride levels). When all subjects were pooled for the analyses, both fibrinogen and PAI-1 levels correlated positively with glucose and insulin levels. PAI-1 was also negatively related to degree of insulin sensitivity measured with the euglycemic clamp technique. In the obese groups, WHR but not body mass index (BMI), correlated with PAI-1 levels. No such correlations were seen in the lean groups. In conclusion, the data show that a high WHR in obese, but not lean middle-aged women, is associated with an impaired fibrinolytic activity. This perturbation becomes enhanced when it is associated with hyperinsulinemia and insulin resistance, which is a typical feature of abdominal obesity.

81. Langlois JA, Harris T, Looker AC, Madans J. Weight change between age 50 years and old age is associated with risk of hip fracture in white women aged 67 years and older. *Arch Intern Med* 1996;156:989-94

**BACKGROUND:** Although changes in body weight with aging are common, little is known about the effects of weight change on health in old age. **OBJECTIVES:** To study the effects of weight loss and weight gain from age 50 years to old age on the risk of hip fracture among postmenopausal white women aged 67 years and older and to determine if the level of weight at age 50 years modifies this risk. **METHODS:** The association between weight change and the risk of hip fracture was studied in 3683 community-dwelling white women aged 67 years and older from three sites of the Established Populations for Epidemiologic Studies of the Elderly. **RESULTS:** Extreme weight loss (10% or more) beginning at age 50 years was associated in a proportional hazards model with increased risk of hip fracture (relative risk) (RR), 2.9; 95 % confidence interval (CI) 2.0-4.1). This risk was greatest among women in the lowest (RR, 2.3; CI, 1.1-4.8) and middle (RR, 2.8; CI, 1.5-5.3) tertiles of body mass index at age 50 years. Among the thinnest women, even more modest weight loss (5% to <10%) was associated with increased risk of hip fracture (RR, 2.3; CI, 1.0-5.2). Weight gain of 10% or more beginning at age 50 years provided borderline protection against the risk of hip fracture (RR, 0.7; CI, 0.4-1.0). The RRs for weight gain of 10 % or more were protective only among women in the middle and high tertiles of body mass index at age 50 years and were not significant (middle tertile RR, 0.8; CI, 0.3-1.8; high tertile RR, 0.6; CI, 0.2-1.9). **CONCLUSIONS:** Weight history is an important determinant of the risk of hip fracture. Weight loss beginning at age 50 years increases the risk of hip fracture in older white women, especially among those who are thin at age 50 years; weight gain of 10 % or more decreases the risk of hip fracture. Physicians should include weight history in their assessment of postmenopausal older women for risk of hip fracture.

82. Lapidus L, Bengtsson C, Larsson B. Distribution of adipose tissue and risk of cardiovascular disease and death: a twelve year follow up of participants in the population study of women in Gothenburg, Sweden. *Brit Med J* 1984;289:1257-61

A longitudinal population study of 1462 women aged 3 -60 was carried out in Gothenburg, Sweden, in 1968-9. In univariate analysis of ratio of waist to hip circumference showed a significant positive association with the 12 year incidence of myocardial infarction, angina pectoris, stroke, and death. The association with incidence of myocardial infarction remained in multivariate analysis and was independent of age, body mass index, smoking habit, serum cholesterol concentration, serum triglyceride concentration, and systolic blood pressure. The relation between the ratio of waist to hip circumference and the end points of myocardial infarction, angina pectoris, stroke, and death was stronger than for any other anthropometric variable studied.

83. Larsson B, Seidell J, Svardsudd K, Welin L, Tibblin G, Wilhelmsen L, et al. Obesity, adipose tissue distribution and health in men--the study of men born in 1913. *Appetite* 1989;13:37-44

Recent studies suggest that cardiovascular disease is associated with abdominal distribution of adipose tissue rather than obesity in terms of total body fat. A number of other variables, known to be associated with obesity, were therefore examined in a cohort of randomly selected middle-aged men in relation to abdominal distribution of adipose tissue, measured as the ratio of the circumferences of the waist and hips (WHR), as well as to degree of obesity, measured as body mass index (BMI). These variables included anthropometric variables, cardiovascular risk factors as well as socioeconomic factors and physical health. Increased WHR, independent of BMI, was negatively associated with height, and hip circumference. Positive associations were found with blood pressure, cholesterol, triglycerides, fibrinogen and smoking. In addition positive associations were found with low social class and social group, illness in terms of sick leave, frequent use of health facilities such as X-rays, as well as diseases such as peptic ulcer. In sharp contrast to this, BMI, independent of WHR, was not associated with physical health variables or social class. Generalized obesity seemed to be associated with good health in the variables measured. There were positive associations to various anthropometric variables, including lean body mass. High BMI was also associated with elevated blood pressure and triglycerides. Several of the indicators of poor health traditionally associated with obesity thus do not seem to be characteristic for obesity in middle-aged men selected at random from the population but rather for an abdominal fat distribution, independent of obesity.

84. Larsson B, Svädsudd K, Welin L. Abdominal adipose tissue distribution, obesity, and risk of cardiovascular disease and death: 13 year follow up of participants in the study of men born in 1913. *Brit Med J* 1984;288:1401-4

In a prospective study of risk factors for ischaemic heart disease 792 54 year old men selected by year of birth (1913) and residence in Gothenburg agreed to attend for questioning and a battery of anthropometric and other measurements in 1967. Thirteen years later these baseline findings were reviewed in relation to the numbers of men who had subsequently suffered a stroke, ischaemic heart disease, or death from all causes. Neither quintiles nor deciles of initial indices of obesity (body mass index, sum of three skinfold thickness measurements, waist or hip circumference) showed a significant correlation with any of the three end points studied. Statistically significant associations were, however, found between the waist to hip circumference ratio and the occurrence of stroke ( $p=0.002$ ) and ischaemic heart disease ( $p=0.04$ ). When the confounding effect of body mass index or the sum of three skinfold thickness was accounted for the waist to hip circumference ratio was significantly associated with all three end points. This ratio, however, was not an independent long term predictor of these end points when smoking, systolic blood pressure, and serum cholesterol concentration were taken into account. These results indicate that in middle aged men The distribution of fat deposits may be a better predictor of cardiovascular disease and death than the degree of adiposity.

85. Lauer MS, Anderson KM, Kannel WB, Levy D. The impact of obesity on left ventricular mass and geometry. The Framingham Heart Study. *JAMA* 1991;266(2):231-6

OBJECTIVE.--To determine the relationship of varying degrees of obesity with left ventricular mass and geometry. DESIGN.--Survey. SETTING.--Population-based epidemiologic study. PARTICIPANTS AND METHODS.--M-mode echocardiograms, which were adequate for estimation of left ventricular mass, were obtained in 3922 healthy participants of the Framingham Heart Study. Measured height and weight were used to calculate body-mass index, a measure of obesity. RESULTS.--Body-mass index was strongly correlated with left ventricular mass. After adjusting for age and blood pressure, body-mass index remained a strong independent predictor of left ventricular mass, left ventricular wall thickness, and left ventricular internal dimension ( $P$  less than .01 for all). Body-mass index was associated with prevalence of echocardiographic left ventricular hypertrophy, particularly in subjects with a body-mass index exceeding 30 kg/m<sup>2</sup>. CONCLUSIONS.--Obesity is significantly correlated with left ventricular mass, even after controlling for age and blood pressure. The increase in left ventricular mass associated with increasing adiposity reflects increases in both left ventricular wall thickness and left ventricular internal dimension.

86. Lauterbach KW, Lubecki P, Oesingmann U, Ollenschläger G, Richard S, Straub C. Konzept eines Clearingverfahrens für Leitlinien in Deutschland. *Z.aerztl.Fortbild.Qual.sich.* 1997;91:283-8

Leitlinien sind wirksame Instrumente zur Sicherung und Verbesserung der Versorgungsqualität und tragen zur Erhöhung der Effizienz der Versorgung bei. Bislang ist jedoch die Qualität von Leitlinien selbst in Deutschland nur wenig systematisch untersucht und verbessert worden. Dies gilt insbesondere auch für die formale Untersuchung von Leitlinien in Bezug auf die Sammlung und Bewertung der Evidenz. Ihre Praktikabilität und ihre gesundheitsökonomischen Folgen. Es liegt eine international anerkannte Methodik vor, mit der bestehende und neue Leitlinien in diesen drei Kategorien untersucht und bewertet werden können. In diesem Beitrag wird ein Clearingverfahren für Leitlinien in Deutschland vorgeschlagen, welches die Aufgabe hat, die Qualität von Leitlinien systematisch zu verbessern sowie den Autoren und Anwendern von Leitlinien wertvolle Informationen anzubieten.

87. Lawton CL, Burley VJ, Wales JK, Blundell JE. Dietary fat and appetite control in obese subjects: weak effects on satiation and satiety. *Int J Obes Relat Metab Disord* 1993;17:409-416

The present study assessed the capacity of both high fat and high carbohydrate (CHO) foods to lead to over-consumption in 12 obese women (mean BMI = 42 kg/m<sup>2</sup>). Subjects were provided with either a low (527 kcal) or high (985 kcal) energy meal at midday. Energy intake was then measured in a later ad libitum dinner meal in which subjects ate from a range of either high fat or high CHO foods. Energy intake following exposure to these meals was then assessed using food intake diary records which were kept for the rest of the day and for the following 24 h. The energy manipulations at lunch gave rise to different levels in the rated intensity of hunger. At the dinner meal subjects consumed an average of 937 kcal following the high energy lunch and 1026 kcal following the low energy lunch (an increase of 10 %). However, average intake from the high CHO dinner meal was only 677 kcal compared to 1336 kcal from the high fat dinner meal (an increase of 97 %). Consequently the most important variable influencing dinner meal size was not level of hunger but the nutrient content of the range of foods consumed. Analysis of dinner meal intake revealed a significant interaction between lunch meal size and dinner meal type. This means that when hunger level was high subjects over-ate on the high fat but not the high CHO foods. Average post-dinner intakes following the high fat and high CHO meals did not differ significantly. These results indicate that dietary fat has a weak effect on both satiation and satiety and reveal how hunger and nutrient composition could interact to lead to over-consumption. The findings suggest that periodic exposure to a high fat meal, particularly when hunger is high, may be sufficient to lead to over-consumption of energy as fat which is not compensated for by reduced later intake.

88. Lean MEJ, Han TS, Morrison CE. Waist circumference indicates the need for weight management. *Bmj* 1995;311:158-61

OBJECTIVE: To test the hypothesis that a single measurement, waist circumference, might be used to identify people at health risk both from being overweight and from having a central fat distribution. DESIGN: A community derived random sample of men and women and a second, validation sample. SETTING: North Glasgow SUBJECTS: 904 men and 1014 women (first sample); 86 men and 202 women (validation sample). MAIN OUTCOME MEASURES: Waist circumference, body mass index, waist:hip ratio. RESULTS: Waist circumference  $\geq 94$  cm for men and  $\geq 80$  cm for women identified subjects with high body mass index ( $\geq 25$  kg/m<sup>2</sup>) and those with lower body mass index but high waist:hip ratio ( $\geq 0.95$  for men,  $\geq 0.80$  for women) with a sensitivity of  $> 96$  % and specificity  $>97.5$  %. Waist circumference  $\geq 102$  cm for men or  $\geq 88$  cm for women identified subjects with body mass index  $\geq 30$  and those with lower body mass index but high waist:hip ratio with a sensitivity of  $>96$  % and specificity  $>98$  %, with only about 2 % of the sample being misclassified. CONCLUSIONS: Waist circumference could be used in health promotion programmes to identify individuals who should seek and be offered weight management. Men with waist circumference  $\geq 94$  cm and women with waist circumference  $\geq 80$  cm should gain no further weight; men with waist circumference  $\geq 102$  cm and women with waist circumference  $\geq 88$  cm should reduce their weight.

89. Lean MEJ, Powrie JK, Anderson AS, Garthwaite PH. Obesity, weight loss and prognosis in type 2 diabetes. *Diabetic Med* 1990;7:228-33

Medical records were reviewed of all 263 Type 2 diabetic patients from the Aberdeen diabetic clinic who were known to have died in 1985 or 1986. Mean age was 65 years (interquartile range 57-75 years) at diagnosis and 72 (66-80) years for men, 75 (72-83) years for women, at death. Life expectancy at age 65 was 35 % less than published figures for the general population. Analysis of survival in 233 patients who lived more than 1 year (189 overweight) using stepwise multiple regression indicated as significant ( $p < 0.05$ ) adverse independent variables: age at diagnosis, presence of clinical ischaemic heart disease at diagnosis, plasma glucose at diagnosis; and as significant favourable variables: oral hypoglycaemic drug therapy, weight loss in the first year, and an interaction between weight loss and BMI for patients with BMI  $> 25$  kg m<sup>-2</sup>. Changes in fashions over the years are likely to have biased these results towards including oral hypoglycaemic therapy and excluding the expected adverse effect of smoking. Mean weight loss at 1 year was 2.6 kg for those with BMI 25-30 kg m<sup>-2</sup>, 6.8 kg with BMI  $> 30$  kg m<sup>-2</sup>, following standard dietetic advice. For the average patient each 1 kg weight loss was associated with 3-4 months prolonged survival.

90. Lévy E, Lévy P, Le Pen C, Basdevant A. The economic cost of obesity the French situation. *Int J Obes* 1995;19:788-93

Objective: to estimate the economic burden of obesity in France. - Design: A prevalence-based approach identifying the costs incurred during a given year (1992) by obese subjects. - Measurements: Direct costs (personal health care, hospital care, physicians services, drugs) and indirect costs (lost output as result of cessation or reduction of productivity caused by morbidity and mortality); economic benefits due to the reduced incidence of hip fractures. - Results: The direct costs of obesity (BMI  $\geq 27$ ) were 11.89 billion French Francs (FF), which corresponded to about 2% of the expenses of the French care system. Hypertension represented 33% of the total amount and cancer 2.5% of the direct cost of

obesity. Indirect costs represented FF 0.6 billion. These are conservative estimates as far as all obesity-related diseases and all health care and indirect costs were not included due to missing information.

- Conclusions: These results were remarkably similar to previous reports on the economic costs of obesity in other western countries (USA, Sweden, Netherlands, Australia) which concluded that the cost of obesity amounted to around 2% to 5% of the total cost of health care in industrialized societies. 91. Lew EA, Garfinkle L. Variations in mortality by weight among 750,000 men and women. *J Chronic Dis* 1979;32:563-576

This paper is based on a portion of a long-term prospective study conducted by the American Cancer Society over the period 1959-1972. It describes the mortality experience according to variations in weight among 750,000 men and women drawn from the general population. The lowest mortality was found among those close to average weight and those 10-20% below average weight. Mortality among men and among women 30-40% heavier than average was nearly 50% higher than among those of average weight; among those more than 40% heavier than average it was nearly 90% higher than among those of average weight. Coronary heart disease was the major factor in the higher mortality of overweights, being 55% higher among those 30-40% heavier than average, and about 100% higher among those more than 40% overweight. Cancer mortality was elevated only among those 40% or more overweight; cancer of the colon and rectum was the principal site of excess mortality among men, while cancer of the gall bladder and biliary passages, breast, cervix, endometrium, uterus and ovary were the major sites of excess mortality among women. Mortality from diabetes was particularly high among overweights, especially women. The mortality findings of this study match closely those of the Build and Blood Pressure study 1959 based on the experience of 41/2 million insured persons.

92. Loeffler G. Pathophysiologie des Fettgewebes. *Deutsches Ärzteblatt* 1997;94(30):1620-23  
Fettgewebe reagiert auf übermäßige Nahrungszufuhr nicht nur passiv mit Massenzunahme. Es ähnelt vielmehr einem endokrinen Organ, wobei die von ihm in die Zirkulation abgegebenen humoralen Faktoren Energiehaushalt und Fettmasse regulieren. Im einzelnen handelt es sich um Estrogene, Leptin, TNF-alpha, Angiotensinogen und Bestandteile des Komplementsystems.

93. Luder E, Melnik TA, DiMaio M. Association of being overweight with greater asthma symptoms in inner city black and Hispanic children. *J Pediatr* 1998;132(4):699-703

OBJECTIVE: To determine whether the weight status of inner city black and Hispanic children with asthma differs from that of their peers and to assess whether overweight asthmatic children experience greater asthma symptoms. STUDY DESIGN: A cross-sectional study in an ambulatory chest clinic of an inner city medical center. METHODS: We studied black and Hispanic children aged 2 to 18 years (n = 209) with the single diagnosis of asthma. The peer control subjects consisted of a sample of black and Hispanic children aged 6 to 13 years (n = 1017), enrolled in the New York City schools. Asthma symptoms, the number of asthma medications prescribed, and peak expiratory flow rate (PEFR) measurements were used to classify asthma severity and relate to body mass index (BMI). Bivariate categorical analysis and chi 2 tests were performed to examine the relationship between high BMI and the individual measures of asthma severity. RESULTS: The prevalence of overweight was significantly higher in children with moderate to severe asthma than in their peers. The risk of overweight based on a BMI in the 85th percentile or greater was significantly associated with the following measures of asthma severity: (1) the number of school days missed per year; (2) a PEFR less than or equal to 60% of the predicted PEFR; and (3) the number of asthma medications prescribed. CONCLUSIONS: The prevalence of overweight was significantly higher in children with moderate to severe asthma than in their peers, and being overweight was associated with significantly more severe asthma symptoms. Further studies in overweight asthmatic children are needed, including the effect of weight loss on lung function and other markers of asthma severity.

94. Maclure KM, Hayes KC, Colditz GA, Stampfer M, Speizer F, Willet W. Weight, diet, and the risk of symptomatic gallstones in middle-aged women. *N Eng J Med* 1989;321:563-9

To assess the risk factors for symptomatic gallstones, 88,837 women in the Nurses' Health Study cohort (age range, 34-59 years) were followed for four years after completing a detailed questionnaire about food and alcohol intake in 1980. A total of 433 cholecystectomies and 179 cases of newly symptomatic, unremoved gallstones, diagnosed by ultrasonographic examination of x-ray films were reported during the four-year follow-up. The age-adjusted relative risk for very obese women, who had a Quetelet index of relative weight (weight in kilograms divided by the square of the height in meters) of more than 32 kg per square meter, was 6.0 (95 percent confidence interval, 4.0 to 9.0) as compared with women whose relative weight was less than 20 kg per square meter. For slightly overweight women (relative weight, 24 to 24.9 kg per square meter), the relative risk was 1.7 (95 percent confidence interval, 1.1 to 2.7). Overall, we observed a roughly linear relation between relative weight and the risk of gallstones. Among the 59,306 women whose relative weight was less than 25 kg per square meter, a high energy intake (>8200 J per day), as compared with a low energy intake (<4730 J per day), was associated with an increased incidence of symptomatic gallstones (relative risk, 2.1; 95 percent confidence interval, 1.4 to 3.3), and an alcohol intake of at least 5 g per day was associated with a decrea-

sed incidence as compared with abstention (relative risk, 0.6; 95 percent confidence interval, 0.4 to 0.8). Parity did not appear to be an important risk factor after an adjustment was made for relative weight. These data support a strong association between obesity and symptomatic gallstones and suggest that even moderate overweight may increase the risk.

95. Makela M. Strategies of health care guideline development in Europe. Meeting on guidelines on healthcare practice. *WHO Regionalbüro für Europa. Kopenhagen* 1997;Dok. POLC 02-020204 EUR / ICP/NHP 022g, kein Abstract.

96. Manson JE, Colditz GA, Stampfer MJ. A prospective study of obesity and risk of coronary heart disease in women. *N Eng J Med* 1990;322:882-9

Abstract We examined the incidence of nonfatal and fatal coronary heart disease in relation to obesity in a prospective cohort study of 115,886 in U.S. women who were 30 to 55 years of age in 1976 and free of diagnosed coronary disease, stroke, and cancer. During eight years of follow up (775,430 person-years), we identified 605 first coronary events, including 306 nonfatal myocardial infarctions, 83 deaths due to coronary heart disease, and 216 cases of confirmed angina pectoris.

A higher Quetelet index (weight in kilograms divided by the square of the height in meters) was positively associated with the occurrence of each category of coronary heart disease. For increasing levels of current Quetelet index (<21, 21 to <23, 23 to <25, 25 to <29, and >=29), the relative risks of nonfatal myocardial infarction and fatal coronary heart disease combined, as adjusted for age and cigarette smoking, were 1.0, 1.3, 1.3, 1.8, and 3.3 (Mantel-extension X for trend = 7.29; P<0.00001). As expected, control for a history of hypertension, diabetes mellitus, and hypercholesterolaemia known to be biologic effects of obesity—attenuated the strength of the association. The current Quetelet index was a more important determinant of coronary risk than that at the age of 18; an intervening weight gain increased risk substantially. These prospective data emphasize the importance of obesity as a determinant of coronary heart disease in women. After control for cigarette smoking, which is essential to assess the true effect of obesity, even mild-to-moderate overweight increased the risk of coronary disease in middle-aged women.

97. Manson JE, Willett WC, Stampfer MJ, Colditz GA, Hunter DJ, Hankinson SE, et al. Body weight and mortality among women. *N Eng J Med* 1995;333:677-85

BACKGROUND: The relation between body weight and overall mortality remains controversial despite considerable investigation. METHODS: We examined the association between body-mass index (defined as the weight in kilograms divided by the square of the height in meters) and both overall mortality and mortality from specific causes in a cohort of 115,195 U.S. women enrolled in the prospective Nurses' Health Study. These women were 30 to 55 years of age and free of known cardiovascular disease and cancer in 1976. During 16 years of follow-up, we documented 4726 deaths, of which 881 were from cardiovascular disease, 2586 from cancer, and 1259 from other causes. RESULTS: In analyses adjusted only for age, we observed a J-shaped relation between body-mass index and overall mortality. When women who had never smoked were examined separately, no increase in risk was observed among the leaner women, and a more direct relation between weight and mortality emerged (P for trend < 0.001). In multivariate analyses of women who had never smoked and had recently had stable weight, in which the first four years of follow-up were excluded, the relative risks of death from all causes for increasing categories of body-mass index were as follows: body-mass index < 19 (the reference category), relative risk = 1.0; 19.0 to 21.9, relative risk = 1.2; 22.0 to 24.9 relative risk = 1.2; 25.0 to 26.9, relative risk = 1.3; 27.0 to 28.9, relative risk = 1.6; 29.0 to 31.9, relative risk 2.1; and >= 32.0, relative risk = 2.2 (P for trend < 0.001). Among women with body-mass indexes of 32.0 or higher who had never smoked, the relative risk of death from cardiovascular disease was 4.1 (95 % confidence interval, 2.1 to 7.7), and that of death from cancer was 2.1 (95 % confidence interval, 1.4 to 3.2), as compared with the risk among women with body-mass indexes below 19.0. A weight gain of 10 kg (22 lb) or more since the age of 18 was associated with increased mortality in middle adulthood. CONCLUSIONS: Body weight and mortality from all causes were directly related among these middle-aged women. Lean women did not have excess mortality. The lowest mortality rate was observed among women who weighed at least 15 percent less than the U.S. average for women of similar age and among those whose weight had been stable since early adulthood.

98. Martin L, Tan T, Horn JR, Bixler EO, Kauffman GL, Becker DA, et al. Comparison of the costs associated with medical and surgical treatment of obesity. *Surgery* 1995;118(4):599-606

BACKGROUND: We compared the long-term costs and outcomes of gastric bypass versus medical therapy (very low-calorie diet plus weekly behavioral modification) for obese patients. METHODS: A successful outcome was defined as the loss of at least one third of excess weight that was maintained for the duration of the study. A minimal cost was assigned: \$3000 for medical and \$24000 for surgical treatment. A cost per pound of weight lost for all patients successfully monitored was calculated. The Federal Trade Commission recently asked all weight loss programs to report this cost for patients at least 2 years after therapy. RESULTS: A total of 201 patients entered surgical and 161 entered medical therapy. The surgical group was initially heavier (mean body mass index (kg/m<sup>2</sup>) +/- SE=49.3+/-0.6

versus 41.2±0.7,  $p < 0.01$ ), but each group's lowest mean body mass index was similar 31.8 versus 32.1, respectively). A significantly higher percentage of patients in the surgical versus the medical group were still successful at year 5: 89 % versus 21 %. The cost per pound lost for medical therapy exceeded the cost of surgical therapy in the sixth posttreatment year (both more than \$250/pound). CONCLUSIONS: Surgical treatment appears to be more cost-effective at producing and maintaining weight loss. It is imperative that long-term follow-up studies be funded to definitely establish this finding.

99. McKeigue PM. Metabolic consequences of obesity and body fat pattern: lessons from migrant studies. The origins and consequences of obesity. *Ciba Foundation Symposium* 1996;201(67):54-67, kein Abstract.

100. McKeigue PM, Shah B, Marmot MG. Relation of central obesity and insulin resistance with high diabetes prevalence and cardiovascular risk in South Asians. *Lancet* 1991;337:382-6

The hypothesis that the high mortality from coronary heart disease (CHD) in South Asians settled overseas compared with other populations is due to metabolic disturbances related to insulin resistance was tested in a population survey of 3193 men and 561 women aged 40-69 years in London, UK. The sample was assembled from industrial workforces and general practitioners' lists. In comparison with the European group, the South Asian group had a higher prevalence of diabetes (19% vs 4%), higher blood pressures, higher fasting and post-glucose serum insulin concentrations, higher plasma triglyceride, and lower HDL cholesterol concentrations. Mean waist-hip girth ratios and trunk skinfolds were higher in the South Asian than in the European group. Within each ethnic group waist-hip ratio was correlated with glucose intolerance, insulin, blood pressure, and triglyceride. These results confirm the existence of an insulin resistance syndrome, prevalent in South Asian populations and associated with a pronounced tendency to central obesity in this group. Control of obesity and greater physical activity offer the best chances for prevention of diabetes and CHD in South Asian people.

101. McMahon SW, Peto R, Cutler J. Blood pressure stroke and coronary heart disease Part I prolonged differences in blood pressure: prospective observational studies. *Lancet* 1990;335:765-74, kein Abstract.

102. Meade TW, Imeson J, Stirling Y. Effects of changes in smoking and other characteristics on clotting factors and the risk of ischaemic heart disease. *Lancet* 1987:986-8

The Northwick Park Heart Study (NPHS) has demonstrated associations of high levels of factor VII coagulant activity (VII<sub>c</sub>) and of plasma fibrinogen concentration with the risk of subsequent ischaemic heart disease (IHD). In cross-sectional data from the 2023 white men in NPHS, lifetime duration of smoking was a determinant of initial plasma fibrinogen levels. Fibrinogen levels had apparently begun to fall soon after smoking was discontinued but it was over 5 years before they had returned to levels found in life-long non-smokers. In prospective data, smoking cessation and the adoption or resumption of smoking were associated with a decrease or an increase, respectively, of about 0.15 g/l in plasma fibrinogen. These changes would lower or raise the risk of IHD by about 20 %. A switch from cigarettes to cigars was associated with a large increase in fibrinogen. A substantial part of the relation between smoking and IHD appears to be mediated through the fibrinogen concentration. Following changes in body mass VII<sub>c</sub> rose in those who had given up smoking and fell in those who resumed.

103. Meade TW, Ruddock V, Stirling Y, Chakrabarti R, Miller GJ. Fibrinolytic activity, clotting factors and long term incidence of ischaemic heart disease in the Northwick Park study. *Lancet* 1993;342:1076-9

Fibrinolytic activity (FA) was measured by dilute blood clot lysis time at entry to the Northwick Park Heart Study in 1382 white men aged 40-64, of whom 179 subsequently experienced episodes of ischaemic heart disease during a mean follow-up period of 16.1 years. There was a significant interaction between age and low FA ( $p = 0.02$ ) with respect to ischaemic heart disease: a difference of one standard deviation in FA was associated with a difference of about 40 % in ischaemic heart disease risk ( $p = 0.002$ ) in those aged 40-54 at entry. The FA association remained after adjusting for plasma fibrinogen. High fibrinogen concentrations themselves were also associated with ischaemic heart disease, as was high factor VII activity with fatal events. Low FA in younger men may exert a long-term influence by impairing the removal of fibrin deposits that contribute to atherogenesis. Low FA appears to be a leading determinant of ischaemic heart disease in younger men and methods of enhancing fibrinolytic activity, whether by life-style changes or pharmacologically, should be considered.

104. Mehnert H, Kuhlmann H. Hypertension and diabetes mellitus. *Dtsch Med J* 1968;19(16):567-571, kein Abstract.

105. Must A, Jacques PF, Dallal GE, Bajema CJ, Dietz WH. Long-term morbidity and mortality of overweight adolescents. A follow-up of the Harvard Growth Study of 1922 to 1935. *N Engl J Med* 1992;327(19):1350-5

BACKGROUND. Overweight in adults is associated with increased morbidity and mortality. In contrast, the long-term effect of overweight in adolescence on morbidity and mortality is not known. METHODS. We studied the relation between overweight and morbidity and mortality in 508 lean or overweight

adolescents 13 to 18 years old who participated in the Harvard Growth Study of 1922 to 1935. Overweight adolescents were defined as those with a body-mass index that on two occasions was greater than the 75th percentile in subjects of the same age and sex in a large national survey. Lean adolescents were defined as those with a body-mass index between the 25th and 50th percentiles. Subjects who were still alive were interviewed in 1988 to obtain information about their medical history, weight, functional capacity, and other risk factors. For those who had died, information on the cause of death was obtained from death certificates. RESULTS. Overweight in adolescent subjects was associated with an increased risk of mortality from all causes and disease-specific mortality among men, but not among women. The relative risks among men were 1.8 (95 percent confidence interval, 1.2 to 2.7;  $P = 0.004$ ) for mortality from all causes and 2.3 (95 percent confidence interval, 1.4 to 4.1;  $P = 0.002$ ) for mortality from coronary heart disease. The risk of morbidity from coronary heart disease and atherosclerosis was increased among men and women who had been overweight in adolescence. The risk of colorectal cancer and gout was increased among men and the risk of arthritis was increased among women who had been overweight in adolescence. Overweight in adolescence was a more powerful predictor of these risks than overweight in adulthood. CONCLUSIONS. Overweight in adolescence predicted a broad range of adverse health effects that were independent of adult weight after 55 years of follow-up. Evidenzklasse III.

106. Ohlin A, Rossner S. Maternal body weight development after pregnancy. *Int J Obes* 1990;14(2):159-173

Body weight development during pregnancy was monitored for 2295 women, and up to 1 year post-partum for 1423 of them, at 14 maternity clinics throughout Stockholm. The objective was to find predictors for post-partum weight retention. The mean weight gain after 1 year post-partum compared with the pre-pregnancy body weight (delta-weight) was 1.5 +/- 3.6 kg ( $P$  less than 0.001). Of the group 30 per cent lost weight, 56 per cent gained 0 to less than 5 kg and 14 per cent gained greater than or equal to 5 kg. When this result was corrected for possible average underestimation of the self-reported pre-pregnancy weight and weight gain with age, the mean delta-weight was 0.5 kg. The factor with the highest correlation with delta-weight was pregnancy weight gain ( $r = 0.36$ ,  $P$  less than 0.001). Very low  $r$ -values, although statistically significant, were obtained for the correlation between the delta-weight and lactation ( $r = -0.09$ ,  $P$  less than 0.01) and age ( $r = 0.06$ ,  $P$  less than 0.05). The delta-weight was not correlated with pre-pregnancy body weight or parity. Women with a delta-weight of greater than or equal to 5 kg had, on average, a higher pre-pregnancy body weight, but initially overweight women had a more variable weight development than lighter women. One in every four women with a weight retention of greater than or equal to 6 kg after a previous pregnancy experienced a high weight gain even after the present pregnancy. Women who stopped smoking had a significantly higher delta-weight than either smokers or non-smokers. Women in the age group greater than or equal to 36 years had a higher mean pre-pregnancy body weight than younger women, and in the age group 26-35 years the pre-pregnancy body weight was increased with increased parity. Thus, post-partum weight development is individual and of the factors studied here only high weight gain during pregnancy and smoking cessation can be considered as predictors for persistent weight gain after 1 year post-partum.

107. Öhlin A, Rössner S. Maternal body weight development after pregnancy. *Int J Obes* 1990;14:159-73

Body weight development during pregnancy was monitored for 2295 women, and up to 1 year post-partum for 1423 of them, at 14 maternity clinics throughout Stockholm. The objective was to find predictors for post-partum weight retention. The mean weight gain after 1 year post-partum compared with the pre-pregnancy body weight (delta-weight) was 1.5+-3,6kg ( $P<0.001$ ).Of the group 30 per cent lost weight, 56 per cent gained 0 to < 5kg and 14 per cent gained <=5 kg. When this result was corrected for possible average underestimation of the self-reported pre-pregnancy weight and weight gain with age, the mean delta-weight was 0.5 kg. The factor with the highest correlation with delta-weight was pregnancy weight gain ( $r=0.36$ ,  $P<0.001$ ). Very low  $r$ -values, although stastically significant, were obtained for the correlation between the delta-weight and lactation ( $r=-0.09$ ,  $P<0.01$ ) and age ( $r=0.06$ ,  $P<0.05$ ). The delta-weight was not correlated with pre-pregnancy body weight or parity. Women with a delta weight of <=5kg had, on average, a higher pre-pregnancy body weight, but initially overweight women had a more variable weight development than lighter women. One in every four women with a weight retention of 6<=kg after a previous pregnancy experienced a high weight gain even after the present pregnancy. Women who stopped smoking had a significantly higher delta-weight than either smokers or non-smokers. Women in the age group >=36 years had a higher mean-pregnancy body weight than younger women, and in the age group 26-35 years the pre-pregnancy body weight was increased with increased parity. Thus, post-partum weight development is individual and of the factors studied here only high weight gain during pregnancy and smoking cessation can be considered as predictors for persistent weight gain after 1 year post partum.

108. Ohlson LO, Larsson B, Svardsudd K. The influence of body fat distribution on the incidence of diabetes mellitus - 13.5 years of follow-up of the participants in the study of men born on 1913. *Diabe-*



tes 1985;34:1055-1058

SUMMARY - In a prospective study of risk factors for ischemic heart disease, 792 54-yr-old men selected by year of birth (1913) and residence in Göteborg, Sweden, agreed to attend for questioning and a number of anthropometric and other measurements in 1967. Thirteen and one-half years later, these baseline findings were reviewed in relation to the number of men who had subsequently developed diabetes mellitus. This analysis focused on the importance of abdominal adipose tissue distribution, measured as the waist-to-hip circumference ratio, as a predictor for development of diabetes. Even when the confounding effect of body mass index, as a measure of the total body fat mass, was accounted for, the waist-to-hip ratio was positively and significantly associated with the risk for diabetes. These results from a prospective study strongly support previous cross-sectional findings indicating that not only the degree of obesity but also the localization of fat is a risk factor for diabetes.

109. Ollenschläger G. Leitlinien für Diagnostik und Therapie der Mitgliedergesellschaften der Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften (AWMF) im Internet (AWMF-online). *Z ärztl Fortbild.* 1996;90:760-761, kein Abstract.

110. Ollenschläger G, Thomeczek C. Ärztliche Leitlinien. Definitionen-Ziele-Implementierung. *Z ärztl Fortbild* 1996;90:355-361

Medical guidelines are an important part of quality control programs. They may act on knowledge, attitude, and behaviour of physicians as well as of medical laymen and, therefore, on the quality of medical care. As guidelines have been developed and distributed in the U.S. and in other countries for decades, recommendations for the medical practice termed "guidelines" or "consensus reports" are more and more distributed in Germany, as well. However, the internationally accepted quality criteria are only rarely taken into account for such independent guidelines. This review aims to impart such quality criteria. Additionally, a structure for a standardized review and organization of guidelines is proposed.

111. Ostlund ED, Staten M, Kohrt WM, Schultz J, Malley M. The ratio of waist-to-hip circumference, plasma-insulin, and glucose tolerance as independent predictors of the HDL-2-cholesterol level in older adults. *N Engl J Med* 1990;322:229-234

High plasma levels of HDL<sub>2</sub>, a subfraction of high-density lipoprotein (HDL) cholesterol, are associated with a reduced risk of coronary heart disease. To investigate the characteristics related to HDL<sub>2</sub> cholesterol levels, we measured lipoprotein levels and several metabolic and anthropometric variables in 146 healthy subjects (77 men and 69 women) in the seventh decade of life. The level of HDL<sub>2</sub> cholesterol was inversely correlated with the ratio of the waist-to-hip circumference ( $r=0.335$  for men;  $r=-0.370$  for women;  $P<0.01$ ) and the plasma insulin level ( $r=-0.400$  for men;  $r=-0.398$  for women;  $P<0.001$ ). In a multiple regression model including both sexes, 41 percent of the variance in the HDL<sub>2</sub> level was explained by the combined effect of the waist-to-hip ratio ( $P<0.0001$ ) and the plasma insulin level ( $P=0.0003$ ), and the degree of glucose tolerance indicated by the integrated area under the plasma glucose curve after an oral glucose-tolerance test ( $P=0.05$ ). The body-mass index, total percentage of body fat, maximal oxygen uptake, diet, and sex were not significant predictors of the HDL<sub>2</sub> level when added to this model, whereas the original variables remained significant predictors. The HDL<sub>2</sub> cholesterol level in subjects at the 25th percentile for waist-to-hip ratio was 153 percent of that in subjects at the 75th percentile. We conclude that HDL<sub>2</sub> levels are inversely correlated with truncal fat, plasma insulin levels, and the presence of glucose intolerance and are not independently associated with sex or total body fat.

112. Paul T, Brand-Jacobi J, Puckl V. Bulimia nervosa. Ergebnisse einer Untersuchung an 500 Patientinnen. *Münch. med. Wschr.* 1984;126:614-8

Seit 10 bis 15 Jahren leiden zunehmend mehr weibliche Jugendliche und junge Frauen an einer suchtartigen Störung des Essverhaltens, der Bulimia nervosa. Kennzeichnend ist als Primärsymptom eine übersteigerte Angst vor einer Gewichtszunahme. Heißhungerattacken und anschließend selbst induziertes Erbrechen sind die typischen Merkmale der bulimischen Symptomatik. Der hohe subjektive Leidensdruck, das zumeist im Normbereich liegende Körpergewicht und ein wahrscheinlich altersgerechtes Sexualverhalten lassen die Bulimia nervosa gegen die Anorexia nervosa abgrenzen. Dies belegt eine Erhebung an 500 betroffenen Frauen in der Bundesrepublik. Aufgrund bisheriger Erkenntnisse wird vorgeschlagen, eine verhaltenstherapeutisch orientierte Ernährungsbehandlung vorzunehmen. Erprobte Therapiekonzepte stehen zur Zeit nicht zur Verfügung.

113. Pi-Sunyer FX. Health implications of obesity. *Am J Clin Nutr* 1991;53:1595-1603

The health risks of obesity increase with its severity and reach significance at a weight  $> 20\%$  above optimal by using life insurance tables, or at a body mass index  $> 27$ . Risks include hypertension, insulin resistance and diabetes mellitus, cardiovascular disease, hypertriglyceridemia, low high-density lipoprotein cholesterol. There is an increased mortality from endometrial cancer in women and from colorectal cancer in men. Chronic hypoxia and hypercapnia, sleep apnea, gout, degenerative joint disease can occur with more severe obesity. The distribution of body fat is directly related to these health risks. Abdominal obesity is more dangerous than gluteal-femoral obesity because the amount of intra-abdominal fat seems to determine much of the increased peril; therefore, risks of cardiovascular di-

sease, stroke, hypertension, and diabetes increase with abdominal obesity, even independently of total fat mass.

114. Pi-Sunyer FX. Medical hazards of obesity. *Ann Intern Med* 1993;119:655-60

The medical hazards of obesity are discussed. Risks include insulin resistance, diabetes mellitus, hypertriglyceridemia, decreased levels of high-density lipoprotein cholesterol, and increased levels of low-density lipoprotein cholesterol. Obesity is also associated with gallbladder disease and some forms of cancer as well as sleep apnea, chronic hypoxia and hypercapnia, and degenerative joint disease. Obesity is an independent risk factor for death from coronary heart disease. A central distribution of body fat enhances the risk for most of these conditions.

115. Pooling Project Research Group. Relationship of blood pressure, serum cholesterol, smoking habits, relative weight and ECG abnormalities to incidence of major coronary events: Final report of the pooling project. *J Chronic Dis* 1978;31:201-6

This is the final report of the national cooperative Pooling Project. It presents the pooled results of five longitudinal investigations on the incidence of coronary heart disease in middle-aged white men (the Albany civil servant, Chicago Peoples Gas Co., Chicago Western Electric Co., Framingham community and Tecumseh community studies), as well as findings from the eight separate studies working together in this effort [1-8]. Measurements of serum cholesterol, blood pressure and cigarette use, made at a single examination of adult American men, are shown to be highly indicative of risk of first heart attack over the next decade. The analyses of the Pooling Project data show that such measurements not only permit classification of a given population of such men into strata of ascending risk, but also prediction of risk from one population to another. Thus, the analyses of the Pooling Project are widely generalizable to middle-aged white American men.

116. Popkin BM, Paeratakul S, Ge K, Fengying MD. Body Weight Patterns among the Chinese: Results from the 1989 and 1991 China Health and Nutrition Surveys. *Am J Public Health* 1995;85:690-694

**OBJECTIVES.** A longitudinal survey assessed the distribution of adult body weight among the Chinese population. **METHODS.** Data from the 1989 and 1991 China Health and Nutrition Survey were used to study changes in the proportions of adults aged 20-45 years who were classified as underweight, normal weight, overweight, and severely overweight. **RESULTS.** There was a slight decline in the proportion of men and women classified as underweight, but among lower-income persons an increase occurred. The proportion of adults with normal body weight decreased, and the proportions of those classified as overweight and severely overweight increased during the same period. The observed increases in proportions of adults classified as overweight and severely overweight were largely confined to the urban residents and to those in the middle- and high-income groups. **CONCLUSIONS.** Results indicate increases in both obesity and undernutrition. Current efforts in China to develop a preventive health care policy emphasize the prevention of excess nutrient intakes and overnutrition and, hence, address the problem of the increase in obesity among well-to-do, mostly urban residents. However, the increase in undernutrition among low-income Chinese adults should not be overlooked and requires further research and serious policy consideration.

117. Popkin BM, Paeratakul S, Zhai F, Ge K. A Review of Dietary and Environmental Correlates of Obesity with Emphasis on Developing Countries. *Obesity Research* 1995a;3(suppl 2):145-153

The relationships between dietary and environmental factors and obesity are reviewed. Findings from selected population studies of diet and body weight are presented. In general, the results from population studies of diet and obesity have been inconsistent and marked with methodological weaknesses, especially the use of cross-sectional study design. Apart from the diet, several social and economic factors appear to be important correlates of obesity in the population. However, most studies have focused on the socioeconomic status as a broad, composite measure. The relationships between income, education, occupation, place of residence, and obesity are reviewed here, with emphasis on the developing countries. In many developing countries, the changing dietary pattern, along with rising life expectancy and changing socioeconomic environment, has contributed to the increasing problems of obesity and other diet-related chronic diseases that will have an enormous impact on the health and health care resource of these countries in the near future.

118. Poullet MC, Després JP, Lemieux SL, Moorjani S, Bouchard C, Tremblay A, et al. Waist circumference and abdominal sagittal diameter: best simple anthropometric indexes of abdominal visceral adipose tissue accumulation and related cardiovascular risk in men and women. *Am J Cardiol* 1994;73:460-8

The amount of abdominal visceral adipose tissue measured by computed tomography is a critical correlate of the potentially "atherogenic" metabolic disturbances associated with abdominal obesity. In this study conducted in samples of 81 men and 70 women, data are presented on the anthropometric correlates of abdominal visceral adipose tissue accumulation and related cardiovascular disease risk factors (triglyceride and high-density lipoprotein cholesterol levels, fasting and postglucose insulin and glucose levels). Results indicate that the waist circumference and the abdominal sagittal diameter are

better correlates of abdominal visceral adipose tissue accumulation than the commonly used waist-to-hip ratio (WHR). In women, the waist circumference and the abdominal sagittal diameter also appeared more closely related to the metabolic variables than the WHR. When the samples were divided into quintiles of waist circumference, WHR or abdominal sagittal diameter, it was noted that increasing values of waist circumference and abdominal sagittal diameter were more consistently associated with increases in fasting and postglucose insulin levels than increasing values of WHR, especially in women. These findings suggest that the waist circumference or the abdominal sagittal diameter, rather than the WHR, should be used as indexes of abdominal visceral adipose tissue deposition and in the assessment of cardiovascular risk. It is suggested from these data that waist circumference values above approximately 100 cm, or abdominal sagittal diameter values > 25 cm are most likely to be associated with potentially "atherogenic" metabolic disturbances.

119. Pyle RL, Mitchell JE, Eckert ED. Bulimia: A report of 34 cases. *Journal of Clinical Psychiatry* 1981;42:60-4

A series of 34 patients with Bulimia is presented. The patients were young females who usually experienced the onset of eating problems by early adulthood. Most had binge eating episodes on a daily basis, frequently followed by vomiting. Although the majority had never had active anorexia nervosa, all of these patients demonstrated characteristics often described in anorectic patients including a preoccupation with food and an exaggerated fear of becoming obese. Many appeared to be clinically depressed. The association between stealing behavior, chemical abuse and bulimia suggests problems with impulse control in this population.

120. Reaven G. Banting lecture 1988. Role of insulin resistance in human disease. *Diabetes* 1988;37(12):1595-1607

Resistance to insulin-stimulated glucose uptake is present in the majority of patients with impaired glucose tolerance (IGT) or non-insulin-dependent diabetes mellitus (NIDDM) and in approximately 25% of nonobese individuals with normal oral glucose tolerance. In these conditions, deterioration of glucose tolerance can only be prevented if the beta-cell is able to increase its insulin secretory response and maintain a state of chronic hyperinsulinemia. When this goal cannot be achieved, gross decompensation of glucose homeostasis occurs. The relationship between insulin resistance, plasma insulin level, and glucose intolerance is mediated to a significant degree by changes in ambient plasma free-fatty acid (FFA) concentration. Patients with NIDDM are also resistant to insulin suppression of plasma FFA concentration, but plasma FFA concentrations can be reduced by relatively small increments in insulin concentration. Consequently, elevations of circulating plasma FFA concentration can be prevented if large amounts of insulin can be secreted. If hyperinsulinemia cannot be maintained, plasma FFA concentration will not be suppressed normally, and the resulting increase in plasma FFA concentration will lead to increased hepatic glucose production. Because these events take place in individuals who are quite resistant to insulin-stimulated glucose uptake, it is apparent that even small increases in hepatic glucose production are likely to lead to significant fasting hyperglycemia under these conditions. Although hyperinsulinemia may prevent frank decompensation of glucose homeostasis in insulin-resistant individuals, this compensatory response of the endocrine pancreas is not without its price. Patients with hypertension, treated or untreated, are insulin resistant, hyperglycemic, and hyperinsulinemic. In addition, a direct relationship between plasma insulin concentration and blood pressure has been noted. Hypertension can also be produced in normal rats when they are fed a fructose-enriched diet, an intervention that also leads to the development of insulin resistance and hyperinsulinemia. The development of hypertension in normal rats by an experimental manipulation known to induce insulin resistance and hyperinsulinemia provides further support for the view that the relationship between the three variables may be a causal one.

121. Reaven G. Role of insulin resistance in human disease (syndrome X): an expanded definition. *Annu Rev Med* 1993;44:121-31

Resistance to insulin-mediated glucose uptake is characteristic of individuals with impaired glucose intolerance or non-insulin-dependent diabetes, and it also occurs commonly in patients with high blood pressure. The physiological response to a decrease in insulin-mediated glucose uptake is an increase in insulin secretion, and as long as a state of compensatory hyperinsulinemia can be maintained, frank decompensation of glucose tolerance can be prevented. However, it is likely that the defect in insulin action and/or the associated hyperinsulinemia will lead to an increase in plasma triglyceride and a decrease in high density lipoprotein-cholesterol concentration, and high blood pressure. It seems likely that the cluster of changes associated with resistance to insulin-mediated glucose uptake comprise a syndrome, which plays an important role in the etiology and clinical course of patients with non-insulin-dependent diabetes, high blood pressure, and coronary heart disease.

122. Reinauer H. Bericht über die Leitlinien in Deutschland. WHO Meeting on Guidelines in Health Care Practice. Dok. POLC 02-020204. EUR/ICP/NPH 022/h ed. Kopenhagen: WHO-Regionalbüro für Europa, 1997, Report.

123. Rexrode KM, Hennekens CH, Willett WC, Colditz GA, Stampfer MJ, Rich-Edwards JW, et al. A

Prospective Study of Body Mass Index, Weight Change, and Risk of Stroke in Women. *JAMA* 1997;277(19):1539-1545

OBJECTIVE: To examine the associations of body mass index (BMI) and weight change with risk of stroke in women.

SETTING AND DESIGN: Prospective cohort study among US female registered nurses participating in the Nurses' Health Study. PARTICIPANTS: A total of 116759 women aged 30 to 55 years in 1976 who were free from diagnosed coronary heart disease, stroke, and cancer. MAIN OUTCOME MEASURE: Incidence of ischemic stroke, hemorrhagic stroke, (subarachnoid or intraparenchymal hemorrhage), and total stroke. RESULTS: During 16 years of follow-up 866 total strokes (including 403 ischemic strokes and 269 hemorrhagic strokes) were documented. In multivariate analyses adjusted for age, smoking, postmenopausal hormone use, and menopausal status, women with increased BMI ( $\geq 27$  kg/m<sup>2</sup>) had significantly increased risk of ischemic stroke with relative risks (RRs) of 1.75 (95 % confidence interval (CI), 1.17-2.59) for BMI of 27 to 28.9 kg/m<sup>2</sup>; 1.90 (95 % CI, 1.28-2.82) for BMI of 29 to 31.9 kg/m<sup>2</sup>; and 2.37 (95 % CI, 1.60-3.50) for BMI of 32 kg/m<sup>2</sup> or more (P for trend < .001), as compared with those with a BMI of less than 21 kg/m<sup>2</sup>. For hemorrhagic stroke there was a nonsignificant inverse relation between obesity and hemorrhagic stroke, with the highest risk among women in the leanest BMI category (P for trend = .20). For total stroke the RRs were somewhat attenuated compared with those for ischemic stroke but remained elevated for women with higher BMI (P for trend < .001). In multivariate analyses that also adjusted for BMI at age 18 years, weight gain from age 18 years until 1976 was associated with an RR for ischemic stroke of 1.69 (95 % CI, 1.26-2.29) for a gain of 11 to 19.9 kg and 2.52 (95 % CI, 1.80-3.52) for a gain of 20 kg or more (P for trend < .001), as compared with women who maintained stable weight (loss or gain < 5 kg). Although weight change was not related to risk of hemorrhagic stroke (P for trend = .20), a direct relationship was observed between weight gain and total stroke risk (P for trend < .001).

CONCLUSIONS: These prospective data indicate that both obesity and weight gain in women are important risk factors for ischemic and total stroke but not hemorrhagic stroke. The relationship between obesity and total stroke depends on the distribution of stroke subtypes in the population.

124. Rolland-Cachera MF, Cole TJ, Sempe M, Tichet J, Rossignol C, Charraud A. Body mass index variations - centiles from birth to 87 years. *Eur J Clin Nutr* 1991;45:13-21

This report provides Body Mass Index (weight/height<sup>2</sup>) values for the French population from birth to the age of 87 years. BMI curves increase during the first year, decrease until the age of 6, increase again up to 65 years and decrease thereafter. These variations reflect the total changes of fat body mass during life. The 50th centile values of Wt/Ht<sup>2</sup> at the ages of 20, 40, 60, 80 years are 21.5, 24.6, 25.4, 24.4 kg/m<sup>2</sup> for men and 20.6, 22.6, 24.1, 23.4 kg/m<sup>2</sup> for women. The values for the 3rd, 50th and 97th centiles in the middle years are approximately 18, 24 and 32 kg/m<sup>2</sup>. Graphs for these and four other percentiles are plotted against age, and two other graphs summarising the variation and skewness of the Wt/Ht<sup>2</sup> distribution are provided to calculate exact percentiles and Z-scores for individuals.

125. Ross CE. Overweight and depression. *J Health Soc Behav* 1994;35(1):63-79

Is being overweight distressing? If it is, is the distress due to negative appraisals by others, to the stresses of trying to fit norms of thinness by dieting, or to the health consequences of being overweight? If being overweight is stigmatizing, negative evaluations by others may be internalized as high levels of depression. This perspective predicts that being overweight has a direct effect on depression, and that the effect is greater in social groups where being overweight is less common, especially among women, Whites, younger people, the well-educated, and the well-to-do. Alternatively, overweight may not be distressing per se. Instead, attempting to fit norms of appearance that equate thinness with attractiveness by dieting is distressing. According to this perspective, the association between being overweight and depression is explained by dieting. Finally, this association may be due to the health consequences of being overweight. A random sample of 2,020 U.S. adults aged 18-90 were interviewed by telephone in 1990. Results showed that being overweight has no direct effect on depression in any social group except among the well-educated. Overweight persons are more likely to diet and to experience worse physical health, both of which are associated with depression. Combined, these explain the negative effects of being overweight on depression.

126. Roubenoff R, Klag MJ, Mead LA, Liang KY, Seidler A, Hochberg M. Incidence and risk factors for gout in white men. *Jama* 1991;266:3004-7

OBJECTIVE: To identify potentially modifiable risk factors for the development of gout. DESIGN: Longitudinal cohort study (The Johns Hopkins Precursors Study). PARTICIPANTS: Of 1337 eligible medical students, 1271 (95 %) received a standardized medical examination and questionnaire during medical school. The participants were predominantly male (91 %), white (97 %), and young (median age, 22 years) at cohort study. OUTCOME MEASURES: The development of gout.

RESULTS: Sixty cases of gout (47 primary and 13 secondary) were identified among 1216 men; none occurred among 121 women ( $P=.01$ ). The cumulative incidence of all gout was 8.6 % among men (95 % confidence interval, 5.9 % to 11.3 %). Body mass index at age 35 years ( $P=.01$ ), excessive weight gain ( $>1.88 \text{ kg/m}^2$ ) between cohort entry and age 35 years ( $P=.007$ ), and development of hypertension ( $P=.004$ ) were significant risk factors for all gout in univariate analysis. Multivariate Cox proportional hazards models confirmed the association of body mass index at age 35 years (relative risk (RR) = 1.12;  $P=.02$ ) excessive weight gain (RR=2.07;  $P=.02$ ), and hypertension (RR=3.26;  $P=.002$ ) as risk factors for all gout. Hypertension, however, was not a significant risk factor for primary gout. CONCLUSION: Obesity, excessive weight gain in young adulthood, and hypertension are risk factors for the development of gout. Prevention of obesity and hypertension may decrease the incidence of and morbidity from gout; studies of weight reduction in the primary and secondary prevention of gout are indicated.

127. Sarlio-Lahtenkorva S, Stunkard A, Rissanen A. Psychosocial factors and quality of life in obesity. *Int J Obes Relat Metab Disord* 1995;19(6):1-5

It can be expected that the quality of life in obesity is impaired since obesity is severely stigmatized in affluent societies and also increases the risk of disability, mortality and morbidity. In addition, the fact that obesity is inversely related to socioeconomic status in women and is associated with both downward social mobility and lower levels of socioeconomic attainment may further impair the quality of life in obesity. However, relatively little is known about the quality of life in obesity.

128. Schapira DV, Clark RA, Wolff PA, Jarrett A, Kumar NB, Aziz NM. Visceral obesity and breast cancer risk. *Cancer* 1994;74:632-9

BACKGROUND: The risk for breast cancer and the sex hormone abnormalities noted in breast cancer patients have been demonstrated in women with upper body fat obesity. The objective of this study was to determine if the visceral component of upper body fat obesity was correlated with breast cancer risk. METHODS: A case-control study of 40 consecutively enrolled women with breast cancer and 40 community-based age, weight, and waist circumference-matched control subjects was conducted. The areas of visceral fat, subcutaneous fat, and total fat were measured using computed tomography at the L-4 vertebral body. Calculations of relative risk for breast cancer were based on these fat compartments. RESULTS: Patients with breast cancer had a significantly greater visceral fat area ( $P=0.01$ ), visceral-to-total-fat area ratio (VT ratio) ( $P<0.001$ ) and significantly lower subcutaneous-to-visceral-fat area ratio (SV ratio) ( $P<0.001$ ) compared with the matched controls. The relative risk for breast cancer increased with increasing VT ratio ( $\leq 0.24=1.0$ ;  $>0.24=9.5$ ) ( $P<0.0001$ ) and decreasing SV ratio ( $\geq 3.64=1.0$ ;  $<3.64=8.5$ ) ( $P=0.0002$ ). CONCLUSIONS: Visceral obesity, as assessed by computed tomography, was a significant risk factor for breast cancer in women matched for age, weight, and waist circumference. Comparing the VT ratio for both groups, breast cancer patients had 45 % more visceral fat compared with matched control subjects.

129. Scheen A, Letiexhe M, Lefebvre P. Effects of metformin in obese patients with impaired glucose tolerance. *Diabetes Metab Rev* 1995;11(1):69-80, kein Abstract, Evidenzklasse III.

130. Schneider R. Relevanz und Kosten der Adipositas in Deutschland. *Ernährungs-Umschau* 1996;43(10):369-374

In den Ernährungsempfehlungen fast aller industrialisierten Länder werden die Prävention und Therapie des Übergewichts bzw. der Adipositas als vorrangige Ziele bezeichnet: Jeder Übergewichtige sollte motiviert werden, die Energieaufnahme zu reduzieren und den Energieverbrauch zu steigern, so daß sich der Body-Mass-Index auf den gewünschten Bereich zubewegt. Trotz dieser einfach klingenden Richtlinie scheitert eine Behandlung der Adipositas häufig in der Praxis, und insbesondere der Langzeiterfolg bleibt aus. Vergleichbar zu vielen anderen Therapien kann auch bei der Adipositas der Patient oft nicht vollständig bzw. zu seiner Zufriedenheit geheilt werden. Insgesamt lassen sich drei Fragestellungen aus der derzeitigen Situation ableiten:

1. Welche Relevanz hat die Adipositas in der deutschen Bevölkerung?
2. Welche Kosten werden durch die Adipositas verursacht?
3. Wie erfolgreich sind derzeit Adipositastherapien in Deutschland?

131. Schwarzer R. *Psychologie des Gesundheitsverhaltens*: Hogrefe, 1996, Buch, Evidenzklasse IV.

132. Segal L, Carter R, Zimmet P. The Cost of Obesity. *PharmacoEconomics* 1994;2(Suppl 1):45-52  
Obesity is a known risk factor for a number of diseases with serious mortality and morbidity implications. Thus, obesity is an economic burden to communities, since it reduces quality of life and leads to premature mortality; in addition, healthcare resources are used to manage obesity-related disease. It was estimated that in 1989, management of disease due to obesity (defined as body mass index  $> 30$ ) cost A\$395 million. This estimate covers the healthcare costs for the management of obesity, non-insulin-dependent diabetes mellitus (NIDDM), gallstones, hypertension, coronary heart disease (CHD), breast cancer (among postmenopausal women), and colon cancer. As this estimate excludes the costs of some disease attributable to obesity, it is an underestimate of the true costs. Nonetheless, the estimated cost of the management of obesity-related conditions represent 86 % of the healthcare costs

used for the management of alcohol-related diseases in Australia. Healthcare costs attributable to obesity have not yet been estimated for countries elsewhere in Asia and the Pacific. However, it is acknowledged that obesity is a major problem in the Pacific, with exceptionally high prevalence rates and concomitant high rates of diseases for which obesity is a major risk factor, particularly NIDDM and CHD. It would, therefore, be useful to explore the cost of disease attributable to obesity in healthcare systems in these communities and the potential for preventive programmes to reduce these costs.

133. Segal L, Dalton A, Richardson J. The cost-effectiveness of primary prevention of non-insulin dependent diabetes mellitus. *Centre for Health Program Evaluation* 1995, kein Abstract.

134. Seidell J, Björntorp P, Sjöström L, Kvist H, Sannerstedt R. Visceral fat accumulation in men is associated with insulin, glucose and C-peptide lipid levels, but negatively with testosterone levels. *Metabolism* 1990;39:897-901

Twenty-three healthy men (age 25 to 50 years), covering a wide range of fatness and body fat distribution, were studied. An oral glucose tolerance test was performed and adipose tissue areas were calculated from computed tomography (CT) scans made at the level of L4/L5. Visceral fat area was associated with elevated concentrations of insulin and C-peptide and with glucose intolerance before and after the oral glucose load. Concentrations of sex-hormone binding globulin (SHBG), as well as total and free testosterone, were negatively correlated with waist/hip circumference ratio and visceral fat area and also negatively associated with increased glucose, insulin, and C-peptide concentrations. In multiple linear regression, adjusting for age, body mass index, and visceral fat area, serum concentrations of free testosterone were still negatively correlated with glucose, insulin, and C-peptide levels. Without claiming any causality in the observed associations, we conclude that, unlike in women, abdominal fat distribution, insulin, glucose, and C-peptide levels are negatively associated with serum testosterone levels in men.

135. Seidell JC. *Are abdominal diameters abominable indicators?* 7th ed. London: John Libbey & Company Ltd. - 7th international Congress on Obesity,, 1996a, Buch.

136. Seidell JC, Bakx KC, Deurenberg P, Burema J, Hautvast JG, F.J. H. The relation between overweight and subjective health according to age, social class, slim behavior and smoking habits in Dutch adults. *Am J Public Health* 1986;76(12):1410-15

Subjective health status was assessed in relation to overweight by administering a list of 51 health complaints to adult men and women who were either chronically overweight as defined by Body Mass Index (BMI) or not overweight, in a continuous morbidity registration in four general practices during the period 1967-83. Responses were received from 455 men (182 overweight) and 790 women (386 overweight), ages 26-66 years. Response rate (71 per cent) and age distribution (mean age 48) were similar in overweight and non-overweight groups of both sexes. BMI was correlated with the total number of complaints in women ( $r = 0.15$ ) but not in men ( $r = 0.07$ ). Multiple regression analysis revealed, however, that age was an effect modifier in this relation, there being a negative association between BMI and subjective health in younger men and a positive association in older men, whereas in women the association between BMI and subjective health was much more pronounced at younger ages than at older ages. In addition, current smoking habits and social class (in men and women) and reported slimming behavior (in women) had an independent relation to the total number of health complaints. BMI was also related to specific complaints and groups of complaints, particularly in women.

137. Seidell JC, Verschuren WM, Kromhout D. Prevalence and trends of obesity in The Netherlands 1987-1991. *Int J Obes Relat Metab Disord* 1995;19(12):924-7

OBJECTIVE: To study the prevalence and trends in obesity in the period 1987-1991. DESIGN: Linear regression of average body mass index (BMI in kg/m<sup>2</sup>) and prevalence of obesity (BMI  $\geq 30$  kg/m<sup>2</sup>) in a continuous monitoring project in three towns in The Netherlands. RESULTS: It was estimated that over the whole period the prevalence of obesity was 7% in men and 9% in women. After adjustment for age and educational level the prevalence of obesity increased significantly in both men with about 1.7 percentage points (+/- standard error: 0.8) and in women with 1.9 +/- 0.8 percentage points between 1987 and 1991. When stratified by 10-year age category the increase was strongest in those aged 20-29 and 50-59 years. When stratified by educational level, the increase was only significant in the lowest category (primary education and lower secondary education) and was not significant in other categories. CONCLUSION: Obesity is relatively common in The Netherlands and, at least among responders to the yearly surveys, the prevalence of obesity has increased in the period 1987-1991 particularly in those with a relatively low educational level.

138. Shaper AG. *Obesity and cardiovascular disease*. Chichester: Wiley, 1996

The strong and consistent relationship observed between body weight and blood pressure develops early in life, and overweight/obesity in adult life is a good predictor of hypertension. Weight reduction leads to a decrease in blood pressure and prevention of weight increase lowers the incidence of hypertension, but obesity is not necessarily the direct cause of raised blood pressure. Obesity is not established as an independent risk factor for stroke beyond its association with other risk factors. Obesity is a relatively weak risk factor for coronary heart disease (CHD) but it is closely associated with

almost all other coronary risk factor. Thus, becoming obese on Western high fat diet, with development of excess central fat, promotes atherogenesis through a wide range of biochemical and hormonal parameters, including insulin sensitivity. The obesity-CHD relationship is further confused by the weight loss associated smoking and smoking-related disease, and is confounded by risk factors that accompany the development and maintenance of obesity. Weight loss in middle-aged populations does not apparently lower CHD incidence, possibly because of lack of specificity in methods of weight reduction. Irrespective of the mechanism involved, early prevention of atherogenic weight gain in young adulthood is an important public health goal towards the control of hypertension and CHD.

139. Shaw G, Velie E, D S. Risk of neural tube defect-affected pregnancies among obese women. *JAMA* 1996;275(14):1093-1096

**OBJECTIVE:** To investigate the risk for neural tube defect (NTD)-affected pregnancies among obese women (ie, women with a body mass index [BMI] > 29kg/m<sup>2</sup>) compared with women of average pre-pregnancy weight. **DESIGN:** Population-based case-control study. **SETTING:** All hospitals in 55 of 58 counties in California. **PARTICIPANTS:** In-person interviews were conducted with mothers of 538 (88% of eligible) NTD cases (including fetuses and infants electively terminated, stillborn, or born alive) and with mothers of 539 nonmalformed controls (88%) within an average of 5 months from the term delivery date. **MAIN OUTCOME MEASURES:** The risk of an NTD-affected pregnancy among obese women. **RESULTS:** Compared with women whose BMI was less than or equal to 29 kg/m<sup>2</sup>, an increased risk for NTD-affected pregnancy was observed among obese women (odds ratio, 1.9; 95% confidence interval, 1.3 to 2.9). The increased risk was not attributable to maternal nonuse of a vitamin containing folic acid, diabetes, use of diet pills, lower dietary folate intake, or an NTD-pregnancy history. Adjustment for maternal age, education, gravidity, use of vitamins, and use of alcohol did not change the odds ratio. The risk associated with maternal obesity was greater for spina bifida and for other less prevalent NTDs than for anencephaly. **CONCLUSION:** Because as many as 10% of women may be obese periconceptionally, the observed twofold increased risk is relevant to the population burden of NTDs.

140. Shephard RJ. Current perspectives on the economics of fitness and sport with particular reference to worksite programs. *Sports Med* 1989;7:286-309

Much of the research on the economic impact of fitness and sport programmes has been initiated with a view to cost containment, or the justification of specific exercise initiatives. Care must be taken when evaluating such reports to consider any resultant biasing of conclusions. Analyses should conform to sound scientific and economic principles, with cost-effectiveness measures generally being more appropriate than cost-benefit analyses. Critical issues of measurement include opportunity costs, marginal and intangible costs, discount and inflation rates, and programme participation rates. At the worksite, costs vary greatly with the scale of facilities and the level of programme supervision that are offered. Beyond a certain ceiling, further expenditures do not seem to enhance programme effectiveness. Likely benefits to a company include an improvement of corporate image, a recruitment of premium employees, gains in the quality and the quantity of production, a decrease of absenteeism and turnover, lower medical costs, an improvement of personal lifestyle (with a potential for future health savings), and a reduced incidence of industrial injuries. Community exercise programmes have the advantage of reaching certain target groups not serviced at the worksite, for instance, the unemployed, women with young children and the elderly. Possible benefits of exercise participation arising in such groups included a reduced demand for medical services, an extended lifespan, and a reduction of disability in the final years of life. While current evidence has many limitations, it does suggest that exercise (particularly in the context of more general health promotion) is both cost-effective and cost-beneficial; the immediate return may be as much as \$2 to \$5 invested.

141. Shephard RJ. A critical analysis of work-site fitness programs and their postulated economic benefits. *Med Sci Sports Exerc* 1992;24:354-70

Many early work-site exercise programs had a unique fitness focus. More recently, modular programs have addressed many facets of lifestyle. Their stated objective has often been to boost corporate morale or employee health rather than to have direct economic benefits, and evaluation has frequently been in terms of process rather than a cost-benefit or a cost-effectiveness analysis. Nevertheless, a growing number of authors have claimed fiscal dividends from such programs. A full economic evaluation must consider such issues as the transfer of benefits between various sectors of the economy, opportunity costs to participants, marginal costs and benefits, inflation, discounting, and the choice between cost-benefit and cost-effectiveness analyses. Suggested benefits include an improvement of corporate image, a decrease of employee turnover, gains of productivity, reduced absenteeism and medical costs, an improved employee lifestyle, and a decrease of industrial injuries. In practice, the corporate impact of a program is greatly attenuated, depending on prevalence of need, participation rate, program response of recruits, and continued employment of such individuals within a company. Costs to the corporation include promotion, facilities, equipment, and professional leadership. However, such items are often small relative to the opportunity costs incurred by the participant. For this

reason, activities that can be built into the normal day of the employee (for example, walking or cycling to and from work) may prove more acceptable and more cost-effective than formal work-site classes.

142. Sjöström L, Narbro K, Sjöström D. Costs and benefits when treating obesity. *Int J Ob* 1995;19(6):9-12

The cost-effectiveness of obesity treatment is dependent on the benefits of weight change. There are at least 50 epidemiological studies showing that an elevated body weight at baseline is associated with increased subsequent morbidity and mortality. In contrast, there are less than a handful of studies which have shown increased morbidity and mortality after weight increases. Manson's study of 118 000 US nurses is the best and most well-known example of this second group of studies. However, there are also about 20 observational epidemiological studies showing an association between weight decrease and a subsequent increase in mortality, also among subjects who were obese at baseline. If this third group of studies turn out to be true there will be mainly costs, but very few benefits when treating obesity. Fortunately, there are a number of reasons to believe that results from the third group of studies are not true for initially obese individuals, but evidently intervention studies are needed to finally solve the current contradictions of the literature. CONCLUSIONS: American experiences as well as data from SOS indicate that direct and indirect costs attributable to obesity are in the order of 7-8% of the total sick care costs in western countries. The benefits over 2 years of efficient obesity treatment are extremely positive, but 10-year data are needed for more valid evaluations. Similarly, 10-year data on direct and indirect costs are needed in weight-reduced and non-weight-reduced groups before the cost-effectiveness of obesity treatment can be finally evaluated. Taking the risk-factor development over 2 years into account, it seems likely that direct and indirect costs will increase more over 10 years in non-weight-reduced than in weight-reduced subjects. Therefore, it seems most likely that long-term efficient obesity treatments (surgical or pharmacological) will result in a favourable cost benefit ratio.

143. Smoller JW, Wadden TA, Stunkard AJ. Dieting and depression: a critical review. *J Psychosom Res* 1987;31:429-440

Investigations of affective changes during weight reduction have produced sharply conflicting results. Studies conducted through the 1950s and 1960s indicated that weight reduction was accompanied by a high incidence of affective disturbance ranging from simple dysphoria to clinical depression and psychosis. More recently, studies of behavioral programs have suggested that weight reduction may actually improve mood. A critical and systematic review of the literature revealed that the conflicting evidence is best explained by differences in mood assessment. The method of mood assessment consistently predicted the affective changes observed in previous reports. Other variables previously thought to influence affective response to weight reduction, including duration of treatment and weight loss, did not independently predict outcome.

144. Sobal J, Stunkard A. Socioeconomic status and obesity: a review of the literature. *Psychol Bull* 1989;105:260-75

A review of 144 published studies of the relationship between socioeconomic status (SES) and obesity reveals a strong inverse relationship among women in developed societies. The relationship is inconsistent for men and children in developed societies. In developing societies, however, a strong direct relationship exists between SES and obesity among men, women, and children. A review of social attitudes toward obesity and thinness reveals values congruent with the distribution of obesity by SES in different societies. Several variables may mediate the influence of attitudes toward obesity and thinness among women in developed societies that result in the inverse relationship between SES and obesity. They include dietary restraint, physical activity, social mobility, and inheritance.

145. Sonne-Holm S, Sorensen TI, Jensen G, Schnohr P. Independent effects of weight change and attained body weight on prevalence of arterial hypertension in obese and non-obese men. *Brit Med J* 1989;299:767-70

OBJECTIVE: To assess the relations among prevalence of arterial hypertension, history of weight change, and current body weight in the range from normal weight to severe obesity. DESIGN: Retrospective analysis of medical records of men registered with Danish military authorities from 1943 to 1977 and followed up four to 40 years later. SETTING: Draft board of Copenhagen and surrounding counties and the rest of Sjaelland and surrounding islands. SUBJECTS: 964 men who were severely obese (body mass index  $\geq 31$  kg/m<sup>2</sup> at the first examination) and 1134 random controls. MAIN OUTCOME MEASURE: Blood pressure and weight. RESULTS: Hypertension was more prevalent in subjects with an unchanged body mass index as that index increased over the range studied. At any body mass index hypertension was more prevalent in subjects who had increased to this index and less common in those who had decreased to it than in those who had stayed the same weight since the first examination. Hypertension among controls was most common in those subjects who had become obese during adulthood. CONCLUSIONS: Changes in body weight have a great influence on arterial hypertension independent of the effect of attained weight, particularly in obese subjects.

146. Sorensen TI. The genetics of obesity. *Metabolism* 1995a;3(9):4-6

Genetic and environmental factors both affect the development of human obesity. The prevalence of



obesity has increased over the past 30 years, and changes in the environment must have played a key role in this increase. Studies of monozygotic twins have found differences in body weight that must be due to environmental influences. However, there is also considerable evidence suggesting a genetic basis for obesity. The body mass index (BMI) of adult offspring is correlated with the BMI of parents, and this can be entirely ascribed to the transmitted genes. Thus, the similarity of BMI is about twice as great among monozygotic twins as among dizygotic twins. Moreover, adoption studies have shown a correlation between the BMIs of biological parents, siblings, and adult adoptees, while the BMI of the adult adoptees showed no correlation with the BMI of their adoptive parents. A few major genes may contribute to the development of obesity. Genetic linkage and candidate gene studies have attempted to identify the genes involved in determining BMI in humans, but have so far produced mixed results.

147. Spielman AB, Kanders B, Kienholz M, Blackburn GL. The cost of losing: an analysis of commercial weight-loss programs in a metropolitan area. *Am J Coll Nutrit* 1992;11:36-41  
Thirty four million adult Americans are obese (>30% above ideal body weight). 1990 national Health Objectives state that 50 % of all adults should adopt weight-loss and exercise regimes. This recommendation has caused a dramatic surge in the number and variety of weight -loss programs currently available. A parallel surge has occurred in the cost of these weight-loss programs. This wide variation in personal expenditure (and treatment provided) necessitates a review of the programs and their cost to the participant. The cost of a 12-week outpatient commercial weight-loss program can range from \$2,120 for the most expensive very low-calorie diet program to \$108 for the least expensive nutrient-balanced hypocaloric diet program. This article reviews 11 commercial diet programs in the Boston area and analyzes the out-of-pocket cost paid to the clinic by the participant to lose 1 kg on each program. Given the complexity of treatment to achieve long-term weight control, knowledge of financial obligations is important.

148. Staffieri JR. A study of social stereotype of body image in children. *J Person Soc Psychol* 1967;7:101-4

90 male children from 6 to 10 years were asked to assign 39 adjectives of various behavior/personality traits to silhouettes which represented extreme endomorph, mesomorph, and ectomorph body types. The results clearly indicate a common stereotype of behavior/personality traits associated with various body types; all the significant adjectives assigned to the mesomorph image were favorable; the adjectives assigned to endomorph were unfavorable (socially) and primarily socially aggressive; the adjectives assigned to the ectomorph were primarily unfavorable (personally) and of a generally socially submissive type. In addition, Ss showed a clear preference to look like the mesomorph image and demonstrated reasonable accuracy in perception of their own body types.

149. Stamler J, Neaton JD, Wentworth D. Blood pressure (systolic and diastolic) and risk of fatal coronary heart disease. *Hypertension* 1989;13:2-12

The 356,222 men aged 35 to 57 years, who were free of a history of hospitalization for myocardial infarction, screened by the Multiple Risk Factor Intervention Trial (MRFIT) in its recruitment effort, constitute the largest cohort with standardized serum cholesterol measurements and long-term mortality follow-up. For each five-year age group, the relationship between serum cholesterol and coronary heart disease (CHD) death rate was continuous, graded, and strong. For the entire group aged 35 to 57 years at entry, the age-adjusted risks of CHD death in cholesterol quintiles 2 through 5 (182 to 202, 203 to 220, 221 to 244, and greater than or equal to 245 mg/dL [4.71 to 5.22, 5.25 to 5.69, 5.72 to 6.31, and greater than or equal to 6.34 mmol/L]) relative to the lowest quintile were 1.29, 1.73, 2.21, and 3.42. Of all CHD deaths, 46% were estimated to be excess deaths attributable to serum cholesterol levels 180 mg/dL or greater (greater than or equal to 4.65 mmol/L), with almost half the excess deaths in serum cholesterol quintiles 2 through 4. The pattern of a continuous, graded, strong relationship between serum cholesterol and six-year age-adjusted CHD death rate prevailed for nonhypertensive nonsmokers, nonhypertensive smokers, hypertensive nonsmokers, and hypertensive smokers. These data of high precision show that the relationship between serum cholesterol and CHD is not a threshold one, with increased risk confined to the two highest quintiles, but rather is a continuously graded one that powerfully affects risk for the great majority of middle-aged American men.

150. Stamler J, Wentworth D, Neaton JD. Is relationship between serum cholesterol and risk of premature death from coronary heart disease continuous and graded? *Jama* 1986;256:2823-8

The 356,222 men aged 35 to 57 years, who were free of a history of hospitalization for myocardial infarction, screened by the Multiple Risk Factor Intervention Trial (MRFIT) in its recruitment effort, constitute the largest cohort with standardized serum cholesterol measurements and long-term mortality follow-up. For each five-year age group, the relationship between serum cholesterol and coronary heart disease (CHD) death rate was continuous, graded, and strong. For the entire group aged 35 to 57 years at entry, the age-adjusted risks of CHD death in cholesterol quintiles 2 through 5 (182 to 202, 203 to 220, 221 to 244, and greater than or equal to 245 mg/dL [4.71 to 5.22, 5.25 to 5.69, 5.72 to 6.31, and greater than or equal to 6.34 mmol/L]) relative to the lowest quintile were 1.29, 1.73, 2.21, and 3.42. Of all CHD deaths, 46% were estimated to be excess deaths attributable to serum chole-

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151. Stamler R, Stamler J, Riedlinger WF. Weight and blood pressure: findings in hypertension screening of 1 million Americans. *Jama* 1978;240:1607-12

In the nationwide Community Hypertension Evaluation Clinic screening of more than 1 million people, the group classifying itself as overweight had prevalence rates of hypertension 50% to 300% higher than other screenees. Frequency of hypertension in overweight persons aged 20 to 39 years was double that of normal weight and triple that of underweight persons. Among those aged 40 to 64 years, the overweight group had a 50% higher hypertension prevalence rate than the normal-weight group and 100% higher than the underweight group. With each higher degree of blood pressure elevation, relative frequency of hypertension with overweight was larger. Thus this study confirms, in the largest group surveyed to date, similar findings in previous cross-sectional surveys. It is also consistent with data from longitudinal and intervention studies on the importance of overweight in relation to hypertension.

152. Stevens J, Cai J, Pamuk E, Williamson D, Thun M, Wood J. The effect of age on the association between body-mass index and mortality. *N Engl J Med* 1998;338:1-7

**BACKGROUND:** The effect of age on optimal body weight is controversial, and few studies have had adequate numbers of subjects to analyze mortality as a function of body-mass index across age groups. **METHODS:** We studied mortality over 12 years among white men and women who participated in the American Cancer Society's Cancer Prevention Study I (from 1960 through 1972). The 62,116 men and 262,019 women included in this analysis had never smoked cigarettes, had no history of heart disease, stroke, or cancer (other than skin cancer) at base line in 1959-1960, and had no history of recent unintentional weightloss. The date and cause of death for subjects who died were determined from death certificates. The associations between body-mass index (defined as the weight in kilograms divided by the square of the height in meters) and mortality were examined for six age groups in analyses in which we adjusted for age, educational level, physical activity, and alcohol consumption. **RESULTS:** Greater body-mass index was associated with higher mortality from all causes and from cardiovascular disease in men and women up to 75 years of age. However, the relative risk associated with greater body-mass index declined with age. For example, for mortality from cardiovascular disease, the relative risk associated with an increment of 1 in the body-mass index was 1.10 (95 percent confidence interval, 1.04 to 1.16) for 30-to-44-year-old men and 1.03 (95 percent confidence interval, 1.02 to 1.05) for 65-to-74-year-old men. For women, the corresponding relative risk estimates were 1.08 (95 percent confidence interval, 1.05 to 1.11) and 1.02 (95 percent confidence interval, 1.02 to 1.03). **CONCLUSIONS:** Excess body weight increases the risk of death from any cause and from cardiovascular disease in adults between 30 and 74 years of age. The relative risk associated with greater body weight is higher among younger subjects.

153. Stunkard AJ, Sorensen TIA. Obesity and socioeconomic status - a complex relation. *N Engl J Med* 1993;329:1036-7, kein Abstract.

154. Tucker D, Siecker H. The effects of change in body position on lung volumes and intrapulmonary gas mixing in patients with obesity, heart failure and emphysema. *Journal of clinical investigation* 1960;39:787-791, kein Abstract.

155. US Agency for Health Care Policy and Research. *Acute Pain Management: Operative or Medical Procedures and Trauma*. Rockville, Maryland, 1992, Buch.

156. Van Itallie T. Health implications of overweight and obesity in the United States. *Ann Intern Med* 1985;103:983-8

The second National Health and Nutrition Examination Survey found that 26% of U.S. adults, or about 34 million people aged 20 to 75 years, are overweight. The survey used a body mass index of 27.8 kg/m<sup>2</sup> or greater for men and 27.3 or greater for women to define overweight. Prevalence of overweight increases with advancing age and is generally much higher among black women than among white women. Women below the poverty line have a much higher prevalence of overweight between ages 25 and 55 years than women above the poverty line. Multivariate analysis indicates that for women race and poverty status are independent predictors of overweight. Hypertension, hypercholesterolemia, and diabetes are commoner in overweight persons than in persons who are not overweight. The relative risk of hypertension, hypercholesterolemia, and diabetes is greater in overweight adults aged 20 to 45 years than it is in overweight persons aged 45 to 75 years. This observation is consonant with mortality data, suggesting that being overweight during early adult life is more dangerous than a similar degree of overweight in later adult life.

157. VERA, Schneider R, Eberhardt W, Hesecker H, Moch KJ. *Die VERA-Stichprobe im Vergleich mit*

*Volkszählung, Mikrozensus und anderen nationalen Untersuchungen: Wissenschaftlicher Fachverlag Dr. Fleck, Sudetenstraße 31, D-6306 Niederkleen, tel.:06447/1224, 1992, Buch.*

158. Vgontzas AN, Tan TL, Bixler EO. Sleep apnea and sleep disruption in obese patients. *Arch Intern Med* 1994;154:1705-11

**OBJECTIVES:** To describe the frequency and severity of sleep apnea in obese patients without a primary sleep complaint and to assess the sleep patterns of obese patients without apnea and compare them with the sleep patterns of nonobese controls. **DESIGN AND SETTING:** Prospective case series with historical controls in an obesity and sleep disorders clinic. **SUBJECTS:** Two hundred obese women and 50 obese men (mean body mass index, 45.3) consecutively referred for treatment of their obesity and 128 controls matched for age and sex. **MAIN OUTCOME MEASURES:** Eight-hour sleep laboratory recording, including electroencephalogram, electro-oculogram, electromyogram, and respirations. Subjectively reported sleep-related symptoms and signs were also recorded. **RESULTS:** Twenty men (40%) and six women (3%) demonstrated sleep apnea warranting therapeutic intervention. Another four men (8%) and 11 women (5.5%) showed sleep apneic activity that warranted recommendation for evaluation in the sleep laboratory. In contrast, none of the 128 controls demonstrated sleep apneic activity severe enough for therapeutic intervention. The best clinical predictors of sleep apnea in the obese population were severity of snoring, subjectively reported nocturnal breath cessation, and sleep attacks. Obese patients, both men and women, without any sleep-disordered breathing demonstrated a significant degree of sleep disturbance compared with nonobese controls. Wake time after sleep onset, number of awakenings, and percentage of stage 1 sleep were significantly higher in obese patients than in controls, while rapid eye movement sleep was significantly lower. **CONCLUSION:** Severely or morbidly obese men are at extremely high risk for sleep apnea and should be routinely evaluated in the sleep laboratory for this condition, while for severely or morbidly obese women the physician should include a thorough sleep history in the clinical assessment.

159. Wannamethee G, Sharper AG. Body weight and mortality in middle aged British men: impact of smoking. *Bmj* 1989;299:1497-502

**OBJECTIVE:** To assess the relation between body mass index and mortality in middle aged British men. **DESIGN:** Men who were recruited for the British Regional Heart Study were followed up for a mean of nine years. **SETTING:** General practices in 24 British towns. **SUBJECTS:** 7735 Men aged 40-59 years selected from the age-sex registers of one group practice in each of the 24 towns. **MAIN OUTCOME MEASURE:** Mortality from cardiovascular and non-cardiovascular causes.

**RESULTS:** 660 of the men died. There was a U-shaped relation between body mass index and total mortality. Very lean men ( $<20 \text{ kg/m}^2$ ) had by far the highest mortality followed by lean men ( $20-22 \text{ kg/m}^2$ ) and obese men ( $\geq 28 \text{ kg/m}^2$ ). The high mortality in lean and very lean men was due largely to non-cardiovascular causes, particularly lung cancer and respiratory disease, which are associated with cigarette smoking. In obese men deaths were more likely to be due to cardiovascular causes. There was a strong inverse association between body weight and cigarette smoking. When the pattern of mortality was examined by age, smoking habits, and preexisting smoking related disease both very lean men and obese men consistently had an increased mortality. The U-shaped relation was most prominent in men in the oldest age group (55-59). Current smokers had a higher mortality than former smokers at virtually all values of body mass index. An increased mortality in lean men was seen only in current smokers and in men with smoking related disease. Among men who had never smoked, lean men had the lowest total mortality, thereafter mortality increased with increasing body mass index ( $p < 0.01$ ). **CONCLUSIONS:** This study provides strong evidence of the impact of cigarette smoking on body weight and mortality and strongly suggests that the benefits of giving up smoking are far greater than the problems associated with the increase in weight that may occur.

160. Westenhöfer J. Anorexia nervosa-Bulimia nervosa-Binge Eating Disorder. *Akt Ernähr Med* 1996a;21:235-242

Anorexia nervosa: Zentrales Merkmal der Anorexia nervosa ist eine schwere Eßstörung, bei der sich die Patientinnen weigern, eine ausreichende Nahrungsmenge zu sich zunehmen. Dieses Eßverhalten läßt sich als extrem gezügeltes Essen beschreiben: Eine strenge und extrem knappe Kaloriengrenze wird eingehalten, Mahlzeiten werden ganz ausgelassen oder beschränken sich auf geringe Mengen "guter" und "erlaubter" Lebensmittel, die von "schlechten" oder fettmachenden" Lebensmitteln deutlich unterschieden werden. Zusätzlich zu dieser starken Einschränkung der Nahrungsaufnahme versuchen viele Patientinnen ihr Gewicht durch Erbrechen oder durch die Einnahme von Appetitzüglern, Abführmitteln oder Entwässerungstabletten zu kontrollieren. Dieses extreme Eßverhalten führt zu einem starken Gewichtsverlust oder bewirkt, daß der natürliche Gewichtsanstieg in der Wachstumsphase ausbleibt. Der Gewichtsverlust führt zu einer meist offensichtlich abgemagerten Gestalt, die ein deutliches, äußerlich erkennbares Zeichen der Anorexia nervosa ist, auch wenn die Betroffenen oft versuchen, ihren abgemagerten körperlichen Zustand durch die Wahl entsprechender Kleidung zu kaschieren.

Trotz ihres offensichtlichen Untergewichts empfinden sich Patientinnen als zu dick oder zu fett (Störung des Körperschemas) und weigern sich, an Gewicht zuzunehmen. Diese Furcht vor einer Gewichtszunahme kann als ein zentrales psychopathologisches Merkmal der Anorexia nervosa betrachtet werden, da sie das gestörte Eßverhalten motiviert und aufrecht erhält. Die krankhaft übersteigerte Angst vor dem Zunehmen ist im Erleben und Verhalten der Patientinnen so zentral, daß Crisp (1984) die Anorexia nervosa als "Normalgewichts-Phobie" beschreibt. Trotz ihres bedenklichen körperlichen Zustands haben die Betroffenen oftmals kein Krankheitsbewußtsein, verleugnen ihre Störung oder lehnen eine therapeutische Behandlung ab.

161. Westenhöfer J. *Gezügelt Essen und Störbarkeit des Eßverhaltens*. 2nd ed. Göttingen: Hogrefe Verlag, 1996b, Buch.

162. WHO, Hartl G. Obesity epidemic puts millions at risk from related diseases. Genf: WHO, 1997, Report.

163. WHO, MONICA-Project. Geographical Variation in the Major Risk Factors of Coronary Heart Disease in Men and Women Aged 35 to 64 Years. *World Health Statistics Quarterly* 1988;41:115-40  
The WHO MONICA Project is designed to measure the trends in mortality and morbidity from coronary heart disease (CHD) and stroke, and to assess the extent to which they are related to changes in known risk factors in different populations in 27 countries. Risk-factor data are collected from population samples examined in at least two population surveys (one at the beginning of the study and the other at the end). The results of the baseline population surveys are presented. In populations studied, the proportion of smokers varied between 34-62% among men and 3-52% among women. The population median of systolic blood pressure varied between 121-146 mmHg in men. In women the figures were 118 mmHg and 141 mmHg respectively. In diastolic blood pressure, the variation of median was from 74 mmHg to over 91 mmHg among men and from 72-89 mmHg among women. The third major risk factor considered was total cholesterol, with the population median ranging between 4.1-6.4 mmol/l among men and 4.2-6.3 mmol/l among women. Caution is required when making cross-sectional comparisons between the risk-factor levels as the MONICA Project was not designed for this purpose. Nevertheless, these data demonstrate clearly the large variety of baseline risk-factor patterns in populations studied in the MONICA Project.

164. Wiese HJ, Wilson JF, Jones RA, Neises M. Obesity stigma reduction in medical students. *Int J Obes* 1992;16:859-68

The purpose of this study was to develop and evaluate an educational intervention designed to modify the stigma held by first year medical students towards obese patients. The intervention, composed of video, audio and written components, was based on Petty and Cacioppo's elaboration likelihood model. Prior to the course, the medical students held largely accurate beliefs about the causes of obesity, but they still maintained negative stereotypes of the obese as lazy and lacking in self-control. Analysis of students' attitudes toward obese patients five weeks and one year after the course indicates that the intervention was effective. At the five-week assessment, students in the intervention group differed from students in the control group on six of eight measures of attitudes towards the obese. One year after the course, the intervention group was significantly more likely to rate genetic factors as important in obesity and less likely to blame the obese for their condition.

165. Wilhelmsen L. Risk factors for coronary heart disease in perspective. European intervention trials. *Am J Med* 1984a;76(2A):37-40

High blood pressure, smoking, and lipid abnormalities are the dominating risk factors for myocardial infarction and sudden coronary death. The influence of one risk factor is markedly modified by other risk factors. In countries with low cholesterol levels, myocardial infarction and sudden coronary death may be uncommon, whereas stroke becomes a relatively important sequelae in patients with severe hypertension. However, in most western countries myocardial infarction and sudden coronary death are more common than stroke, especially in patients with moderate blood pressure elevations. The results of intervention studies in coronary heart disease must be viewed in the light of the general risk factor pattern. The side effects of drugs should be considered since large-scale intervention is often required in order to save a relatively small number of lives. In those at high risk from cardiovascular complications, certain drugs are possibly more effective than others in preventing the more serious end points. The results of the Oslo trial are compared with those of the WHO Multifactorial Trial, which randomized factories to intervention and control (nonintervention) in England, Belgium, and Italy, and also with the Goteborg Multiple Risk Factor Intervention Trial. A comparison of the different trials might indicate caution with respect to drug treatment in people with moderately increased risk factors. The effect of the incidence of coronary heart disease in different trials correlated broadly with changes in risk factors. Varying effects on mortality and morbidity might be found for different treatment modalities.

166. Wilhelmsen L, Svardsudd K, Korsan-Bengtson K, Larsson B W, L, , Tibblin G. Fibrinogen as a risk factor for stroke and myocardial infarction. *N Engl J Med* 1984b;311(8):501-5

To study the possible risk factors for cardiovascular disease, we collected data on plasma levels of

coagulation factors, blood pressure, serum cholesterol, and smoking in a random sample of 792 men 54 years of age. During 13.5 years of follow-up, myocardial infarction occurred in 92 men, stroke in 37, and death from causes other than myocardial infarction or stroke in 60. The blood pressure, degree of smoking, serum cholesterol, and fibrinogen level measured at the base-line examination proved to be significant risk factors for infarction by univariate analyses during follow-up, and blood pressure and fibrinogen were risk factors for stroke. Fibrinogen and smoking were strongly related to each other. The relation between fibrinogen and infarction, and between fibrinogen and stroke, became weaker when blood pressure, serum cholesterol, and smoking habits were taken into account, but was still significant for stroke. Although causality cannot be inferred from these data, it is possible that the fibrinogen level plays an important part in the development of stroke and myocardial infarction.

167. Willett WC, Green A, Stampfer MJ, Speizer FE, Colditz GA. Relative and absolute excess risks of coronary heart disease among women who smoke cigarettes. *N Engl J Med* 1987;317:1303-9

We prospectively examined the incidence of coronary heart disease in relation to cigarette smoking in a cohort of 119,404 female nurses who were 30-55 years of age in 1976 and were free of diagnosed coronary heart disease. During six years of follow-up, 65 of the women died of fatal coronary heart disease and 242 had a nonfatal myocardial infarction. The number of cigarettes smoked per day was positively associated with the risk of fatal coronary heart disease (relative risk = 5.5 for  $\geq 25$  cigarettes per day) and angina pectoris (relative risk = 2.6). Even smoking 1 to 4 or 5 to 14 cigarettes per day was associated with a twofold to threefold increase in the risk of fatal coronary heart disease or nonfatal infarction. Overall, cigarette smoking accounted for approximately half these events. The attributable (absolute excess) risk of coronary heart disease due to current smoking was highest among women who were already at increased risk because of older age, a parental history of myocardial infarction, a higher relative weight, hypertension, hypercholesterolemia, or diabetes. In contrast former smokers had little, if any, increase in risk. These prospective data emphasize the importance of cigarette smoking as a determinant of coronary heart disease in women, as well as the markedly increased hazards associated with this habit in combination with other risk factors in this disease.

168. Willett WC, Manson JE, Stampfer MJ, Colditz GA, Rosner B, Speizer FE, et al. Weight, weight change, and coronary heart disease in women. Risk within the "normal" weight range. *Jama* 1995;273(6):461-5.

OBJECTIVE: To assess the validity of the 1990 US weight guidelines for women that support a substantial gain in weight at approximately 35 years of age and recommend a range of body mass index

(BMI) (defined as weight in kilograms divided by the square of height in meters) from 21 to 27 kg/m<sup>2</sup>, in terms of coronary heart disease (CHD) risk in women. DESIGN: Prospective cohort study. SETTING: Female registered nurses in the United States. PARTICIPANTS: A total of 115 818 women aged 30 to 55 years in 1976 and without a history of previous CHD. RESULTS: During 14 years of follow-up, 1292 cases of CHD were ascertained. After controlling for age, smoking, menopausal status, postmenopausal hormone use, and parental history of CHD and using as a reference women with a BMI of less than 21 kg/m<sup>2</sup>, relative risks (RRs) and 95 % confidence intervals (CIs) for CHD were 1.19 (0.97 to 1.44) for a BMI of 21 to 22.9 kg/m<sup>2</sup>, 1.46 (1.20 to 1.77) for a BMI of 23 to 24.9 kg/m<sup>2</sup>, 2.06 (1.72 to 2.48) for a BMI of 25 to 28.9 kg/m<sup>2</sup>, and 3.56 (2.96 to 4.29) for a BMI of 29 kg/m<sup>2</sup> or more. Women who gained weight from 18 years of age were compared with those with stable weight ( $\pm 5$ kg) in analyses that controlled for the same variables as well as BMI at 18 years of age. The RRs and CIs were 1.25 (1.01 to 1.55) for a 5- to 7.9 kg gain, 1.64 (1.33 to 2.04) for an 8- to 10.9 kg gain, 1.92 (1.61 to 2.29) for an 11- to 19 kg gain, and 2.65 (2.17 to 3.22) for a gain of 20 kg or more. Among women within the BMI

range of 18-25 kg/m<sup>2</sup>, weight gain after 18 years of age remained a strong predictor of CHD risk.

CONCLUSIONS: Higher levels of body weight within the "normal" range, as well as modest weight gains after 18 years of age, appear to increase risks of CHD in middle-aged women. These data provide evidence that current US weight guidelines may be falsely reassuring to the large proportion of women older than 35 years who are within the current guidelines but have potentially avoidable risks of CHD.

169. Williams C, Campanaro L, Squillace M, Bollella M. Management of childhood obesity in pediatric practice. *Ann N Y Acad Sci* 1997;817:225-240

Evaluation of obese children and adolescents in the pediatric office or clinic should include baseline assessment of weight for height and body fatness; rule out endocrine and genetic causes of obesity; and evaluate other health-risk factors, such as those for cardiovascular disease, cancer, diabetes, and hypertension. Treatment of obesity is most successful if realistic goals are set; a balanced low-fat/high-fiber diet is stressed; a safe rate of weight loss of 1 to 2 pounds per week is achieved through a moderate reduction of caloric intake (approximately 20-25% decrease); increased physical activity is stressed as much as diet; parental support is strong; and behavior therapy is provided during the course of treatment to help both child and parent achieve the diet, exercise, and behavior goals.

170. Williamson DF, Madans J, Anda RF, Kleinman JC, Giovino GA, Byers T. Smoking cessation and severity of weight gain in a national cohort. *N Engl J Med* 1991;324:739-45

BACKGROUND: Many believe that the prospect of weight gain discourages smokers from quitting. Accurate estimates of the weight gain related to the cessation of smoking in the general population are not available, however. METHODS: We related changes in body weight to changes in smoking status in adults 25-74 years of age who were weighed in the First National Health and Nutrition Examination Survey (NHANES I, 1971 to 1975) and then weighed a second time in the NHANES I Epidemiologic Follow-up Study (1982 to 1984). The cohort included continuing smokers (748 men and 1137 women) and those who had quit smoking for a year or more (409 men and 359 women). RESULTS: The mean weight gain attributable to the cessation of smoking, as adjusted for age, race, level of education, alcohol use, illnesses related to change in weight, base-line weight, and physical activity, was 2.8 kg in men and 3.8 kg in women. Major weight gain (>13 kg) occurred in 9.8 percent of the men and 13.4 percent of the women who quit smoking. The relative risk of major weight gain in those who quit smoking (as compared with those who continued to smoke) was 8.1 (95 percent confidence interval, 4.4 to 14.9) in men and 5.8 (95 percent confidence interval, 3.7 to 9.1) in women, and it remained high regardless of the duration of cessation. For both sexes, blacks, people under the age of 55, and people who smoked 15 cigarettes or more per day were at higher risk of major weight gain after quitting smoking. Although at base line the smokers weighed less than those who had never smoked, they weighed nearly the same at follow-up. CONCLUSIONS: Major weight gain is strongly related to smoking cessation, but it occurs in only a minority of those who stop smoking. Weight gain is not likely to negate the health benefits of smoking cessation, but its cosmetic effects may interfere with attempts to quit. Effective methods of weight control are therefore needed for smokers trying to quit.

171. Williamson DF, Madans J, Pamuk E, Flegal JS, Kendrick JS, Serdula MK. A prospective study of childbearing and 10-year weight gain in US white women 25 to 40 years of age. *Int J Obesity* 1994;18:561-9

Although birth rates to US women aged 25 and older have increased markedly over the last two decades, accurate estimates of the long-term weight gain associated with childbearing are not available for older mothers in the general population. We examined the effect of childbearing on weight change in 2547 white women aged 25-45 years who were initially weighed in the First National Health and Nutrition Examination Survey (1971-75) and who were reweighed an average of 10 years later. Linear and logistic regression estimates were adjusted for duration of follow-up, age, body mass index, initial parity, education, smoking, drinking, employment status, marital status, illness, physical activity, and dying to lose weight. Compared to parous women who did not give birth during the study period, the mean excess weight gain was 1.6 kg (95% Confidence Limits, +/- 2.3 kg) for nulliparous women, and was 1.7 kg (+/- 1.1 kg), 1.7 kg (+/- 2.0 kg), and 2.2 kg (+/- 4.3 kg), for women having one, two and three live births, respectively. Among women who were nulliparous at baseline, those that had their live births during the study period gained similar amounts of weight to that of women who began childbearing before the beginning of the study. The risk of gaining more than 13 kg was increased by 40%-60%, and the risk of becoming overweight was increased by 60%-110% in women having live births during the study. We conclude that the average weight gain associated with childbearing after the age of 25 is quite modest in US white women. However, for some women who give birth after the age of 25 the risks of major weight gain and becoming overweight are increased in association with childbearing.

172. Williamson DF, Pamuk E, Thun M, Flanders D, Byers T, Heath C. Prospective study of intentional weight loss and mortality in never-smoking overweight US white women aged 40-64 years. *Am J Epidemiol* 1995;141(12):1128-41

Although 40% of US women indicate they are currently trying to lose weight, the association between intentional weight loss and longevity is unknown. The authors analyzed prospective data from 43,457 overweight, never-smoking US white women aged 40-64 years who in 1959-1960 completed a questionnaire that included questions on weight change direction, amount, time interval, and intentionality. Vital status was determined in 1972. Proportional hazards regression was used to estimate mortality rate ratios for women who intentionally lost weight compared with women who had no change in weight. Women who died within the first 3 years of follow-up were excluded. Analyses were stratified by preexisting illness and adjusted for age, beginning body mass index, alcohol intake, education, physical activity, and health conditions. In women with obesity-related health conditions (n = 15,069), intentional weight loss of any amount was associated with a 20% reduction in all-cause mortality, primarily due to a 40-50% reduction in mortality from obesity-related cancers; diabetes-associated mortality was also reduced by 30-40% in those who intentionally lost weight. In women with no preexisting illness (n = 28,388), intentional weight loss of or = 20 lb (or = 9.1 kg) that occurred within the previous year was associated with about a 25% reduction in all-cause, cardiovascular, and cancer mortality; however, loss of 20 lb (9.1 kg) or loss that occurred over an interval of or = 1 year was generally associated with small to modest increases in mortality. The association between intentional weight loss and longevity in middle-aged overweight women appears to depend on their health status. Intentional

weight loss among women with obesity-related conditions is generally associated with decreased premature mortality, whereas among women with no preexisting illness, the association is equivocal.

173. Wilson GT. Relation of Dieting and Voluntary Weight Loss to Psychological Functioning and Binge Eating. *Ann Intern Med* 1993;119:727-30

Voluntary weight loss in obese patients consistently reduces negative emotions such as depression and anxiety in the short term. Dieting by persons of normal weight is associated with low self-esteem and depressive symptoms. Dieting is linked to the development and maintenance of eating disorders such as anorexia nervosa and bulimia nervosa, although the precise nature of this association is unclear. Dieting cannot be a sufficient causal condition and must combine with other still undetermined vulnerabilities to cause eating disorders. Identification of these risk factors must precede the development of effective programs to prevent eating disorders.

174. Winkelman J. Clinical and polysomnographic features of sleep-related eating disorder. *J Clin Psychiatry* 1998;59(1):14-19

**BACKGROUND:** Sleep-related eating disorder is a recently described clinical syndrome that combines characteristics of both eating and sleep disorders. Nocturnal partial arousals are followed by rapid ingestion of food and subsequent poor memory for the episode. Only two case series examining this disorder have been published, and both are from the same sleep disorders center in a general hospital. **METHOD:** The author describes 23 consecutive cases of sleep-related eating disorder that presented to the Sleep Disorders Center at McLean Hospital. All patients were administered a standardized clinical sleep disorders evaluation followed by a semistructured interview to elicit information regarding characteristics of sleep-related eating disorder. Polysomnographic evaluation was performed on all patients with clinical histories of sleep-related eating disorder. **RESULTS:** Eighty-three percent (N = 19) of the 23 patients were female. For most of the patients, the disorder had begun in adolescence (mean +/- SD = 21.6 +/- 10.9 years) and had been chronic, with a mean duration of 15.8 +/- 11.2 years. Nearly all patients reported eating on a nightly basis (1-6 times per night), and all episodes followed a period of sleep. All patients described their eating as "out of control," and two thirds stated that they "binged" during the night. Over 90% (21/23) reported their state at the time of nocturnal eating as "half-awake, half-asleep" or "asleep", and over 90% reported "consistent" or "occasional" amnesia for the event. Nearly half (11/23) of the sample were given a polysomnographic diagnosis of somnambulism. Thirty-five percent (8/23) had a lifetime eating disorder diagnosis.

**CONCLUSION:** Sleep-related eating disorder appears to be a relatively homogeneous syndrome combining features of somnambulism and daytime eating disorders. However, no current nosology accurately characterizes these patients. Physicians should be aware of the existence of the disorder and the value of referring patients with sleep-related eating disorder to a sleep disorders center.

Sleep Disorders Center, Brigham and Women's Hospital, Harvard Medical School, Boston, Mass 02115, USA.

175. Wiross R, Shaw KD, Rissanen J, Martel Y, de Guise J, Avruch L. Sex differences in lean and adipose tissue distribution by magnetic resonance imaging: anthropometric relationships. *Am J Clin Nutr* 1994;59:1277-1285

This study compared total and regional adipose tissue (AT) and lean tissue (LT) distribution measured by magnetic resonance imaging (MRI) in obese, android women (n=40) and men (n=17). Women had significantly (P<0.01) greater subcutaneous AT (39.6+/-11.6 vs 30.7+/-7.5 L) but significantly (P<0.01) less visceral AT (2.5+/-1.1 vs 4.8 +/- 2.1 L) and LT (42.8+/-4.7 vs 58.2+/-6.2 L) compared with men. Segmentation of the visceral AT volume demonstrated that women had significantly (P<0.01) less intraperitoneal (1.98+/-0.84 vs 3.74+/-1.61 L) and extraperitoneal AT (0.51+/-0.23 vs 1.04+/-0.47 L). When the legs, hip and pelvic region, and abdomen and torso regions were compared, women had significantly greater absolute quantities of subcutaneous AT and significantly less LT in all regions (P<0.01); however, in all regions the relative distribution of both was similar. Anthropometric prediction of MRI-measured total AT gave SEs of 7.7% for women and 7.5 % for men, for visceral AT 30 % for women and 19 % for men. Anthropometric prediction of LT gave SEs of 6.5 % for women and 3.6 % for men.

176. Wirth A. Adipositas. Erhöhte Mortalität durch arteriosklerotische Folgekrankheiten und Karzinome. *Der Internist* 1997;3(38):214-223

**ZUSAMMENFASSUNG:** Im Unterschied zu einigen Industrieländern wird die Adipositas in Deutschland von vielen nicht als Krankheit betrachtet. Vorherrschend ist immer noch die Einschätzung der Adipositas als ein kosmetisches Problem mit Verkennung der Krankheitsrisiken, der Kosten, der Einschränkung der Lebensqualität und der Exzeßmortalität. In den letzten Jahrzehnten sind eine Reihe von epidemiologischen und großen Beobachtungsstudien durchgeführt worden, die der Adipositas zweifelsfrei eine erhöhte Mortalität zuweisen. Neben einer Erhöhung des Körpergewichtes hat sich insbesondere die Fettverteilung als wichtiger Prädiktor für eine erhöhte Sterblichkeit herausgestellt. Diese Zusammenhänge gelten für Frauen und Männer gleichermaßen. Es wird geschätzt, daß in Deutschland ca. 75000 Personen jährlich aufgrund einer erhöhten Körperfettmasse sterben. Die Übersterblichkeit

Adipöser ist auf eine erhöhte Erkrankungsrate für arteriosklerotische Krankheiten wie die koronare Herzkrankheit und den Apoplex sowie auf Karzinome zurückzuführen. Letztere sind entweder hormon- oder ernährungsabhängig. Für das hohe Arterioskleroserisiko sind vielfältige Faktoren und Mechanismen verantwortlich. Zum einen ist die Adipositas selbst ein unabhängiger kardiovaskulärer Risikofaktor. Zum anderen induziert die Adipositas eine Reihe von anderen Risikofaktoren wie dem Diabetes mellitus Typ II, Fettstoffwechselstörungen, Störungen der Fibrinolyse und die Hypertonie. Treten die genannten Risikofaktoren zusammen mit einer Insulinresistenz auf, spricht man von einem metabolischen Syndrom, eine Insulinresistenz ist fast immer mit einer abdominalen Adipositas vergesellschaftet. Es wundert daher nicht, daß die Adipositas im Verbund mit anderen durch sie verursachten Krankheiten der wichtigste kardiovaskuläre Risikofaktor ist. Bei der koronaren Herzkrankheit ist ihr Anteil besonders hoch; er wird auf 36 % geschätzt.

FAZIT FÜR DIE PRAXIS: Die Adipositas erhöht die Mortalität in Abhängigkeit des Gewichts durchschnittlich auf das Doppelte; auf ein Mehrfaches ist das Morbiditätsrisiko gesteigert und erstreckt sich auf alle Organsysteme und Krankheitsbilder, vorwiegend auf:

- kardiovaskuläres System (KHK, Hypertonie, Linksherzhypertrophie, Herzinsuffizienz, Schlaganfall etc.)
- metabolische und hormonelle Funktionen (Diabetes, Fettstoffwechselstörungen, Gicht, Sexualfunktion etc.)
- Blutgerinnung
- respiratorisches System
- hepatobiliäres System
- Haut
- Bewegungsapparat
- Neoplasien
- psychosoziale Probleme
- Verschiedenes (OP-Risiko, erschwerte Untersuchungsbedingungen, Ausdauer etc.)

Die Kombination meist mehrerer adipositas-bedingter Krankheitsbilder ist eher die Regel als die Norm. Obwohl die ersten Daten über die erhöhte Malignominzidenz 1979 vorgelegt wurden, stammen weitere Studien zu diesem Problem erst aus neuester Zeit. Bei adipösen Frauen ist das Risiko für das Mamma-, Endometrium-, Zervix- und Gallenblasenkarzinom deutlich erhöht, bei adipösen Männern das Risiko für das Prostata- und kolorektale Karzinom, bei beiden Geschlechtern die Risiken für das Ösophagus-, Leber- und Pankreaskarzinom. Die Ursachen hierfür sind nur teilweise geklärt und Gegenstand laufender Untersuchungen.

177. Wolever T, Chiasson J, Josse R, Hunt J, Palmason C, Rodger N, et al. Small weight loss on long-term acarbose therapy with no change in dietary pattern or nutrient intake of individuals with non-insulin-dependent diabetes. *nt J Obes Relat Metab Disord* 1997;21(9):756-763

OBJECTIVES: To see if the long-term treatment of non-insulin dependent diabetes (NIDDM) with the alpha-glucosidase inhibitor acarbose affects food intake and body weight. DESIGN: Randomized, double-blind, placebo-controlled, parallel design clinical trial of 12 months duration. SUBJECTS: Subjects with NIDDM in four treatment strata: 77 on diet alone, 83 also treated with metformin, 103 also treated with sulfonylurea and 91 also treated with insulin. MEASUREMENTS: Two 3 day diet records were obtained before randomization to acarbose or placebo therapy, and additional 3 day diet records were obtained at 3, 6, 9 and 12 months after randomization. Body weight was also measured at these times. RESULTS: Of the 354 subjects randomized, 279 (79%) completed at least 9 months of therapy and, of these, 263 (94%) provided at least one diet record during the baseline period and two diet records during the treatment period. After one year, subjects on acarbose had lost 0.46 +/- 0.28 kg, which differed significantly from the 0.33 +/- 0.25 kg weight gain on placebo (P = 0.027). The difference in weight change between acarbose and placebo did not differ significantly in the different treatment strata. Being in the study had significant effects on diet, including a reduction in energy intake from 1760-1700 Kcal/d (P < 0.05), a reduction in simple sugars intake from 18.5-17.4% of energy (P < 0.001), and reductions in the number of different foods consumed (33-30, P < 0.001) and the number of meals eaten per day (4.7-4.3, P < 0.001). However, compared to placebo treatment, acarbose had no effect on energy intake, nutrient intakes, or dietary patterns. CONCLUSIONS: In subjects with NIDDM on weight-maintaining diets, long-term acarbose therapy results in a small weight loss, but has no effect on energy or nutrient intakes. The weight loss induced by acarbose may be due partly to reduced doses of concomitant oral agents and insulin and partly to energy loss due to increased colonic fermentation. Evidenzklasse Ib.

178. Wolf A, GA C. Current estimates of the economic cost of obesity in the United States. *Obesity research* 1998;6(2):97-106

This study was undertaken to update and revise the estimate of the economic impact of obesity in the United States. A prevalence-based approach to the cost of illness was used to estimate the economic costs in 1995 dollars attributable to obesity for type 2 diabetes mellitus, coronary heart disease (CHD),



hypertension, gallbladder disease, breast, endometrial and colon cancer, and osteoarthritis. Additionally and independently, excess physician visits, work-lost days, restricted activity, and bed-days attributable to obesity were analyzed cross-sectionally using the 1988 and 1994 National Health Interview Survey (NHIS). Direct (personal health care, hospital care, physician services, allied health services, and medications) and indirect costs (lost output as a result of a reduction or cessation of productivity due to morbidity or mortality) are from published reports and inflated to 1995 dollars using the medical component of the consumer price index (CPI) for direct cost and the all-items CPI for indirect cost. Population-attributable risk percents (PAR%) are estimated from large prospective studies. Excess work-lost days, restricted activity, bed-days, and physician visits are estimated from 88,262 U.S. citizens who participated in the 1988 NHIS and 80,261 who participated in the 1994 NHIS. Sample weights have been incorporated into the NHIS analyses, making these data generalizable to the U.S. population. The total cost attributable to obesity amounted to \$99.2 billion dollars in 1995. Approximately \$51.64 billion of those dollars were direct medical costs. Using the 1994 NHIS data, cost of lost productivity attributed to obesity (BMI > or = 30) was \$3.9 billion and reflected 39.2 million days of lost work. In addition, 239 million restricted-activity days, 89.5 million bed-days, and 62.6 million physician visits were attributable to obesity in 1994. Compared with 1988 NHIS data, in 1994 the number of restricted-activity days (36%), bed-days (28%), and work-lost days (50%) increased substantially. The number of physician visits attributed to obesity increased 88% from 1988 to 1994. The economic and personal health costs of overweight and obesity are enormous and compromise the health of the United States. The direct costs associated with obesity represent 5.7% of our National Health Expenditure in the United States.

179. Wolf AM, Colditz GA. The costs of obesity: the U.S. perspective. *Pharmacoeconomics* 1994;5:34-7

Obesity is associated with an increased risk of many major chronic diseases. We estimated the economic costs of obesity-associated non-insulin-dependent diabetes mellitus, cardiovascular disease, gallbladder disease, cancer, and musculoskeletal disorders in 1990 US dollars, using a prevalence-based approach to cost-of-illness. In addition to direct costs, indirect costs were also estimated. The indirect cost of morbidity was estimated by calculating the costs associated with work days lost, and mortality costs were estimated on the basis of lifetime earnings lost. In 1990, the direct cost of obesity-associated disease in the US was \$US45.8 billion, and the indirect cost of obesity was estimated to be \$US23.0 billion. Therefore the total economic cost of obesity was estimated to be \$US68.8 billion in 1990.

180. Wolf AM, Colditz GA. Social and economic effects of body weight in the United States. *Am J Clin Nutr* 1996;63(3 Suppl):466-9

Given that overweight is clearly associated with increased risk of many major chronic diseases, the United States could have saved approximately \$45.8 billion or 6.8% of health care expenditures in 1990 alone if obesity were prevented. The question then arises, economically and socially, what is a healthy body weight? Using a prevalence-based approach to cost of illness, we estimated the economic costs (1993 dollars) associated with illness at different strata of body mass indexes (BMIs, in kg/m<sup>2</sup>) and varying increments of weight gain to address the questions: At what body weight do we initiate preventive services? What are the direct costs associated with weight gain? Second, using the 1988 National Health Interview Survey (NHIS), we evaluated the marginal increase in certain social indexes reflective of functional impairment and morbidity (ie, restricted-activity days, bed days, and work-loss days) as well as physician visits associated with different strata of BMI. With respect to economic and social indexes, a healthy body weight appears to be a BMI 25, and weight gain should be kept to 5 kg throughout a lifetime.

### 11.3.3. Evaluierete, nicht zitierte Literatur (Publikationen zur Adipositas therapie mit Abstracts)

1. Adami GF, Campostano A, Gandolfo P, Marinari G, Bessarione D, Scopinaro N. Body composition and energy expenditure in obese patients prior to and following biliopancreatic diversion for obesity. *Eur Surg Res* 1996;28(4):295-8

Body composition and resting energy expenditure (REE) were assessed in 69 obese patients prior to and 1 year following biliopancreatic diversion (BPD). Fat-free mass (FFM) and body fat sizes were very similar to those of nonoperated subjects closely matched for body weight and FFM size. In the BPD subjects, the REE data were high, thus excluding a dilatation of non-energy-consuming extracellular spaces and suggesting an increase in the ratio between the organs and the less metabolically active muscle mass within the FFM.

Evidenzklasse: IIb.

2. Alfieri MA, Pomerleau J, Grace DM, Anderson L. Fiber intake of normal weight, moderately obese and severely obese subjects. *Obes Res* 1995;3(6):541-7

The lack of dietary fiber may be a contributing factor in obesity. This study examined the fiber intake of three weight groups: normal (20.0 or = BMI or = 27.0), moderately obese (27.1 or = BMI or = 39.9) and severely obese (BMI or = 40.0). Each group contained 50 subjects. Detailed 3-day food records were used to gather the nutritional data. Fiber intake in the normal weight group was 18.8 +/- 9.3 grams, the moderately obese consumed 13.3 +/- 5.8 grams of fiber and the severely obese 13.7 +/- 5.7 grams. Total fiber intake in grams was found to be significantly higher in the lean group (p 0.05) and was positively associated with sex and education level with men and more highly educated individuals consuming more fiber. Using regression analysis total fiber in grams and fiber in g/1000 kcalories was inversely associated with BMI after adjusting for sex, age, education level and income (p 0.01). A high fiber diet may help to promote a negative energy balance by causing early satiety secondary to gastric distention. Dietitians and physicians need to emphasize the importance of a high fiber diet to their obese patients.

Evidenzklasse: IIa.

3. American Diabetes Association. American Diabetes Association Position Statement. Diabetes mellitus and exercise. American Diabetes Association. *Diabetes Care* 1995;7:416-20

In 1993, the National Diabetes Advisory Board charged the American Diabetes Association to coordinate a task force of representatives of diabetes and other organisations to review, and revise if indicated, the National Standards for Diabetes Patient Education Programs. The Task Force consisted of representatives from the following organisations: The American Association of Diabetes Educators, The American Diabetes Association, The American Dietetic Association, the Centers for Disease Control and Prevention, the Department of Defense, the Department of Veterans Affairs, the Diabetes Research and Training Centers, the Indian Health Service, and the Juvenile Diabetes Foundation, Inc. The task force decided to revise the standards to reflect recent research and current health care trends. Thus, the standards were revised and are now termed the National Standards for Diabetes Self- Management Education Programs. These revised standards have been endorsed by the organizations involved in their development.

Evidenzklasse: IV.

4. American Obesity Association. Guidance for treatment of Adult Obesity. *Shape up America*. Bethesda, MD, 1997; Report, Evidenzklasse: IV.

5. Astrup A. The sympathetic nervous system as a target for intervention in obesity. *Int J Obes Relat Metab Disord* 1995;19(7):24-8

The sympathoadrenal system plays an important role in the regulation of both energy intake and energy expenditure (EE), and the sympathetic nervous system (SNS) offers a dual target for pharmacological intervention directed at weight loss in obese patients. The sizes of the fat-free mass and fat mass are the major determinants of resting EE, but studies using different techniques have shown that differences in sympathetic activity can account for an additional proportion of the variation between individuals. Differences in thermogenic responses to food can also be explained by different abilities to activate the sympathoadrenal system. A low resting EE for a given body composition is one manifestation of the genetically determined predisposition to obesity. A low sympathetic activity may be one factor responsible but, as yet, no conclusive evidence has been found. In dietary treatment programmes of obesity, patients with high levels of EE and greater SNS activity achieve greater long-term weight loss than those with lower levels. Pharmacological stimulation with sympathomimetic compounds suppresses appetite and increases energy expenditure through stimulation of beta 1, beta 2, and beta 3-receptor subtypes. During chronic treatment, the beta 3-mediation may predominate due to down-regulation of beta 1- and beta 2-receptors. An improved understanding of the aetiological role of the SNS in the development of obesity in genetically susceptible individuals may permit tailoring of pharmacological intervention.

Evidenzklasse: IV.

6. Astrup A, Raben A. Carbohydrate and obesity. *Int J Obes Relat Metab Disord* 1995;19(5 Suppl.):27-37; kein Abstract, Evidenzklasse IV.

7. Astrup A, Toubro S, Raben A, Skov A. The role of low-fat diets and fat substitutes in body weight management: what have we learned from clinical studies? *J Am Diet Assoc* 1997;97(7):82-87

The introduction of low-fat, high-complex carbohydrate diets for the prevention and treatment of obesity was based on the causal link established between dietary fat and body fatness. Observational and mechanistic studies show that because fat possesses a lower satiating power than carbohydrate and protein, a diet rich in fat can increase energy intake. The propensity to gain weight is enhanced in susceptible persons, particularly sedentary people who have a genetic predisposition to obesity. Low-fat diets cause weight loss proportional to pretreatment body weight in a dose dependent manner; that is, weight loss is correlated positively to the reduction in dietary fat content. A reduction of 10% fat energy produces an average 5-kg weight loss in obese persons. As with traditional caloric counting

diets, obese persons lose weight only if they adhere to the prescribed low-fat diet. Failure to achieve a weight loss and to maintain it may be attributed in part to lack of adherence to the diet. After a major weight loss, an ad libitum low-fat diet program appears to be superior to caloric counting in maintaining the weight loss 2 years later. Replacing some fat with protein instead of carbohydrate may increase the weight loss further. Moreover, fat substitutes may make it easier to prevent and treat obesity by making the diet palatable. More randomized, controlled, long-term dietary intervention studies are warranted to identify the optimal diet composition for the treatment of obesity.

8. Atkinson RL. Proposed Standards for Judging the Success of the Treatment of Obesity. *Ann Intern Med* 1993;119:677-80

The purpose of this report is to propose standards for the successful treatment of obesity. This process is somewhat arbitrary because obesity is a multifactorial disease and because standards need revision as diagnostic and treatment techniques improve. Weight loss, the classic standard of success, does not account for individual variability. Reduction in other measures of body size, such as body mass index, percentage of excess weight, and body fat, may be preferable. Improvement in known complications of obesity (diabetes mellitus, hypertension, hyperlipoproteinemia, sleep apnea, and psychosocial problems) are equally valid measures of success. Because obesity is a chronic disease, maintenance of weight loss is included as a standard of success. Response to obesity treatment varies, and thus criteria to define minimal, intermediate, and full success for each variable are necessary.

Evidenzklasse: IV.

9. Atkinson RL, Blank RC, Loper JF, Schumacher D, Lutes RA. Combined drug treatment of obesity. *Obes Res* 1995;3(4):497S-500S

Pharmacological treatment of obesity has been neglected as a viable therapeutic option for many years. Recent long term studies with combinations of obesity drugs gives promise that drugs may play a role in weight maintenance, which classically has been the most difficult aspect of treating obesity. Currently available obesity drugs include centrally acting adrenergic agents and serotonin agonists. Drugs still in development include a lipase inhibitor that produces fat malabsorption, a combined adrenergic-serotonergic reuptake inhibitor, various gut-central nervous system peptides, and a number of beta-3 agonists. Any of these obesity drugs given alone produces modest weight loss, and for most, weight loss continues for as long as medication is given. The most successful drug regimens to date are combinations of phentermine and fenfluramine or of ephedrine, caffeine, and/or aspirin. The former combination produces reduction in body weight and complications of obesity for 2 to almost 4 years in clinical trials to date. More research is needed to document long term efficacy and particularly the long term safety of these and other combinations.

Evidenzklasse: IV.

10. Atrens DM. The questionable wisdom of a low-fat diet and cholesterol reduction. *Soc Sci Med* 1994;39:433-47

The prevalent wisdom that a low-fat diet and cholesterol reduction are essential to good cardiovascular health is coming under increased scrutiny. An examination of the foundations of this view suggests that in many respects it was ill-conceived from the outset and, with the accumulation of new evidence, it is becoming progressively less tenable. Cross-sectional, longitudinal and cross-cultural investigations have variously suggested that the relationship between dietary fat intake and death from heart disease is positive, negative and random. These data are incompatible with the view that dietary fat intake has any causal role in cardiovascular health. Although hypercholesterolemia is associated with increased liability to death from heart disease, it is as frequently associated with increased overall life expectancy as with decreased life expectancy. These findings are incompatible with labelling hypercholesterolemia an overall health hazard. Moreover, it is questionable if the cardiovascular liability associated with hypercholesterolemia is either causal or reversible. The complex relationships between diet, serum cholesterol, atherosclerosis and mortality and their interactions with genetic and environmental factors suggest that the effects of simple dietary prescriptions are unlikely to be predictable, let alone beneficial. These cautions are borne out by numerous studies which have shown that multifactorial primary intervention to lower cholesterol levels is as likely to increase death from cardiovascular causes as to decrease it. Importantly, the only significant overall effect of cholesterol-lowering intervention that has ever been shown is increased mortality. The stress and helplessness associated with misapprehensions as to the dangers of dietary fat and the asceticism inherent in the war on cholesterol have considerable implications for health practices. Recent research in behavioral immunology suggests that stress and helplessness are likely to compromise immunity and promote ill-health.

Evidenzklasse: IV.

11. Avenell A, Richmond PR, Lean ME, Reid DM. Bone loss associated with a high fibre weight reduction diet in postmenopausal women. *Eur J Clin Nutr* 1994;48:561-6

OBJECTIVE: To examine the effect of high fibre weight reduction on bone density in postmenopausal women. DESIGN: Case-control study. SETTING: Hospital outpatient dietetic clinic and Osteoporosis Screening Unit. SUBJECTS AND INTERVENTIONS: Sixteen overweight volunteers who followed a

high fibre reducing diet for 6 months, to lose 20% of excess body weight (above body mass index 25 kg/m<sup>2</sup>), and returned to their starting weight by the end of a further 6 months. Forty-six non-dieting controls, matched for age and years postmenopause, selected from screening unit volunteer register. RESULTS: Annual percentage changes in lumbar spine bone mineral density, measured by dual energy X-ray absorptiometry were: controls -2.5% (SE 0.5), dieters -4.8% (0.9), 95% confidence interval of difference between groups -0.2 to -4.3% (P = 0.03); femoral neck bone density controls -2.5% (0.5), dieters -2.1% (0.9), 95% confidence interval of difference -1.7 to 2.5% (P = 0.69). CONCLUSIONS: High fibre weight reduction in postmenopausal women significantly increased annual bone loss from the lumbar spine. This loss was not reversed by weight regain in the second 6 months. Repeated cycles of high fibre weight loss and weight gain may increase the risk of spinal osteoporosis.

Evidenzklasse: IIa.

12. Bakris GL, Weir MR, Sowers JR. Therapeutic challenges in the obese diabetic patient with hypertension. *Am J Med* 1996;101(3A):33-46

Obesity, diabetes mellitus, and hypertension are common and interrelated medical problems in Westernized, industrialized societies. These medical conditions are associated with an increased risk of cardiovascular disease and are more prevalent among minorities, such as African-American and Hispanic populations. The associated cardiovascular risks of these problems are more thoroughly addressed in another review in this supplement. Obesity markedly enhances the development of type II diabetes. Moreover, it enhances the cardiovascular risk associated with other risk factors, such as hypertension and dyslipidemia. Weight reduction in association with an aerobic exercise program improves metabolic abnormalities and reduces blood pressure in individuals with diabetes and hypertension. Frequently, however, pharmacologic treatment is required to lower blood pressure. Individual therapy with an angiotensin-converting enzyme (ACE) inhibitor is preferred initially in these individuals, with the addition of either a low dose diuretic or a nondihydropyridine calcium antagonist if additional blood pressure reduction is required. These additive agents are recommended, since each has been shown individually to reduce cardiovascular morbidity and to preserve renal function among diabetic patients. Other issues, such as aggressive therapy of lipids and adequate glycemic control, are also important strategies for reducing cardiovascular and renal morbidity and mortality in this very high-risk population.

Evidenzklasse: IV.

13. Ballor DL, Katch VL, Becque MD, Marks CR. Resistance weight training during caloric restriction enhances lean body weight maintenance. *Amer J Clin Nutr* 1988;47:19-25

To assess the individual and combined effects of weight loss and weight training on body weight and body composition, 40 obese women were randomly assigned to one of four groups for an 8 wk weight-loss study. These groups were control (C); diet without exercise (DO); diet plus weight training (DPE); and weight training without diet (EO). Body weight decreased for DO (-4.47 kg) and DPE (-3.89 kg) compared with C (-0.38 kg) and EO (0.45 kg). Lean body weight (LBW) increased for EO (1.07 kg) compared with DO (-0.91 kg) and C (-0.31 kg) and for DPE (0.43 kg) compared with DO. Upper-arm muscle areas (determined by radiograph) increased for DPE (11.2 cm<sup>2</sup>) and EO (10.4 cm<sup>2</sup>) compared with C (2.7 cm<sup>2</sup>) and DO (2.1 cm<sup>2</sup>). It was concluded that weight training results in comparable gains in muscle area and strength for DPE and EO. Adding weight training exercise to a caloric restriction program results in maintenance of LBW compared with DO.

Evidenzklasse: Ib.

14. Barkin RL. New agent for obesity management [letter]. *J Fam Pract* 1996;43(3):224; Brief, Evidenzklasse: IV.

15. Berg A, Halle M, Bauer S, Korsten-Reck U, Keul J. [Physical activity and eating behavior: strategies for improving the serum lipid profile of children and adolescents]. *Wien Med Wochenschr* 1994;144(7):138-44

Coronary risk factors such as obesity, dyslipoproteinaemia and low physical fitness are often prevalent in childhood. In contrast, regular physical activity and healthy nutrition have been shown to be effective in primary and secondary prevention of coronary artery disease. An increment in physical activity with concomitant weight loss has a profound influence on peripheral lipoprotein metabolism and has shown to improve the atherogenic lipoprotein profile. As risk factors often track from childhood into adulthood it seems inevitable to prevent or diminish risk factors as early as possible. Therefore, intervention programmes for prevention of coronary artery disease have to be conducted in childhood. Experience from an own intervention programme of obese children has shown that the combination of intensive dietary and physical education improves physical fitness, body composition as well as lipid metabolism. Whether short-term benefits will continue into adulthood and reduce coronary artery disease in midlife will have to be shown. Nonetheless, it seems out of question that children showing risk factors such as obesity or hypercholesterolaemia will benefit from early intervention programmes when changing dietary and exercise behaviours.

Evidenzklasse: IV.

16. Bihm B. New treatment for obesity: dexfenfluramine (Redux). *Medsurg Nurs* 1996;5(5):360-2, 373  
kein Abstract, Evidenzklasse: IV.

17. Björntorp P. Evolution of the understanding of the role of exercise in obesity and its complications. *Int J Obes Relat Metab Disord* 1995;19(4):1-4

Exercise is often added to energy intake restriction in treatment programs for obesity. The effects of exercise alone on body fat mass is highly variable, and less efficient than diminishing energy intake. However, exercise has additional, beneficial effects on most of the metabolic risk factors for cardiovascular disease and non-insulin dependent diabetes mellitus. A problem is the feasibility of training programs. Conventional, aerobic type of interventions are difficult to adhere to because of their strenuous character and because of boredom. Recent findings of essentially similar effects of low intensity programs, creating Metabolic Fitness appear more attractive and useful. The final proof of a potential protective effects of exercise against cardiovascular disease and diabetes needs very difficult, time-consuming and expensive studies, if at all feasible to perform. The current evidence for protective effects is highly suggestive, and the beneficial effects on the risk factors for these diseases have been demonstrated. Provided that feasible methods and motivation are available we can therefore now probably recommend increased physical activity.

Evidenzklasse: IV.

18. Blackburn GL. Comparison of medically supervised and unsupervised approaches to weight loss and control. *Ann Intern Med* 1993;119:714-18

The rising incidence of obesity in the United States has given physicians an increased role in its treatment. Although unsupervised programs can produce significant weight losses, the lack of medical supervision increases the potential for health problems. As with other lifestyle changes (for example, smoking cessation and blood pressure control), even minimal physician involvement may enhance outcome. In published clinical trials, the absence of contact with health professionals among control group participants may account in part for their poor success at weight loss or for their weight gain. Smaller trials examining the value of physician advice and encouragement among dieting patients have shown promising results. Physicians should monitor the health of obese and overweight patients during and after weight loss as is appropriate for the patient, depending on caloric levels, rate of weight loss, weight-loss goals, and intercurrent health events. Medical supervision is necessary for patients on very-low-calorie diets, for severely obese patients (body mass index 35), and for patients with other health problems.

Evidenzklasse: IV.

19. Blair SN. Evidence for success of exercise in weight loss and control. *Ann Intern Med* 1993;119(7 Pt 2):702-6

Physically active men and women may be less likely than their sedentary peers to become overweight. Caloric restriction in overweight persons produces larger weight losses than does exercise, although more of the weight loss by dieting is from lean body mass. The addition of exercise to diet intervention produces more weight loss than does dieting alone. Exercise has a favorable effect on body fat distribution, with a reduction in waist-to-hip ratio with increased exercise. Exercise is especially important in maintaining weight loss in overweight persons. Several prospective studies have shown that overweight men and women who are active and fit have lower rates of morbidity and mortality than overweight persons who are sedentary and unfit. Therefore, exercise is of benefit to overweight persons, even if it does not make them lean. Exercise is recommended as an important part of a weight control program.

Evidenzklasse: IV.

20. Blocker WP, Jr., Ostermann HJ. Obesity: evaluation and treatment. *Dis Mon* 1996;42(12):829-73  
Obesity as a chronic condition among large numbers of people is a disease of recent origin, often but by no means always associated with dietary habits and sedentary lifestyle. Many obese people want to lose weight, and may have tried to do so numerous times with self-help or proprietary weight-loss programs. When they seek a physician for help in losing weight-or when a physician advises an obese patient to lose weight as part of a clinical strategy-care must be taken to "match" the patient to an appropriate therapeutic program with appropriate therapeutic goals. History and physical examination and psychologic evaluation are essential elements of patient screening. Complications of obesity must be taken into account in any treatment plan. The multidisciplinary management strategy is most likely to succeed in helping the patient lose weight. It also avoids untoward events associated with complications or concomitant disease. The multidisciplinary approach is especially important when the patient does not lose weight, and alternative strategies must be considered, such as surgical approaches.

Evidenzklasse: IV.

21. Boisaubin EV. Treatment for obesity. *Jama* 1996;276(6):445; kein Abstract, Evidenzklasse: IV.

22. Booth M, Bauman A, Oldenburg B. Effects of a national mass-media campaign on physical activity participation. *Health Promotion International* 1992;7:241-7

Regular physical activity has an important role in disease prevention and the promotion of positive

health. Population-wide campaigns to promote physical activity are a potentially important health promotion strategy to increase participation, but little is known about their effects. A mass-media campaign, supported by a range of community events, was conducted by the National Heart Foundation (NHF) of Australia in 1990. It comprised television advertising, professional education activities and interviews, promotional materials and community events, and was designed to increase knowledge of the preventive role of physical activity and to encourage the sedentary to start walking. Representative national population surveys were conducted two weeks before and four weeks after the campaign in order to determine the impact of the campaign on the prevalence of physical activity, with particular emphasis on the prevalence of inactivity and walking. Approximately 75% of participants in the post-campaign survey could recall the campaign message. There were no changes in knowledge about the benefits of physical activity, as pre-campaign levels were very high. There was an increase in the proportion of people aged over 50 who reported walking following the campaign, and an increase in the number of times per two-week period that walking was reported. Significant effects upon walking were also noted in the least educated group. The campaign was equally effective for both men and women. Such an outcome is encouraging, given concerns about social inequalities in the distribution of health risk factors.

Evidenzklasse: IIb.

23. Bosello O. The benefits of modest weight loss in type II diabetes. *Int J Obes* 1997;21(Suppl 1):10-3  
Obesity increases the risk of developing type II diabetes. However, the link between the two remains unclear, although insulin resistance and visceral adiposity are dominant risk factors. A study with CT scanning confirmed that the degree of visceral adiposity had a significant positive correlation with insulinaemia, and was negatively associated with insulin sensitivity. A 48 month retrospective study in patients with type II diabetes, who had received dietary therapy, identified a 'responder' group in whom metabolic improvements accompanied weight loss. Preferential loss of visceral fat may be an important factor in these 'responders'. Patients losing > 6.9 kg (or at least 10% mean baseline body weight) have demonstrated significant improvements in their glucose, HbA1 and lipid profiles. Modest weight loss by patients with type II diabetes therefore improves glycaemic control, insulin sensitivity and cardiovascular risk factors; and the risk of developing long-term diabetes-related complications may also be reduced by such metabolic improvements.

Evidenzklasse: IIb.

24. Bray GA. Use and abuse of Appetite-suppressant Drugs in the Treatment of Obesity. *Ann Intern Med* 1993;119:707-13

Most of the available appetite-suppressant drugs act on noradrenergic and possibly dopaminergic receptors to produce satiety. A smaller number increase excess neuronal serotonin levels by blocking serotonin reuptake or by increasing its release. All these drugs produce significantly greater weight loss than does placebo in most studies. Abuse is a problem with amphetamine, methamphetamine, and benzphetamine, whereas other drugs have minimal or no potential for abuse. Weight loss can be sustained for up to 36 months. Net weight loss, compared with placebo, ranges from 2 to 10 kg, and weight regain after terminating drug treatment proves that drugs do not work when not taken. The stigma of obesity, the public opprobrium toward obese persons, and regulatory rigidity have led to unjustified distrust in the potential of drug treatment for obesity.

Evidenzklasse: IV.

25. Bray GA. Obesity and surgery for a chronic disease [comment]. *Obes Res* 1996a;4(3):301-3

Kommentar, Evidenzklasse: IV.

26. Bray GA. Evaluation of drugs for treating obesity. *Obes Res* 1995;3(4):425-434

Criteria for the evaluation of new drugs to treat obesity are important as guides for designing clinical trials to test these agents. These criteria must be developed in relation to the realities of obesity, which is a chronic disease associated with morbidity and mortality that is increased by visceral fat deposits. The observation that patients regain weight after stopping drug treatment for obesity argues for the proposition that drugs work only when taken and NOT that the drugs are ineffective. The analogy between the development of treatments for obesity to those for the treatment of hypertension is used to highlight potential areas for new developments. Several features of an ideal drug for the treatment of obesity are suggested. Criteria for evaluating new drugs include both primary and secondary endpoints. The primary endpoint for an anti-obesity drug should be weight loss, possibly by category of success. Losses of total body fat or visceral fat might be alternative primary endpoints. Secondary endpoints include reduction in risk factors for associated diseases and improvement in the quality of life. In trials where vigorous placebo designs including highly aggressive behavior modification or very-low-calorie diets were used, it may be difficult or impossible to detect a response to a drug.

Evidenzklasse: IV.

27. Bray GA, De Lany J. Opinions of obesity experts on the causes and treatment of obesity--a new survey. *Obes Res* 1995;3(4):419-423

A survey of opinions on the causes of and effectiveness for treatment of obesity was carried out on

data provided by questionnaires from 57 physicians and scientists involved in obesity research. Responses were grouped by region (Europe, North America, and South America), gender, age (30-50 and over 50 years), and professional training (MD or PhD). Metabolic factors were considered the most important cause of obesity overall with physical inactivity only slightly behind. There were no gender differences, but the older group thought physical inactivity was a more important cause than the younger group. Weight cycling overall was not considered very important, although it was significantly more important among the Ph.D. group. Low-fat diets were considered the most effective treatment, with the older group of respondents rating low-fat diet more highly than their younger colleagues. Exercise was viewed as a more important treatment among North Americans, and medications as less in the treatment of obesity. All groups viewed serotonergic and thermogenic drugs as the most effective treatments whose usefulness would increase during the next 10 years.

Evidenzklasse: IV.

28. Bray GA, Ryan DH, Gordon D, Heidingsfelder S, Cerise F, Wilson K. A double-blind randomized placebo-controlled trial of sibutramine. *Obes Res* 1996;4(3):263-70

Sibutramine is a beta-phenethylamine which blocks reuptake of norepinephrine and serotonin. In this clinical study, a group of 173 patients were randomized to treatment with sibutramine at doses of 1, 5, 10, 15, 20 or 30 mg/d and were compared with placebo in a 24-week double-blind trial. There was a dose-dependent reduction in body weight, with doses of 10, 15, 20 and 30 mg being significantly greater than placebo. Weight loss was still continuing in the highest three doses at the end of the study. When drugs were discontinued patients regained weight, as expected. Side effects were generally mild and were most evident in the group treated with the highest dose. These studies suggest that sibutramine may be a valuable new drug for treatment of obesity.

Evidenzklasse: Ib.

29. Brolin R. Update: NIH Consensus Conference. Gastrointestinal Surgery for Severe Obesity. *Nutrition* 1996;12:403-4

The 1991 Consensus Development Panel was instrumental both in establishing criteria for selection of patients for surgical treatment and in recognition of operations that have been shown to be safe and reasonably effective in the long term. The Panel may have been premature in endorsement of any form of banded gastroplasty because the long-term weight loss results of these procedures are frequently disappointing. It seems likely that a consensus panel on the same subject would be worthwhile in the next decade to carefully evaluate such procedures as biliopancreatic bypass and the various laparoscopic techniques for gastric banding. In 1996 surgery remains the only effective treatment for patients with medically severe (morbid) obesity.

Evidenzklasse: IV.

30. Brolin RE, Robertson LB, Kenler HA, Cody RP. Weight loss and dietary intakes after vertical banded gastroplasty and Roux-en-Y gastric bypass. *Ann Surg* 1994;220:782-790

OBJECTIVE: The purpose of this study was to learn whether preoperative eating habits can be used to predict outcome after vertical banded gastroplasty (VBG) and Roux-en-Y gastric bypass (RYGB).

BACKGROUND SUMMARY: Several independent randomized and sequential studies have reported significantly greater weight loss after RYGB in comparison with VBG. Although the mechanism responsible for weight loss after both procedures is restriction of intake rather than malabsorption, the relationships between calorie intake, food preferences, and postoperative weight loss are not well defined.

METHODS: During the past 5 years, 138 patients were prospectively selected for either VBG or RYGB, based on their preoperative eating habits. All patients were screened by a dietitian who determined total calorie intake and diet composition before recommending VBG or RYGB. Thirty patients were selected for VBG; the remaining 108 patients were classified as "sweet eaters" or "snackers" and had RYGB. Detailed recall diet histories also were performed at each postoperative visit. RESULTS: Early morbidity rate was zero after VBG versus 3 % after RYGB. There were no deaths. Mean follow-up was 39 +/- 11 months after VBG and 38 +/- 14 months after RYGB. Mean weight loss peaked at 74 +/- 23 lb at 12 months after VBG and 99 +/- 24 lb at 16 months after RYGB ( $p < 0.001$ ). Twelve of 30 VBG patients lost  $\geq 50$  % of their excess weight versus 100 of 108 RYGB patients ( $P < 0.0001$ ). Milk/ice cream intake was significantly greater postoperatively in patients who underwent VBG versus patients who underwent RYGB after 6 months ( $p < 0.003$ ) whereas solid sweets intake was significantly greater after VBG during the first 18 months postoperatively ( $p < 0.004$ ). Revision of VBG was performed in 6 of 30 patients (20 %) for complications or poor weight loss, whereas only 2 of 108 patients who underwent RYGB required surgical revisions ( $p < 0.001$ ). CONCLUSIONS: These data show that VBG adversely alters postoperative eating behavior toward soft, high-calorie foods, resulting in problematic postoperative weight loss. Conversely, RYGB patients had significantly greater weight loss despite inferior preoperative eating habits. The high rate of surgical revision in conjunction with inconsistent postoperative weight loss has led us to no longer recommend VBG as treatment for morbid obesity.

Evidenzklasse: III.

31. Brownell KD. Exercise and obesity treatment: psychological aspects. *Int J Obes Relat Metab Di-*

sord 1995;19(4):122-5

Exercise is clearly beneficial as a means for losing weight and keeping it off. Given recent studies showing its association with maintenance, it would be difficult to argue that any factor is more important than exercise. For an exercise program to be helpful for obese persons, the challenges of exercise adherence must be considered, as must the mechanisms linking exercise to weight control. Both argue for whatever activity an individual will undertake that will produce the psychological effects that promote weight control.

Evidenzklasse: IV.

32. Brownell KD, Wadden TA. The heterogeneity of obesity: fitting treatments to individuals. *Behav Ther* 1991;22:153-77 Brownell, K.

Body weight is regulated by a complex interaction of biological, behavioural, and cultural factors. The population as a whole is at risk for obesity because of increased intake of dietary fat, the consumption of calories in fewer meals per day, striking accessibility to palatable foods, and decreased physical activity. This risk may become a reality in individuals with certain biological predispositions (genetic tendency, low metabolic rate, increased fat cell number), specific eating patterns, and susceptibility to the extreme cultural pressure to be lean. These factors must be considered in establishing goals for treatment, which fall into medical and psychosocial categories. This includes defining a "reasonable" as opposed to "ideal" weight. A three-stage process is proposed for identifying the best treatment for an individual. This involves a classification decision, a stepped care decision, and then a matching decision. Criteria are provided for a comprehensive assessment of the overweight individual, and treatment options are reviewed for programs of varying intensity, cost, and risk.

Evidenzklasse: IV.

33. Budenholzer B. Appetite suppressants for obesity. *J Fam Pract* 1997;44(1):19-20; Brief, Evidenzklasse: IV.

34. Burton BT, Forster WR, Hirsch J, van Itallie TB. Health implications of obesity: an NIH consensus development conference. *Int J Obes* 1985;9:155-169

A Consensus Development Conference on the Health Implications of Obesity was held in February 1985 at the National Institutes of Health in Bethesda, Maryland, USA. After presentations by 19 experts in relevant subject areas, a panel of 15 impartial senior level professionals presented their consensus of findings and recommendations. This paper summarizes the results of the conference and provides reference tables of body mass index (BMI) values and weight goals, along with nomograms of the BMI determined from height and weight scales, to show comparisons with weight goals. The goals are taken from two widely available tables of mortality data by weight. These references aids are included to illustrate the potential clinical value of wider use of the BMI, as recommended in the conference.

Evidenzklasse: IV.

35. Buzzard IM, Sievert YA. Research priorities and recommendations for dietary assessment methodology. *Am J Clin Nutr* 1994;59(suppl 1):275-80

A list of research priorities related to dietary assessment methodology is presented. The priorities are based on a consensus of opinion by a multidisciplinary international group of experts who participated in the First International Conference on Dietary Assessment Methods. These experts included researchers in dietary assessment methodology, major users of dietary assessment methods, and policymakers involved in setting food and nutrition policies. The list of priorities may be used as a guide for planning future research in dietary assessment methods, for prioritizing the allocation of available research resources, and for planning subsequent conferences. A list of recommendations related to dietary assessment methodology is also presented. Procedures used by the conference planners to select the experts are described, and the need for developing objective criteria for ranking priorities is discussed. An ongoing function of the conference series will be to continue the process of revising the priorities and recommendations to reflect progress made and newly identified needs in dietary assessment methodology.

Evidenzklasse: IV.

36. Cade J, S OC. Management of weight problems and obesity: knowledge, attitudes and current practice of general practitioners. *Br J Gen Pract* 1991;41:147-50

A postal questionnaire was used to assess general practitioners' knowledge, attitudes and current practice of treatment regarding obesity and weight problems. Overall, 299 responses (75%) were received from general practitioners randomly selected from family practitioner committee lists in Portsmouth and Norwich. Currently 27% of the doctors were overweight and a further 3% obese. Many doctors (69%) had tried to lose weight at some time and 40% had been overweight and a further 12% obese in the past. The most popular methods used to educate overweight and obese patients were one to one counselling and giving out diet sheets and leaflets on healthy eating. The treatment advice to patients from the majority of doctors was to eat less in general (78%) (specifically to eat fewer calories 75%); to exercise (77%); or to attend a slimmers group (54%). Doctors thought that they were less effective than the media or the family in persuading overweight patients to lose weight. Doctors said



they were prepared to counsel on weight reduction but felt they had little success in achieving weight loss in patients. Experience was ranked as the most important contributor to knowledge about managing obesity, and medical school was rated as least important. Further study is needed to discover how different practices and attitudes affect patient management and which ones are associated with greatest success. Medical schools and postgraduate centres could play a more important role in educating doctors about nutrition.

Evidenzklasse: III.

37. Cairella M, Cairella G, Graziani P, Mirante MG, Taghva AR. Changes in dietary intake of obese patients treated by diet associated with d-fenfluramine. *Clin Ter* 1992;140(3):235-8

The object of the present research was to study the effect of dexfenfluramine (d-F) and placebo (P) on compliance with dietary treatment, especially as far as changes in kcal and macronutrient intake are concerned. A double-blind study d-F vs P was performed in 36 obese females, age range 20-59 years (mean 37.22 +/- 12.41), with a mean BMI of 33.95 +/- 5.36, suffering from obesity due to overeating without complications: Outpatient control every 30 days. The study protocol provided for a 14-month double-blind treatment with daily administration of either P (2 capsules) or d-F (two 15 mg capsules). Dietary prescription of 1200 kcal (5016 kJ) was given 15 days before enrollment (T/0) and during this period enrollment criteria were checked prior to randomization. Dietary intake was checked by a three-day recall (one working day, one half-holiday and one full holiday) in basal conditions and after 6-12 and 14 months. Administration of d-F and P brought about changes in alimentary behaviour in obese patients according to the dietary regime prescribed. In our patients, no highly significant differences between d-F and P were observed; however, the effect of P on macronutrient intake (carbohydrates, lipids and proteins) tended to peter out around the 12th month. Treatment with d-F reduced the consumption of simple carbohydrates, animal fats but not of animal proteins.

Evidenzklasse: Ib.

38. Carella MJ, Mantz SL, Rovner DR, Willis PW, 3rd, Gossain VV, Bouknight RR, et al. Obesity, adiposity, and lengthening of the QT interval: improvement after weight loss. *Int J Obes Relat Metab Disord* 1996;20(10):938-42

OBJECTIVES: To determine the prevalence of QT interval prolongation in patients referred to an outpatient clinic for treatment of obesity; and to describe the change in the QT interval during rapid weight loss with a very-low-calorie diet. DESIGN: Retrospective and prospective review of charts and electrocardiograms. SUBJECTS: Five hundred twenty-two obese patients (411 female, 112 males) with a mean age 44 (18-78 y) and a mean initial weight of 116 kg (63-285 kg) completing 26 weeks of treatment between September, 1989 through to December, 1993. MEASUREMENTS: We reviewed the EKGs of all patients and serially monitored the QTc if greater than 0.44 s or if more than 23 kg was lost during treatment. The QTc interval was calculated with Bazett's formula using both a manual method and an automated software program. In some patients, body composition was measured by hydrodensitometry. RESULTS: The QTc interval before treatment was 0.42 +/- 0.026 s by manual measurement and 0.41 +/- 0.021 s by automated measurement. Forty-one to 53% of patients showed a QTc interval of greater than 0.42 s and 10-24% demonstrated moderate prolongation (0.44 s). In those patients for whom repeat EKG were performed, QTc showed shortening with weight loss by both methods (mean +/- s.e. of 0.42 +/- 0.003 to 0.41 +/- 0.003 s, P 0.01 manually and 0.41 +/- 0.003 to 0.40 +/- 0.003 s, p 0.005 by automated program). Analyses were repeated excluding 179 patients with a cardiovascular-related diagnosis or intraventricular block and the results were similar. By regression analysis, gender and fat mass (FM) percentage above normal predicted the QTc. CONCLUSIONS: QT Interval prolongation is common in obesity. For each 50% increase in FM% above normal, there is a 5 ms increase in the QTc above a 'normal' upper limit of 0.40 and 0.38 s in women and men, respectively. Moreover, the QT interval shortens with weight loss. This change may represent an additional benefit of weight loss along with the improvement in other cardiovascular risk factors.

Evidenzklasse: IIb.

39. Casado Martinez JJ, Mora Moreno F, Gonzalez Tapia MC, Vera Perez P, Munoz Barata MJ. A clinical trial on the efficacy of an alternative diet in obese patients. *Aten Primaria* 1993;11(9):470-1, 473-4

OBJECTIVE. To evaluate the effectiveness of a diet based on dietary advice in treating obesity. DESIGN. Random clinical investigation of two groups of obese people. SETTING. Two health centres in the city of Huelva. MEASUREMENTS AND MAIN RESULTS. We randomly assigned two types of diet, one consisting of dietary advice (A) and the other consisting of low calorie daily menus (B). These were followed for a period of 2 months. At the end of the period we administered a questionnaire on the difficulties in adhering to the diet. 88.4% of those on diet A lost weight, compared with 55.5% of those on diet B (p 0.025). There were mean decreases in cholesterol and triglyceride levels with diet A of 12.37 +/- 12 and 22.1 +/- 18 mg/dl respectively. In the case of diet B, there were increases of these levels of 8.4 +/- 13 and 2.09 +/- 14 mg/dl respectively (p 0.05). Of those who followed diet A, 16.7% said they experienced difficulty in keeping to it, while 45.4% of those on diet B said they experienced

such difficulty (p 0.025). Altogether, 29.16% of those who followed diet B (p 0.025). CONCLUSIONS. With the diet based on nutritional advice a larger number of the subjects lost weight, felt less hungry hunger; this diet is easier to keep to, and produces a significant decrease in cholesterol and triglyceride levels.

Evidenzklasse: Ib.

40. Cheah JS. Current management of obesity. *Singapore Med J* 1996;37(3):299-303

Obesity is common and its prevalence is rising. In Singapore, a national health survey in 1992 showed that 5% of the adult population were obese and 21% were overweight. Obesity causes much morbidity and mortality and treatment is desirable. The majority of obese patients have no known cause but it is essential to exclude any underlying cause before treatment. Antiobesity drugs should be used as an adjunct to an adequate programme of dietary restriction, exercise and behavior modification. Serotonergic drugs and adrenergic agents are available in the treatment of obesity. The short-term efficacy and safety of antiobesity drugs such as fenfluramine and d-fenfluramine are proven. The long-term use of antiobesity drugs used singly or in combination remains to be established. Many peptides (cholecystokinin, glucagon, bombesin, neurotensin, etc) with weight reduction properties are undergoing extensive studies: their clinical applications are experimental. The treatment of obesity is difficult and frustrating and antiobesity drugs have an established short-term role. In morbid obesity where the life of the patient is in danger, surgery such as gastric plication may be life-saving. The recent discovery of leptin (1994) and neuropeptide Y (1995) are important breakthrough in obesity research; hopefully further research may produce more effective treatment of obesity in man.

Evidenzklasse: IV.

41. Clark MM, Cargill BR, Medeiros ML, Pera V. Changes in self-efficacy following obesity treatment. *Obes Res* 1996;4(2):179-81

Self-efficacy is an important component in the treatment of obesity. However, there is limited research examining changes in self-efficacy following obesity treatment. In this quasi-experimental study, 26 obese subjects demonstrated significant improvement on the Weight Efficacy Life-Style Questionnaire (WEL) following participation in a 26-week multidisciplinary VLCD program. Subjects demonstrated significant improvement from pre- to post-treatment on total WEL scores and on all five of the situational factors: Negative Emotions, Availability, Social Pressure, Physical Discomfort and Positive Activities. These results provide further construct validity for the WEL and offer guidelines for the amount of change that subjects may demonstrate on the WEL following obesity treatment.

Evidenzklasse: III.

42. Clark MM, King TK. Obesity level and attrition: a response. *Obes Res* 1996;4(5):487-8

Brief, Evidenzklasse IV.

43. Clark MM, Niaura R, King TK, Pera V. Depression, smoking, activity level, and health status: pretreatment predictors of attrition in obesity treatment. *Addict Behav* 1996;21(4):509-13

Consistent predictors of attrition in obesity treatment have not been identified. This study examined whether pretreatment psychological and health behavior variables would predict attrition from a 26 week clinical multidisciplinary VLCD and behavior therapy program. Higher levels of depression, current smoking, being sedentary, and having nontreated high blood pressure were associated with treatment attrition. Thus, a biopsychosocial assessment which evaluates medical and psychiatric status may help clinicians to identify individuals at high risk for attrition.

Evidenzklasse: III.

44. Clark MM, Pera V, Goldstein MG, Theborge RW, Guise BJ. Counseling strategies for obese patients. *Am J Prev Med* 1996;12(4):266-70

Counseling strategies usually assume that an individual is ready to change; however this assumption is probably not true for many obese individuals seeking medical care. Since individuals progress through a series of stages of change, some may not yet be ready to change. The transtheoretical model of behavior change proposes that individuals move through stages of change: precontemplation, contemplation, preparation, action, and maintenance. This model has been successfully applied to a range of addictive behaviors. The application of the transtheoretical model of behavior change to obesity treatment holds promise because interventions that match treatment strategies to an individual's stage of change may be more effective than current treatments. This article reviews the potential benefits of using the transtheoretical model for weight management in the primary care setting. Medical Subject Headings (MeSH): obesity, counseling, behavior.

Evidenzklasse: IV.

45. Clemenson ND. New agent for obesity management. *J Fam Pract* 1996;43(3):224; discussion 225  
Brief, Evidenzklasse: IV.

46. Compston JE, Laskey MA, Croucher PI, Coxon A, Kreitzman S. Effect of diet-induced weight loss on total body bone mass. *Clin Sci* 1992;82(4):429-32.

1. Total body areal bone mineral density was measured by dual-energy X-ray absorptiometry in eight women before and 10 weeks after a very-low-calorie diet [405 kcal (1701 kJ)/day]. 2. The mean weight

loss of 15.6 kg was accompanied by a statistically significant reduction in total body bone mineral density from 1.205 +/- 0.056 to 1.175 +/- 0.058 g/cm<sup>2</sup> (mean +/- SD, P less than 0.005). 3. After cessation of the diet, weight gradually increased and by 10 months was similar to baseline values. Total body bone mineral density also increased after stopping the diet and mean values obtained 10 months after the diet did not differ significantly from initial values. Throughout the study total body bone mineral density values in all subjects were well within the range reported for normal subjects. 4. These data indicate that diet-induced weight loss is associated with rapid bone loss, subsequent weight gain being accompanied by increases in bone mass. Further studies are required to establish the clinical significance of these findings and, in particular, the skeletal distribution of bone loss.

Evidenzklasse: IIb.

47. Crawford D, Worsley A. Dieting and slimming practices of South Australian Women. *Med J Aust* 1988;148:325-8

A random, population survey of 406 Adelaide women who aged 18 to 86 years, which was conducted in July 1986, showed that in the previous year 68% of the women had exercised, 38% of the women had dieted, 15% of the women had fasted, 10% of the women had taken slimming tablets, 6% of the women had used diuretic agents and 3% of the women had used laxative agents in order to reduce or to control their weight. At the time of the survey 43% of women (60% of overweight women and 34% of non-overweight women) were attempting to lose weight. The most common reasons for wishing to lose weight were: to feel better (75% of women); to look better (65% of women); and health or medical reasons (33% of women). In addition, a majority of the women were dissatisfied with the shape of their stomach, hips, midriff, waist, thighs and buttocks. The family doctor, books and magazines acted as the major sources of information on dieting and weight control. However, most of the women felt that their doctors did not provide them with enough advice on this topic, and the women were almost unanimous in their criticism of the preoccupation magazines with slimness. The results suggest that health professionals need to provide women with more advice on safe weight-control strategies and sensible body-weight goals.

Evidenzklasse: III.

48. Davis MK. A comprehensive weight-loss program for soldiers. *Mil Med* 1996;161(2):84-8

A weight-loss treatment program for active duty military personnel is discussed and evaluated. The Fat Loss and Exercise Program at U.S. Army Hospital, Bremerhaven, Germany, consisted of a 3-week inpatient treatment program and 6 months of weekly outpatient follow-up. The program combined a multidisciplinary team approach to the treatment of obesity--psychology, internal medicine, nursing, nutrition care, and physical therapy. Patients showed a significant weight and body fat loss [F(2,90) = 52.91 and 65.85, p 0.001, respectively] from the initiation of treatment (mean = 205.9 pounds, 28.91%) to the end of the inpatient program (mean = 192.8 pounds, 25.97%) with maintenance over 6 months (mean = 190.4 pounds, 25.03%). Changes in cholesterol levels by treatment phase are also discussed. Results demonstrate positive increases in high-density lipoprotein at each phase. These results support a comprehensive, multidisciplinary inpatient treatment of obesity within the military.

Evidenzklasse: III.

49. Desai C. Surgery for morbid obesity. *Acta Chir Belg* 1996;96(5):192-6

kein Abstract, Evidenzklasse: IV.

50. Després JP, Lamarche B. Low-intensity endurance exercise training, plasma lipoproteins and the risk of coronary heart disease. *J Intern Med* 1994;236:7-22

Physically active individuals generally show a reduced risk of coronary heart disease (CHD) compared to the sedentary population. However, whether such reduction in CHD risk mainly results from the concomitant improvement in cardiorespiratory fitness or from the alterations in CHD risk factors has yet to be clearly established. Furthermore, there is still some controversy regarding the potential associations between endurance training-induced changes in metabolic variables considered as CHD risk factors (plasma glucose, insulin and lipoprotein levels) and the magnitude of improvement in cardiorespiratory fitness. From the results of several studies discussed in this article, it is proposed that prolonged endurance exercise of low intensity (approximately 50% VO<sub>2</sub>max), performed on an almost daily basis, seems to significantly improve metabolic variables considered as CHD risk factors through mechanisms that are likely to be independent from the training-related changes in cardiorespiratory fitness. The notion of 'metabolic fitness' is introduced and can be defined as the state of a set of metabolic variables relevant to CHD risk and affected by the level of physical activity. Evidence available suggests that these metabolic variables are not closely related to the adaptation of cardiorespiratory fitness in response to exercise training. The concept of metabolic fitness has several implications for the prescription of exercise and for the primary and secondary prevention of CHD. Indeed, emphasis should not be placed on aiming at increasing VO<sub>2</sub>max through high-intensity exercise, but rather on producing a substantial increase in daily energy expenditure that will eventually lead to weight loss and related improvements in carbohydrate and lipid metabolism. Therefore, from a practical standpoint, although a 1 h daily walk may not have marked effects on cardiorespiratory fitness, it probably repre-

sents an exercise prescription that is likely to substantially improve 'metabolic fitness', thereby reducing the risk of CHD.

Evidenzklasse: IV.

51. Disc Collaborative Research Group. Efficacy and Safety of Lowering Dietary Intake of Fat and Cholesterol in Children with Elevated Low-Density Lipoprotein Cholesterol: the Dietary Intervention Study in Children (DISC). *Jama* 1995;273:1429-35

Objective.—To assess the efficacy and safety of lowering dietary intake of total fat, saturated fat, and cholesterol to decrease low density lipoprotein cholesterol (LDL-C) levels in children. Design.— Six-center randomized controlled clinical trial.

Participants.— Prepubertal boys (n=362) and girls (n=301) aged 8 to 10 years with LDL-C levels greater than or equal to the 80th and less than the 98th percentiles for age and sex were randomized into an intervention group (n=334) and a usual care group (n=329). Intervention. - Behavioral intervention to promote adherence to a diet providing 28% of energy from total fat, less than 8% from saturated fat, up to 9% from polyunsaturated fat and less than 75 mg/4200 kJ (1000 kcal) per day of cholesterol (not to exceed 150 mg/d). Main Outcome Measures.—The primary efficacy measure was the mean LDL-C level at 3 years. Primary safety measures were mean height and serum ferritin levels at 3 years. Secondary efficacy outcomes were mean LDL-C levels at 1 year and mean total cholesterol levels at 1 and 3 years. Secondary safety outcomes included red blood cell folate values; serum zinc, retinol, and albumin levels; serum high-density lipoprotein cholesterol (HDL-C) values, LDL-C:HDL-C ratio, and total triglyceride levels; sexual maturation; and psychosocial health. Results.— At 3 years, dietary total fat, saturated fat, and cholesterol levels decreased significantly in the intervention group compared with the usual care group (all  $P < .001$ ). Levels of LDL-C decreased in the intervention and usual care groups by 0.40 mmol/L (15.4 mg/dL) and 0.31 mmol/L (11.9 mg/dL), respectively. Adjusting for baseline level and sex and imputing values for missing data, the mean difference between the groups was -0.08 mmol/L (-3.23 mg/dL) (95% confidence interval [CI], -0.15 to -0.01 mmol/L [-5.6 to -0.5 mg/dL]), which was significant ( $P=.02$ ). There were no significant differences between the groups in adjusted mean height or serum ferritin levels ( $P>.05$ ) or other safety outcomes. Conclusions.—The dietary intervention achieved modest lowering of LDL-C levels over 3 years while maintaining adequate growth, iron stores, nutritional adequacy, and psychological well-being during the critical growth period of adolescence.

Evidenzklasse: Ib.

52. Ditschuneit HH, Flechtner-Mors M, Adler G. The effect of withdrawal and re-introduction of dexfenfluramine in the treatment of obesity. *Int J Obes Relat Metab Disord* 1996;20(3):280-2

In this study 25 patients, who had completed the INDEX trial (Guy-Grand et al. *Lancet* 1989; 2: 1142-1145) were reexamined 2 months after withdrawal of the study medication. The patients then in an open trial received dexfenfluramine (dF) for 6 months. The observed weight gain after withdrawal of study medication was higher in patients treated beforehand with dF (2.6 +/- 1.2 kg) than in patients who had received placebo (0.8 +/- 1.0 kg). In the open dF trial rate of weight loss was lower than it had initially been in the patients receiving dF from the outset of the INDEX trial (13.1 +/- 4.6 kg within 6 months). In the previous dF treated patients weight loss after re-introduction of dF was 3.7 +/- 2.7 kg. The previous placebo-treated patients, now receiving dF for the first time, lost 4.8 +/- 1.1 kg. Thus, after withdrawal of dF, patients experience weight gain, but after re-introduction of dF, renewed weight loss is achieved. However, the rate of weight loss declines with time.

Evidenzklasse: IIa.

53. Doar JWH, Thompson ME, Wilde CE, Sewell PFJ. Influence of treatment with diet alone on oral glucose tolerance test and plasma sugar and insulin levels in patients with maturity onset diabetes mellitus. *Lancet* 1975;1:1263-6

Oral glucose tolerance test (O.G.T.T.) plasma sugar and insulin levels were measured in 118 newly diagnosed maturity-onset diabetic patients before and after treatment with diet alone for periods of two and six months. The results of glucose-tolerance tests carried out during treatment could be predicted from the initial test and the weight reduction between the test. This prediction was not improved by the addition of further variables, including age, obesity, and plasma-insulin levels during the first test. The change in O.G.T.T. plasma-insulin between the first and second tests was predicted by the result of the initial test, the improvement of glucose tolerance between the two tests, and the degree of weight reduction. 95% of the group achieved some improvement of glucose tolerance after two months of dietary treatment, and 59% of the group achieved adequate diabetic control by this time. It is concluded that treatment with diet alone should be the first-line management for patients with newly diagnosed maturity-onset diabetes mellitus.

Evidenzklasse: IIa.

54. Donckers SW. Anorexic medications to treat obesity. *Nurse Pract* 1996;21(4):13-4

Brief, Evidenzklasse: IV.

55. Donnelly JE, Jacobsen DJ, Whatley JE, Hill JO, Swift LL, Cherrington A, et al. Nutrition and physi-

cal activity program to attenuate obesity and promote physical and metabolic fitness in elementary school children. *Obes Res* 1996;4(3):229-43

Obesity and low levels of physical and metabolic fitness are risk factors for cardiovascular disease and diabetes. The purpose of this investigation was to attenuate obesity and improve physical and metabolic fitness in elementary school children. Schools have the opportunity, mechanisms, and personnel in place to deliver nutrition education, fitness activities, and a school food service that is nutritious and healthy. Cohorts from grades 3 to 5 in two school districts in rural Nebraska (Intervention/Control) participated in a 2-year study of physical activity and modified school lunch program. Data collection for aerobic capacity, body composition, blood chemistry, nutrition knowledge, energy intake, and physical activity was at the beginning and end of each year. Int received enhanced physical activity, grade specific nutrition education, and a lower fat and sodium school lunch program. Con continued with a regular school lunch and team sports activity program. At year 2, Int lunches had significantly less energy (9%), fat (25%), sodium (21%), and more fiber (17%). However, measures of 24-hour energy intake for Int and Con showed significant differences for sodium only. Physical activity in the classroom was 6% greater for Int compared to Con ( $p < 0.05$ ) but physical activity outside of school was approximately 16% less for Int compared to Con ( $p < 0.05$ ). Body weight and body fat were not different between schools for normal weight or obese children. No differences were found for cholesterol, insulin, and glucose; however, HDL cholesterol was significantly greater and cholesterol/HDL was significantly less for Int compared to Con ( $p < 0.05$ ). It appears that compensation in both energy intake and physical activity outside of school may be responsible for the lack of differences between Int and Con.

Evidenzklasse: III.

56. Dowse GK, Gareeboo, Alberti K. Changes in population cholesterol concentrations and other cardiovascular risk factor levels after five years of the non-communicable disease intervention programme in Mauritius. *Brit Med J* 1995;311:1255-9

Objective- To study changes in the prevalence of risk factors for cardiovascular disease after a five year population-wide intervention programme promoting a healthy lifestyle in a developing country. Design- cross sectional cluster surveys in 1987 and 1992. Methodology included a two hour 75 g oral glucose tolerance test, measurement of body mass index, waist/hip ratio, basal lipid concentrations, and blood pressure; and a lifestyle questionnaire. Setting- Mauritius in the Indian Ocean. Subjects- All adults aged 25 - 74 years residing in geographically designed clusters. Main outcome measures- Age standardised prevalence of categorical disease and risk factor conditions and mean levels and frequency distribution of continuous variables. Results- response rates were 86.2% (5080/55892) in 1987 and 89.5% (5162/5770) in 1992. Significant decreases were found in the prevalence of hypertension (15.0 % to 12.1 % in men and 12.4% to 10.9 % in women); cigarette smoking 58.2 % to 47.2 % and 6.9 % to 3.7 % respectively); and heavy alcohol consumption (38.2.% to 14.4. % and 2.6 % to 0.6 % respectively). Moderate leisure physical activity increased from 16.9 % to 22.1 % in men and from 1.3. % to 2.7 % in women. Mean population serum total cholesterol concentration fell appreciably from 5.5 mmol/l to 4.7mmol/l ( $p < 0.001$ ). The prevalence of overweight or obesity increased, and the rates of glucose intolerance changed little. The population frequency distributions of blood pressure, serum lipid concentration, and a composite risk factor score shifted advantageously. Conclusions- Life style intervention projects can be implemented and have positive effects in developing countries. A pronounced improvement in the population lipid profile in Mauritius was properly related to a change in the saturated fat content of a widely used cooking oil.

Evidenzklasse: III.

57. Drent ML, van der Veen EA. Lipase inhibition: a novel concept in the treatment of obesity. *Int J Obes* 1993;17:241-4

Orlistat (Ro 18-0647) is an inhibitor of gastric, carboxylester and pancreatic lipase and specifically reduces the absorption of dietary fat due to the inhibition of triglyceride hydrolysis. Orlistat can be used for the treatment of obesity. Of 52 healthy obese patients entering a four-week single-blind run-in period with diet (500 kcal-reduced, containing 30% of calories in the form of fat) and placebo three times a day, 44 patients showed compliance to the diet by reducing their body weight by 0.5-4 kg from screening. These patients were randomized for a 12-week double-blind, parallel group, placebo-controlled treatment period with diet and 50 mg Orlistat or placebo three times a day. Complete data were available for 39 patients, 20 on Orlistat (3 men, 17 women; mean weight 85.5 +/- 12.1 kg; mean body mass index 30.6 +/- 3.7 kg/m<sup>2</sup>) and 19 on placebo (3 men, 16 women; mean weight 81.9 +/- 7.9 kg; mean body mass index 30.0 +/- 2.6 kg/m<sup>2</sup>). Total weight loss after randomization was 4.3 +/- 3.4 kg in the Orlistat group and 2.1 +/- 2.8 kg in the placebo group ( $P = 0.025$ , analysis of variance with repeated measurements; 95% confidence interval for the weight loss difference 0.2-4.2 kg). Gastrointestinal side effects were seen in the Orlistat group, but in most patients the symptoms were mild or transient. One patient dropped out because of faecal incontinence. No effect was seen on vitamin A levels, but vitamin E levels became lower in the Orlistat group ( $P < 0.05$ , paired t test). (ABSTRACT TRUNCATED AT 250 WORDS).

Evidenzklasse: Ib.

58. Duffy G, Spence SH. The effectiveness of cognitive self-management as an adjunct to a behavioural intervention for childhood obesity: a research note. *J Child Psychol Psychiatry* 1993;34(6):1043-50  
This study investigated the effectiveness of cognitive self-management training as an adjunct to the behavioural management of childhood obesity. Twenty-seven overweight children aged 7-13 years were randomly assigned to either behavioural management plus relaxation placebo or a combined behavioural-cognitive self-management approach. Evaluations following the eight treatment sessions revealed a significant reduction in percentage overweight for children in both experimental groups and improvements were maintained at 3- and 6-month follow-ups. Both conditions were also effective in reducing the number of high-risk foods consumed. No difference in outcome was found between treatments at the post-treatment assessment or 3- and 6-month follow-ups. Although a reduction in percentage overweight of around 9% was found for both procedures, subjects in general remained considerably overweight.

Evidenzklasse: Ib.

59. Egger G, Bolton A, M ON, Freeman D. Effectiveness of an abdominal obesity reduction programme in men: the GutBuster "waist loss" programme. *Int J Obes Relat Metab Disord* 1996;20(3):227-31  
OBJECTIVE: To examine the long term (1-2 year), as well as immediate effectiveness of a "waist loss" programme for men. DESIGN: Two preliminary studies are reported; one following a small group of 42 men over two years after a 6 week "GutBuster" course, the second following men for 1 year after having completed the initial 6 week programme (n = 83), or the initial course plus an additional six fortnightly "advanced" course (n = 37). MEASUREMENTS: Waist, hip and weight measures were reported for the 2 year group; waist and hip only in study 2. Dietary fat, exercise and alcohol intake were also recorded in study 2 through the use of questionnaires. The goal for the initial course was a 1% waist loss per week. RESULTS: All groups achieved an average waist loss 1%/week during the initial programme. Waist sizes reported in study 1 were significantly less after 2 years (t = 8.28, p 0.001) averaging a 6% loss in the group. This equated with an average weight loss of 5.5 kg. A repeated measures ANOVA also showed a significant main effect (F = 85.35; p 0.0001) for waist losses and an interaction effect (F = 16.53; p 0.0001) between initial and advanced groups after 1 year in study 2. Average waist losses were 4% and 10% respectively. There were also significant changes in dietary fat intake, exercise and alcohol consumption. CONCLUSION: Reductions in waist size in men appear to be more feasible than weight losses in women. "Waist loss" may also be a more valid measure of fat loss in men than body mass measures.

Evidenzklasse: IIb.

60. Eliahou HE, Laufer J, Blau A, Shulman L. Effect of low-calorie diets on the sympathetic nervous system, body weight, and plasma insulin in overweight hypertension. *Am J Clin Nutr* 1992;56(1 Suppl):175S-178S

When weight reduction was found to decrease blood pressure in the overweight hypertensive patient, it was hailed as the causative factor. A growing number of recent studies indicate that this association may be secondary to a correlation between diet-associated metabolic change and the sympathetic nervous system. A select group such as overweight hypertensive patients may have a genetic predisposition for such a correlation. In overweight hypertensive patients, low-calorie diet and especially very-low-calorie diet, correlate with improved glucose metabolism, a decrease in plasma insulin concentration, and altered norepinephrine concentrations and thus sympathetic nervous system activity. Several of these studies also show a lack of effect of salt intake on blood pressure. Thus, it seems that metabolic changes caused by the decrease in caloric intake are responsible for the decrease in blood pressure. These must be investigated to understand the effect of the different diets on blood pressure. Very low-calorie diets were found very useful in breaking the vicious circle of severe nonresponsive hypertension to medication.

Evidenzklasse: IV.

61. Elks ML. Appetite suppressants as adjuncts in the treatment of obesity. *J Fam Pract* 1996;42(3):287-92

Obesity is a common and challenging problem that often leads to other medical problems, including type II diabetes, hyperlipidemia, hypertension, coronary artery disease, and degenerative joint disease. Weight loss, which is central to the dietary treatments for obesity, is often of limited success. Recent studies have documented the safety and efficacy of certain appetite suppressants for assisting in long-term weight loss and maintenance of weight loss. Since appetite suppressants, alone or in combination, have been documented to be safe and effective adjuncts for treating obesity and complicated obesity, physicians should consider using these agents in the pharmacotherapy for obese patients.

Evidenzklasse: IV.

62. Epstein LE, Valoski AM, Vara LS, McCurley J, Wisniewski L, Kalarchian KR, et al. Effects of decreasing sedentary behaviour and increasing activity on weight change in obese children. *Health Psychol* 1995a;14:109-115

Obese children 8-12 years old from 61 families were randomised to treatment groups that targeted increased exercise, decreased sedentary behaviours, or both (combined group) to test the influence of reinforcing children to be more active or less sedentary on child weight change. Significant decreases in percentage overweight were observed after 4 months between the sedentary and the exercise groups (-19.9 vs. -13.2). At 1 year, the sedentary group had a greater decrease in percentage overweight than did the combined and the exercise groups (-18.7 vs. -10.3 and -8.7) and greater decrease in percentage of body fat (-4.7 vs. -1.3). All groups improved fitness during treatment and follow-up. Children in the sedentary group increased their liking for high-intensity activity and reported lower caloric intake than did children in the exercise group. These results support the goal of reducing time spent in sedentary activities to improve weight loss.

Evidenzklasse: IIb.

63. Epstein LH. Family-based behavioural intervention for obese children. *Int J Obes Relat Metab Disord* 1996b;20(1):S14-21

The family environment can contribute to the development of obesity. Parenting styles may influence the development of food preferences and the ability of a child to regulate intake. Parents and other family members arrange a common, shared environment that may be conducive to overeating or a sedentary lifestyle. Family members serve as models, and reinforce and support the acquisition and maintenance of eating and exercise behaviours. Family-based interventions are needed to modify these variables in treating obese children. We have made significant progress in developing interventions that target obese 8-12 year-old children, completing four 10-year follow-up studies that provide support for two factors that are useful in childhood obesity treatment. First, our research suggests that the direct involvement of at least one parent as an active participant in the weight loss process improves short- and long-term weight regulation. Second, our research suggests that increasing activity is important for maintenance of long-term weight control. Correlational analyses on the 10-year database suggest that family and friend support for behaviour change are related to long-term outcome. Family-based obesity treatment provides interventions for both children and their parents, but children benefit more from treatment than their parents. These positive results provide an encouraging basis for optimism that further development of interventions, based on newer research on family processes and behaviour changes, can be useful in treating childhood obesity.

Evidenzklasse: IV.

64. Epstein LH, Valoski A, Wing RR, McCurley J. Ten-Year Follow-up of Behavioural, Family-Based Treatment for Obese Children. *Jama* 1990;264:2519-23

Using a prospective, randomised, controlled design, we examined the effects of behavioural family-based treatment on percent overweight and growth over 10 years in obese 6- to 12-year old children. Obese children and their parents were randomised to three groups that were provided similar diet, exercise, and behaviour management training but differed in the reinforcement for weight loss and behaviour change. The child and parent group reinforced parent and child behaviour change and weight loss, the child group reinforced child behaviour change and weight loss, and the non-specific control group reinforced families for attendance. Children in the child and parent group showed significantly greater decreases in percent overweight after 5 and 10 years (-11.2% and -7.5%, respectively) than children in the non-specific control group (+7.9% and +14.3%, respectively). Children in child group showed increases percent overweight after 5 and 10 years (+2.7% and +4.5%, respectively) that were midway between those for the child and parent and non-specific groups and not significantly different from either. At 10 years, child height was related strongly to the height of the parent of the same sex ( $r = .78$ ): children were 1.8cm taller than their parents, with no differences in height between groups.

Evidenzklasse: Ib.

65. EU- Kommission über Lebensmittel für kalorienarme Ernährung zur Gewichtsverringierung. EU Richtlinie 96/8 der Kommission. Brüssel: Europäische Gemeinschaften, 1996

Report, Evidenzklasse: IV.

66. Fairburn CG, Cooper Z. New perspectives on dietary and behavioural treatments for obesity. *Int J Obes Relat Metab Disord* 1996;20(1):9-13

Obesity is a major public health problem. The proportion of the adult population in Britain with a body mass index BMI over 30 kg/m<sup>2</sup> has increased markedly over recent years. It has been projected that by the year 2005 about 20% of men and 23% of women will have a BMI greater than 30 kg/m<sup>2</sup>, compared with The Health of the Nation targets of 6% and 8%, respectively. The rates in the United States are even higher and are continuing to rise. As a result, increasing numbers of people are going to suffer from weight-related medical complications, including diabetes mellitus, hypertension, lipid abnormalities, cardiovascular disease, stroke and osteoarthritis. They will also experience the adverse psychological and social consequences of obesity. This increase in the prevalence of obesity makes it imperative that improved methods be developed for both its prevention and treatment. In this article we focus on dietary and psychological methods of treatment in particular.

Evidenzklasse: III.

67. Farquhar JW, Fortmann SP, Flora JA. Effects of community-wide education on cardiovascular disease risk factors: the Stanford Five City Project. *J Am Med Assoc* 1990;264:359-65

To test whether communitywide health education can reduce stroke and coronary heart disease, we compared two treatment cities (N= 122 800) and two control cities (N=197500) for changes in knowledge of risk factors, blood pressure, plasma cholesterol level, smoking rate, body weight, and resting pulse rate. Treatment cities received a 5-year, low-cost, comprehensive program using social learning theory, a communication-behavior change model, community organization principles, and social marketing methods that resulted in about 26 hours of exposure to multichannel and multifactor education. Risk factors were assessed in representative cohort and cross-sectional surveys at baseline and in three later surveys. After 30 to 64 months of education, significant net reductions in community averages favoring treatment occurred in plasma cholesterol level (2%), blood pressure (4%), resting pulse rate (3%), and smoking rate (13%) of the cohort sample. These risk factor changes resulted in important decreases in composite total mortality risk scores (15%) and coronary heart disease risk scores (16%). Thus, such low-cost programs can have an impact on risk factors in broad population groups.

Evidenzklasse: IIa.

68. Ferro-Luzzi A, Strazzullo P, Scaccini C. Changing the Mediterranean diet: effects on blood lipids. *Am J Clin Nutr* 1984;40:1027-37

A study was carried out on 48 healthy middle- age men and women habitually subsisting on the "Mediterranean type" diet in rural area of southern Italy. Their freely chosen natural diet was modified for a period of 42 days by partially substituting animal fats for olive oil. Currently available foods were used, and the subjects maintained their habitual lifestyle. Dietary fat content changed from 33 to 37 % of total energy and the polyunsaturated to saturated fatty acid ratio changed from 0.48 to 0.22. The base-line serum total cholesterol of men increased during the dietary intervention period from 214 +/- 30 mg/dl (mean and SD) to 245 +/- 33 mg (+15%). Low-density lipoprotein cholesterol increased 19 %, while high-density lipoprotein cholesterol remained unmodified. Women, while exhibiting a similar trend in serum total cholesterol (+16%), showed also a 19% increase in their high-density lipoprotein cholesterol (p<0.001). Apoprotein B increased in parallel with low-density lipoprotein cholesterol in both sexes. The results of the study confirmed the impact of the dietary factor on blood lipids. They also provide additional evidence on the response of high-density lipoprotein cholesterol to diet in free living population.

Evidenzklasse: IIb.

69. Föger M, Bart G, Rathner G, Jäger B, Fischer H, Zollner-Neussl D. Körperliche Aktivität, Ernährungsberatung und psychologische Führung in der Behandlung adipöser Kinder. *Monatsschr Kinderheilkd* 1993;141:491-7

Fragestellung/Hintergrund: Es gibt verschiedene Therapieansätze, um die Adipositas mit ihren bekannten Folgen bereits im Kindesalter günstig zu beeinflussen. In unseren Augen kann nur eine kombinierte Therapie zielführend sein. Methode: Unser Programm besteht daher aus körperlicher Aktivität, Ernährungsmodifikation und psychologischer Betreuung, wobei keine Reduktionsdiät verordnet wird. 17 adipöse Kinder zwischen 7 und 12 Jahren nahmen an dem 6monatigen, ambulanten Therapieprogramm teil. Ergebnisse: Die 17 Kinder der Kontrollgruppe unterschieden sich nicht signifikant in Alter, Geschlecht, Gewicht und prozentualem Übergewicht, sie erhielten eine 1malige Diätberatung, nahmen jedoch nicht am Programm teil. Nach 6 Monaten war das prozentuale Übergewicht der Interventionsgruppe signifikant geringer als das der Kontrollgruppe (35, 7 vs. 48,8%, p = 0,008). Die Kinder der Interventionsgruppe hatten ihr prozentuales Übergewicht signifikant verringert (-11,5%), die der Kontrollgruppe nicht(+2,8%). Im Gegensatz zur Kontrollgruppe waren Verbesserungen im Bereich der Sportmotorik für die Interventionsgruppe größtenteils signifikant. Beide Gruppen verbesserten tendenziell ihr Körperbild, während die Verbesserung im Selbstwertgefühl nur für die Interventionsgruppe signifikant war. Die Veränderungen im Lipidprofil waren nicht signifikant. Schlußfolgerung: Ein sportmotorisches Bewegungsprogramm in Kombination mit einer Ernährungsberatung und psychologischer Führung führt somit auch ohne eine Reduktionsdiät zu einem günstigen Kurzzeitverlauf der kindlichen Adipositas.

Evidenzklasse: IIa.

70. Fontaine KR, Cheskin LJ, Barofsky I. Health-related quality of life in obese persons seeking treatment. *J Fam Pract* 1996;43(3):265-70

BACKGROUND: The relationship between obesity and increased risks of morbidity and mortality is well established. Less is known about the impact of obesity on functional health status and subjective well-being. METHODS: We examined health-related quality of life (HRQL), measured by the Medical Outcomes Study Short Form-36 Health Survey (SF-36), and clinical characteristics of 312 consecutive persons seeking outpatient treatment for obesity at a university-based weight management center. SF-36 scores were adjusted for sociodemographic factors and various comorbidities, including depressi-



on, to better estimate the effect of obesity on HRQL. Health-related quality of life of the obese patients was then compared with that of the general population and with a sample of patients who have other chronic medical conditions. RESULTS: Compared with general population norms, participants who had a mean body-mass index (BMI) of 38.1 reported significantly lower scores (i.e., more impairment) on all eight quality-of-life domains, especially bodily pain and vitality. The morbidly obese (mean BMI, 48.7) reported significantly worse physical, social, and role functioning, worse perceived general health, and greater bodily pain than did either the mildly (mean BMI, 29.2) or moderately to severely obese (mean BMI, 34.5). The obese also reported significantly greater disability due to bodily pain than did patients with other chronic medical conditions. CONCLUSIONS: Obesity profoundly affects quality of life. Bodily pain is a prevalent problem among obese persons seeking weight loss and may be an important consideration in the treatment of this population.

Evidenzklasse: III.

71. Fortmann SP, Williams PT, Hulley SB, Haskell WL, Farquhar JW. Effect of health education on dietary behavior: the Stanford Three Community Study. *Am J Clin Nutr* 1981;34:2030-8

A 2-yr mass media cardiovascular health education program in two communities was followed by a 3rd, maintenance yr of reduced effort. In each community, a representative cohort reported its dietary behaviour annually to an interviewer using a questionnaire which estimated daily consumption of cholesterol and fat. Relative weight and plasma cholesterol were also measured annually. Both men and women in the treatment towns reported reductions in dietary cholesterol (23 to 34%) and saturated fat (25 to 30%) which were significantly larger than those reported in a 3rd, control community. Relative weight was increased in the control community when compared to the treatment towns, perhaps as a result of the ageing of the cohorts. Similar patterns were observed for plasma cholesterol changes. The 2-yr changes were maintained or increased during the 3rd, maintenance yr. The changes in individual values for plasma cholesterol showed low level correlations with dietary cholesterol and saturated fat, but the association with weight change was more important. These results suggest that mass media health education can achieve lasting changes in diet, obesity, and plasma cholesterol on a community level.

Evidenzklasse: IIa.

72. Foster GD, Wadden TA, Brownell KD. Peer-led program for the treatment and prevention of obesity in the schools. *Journal of Consulting and Clinical Psychology* 1985;53(4):538-40

A total of 89 overweight children in Grades 2-5 in one experimental and one control school participated in a 12-week weight reduction program conducted primarily by older children trained as peer counselors. Children in the experimental school lost 0.15 kg and reduced their percentage overweight by 5.3%, whereas those in the control school gained 1.3 kg and increased their percentage overweight by 0.3%. Program children also showed positive changes in self-concept as compared with control group and displayed improvements in food selection. Changes in weight, self-concept, and food selection were only partially maintained at 18-week follow-up, however, pointing to the need for an ongoing program of weight loss maintenance.

Evidenzklasse: IIb.

73. Gidding SS, Leibel RL, Daniels S, Rosenbaum M, Van Horn L, Marx GR. Understanding obesity in youth. A statement for healthcare professionals from the Committee on Atherosclerosis and Hypertension in the Young of the Council on Cardiovascular Disease in the Young and the Nutrition Committee, American Heart Association. *Circulation* 1996;94(12):3383-7

kein Abstract, Evidenzklasse: IV.

74. Goldberg GR, Prentice AM, Davies HL, Murgatroyd PR. Residual effect of graded levels of exercise on metabolic rate. *Eur J Clin Nutr* 1990;44:99-105

The hypothesis that exercise induces a residual effect on metabolic rate only when the intensity exceeds a certain threshold was tested by studying 10 healthy untrained adults performing graded levels of bicycle ergometry on five separate occasions. The exercise consisted of four 30 - min periods at intensities ranging from 0 to 100 Watts. Energy expenditure was measured by continuous indirect whole-body calorimetry. The highest level of exercise increased 24-h energy expenditure by 34 %. Food intake was modified for each measurement in order to maintain energy balance. Sleeping and basal metabolic rates on the night following exercise were raised at low intensity of exercise. There was an almost linear dose-response relationship and no evidence of a threshold. However, the effect was small amounting to only 5.8 % over night and 3.9 % in the morning following 2 hours exercise at over 60 % VO<sub>2</sub> max during preceding day. This suggests that residual energy expenditure incurred after moderate levels of exercise is unlikely to be a very useful adjunct to slimming regimes.

Evidenzklasse: IIb.

75. Goldstein DJ, Rampey AH, Jr., Roback PJ, Wilson MG, Hamilton SH, Sayler ME, et al. Efficacy and safety of long-term fluoxetine treatment of obesity--maximizing success. *Obes Res* 1995;3(4):481-490

Obesity is a major health care concern because of its associated medical complications and increased

mortality. Despite a myriad of short-term weight loss strategies and the motivation of improving health, patients have difficulty maintaining reduced weight. Pharmacologic agents, such as fluoxetine, a selective serotonin uptake inhibitor, have been investigated as adjunctive therapy to standard weight management programs. Extended therapy with fluoxetine has demonstrated clinically meaningful benefits on weight loss and obesity-associated medical conditions in double-blind placebo-controlled studies. However, the magnitude of these benefits for individuals vary. Such findings are consistent with the belief that the obesity syndrome has differing etiologies. Accordingly not all patients are likely to benefit from a particular therapy. Studies should identify patient subgroups that are more likely to respond to a specific therapy. In this study of 719 fluoxetine-treated and 722 placebo treated patients in four multicenter, randomized, double-blind, long-term clinical trials, we investigated possible predictors of a beneficial long-term outcome from fluoxetine therapy. Patients' age, current smoking activity, and baseline uric acid concentration were predictors of a meaningful long-term treatment effect. Further review of the weight loss patterns of patients achieving long-term success provided the basis for a treatment monitor. Use of the predictors and the treatment monitor are strategies to maximize the benefits of therapy through improved patient selection and monitoring during a therapeutic program.

Evidenzklasse: Ib.

76. Graham DJ, Green L. Further Cases of Valvular Heart Disease Associated with Fenfluramine-Phentermine. *New England J of Medicine* 1997;337(9):635

Brief, Evidenzklasse: IV.

77. Guy-Grand B. A new approach to the treatment of obesity. *Annals NY Acad Sci* 1987;499:313-317  
kein Abstract, Evidenzklasse: IV.

78. Guy-Grand B. Clinical studies with dexfenfluramine: from past to future. *Obes Res* 1995;3(4):491-496

d Fenfluramine (dF) (15 mg twice daily) has been studied in controlled trials in human obesity. It has been shown to increase adherence to weight lowering programs, to double the number of patients losing 10 kg or more when compared with a fairly efficient placebo plus dietary counselling, and to prevent weight regain when continued over a 1 year period. Weight loss after 1 month and 4 months is likely to predict subsequent outcome. Also, significant improvement in metabolic risk factors and blood pressure were clearly demonstrated, even more markedly in some obesity-associated diseases, when body weight is maintained at a lower level. Even moderate but sustained weight loss of some 10% of starting weight or less has been confirmed to be of medical value. Tolerance and safety of dF can be considered acceptable, even if longer term follow-up is clearly needed. These studies support the concept that long-term pharmacotherapy with this serotonergic drug might help achieve better outcome in the management of many obese patients, particularly in preventing relapse. The long-term managerial strategies to be developed for each patient might thus include dF together with dietary advice, behavioral modification and physical exercise, either simultaneously or sequentially.

Evidenzklasse: Ib.

79. Haines AP, Sanders TAB. Dietary advice for lowering plasma cholesterol. *Br Med J* 1989;298:1594-5; kein Abstract, Evidenzklasse: IV.

80. Hakala P, Karvatti RL, Ronnema T. Group versus individual weight reduction in the treatment of severe obesity - a five year follow-up study. *Int J Obes Relat Metab Disord* 1993;17:97-102

The aim of the study was to compare group and individual weight reduction programmes in the treatment of severe obesity. The study population included forty women and twenty men, mean age 41 years. The mean body mass index was 43.5 kg/m<sup>2</sup> in women and 42.2kg/m<sup>2</sup> in men. The subjects were randomly divided into two groups, one with group counselling (GC group) and the other with individual counselling (IC group). The treatment programme of the GC group consisted of a two-week weight reduction period in a rehabilitation centre followed by group sessions for two years. The programme of the IC group consisted of individual counselling and follow-up by a physician. The adherence rate of the follow-up examinations was 97% at two years and 88% at five years. In the GC-group the mean weight reduction in women at three months and at one, two and five years was 15.6, 15.7, 5.4 and 2.1 kg and in men 14.9, 13.1, 1.8 and 3.0 kg, respectively. In the IC-group the corresponding values for women were 8.4, 11.9, 10.4 and 3.4 kg and for men 167.0, 26.2, 15.6, and 12.9 kg. Self-reported and measured weights at the five-year follow-up were closely correlated (r=0.99). Weight loss during the first three month predicted a good result at two and five years. The results showed that group counselling starting with an inpatient period led to rapid weight reduction, but a better and more sustained effect was achieved by individual counselling, especially in men.

Evidenzklasse: IIb.

81. Hall SM, Tunstall, Vila KL, Duffy J. Weight gain prevention and smoking cessation: cautionary findings. *Am J Public Health* 1992;82:799-803

OBJECTIVES. Weight gain is a consistent sequel of smoking cessation. A successful intervention might attract smokers who fear weight gain. If the gain causes smoking relapse, such an intervention might reduce smoking relapse risk. METHODS. Using a sample of 158 smokers who completed a 2-

week smoking treatment program, we compared an innovative weight gain prevention intervention with both a nonspecific treatment and standard treatment. Subjects were assessed on weight and smoking behavior and followed for 1 year. RESULTS: A disturbing, unexpected finding was that subjects in both the innovative and nonspecific conditions had a higher risk of smoking relapse than did standard treatment subjects. Some differences were observed between abstinent and smoking subjects in weight gain by treatment condition. CONCLUSIONS: Both active interventions may have been so complicated that they detracted from nonsmoking. Also, caloric restriction may increase the reinforcing value of nicotine, a psychoactive drug, thereby increasing smoking relapse risk. The magnitude of weight gain after smoking cessation may not merit interventions that increase smoking risk. Perhaps attitudinal modifications are the most appropriate.

Evidenzklasse: IIb.

82. Hayaki J, Brownell KD. Behaviour change in practice: group approaches. *Int J Obes Relat Metab Disord* 1996;20(1):S27-30

Preliminary research in the treatment of obesity suggests that group interventions may be at least as effective as individual interventions, presumably due to the social support created among individuals in the group. Given that a cost-effectiveness analysis may favor groups, further research is necessary on how the benefits of group process can be maximized.

Evidenzklasse: IV.

83. Heath C, Grant W, Marcheni P, Kamps C. Do family physicians treat obese patients? *Fam Med* 1993;25(6):401-2

BACKGROUND: The purpose of this study was to characterize what patient and physician factors increase the likelihood of physicians counseling weight loss in their overweight patients. METHODS: A retrospective chart survey of 418 outpatient charts from 50 family medicine residents and faculty was conducted. RESULTS: Of the 267 patients who were overweight based on a body mass index score of more than 27, only 29.6% had been instructed to lose weight. Overweight patients with hypertension, diabetes, hypercholesterolemia, or coronary artery disease were instructed to lose weight 32.9% of the time. Patient age or sex and physician age, sex, or level of training did not affect the frequency of treatment. CONCLUSION: Physicians need to be more aggressive in their counseling of overweight patients.

Evidenzklasse: III.

84. Hedenbro JL. Surgical treatment for morbid obesity. *British Journal of Surgery* 1995;82:1702  
Brief, Evidenzklasse: IV.

85. Hill J, Melby C, Johnson S, Peters J. Physical Activity and energy requirements. *Am J Clin Nutr* 1995;62(Suppl 5):1059-1066.

Differences in physical activity represent the largest source of variability in energy requirements, both within and between individuals. Chronic changes in physical activity can produce chronic changes in energy requirements that, if not compensated for, can lead to changes in the level at which body weight and body composition are maintained over time. We present a model that can serve as a framework for understanding how energy and macronutrient balance are maintained in steady state conditions, and for illustrating the potential effect of a change in physical activity on these steady state conditions and on energy requirements. According to the model, a chronic change in physical activity forces changes in other aspects of energy and substrate utilization so that a steady state condition can be reestablished. The net effects of the change in physical activity on energy requirements will depend on how and over what period of time these new steady states are reached. Although we cannot at present predict, for any individual, the precise effect of changes in physical activity on energy requirements and on body weight and composition, our model provides a framework for further study of the factors that can influence energy requirements.

Evidenzklasse: IV.

86. Hillsdon M, Thorogood M, Anstiss T, Morris J. Randomised controlled trials of physical activity promotion in free living populations: a review. *J Epidemiol Comm Health* 1995;49:448-53

Objectives- To review evidence on the effectiveness of trials of physical activity promotion in healthy, free living adults. To identify the more effective intervention programmes. Methods-Computerised databases and references were searched. Experts were contacted and asked for information about existing work. Inclusion criteria- Randomised controlled trials of healthy, free living adult subjects, where exercise behaviour was the dependent variable were included. Conclusions- Ten trials were identified. The small number of trials limits the strength of any conclusions and highlights the need for more research. No UK based studies were found. Previously sedentary adults can increase activity levels and sustain them. Promotion of these changes requires personal instruction, continued support, and exercise of moderate intensity which does not depend on attendance at a facility. The exercise should be easily included into an existing lifestyle and should be enjoyable. Walking is the exercise most likely to fulfil these criteria.

Evidenzklasse: Ib.

87. Himes JH, Dietz WH. Guidelines for overweight in adolescent preventive services: recommendations from an expert committee. The Expert Committee on Clinical Guidelines for Overweight in Adolescent Preventive Services. *Am J Clin Nutr* 1994;59(2):307-16

An expert committee was convened to determine specific criteria for overweight to be integrated into routine preventive screening of adolescents. Body mass index (BMI) should be used routinely to screen for overweight adolescents. Youth with BMIs or = 95th percentile for age and sex, or 30 (in kg/m<sup>2</sup>) should be considered overweight and referred for indepth medical follow-up to determine underlying diagnoses. Adolescents with BMIs or = 85th percentile but 95th percentile or or = 30, should be considered at risk of overweight, and should be referred to a second-level screen. The second-level screen includes family history, blood pressure, total cholesterol, large prior increment in BMI, and concern about weight. If youths are positive for any of the items on the second-level screen they should be referred for further medical assessment.

Evidenzklasse: IV.

88. Hirsch J. The physician's role in the treatment of obesity. *J Intern Med* 1995;238(4):295-7

Kommentar, Evidenzklasse: IV.

89. Hollmann M, Runnebaum B, Gerhard I. Effects of weight loss on the hormonal profile in obese, infertile women. *Hum Reprod* 1996;11(9):1884-91

This study was designed to investigate the effects of weight loss in obese, infertile women with special interest in changes of blood hormones, menstrual function and pregnancy rate. Blood glucose, insulin, C-peptide and different steroid and pituitary hormones during oral glucose loading were determined in a group of 58 obese women with menstrual irregularities. Of the 58 women, 35 took part in a weight-reducing programme lasting 32 +/- 14 weeks (mean +/- SD) with a weight loss of 10.2 +/- 7.9 kg (therapy group). At the time of first oral glucose tolerance testing, insulin resistance was a feature in 85% of the women in the therapy group, and 22% were hyperandrogenaemic. Weight loss resulted in a significant reduction in blood glucose, insulin, androstenedione, dihydrotestosterone and oestradiol concentrations. The pregnancy rate was 29% in this group and of them, 80% showed an improvement of their menstrual function. Thus, weight reduction is the appropriate treatment for women with obesity-related endocrine derangement, menstrual irregularity and infertility.

Evidenzklasse: IIb.

90. Hunt TK. Surgical treatment for morbid obesity. *Br J Surg* 1996;83(4):571, Brief, Evidenzklasse: IV.

91. Husemann B. Therapy of morbid obesity--is the surgeon consulted? *Zentralbl Chir* 1996b;121(5):349-53

The surgical treatment of morbid obesity overlooks now more than 25 years beginning with the jejunocolostomy reaching to the vertical banded gastropasty in any of the various modifications. Despite effective weight loss there are some dangerous complications, even in the long-term run. Though the surgical therapy of extreme obesity should be carried out restrictively and only in the correct indication according to the rules of the bariatric society or the National Consensus Conference.

Evidenzklasse: IV.

92. Hypertension Prevention Trial Research Group. The hypertension prevention trial: three year effects of dietary change on blood pressure. Hypertension Prevention Trial Research Group. *Arch Intern Med* 1990;150:153-160

A total of 841 healthy men and women aged 25 to 49 years, with diastolic blood pressures of 78 to 89 mm Hg, were randomly assigned to a control treatment group (no dietary counseling) or to one of four dietary counseling treatment groups (reduced calories, reduced sodium, reduced sodium and calories, or reduced sodium and increased potassium). Participants were followed for a 3-year period to assess the effect of dietary changes on blood pressure. After 6 months, counseling had resulted in a net (of control) mean overnight urinary sodium reduction of 13%, a potassium increase of 8%, and a decrease in mean body weight of 7%. At 3 years, the sodium and weight reductions were 10% and 4%, respectively; the potassium change was nil. All four dietary counseling treatment groups had lower mean blood pressures than the control group. The largest net reduction in blood pressure occurred in the calorie group: diastolic pressure was 2.8 mm Hg and 1.8 mm Hg and systolic pressure, 5.1 mm Hg and 2.4 mm Hg at 6 months and 3 years, respectively. All four dietary counseling treatment groups experienced fewer hypertensive events; significantly fewer occurred in the sodium groups. The beneficial effects on blood pressure achieved in this trial have implications for the prevention of cardiovascular disease through dietary reduction of calories and sodium.

Evidenzklasse: Ib.

93. Iacono JM, Puska P, Dougherty RM, Pietinen P, Vartiainen E, Leino U. Effect of dietary fat on blood pressure in a rural Finnish population. *Am J Clin Nutr* 1983;38:860-9

Thirty couples living in Liperi, a community of North Karelia, aged 40 to 50 yr participated in a dietary intervention study to assess the influence of dietary fat on blood pressure and other parameters. After a weeklong base-line period the subjects consumed a low fat diet (24% of energy) with a polyunsaturated /saturated fat ratio (P/S) of 1.2 for 6 wk. After this 6-wk intervention period the subjects resumed

their normal diets (36%energy from fat, P/S 0.15) for an additional 6-wk period. Body weight remained constant throughout the study and salt intakes were approximately 12 g/day. During the low fat, high P/S period a decrease of 7.5 and 2.8 mm Hg pressure occurred for systolic and diastolic blood pressure from the base-line level. When the normal diet was resumed, systolic and diastolic blood pressures increased by 7.7 and 6.3 mm Hg, respectively, from the levels observed at the end of intervention period.

Evidenzklasse: IIb.

94. Inoue S. Clinical studies with mazindol. *Obes Res* 1995;3(4):549-552

An anorexiant, mazindol suppresses food intake by 1) stimulating beta-adrenergic receptors, 2) inhibiting the feeding center and, 3) stimulating the satiety center in the hypothalamus. In Japan, mazindol is available for clinical use. We examined the effects of mazindol on 1) body weight, appetite, and abnormalities of obesity-related diseases in long-term use 2) maintenance of the reduced body weight after very-low-calorie diet (VLCD) therapy 3) combined use with VLCD therapy and, 4) inhibition of body weight gain in Prader-Willi syndrome. In long-term effects of mazindol, the average reduction of individual body weight was around 6.8 kg. The appetite of 59% of obese subjects was moderately suppressed. Systolic blood pressure, serum GOT, serum triglyceride, serum cholesterol, and glucose tolerance were also improved. With mazindol, 53.3% of obese subjects kept the reduced body weight after VLCD, in contrast, 20.0% of them kept it without mazindol. Combined use of mazindol with VLCD made the VLCD therapy more effective in outpatients. Two of 3 patients with Prader-Willi syndrome inhibited their body weight gain with mazindol. Thus, mazindol produced positive effects in these studies, although the effects were limited.

Evidenzklasse: IIb.

95. Jalkanen L, Linker H. Comprehensive obesity therapy program. *Versicherungsmedizin* 1995;47(1):23-6

Being overweight is now accepted as one of the big health problems of our society. A major extent of overweight is associated with numerous disease and has to be considered as a disease itself. Considerable and intensive efforts are necessary to terminate the increasing trend or to turn it into the opposite direction. The OPTIFAST-program is an extensive therapy program with nearly guaranteed success. As compared to other programs, the longterm results are good, though they still need considerable improvement. A common strategy should be developed for a longterm and permanent program.

Evidenzklasse: IV.

96. James WP. Treatment of obesity: the constraints on success. *Clinics in Endocrinology and Metabolism* 1984a;13:635-63

This chapter will attempt to show some of the constraints which one has to bear in mind when considering how best to manage an obese patient. The treatment of the obese individual is often frustrating and it is little surprise that it has not been given the degree of vigorous analysis which the treatment of other disorders receives from the medical profession. Often management passes from the hands of the physician to a paramedical professional or a lay person since frequently the physician seems to have few specialist skills to apply once the obese individual has been examined and a management policy agreed. Furthermore greater success seems to come to those patients whose condition is managed by individuals with an exclusive interest in the problem, a feature characteristic of few medical practitioners.

Evidenzklasse: IV.

97. Jeffery RW. Community programs for obesity prevention: The Minnesota Heart Health Program. *Obes Res* 1995;3:283-8

Community intervention strategies for obesity that were developed and evaluated in the Minnesota Heart Health Program (MHHP) are described. The MHHP was a 13-year research and demonstration project involving 6 communities that was designed to evaluate whether a sustained multicomponent education campaign could reduce population-wide risk factors for cardiovascular disease. MHHP weight control activities included adult education classes for weight control, exercise, and cholesterol reduction, a worksite weight control program, a home correspondence course for weight loss and a weight gain prevention program. In separate component evaluation studies each of the programs was shown to facilitate favorable changes in weight among individuals choosing to participate in them. Compared to more intensive interventions, weight changes produced by these methods were modest in magnitude, but the number of individuals participating in some of them was quite large. The overall effects of the MHHP program on population levels of obesity were disappointing. Over 7 years of intervention there was a strong upward trend in weight in all communities, independent of age, demographics, smoking habits, or other potential confounding variables. This trend was not different in communities receiving education than in comparison communities. Possible reasons for these results are discussed.

Evidenzklasse: IIb.

98. Jeffery RW, Gerber WM, Rosenthal BS, Lindquist RA. Monetary contracts in weight control: effecti-

veness of group and individual contracts of varying size. *J Consult Clin Psychol* 1983;51:242-8  
Eighty-nine overweight men drawn from a community population sample were assigned randomly to one of six treatment groups for weight reduction. All groups participated in a 15-week behaviorally oriented program. Each involved a monetary contract in which participant deposits were returned contingent on weight lost. The program goal was thirty pounds (13.6 kg) lost. Groups varied in (a) amount of deposit (\$ 30, \$ 150, \$300), and in (b) type of contract (refunds contingent on either individual or mean group performance). It was found that group contracts were associated with significantly more weight loss than individual contracts. This difference was maintained over one-year follow-up. Amount of deposit was positively, although weakly, related to short-term treatment outcomes. However, the short-term advantage of the larger contracts disappeared rapidly with time. Neither nor time nor amount of deposit significantly affected participation rates. Overall weightlosses in the study were large.

Evidenzklasse: IIb.

99. Jeffery RW, Wing RR. Long-term effects of interventions for weight loss using food provision and monetary incentives. *J Consult Clin Psychol* 1995;63(5):793-6

One hundred seventy-seven men and women who had participated in an 18-month trial of behavioral interventions involving food provision and financial incentives were examined 12 months later. Food provision, but not financial incentives, led to better weight loss than standard behavioral treatment during the 18-month trial, but over 12 additional months of no-treatment follow-up, all treated groups gained weight, maintained only slightly better weight losses than a no-treatment control group, and did not differ from each other. Weight loss success during both active treatment and maintenance was associated with increase in exercise, decrease in percentage of energy from fat, increase in nutrition knowledge, and decrease in perceived barriers to adherence. Obesity treatment research should focus on developing better ways to maintain changes in the diet and exercise behaviors needed for sustained weight loss.

Evidenzklasse: Ib.

100. Kawachi I, Troisi R, Rotnitzky A. Can Physical Activity Minimize Weight Gain in Women after Smoking Cessation. *Am J Pub Health* 1996;86(7):999-1004

OBJECTIVES. The purpose of this study was to examine prospectively whether exercise can modify weight gain after smoking cessation in women. METHODS. Data were analyzed from a 2-year follow-up period (1986-1988) in the Nurses' Health Study, an ongoing cohort of 121,700 US women aged 40 to 75 in 1986. RESULTS. The average weight gain over 2 years was 3.0 kg in the 1474 women who stopped smoking, and 0.6 kg among the 7832 women who continued smoking. Among women smoking 1 to 24 cigarettes per day, those who quit without changing their levels of exercise gained an average of 2.3 kg more (95% confidence interval [CI] = 1.9, 2.6) than women who continued smoking. Women who quit and increased exercise by between 8 to 16 MET-hours (the work metabolic rate divided by the resting metabolic rate) per week gained 1.8 kg (95% CI = 1.0, 2.5), and the excess weight gain was only 1.3 kg (95% CI = 0.7, 1.9) in women who increased exercise by more than 16 MET-hours per week. CONCLUSIONS. Smoking cessation is associated with a net excess weight gain of about 2.4 kg in middle-aged women. However, this weight gain is minimized if smoking cessation is accompanied by a moderate increase in the level of physical activity.

Evidenzklasse: IIb.

101. Kawamura M, Adachi T, Nakajima J, Fujiwara T, Hiramori K. Factors that affect calorie-sensitive and calorie-insensitive reduction in blood pressure during short-term calorie restriction in overweight hypertensive women. *Hypertension* 1996;27:408-13

This study was performed to elucidate the factors that affect the reduction in blood pressure produced by calorie restriction in overweight women with essential hypertension. Fifty-one subjects were admitted to the metabolic ward of the hospital. After being fed a standard diet (6.3 to 8.4 MJ/d) for 2 weeks, the calorie-restricted group (n=34) was fed a low-calorie diet (1.9 MJ/d) for an additional 2 weeks. The calorie-nonrestricted group (n=17) was fed the standard diet for 4 weeks. Sodium and potassium intake was kept constant, as was the level of exercise activity. The calorie-restricted group was subdivided into "calorie-sensitive" and "calorie-insensitive" groups based on an average 5 mm Hg reduction in mean blood pressure during the low-calorie diet. The mean age was 51+/-6 years (mean+/-SD) in the calorie-sensitive group (n=16), which was significantly lower than the mean age of 61+/-6 years in the calorie-insensitive group (n=18). Multiple regression analysis indicated that age and change in body weight exhibited significant correlations with blood pressure reduction produced by calorie restriction among 17 parameters. Findings suggest that age can predict the extent of blood pressure reduction that would be obtained during 2 weeks of calorie restriction in overweight hypertensive women. The reduction in blood pressure may be related in part to the amount of weight loss.

Evidenzklasse: Ib.

102. Keller C, Stevens KR. Assessment, etiology, and intervention in obesity in children. *Nurse Pract* 1996;21(9):31-6, 38, 41-2

Obesity is a common nutritional disturbance of children and affects 25% to 30% of children and adolescents. This paper examines obesity in childhood, the measurement of obesity in children, and the relationship of obesity to coronary heart disease risks and discusses weight reduction issues in children. Clinically useful definitions of obesity in children have not been established, although the body mass index, together with anthropometric measurements, may provide the practitioner with useful assessment parameters. Discussions of weight in children must acknowledge the nutritional requirements of the normally occurring growth process. Because growth (and subsequently weight) varies widely among children even of the same age, measurement, classification, and control of weight must take into account the growth process and growth requirements. Interventions in childhood obesity should be directed toward family involvement in the chosen strategy and nutritional prudence coupled with typical activity.

Evidenzklasse: IV.

103. Kimm SY. The role of dietary fiber in the development and treatment of childhood obesity. *Pediatrics* 1995;96:1010-4

Childhood obesity is viewed as a public health problem in the United States because of its assumed high prevalence and increasing secular trend. The best estimate of the genetic contribution to obesity ranges from 5% to 25%. Environmental factors play a major role in obesity development. Low income and a low level of education have been associated with obesity, particularly among white women. Caloric intake as a risk factor for obesity has not been clearly established. This lack of a clear-cut association may be attributable to the problem of accurately measuring caloric intake. Several studies have linked increased total fat intake, rather than caloric intake, with obesity. Some studies have linked television viewing to obesity in children. Obesity is rare among the populations of developing countries, where dietary fiber intake is high. Explanations for the role of dietary fiber in obesity include a reduced caloric density of the foods, a slower rate of food ingestion, and possible effects on satiety. Most studies on the role of fiber in the treatment of obesity have been somewhat limited by lack of comparison groups, inadequate sample sizes, and short durations of the observations. However, although limited, the available evidence suggests that fiber potentially could play a useful role in weight reduction. For children, fiber administration should be considered as an adjuvant therapy rather than a primary modality, because fiber might aid in promoting satiety during meals and curbing hunger between meals. (ABSTRACT TRUNCATED AT 250 WORDS).

Evidenzklasse: IV.

104. King AC. Community intervention for promotion of physical activity and fitness. *Exer Sports Sci Rev* 1991;19:211-559; kein Abstract, Evidenzklasse: IV.

105. King NA, Burley VJ, Blundell JE. Exercise-induced suppression of appetite: effects on food intake and implications for energy balance. *Eur J Clin Nutr* 1994;48(10):715-24

OBJECTIVE: To examine the effects of exercise on short term energy intake and to investigate the existence of exercise-induced anorexia. DESIGN: Two studies were conducted, both with three treatment conditions and employing a repeated measures design. SETTING: The Human Appetite Research Unit at Leeds University Psychology department. SUBJECTS: Twenty three healthy, lean male subjects (n = 11 and n = 12 respectively) were recruited from the student/staff population of Leeds University. INTERVENTIONS: Subjects were randomly assigned to a control, low intensity and high intensity exercise treatment in the first study and to a control, short duration and long duration exercise treatment (high intensity) in the second. Motivation to eat was measured by visual analogue rating scales and by the length of the time between the end of exercise and the volitional onset of eating. Energy and macronutrient intakes were measured by means of a free-selection test meal and by recorded intakes for the next 2 days. RESULTS: Subjective feelings of hunger were significantly suppressed during and after intense exercise sessions (P 0.01), but the suppression was short-lived. Exercise sessions had no significant effect on the total amount of food consumed in the test meal but intense exercise delayed the start of eating (P 0.05). When energy intake was assessed relative to the energy expended during the exercise or control periods, only the long duration, high intensity session created a significant short-term negative energy balance (P 0.001). CONCLUSIONS: These studies indicate that exercise-induced anorexia can be characterized by a brief suppression of hunger, accompanied by a delay to the onset of eating. The temporal aspects of exercise-induced anorexia may best be measured by the resistance to begin eating rather than the amount of food consumed.

Evidenzklasse: Ib.

106. Kirsch I, Montgomery G, Sapirstein G. Hypnosis as an adjunct to cognitive-behavioral psychotherapy for obesity: a meta-analysis. *J Consult Clin Psychol* 1995;63(2):214-20

A meta-analysis was performed on 18 studies in which a cognitive-behavioral therapy was compared with the same therapy supplemented by hypnosis. The results indicated that the addition of hypnosis substantially enhanced treatment outcome, so that the average client receiving cognitive-behavioral hypnotherapy showed greater improvement than at least 70% of clients receiving nonhypnotic treatment. Effects seemed particularly pronounced for treatments of obesity, especially at long-term follow-

up, indicating that unlike those in nonhypnotic treatment, clients to whom hypnotic inductions had been administered continued to lose weight after treatment ended. These results were particularly striking because of the few procedural differences between the hypnotic and nonhypnotic treatments.

Evidenzklasse: IIb.

107. Korsten-Reck U, Bauer S, Keul J. Sports and nutrition--an ambulatory care program for obese children (long-term experiences). *Pediatr Padol* 1993;28(6):145-52

Sports activity (three times per week), dietary changes and modification of behavior are the basic tenets of an outpatient program run for 9- to 12-year-old adipose children since 1987. The following goals are to be attained: increase in physical performance capacity and body awareness, long-lasting change in eating habits, weight loss to less than 20% overweight compared to the age-normal, and understanding of the permanence of body weight problems. Individual dietary consultation is offered in addition to the initial examination consisting of physical examination, skin fat-fold measurement, blood chemical parameters, spirometry and a detailed discussion with parents and children. The eating habits of the children are recorded in a dietary history (three-day dietary protocol, questionnaire) and discussed in individual consultations with the parents and children. Moreover, the nutritional program includes regular nutritional consultations and parents' meetings every month. Cooking instructions provide practical knowledge of food preparation to preserve nutrients in an energy-reduced, tasty diet, as well as theoretical basics of nutrition. The control examinations show improvement in body-weight related performance capacity and laboratory parameters (lipid metabolism) as well as individual weight loss or stability (reference weight). Aware and controlled nutritional habits were learned especially by the children of parents who, for their part, tried to tailor their diets to be better balanced, whole-some and more need-oriented. Overall the nutritional composition improved with less energy intake. The intake of complex carbohydrates increased especially through consumption of ballast-rich musli, as well as whole wheat bread, vegetables and fruits.(ABSTRACT TRUNCATED AT 250 WORDS).

Evidenzklasse: IV.

108. Kral J. *Surgical treatment of obesity*. New York: Guilford Press, 1995; Buch, Evidenzklasse: IV.

109. Kreider JW, Hughes KC, Smeal D, Hirai T, Manders EK. Obesity. *Clin Plast Surg* 1996;23(4):671-81

Obesity is a heterogeneous family of disorders with several overlapping contributory causes. It markedly increases morbidity and mortality from many different diseases, and affected patients are the targets of severe, negative social pressures. Physicians traditionally have been unsuccessful in treating obesity. The usual physician's office approach to obese persons is to conduct a good history and physical examination and then prescribe a 4200-J diet sheet and monthly or bi-monthly office visits. This approach usually produces mild and ephemeral weight loss. Some patients quickly become disillusioned and manifest as appointment "no-shows." The doctor often bemoans the lack of will power of his or her ex-patient. Such patients and their physicians would be better served by referral to a professional weight management program, in which a coordinated team approach has proven effective and persistent in body weight control. "He that putteth his trust in the Lord shall be made fat."

Evidenzklasse: IV.

110. Kriwanek S, Armbruster C, Blauensteiner W. Surgical treatment for morbid obesity. *British Journal of Surgery* 1995;82:1701; Brief, Evidenzklasse: IV.

111. Kriwanek S, Beckerhinn P, Blauensteiner W, Dittrich K, Armbruster C. Therapeutic failures after gastric bypass operations for morbid obesity (see comments). *Langenbecks Arch Chir* 1995;380(2):70-4

BACKGROUND: Although gastric bypass is an effective treatment for morbid obesity, the postoperative results are unsatisfactory in 10% of all patients. Therapeutic failures after an operation performed with the sole purpose of reducing the risk of obesity-associated diseases have to be taken seriously. The goal of this study was to investigate the causes of these failures. METHOD: From 1979 to 1993, 165 gastric bypass operations (technique: Mason-Griffen) were performed. Long-term results were obtained in 60 patients after an average of 6.6 years (range 3-13). On follow-up all patients were examined and asked about their level of satisfaction with the weight loss achieved and changes in eating habits. RESULTS: In 6 patients the weight reduction was regarded as insufficient (BMI 35 and reduction of BMI 10). The causes of these failures were technical in 3 cases (gastric pouch to 0 large in 1, dilatation of gastrojejunostomy in 2). Three patients had a high calorie intake through an intact gastric bypass by snacking. Three patients regarded the operation as a failure although they had achieved significant weight loss, because they could no longer eat the usual amounts of food. CONCLUSION: Correct surgical technique and preoperative information on the changes in eating habits after a gastric bypass operation are the most important steps in preventing therapeutic failures.

Evidenzklasse: IIb.

112. Kuhlmann HW. Obesity. *Internist (Berl)* 1996;37(6):648-52; Brief, Evidenzklasse: IV.

113. Kunath U, Memari B. Laparoscopic gastric banding for treatment of pathologic obesity. *Chirurg* 1995;66(12):1263-7



Since 1983 gastric banding is a proven operative method, which reduces effectively excess weight in morbid obesity. The laparoscopic procedure, which was performed in July 1994 for the first time in Germany, is described. Indications, results and operative-technical problems are discussed.

Evidenzklasse: IV.

114. Lean MJ, James WPT. Prescription of diabetic diets in the 1980's. *Lancet* 1986;1:723-725

A method is described to aid the prescription of diabetic diets, derived from newly available data for computation of metabolic rates of individuals. Absolute daily amounts of the main nutrients required to formulate a patient's diet are obtained from simple nomograms based on the patient's height and activity level. This system is more accurate and more flexible than currently accepted methods of dietary assessment and should lead to improved use of dietetic resources.

Evidenzklasse: III.

115. Leibel RL, Hirsch J, Appel BE, Checani G. Energy intake required to maintain body weight is not affected by wide variation in diet composition. *Am J Clin Nutr* 1992;55:350-5

Diets rich in fat may promote obesity by leading to a greater deposition of adipose-tissue triglycerides than do isoenergetic diets with less fat. This possibility was examined by a retrospective analysis of the energy needs of 16 human subjects (13 adults, 3 children) fed liquid diets of precisely known composition with widely varied fat content, for 15-56 d (33 +/- 2 d, mean +/- SE). Subjects lived in a metabolic ward and received fluid formulas with different fat and carbohydrate content, physical activity was kept constant, and precise data were available on energy intake and daily body weight. Isoenergetic formulas contained various percentages of carbohydrate as cerelose (low, 15%; intermediate, 40% or 45%; high, 75%, 80%, or 85%), a constant 15% of energy as protein (as milk protein), and the balance of energy as fat (as corn oil). Even with extreme changes in the fat-carbohydrate ratio (fat energy varied from 0% to 70% of total intake), there was no detectable evidence of significant variation in energy need as a function of percentage fat intake.

Evidenzklasse: IIb.

116. Marks SJ, Moore NR, Clark ML, Strauss BJ, Hockaday TD. Reduction of visceral adipose tissue and improvement of metabolic indices: effect of dexfenfluramine in NIDDM. *Obes Res* 1996;4:1-8

Increased visceral adipose tissue is thought to contribute to impaired glucose tolerance. We studied 10 men with non-insulin dependent diabetes (NIDDM) before and after a 12-week intervention study using dexfenfluramine. Subjects had a mean body mass index (BMI) of 26.4 +/- 1.7 kg/m<sup>2</sup> and had an abdominal distribution of body fatness (waist-to hip ratio 0.9). Anthropometric indices, biochemistry, macronutrient intake from 7-day food records as well as a euglycaemic glucose clamp and magnetic resonance imaging (MRI) were performed at week 0 and week 12. Abdominal adipose tissue area measured by MRI was reduced from 854 +/- 270 cm<sup>2</sup> to 666 +/- 231 cm<sup>2</sup> (p = 0.003) due mainly to a selective 32% reduction in visceral fat area from 484 +/- 230 cm<sup>2</sup> to 333 +/- 72 cm<sup>2</sup> (p = 0.002). Insulin sensitivity improved from 0.29 +/- 0.13 [min<sup>-1</sup> (mU/L)] to 0.54 +/- 0.21 [min<sup>-1</sup> (mU/L)] (p = 0.01) and C-peptide levels reduced from 0.77 +/- 0.24 mumol/L to 0.58 +/- 0.15 mumol/L (p = 0.002). The reductions in fasting glucose and glycated haemoglobin failed to achieve significance. Fasting total cholesterol and triglyceride levels significantly reduced (p = 0.001 and p = 0.021 respectively). There was a reduction in total energy intake (p = 0.005) due to a significant reduction in calories obtained from fat (p 0.001). Thus dexfenfluramine was shown to be a useful adjunct therapy for the reduction of visceral fat in abdominally-obese men with NIDDM with an associated improvement in insulin sensitivity.

Evidenzklasse: IIb.

117. Marshall RD. Gastroplasty for morbid obesity. Guidelines for post-operative management. *Aust Fam Physician* 1996;25(7):1101-3

Morbid obesity is a very difficult condition to treat. Any operation intended to help the patient lose weight is no more than a beginning, and must be combined with rigorous postoperative care or it will surely fail.

Evidenzklasse: IV.

118. Marti B. Physical activity and blood pressure. An epidemiological brief review of primary preventive effects of physical exercise activities. *Schweiz Rundsch Med Prax* 1992;81(15):473-9

The relation between physical exercise and blood pressure as well as the risk of hypertension has been investigated extensively during recent years. Cross-sectional studies on exercising and physically fit subjects have shown that endurance capacity (i. e. maximum aerobic capacity) is inversely related to resting blood pressure. However, not all physical activities are associated with lower blood pressure levels; e.g. swimming, weight lifting and competitive cross-country skiing were found to be related to elevated blood pressure values in some studies. Population-based investigations reveal a trend towards lower blood pressure values in physically habitually active persons, with the difference between active and inactive subjects not exceeding 5 mmHg. Three epidemiological cohort studies have consistently demonstrated that sedentary, unfit persons have a 20 to 50% higher prospective risk of hypertension, as compared to exercising, physically fit persons. Some intervention studies with normotensive subjects show a reduction in resting blood pressure of 5 to 10 mmHg at best after several months of

aerobic training, while other studies show no effect. At least two factors could be responsible for these somewhat inconsistent observations: 1. exercise intensity may act as an 'effect modifier', since vigorous to maximally hard exercise rather increases than lowers resting blood pressure, 2. in statistical analysis on the effect of physical training on blood pressure, it is crucial whether concomitant changes in body weight and body composition are taken into account: any adjustment for changes in body composition will substantially reduce the magnitude of 'exercise-induced' reductions in blood pressure. (ABSTRACT TRUNCATED AT 250 WORDS).

Evidenzklasse: IV.

119. Massachusetts Medical Society Committee on Nutrition. Fast food fare: consumer guidelines. *N Eng J Med* 1990;321:752-5

Fast-food dining has been so well accepted that recommendations to reduce or eliminate it are likely to meet with little or no success. The more efficacious approach is to improve the nutritional quality of fast foods and the eating practices of its consumers. Fast-food chains should be regarded as one of many possible food sources, with advantages and limitations that must be considered within the context of one's total diet. For such considerations, consumers need to be educated about how to choose foods, especially when eating out. Health professionals should be able to provide some advice, but much more could be done by the fast-food establishments themselves. First, in addition to disclosing the protein and vitamin contents of their foods, fast-food restaurants should provide information on the number of calories and the levels of important minerals and fats (quantity and type), so that consumers can make informed choices. Second, they should provide printed menus for consumers wishing to restrict their intake of sodium, calories, or fats, indicating the best choices for such a meal. Third, they should expand their efforts to identify the nutrient contents of foods-for example, at salad bars. Fourth, they should make readily available such items as skim or low-fat milk, margarine, low-fat salad dressing, and 100 percent whole-grain buns, so that consumers will find it easier to make healthful choices. Finally, for the health of all of us, these important purveyors of food should work with experts to provide optimal nutrition for the public.

Evidenzklasse: IV.

120. McMurdo ME, Burnett L. Randomized controlled trial of exercise in the elderly. *Gerontology* 1992;38:292-8

Eighty-seven healthy volunteers aged 60-81 years were randomly allocated to either an aerobic exercise class or a health education group. Only 6 subjects dropped out during the 32-week study, and the average compliance with the interventions was 83% for exercise (on average 83/100 individual exercise sessions were attended) and 71% for health education. The health education group showed improvements from the baseline in physical activity levels, pulse rate, blood pressure and self-rating of mood. The exercise group improved from baseline in knee and spine flexibility, leg and back strength, pulse rate, blood pressure, maximum physical exertion levels, self-rating of mood and perceived health status. Between group comparison at the end of the study showed the exercise group significantly better than the health education group in terms of spine flexion ( $p = 0.0001$ ), perceived health status ( $p = 0.05$ ), life satisfaction ( $p = 0.05$ ) and maximal physical exertion ( $p = 0.01$ ). This study has demonstrated the acceptability and effectiveness of an aerobic exercise class for the elderly, and the effectiveness of health education for this age group.

Evidenzklasse: IIb.

121. Med Lett Drugs Ther. Dexfenfluramine for obesity. *Med Lett Drugs Ther* 1996;38(979):64-5  
Dexfenfluramine (Redux - Wyeth-Ayerst) has been approved by the US Food and Drug Administration as an aid to diet for treatment of obesity and maintenance of weight loss. Dexfenfluramine is the dextro-rotatory isomer of d, l-fenfluramine (Pondimin), which has been marketed for short-term weight reduction for many years and recently has been widely used in combination with phentamine (Ionamin, and others), a sympathomimetic drug.

Evidenzklasse: IV.

122. Meinders AE, Pijl H. Very low calorie diets and recently developed anti-obesity drugs for treating overweight in non-insulin dependent diabetics. *Int J Obes Relat Metab Disord* 1992;16(4):35-9

Weight reduction in non-insulin dependent diabetes mellitus (NIDDM) patients improves metabolic control, reduces cardiovascular risk factors, has blood pressure lowering effects and improves the well-being of the patient. This paper describes the role of very low calorie diets (VLCD), exercise, beta-adrenergic drugs and serotonergic agents in the treatment of overweight in NIDDM. VLCD reduce body weight and improve glucose metabolism. Physical exercise programmes in addition to dietary restriction substantially contribute to weight loss and metabolic control in NIDDM. New specific beta-adrenergic agents, exhibiting virtually no beta 1 or beta 2 activity, increase energy expenditure and weight loss probably by enhancement of the basal metabolic rate. The target tissue in humans of this beta-adrenergic effect is as yet unknown. These drugs seem to enhance weight loss when used in combination with (very) low calorie diets compared to dietary restriction alone. Serotonergic drugs reduce body weight by decreasing appetite, in particular for carbohydrates. Furthermore these drugs

seem to improve insulin receptor sensitivity.

Evidenzklasse: IV.

123. Meisler JD, St Jeor S. Summary and recommendations from the American Health Foundation's Expert Panel on Healthy Weight. *Am J Clin Nutr* 1996;63(suppl):474-7; kein Abstract, Evidenzklasse: IV.

124. Mikines KJ. The influence of physical activity and inactivity on insulin action and secretion in man. *Acta Physiol Scand Suppl* 1992;609:1-43

General considerations: Glucose is the most important fuel for oxidation in man as the central nervous system under ordinary conditions can only maintain metabolism from glucose supplied from plasma, and glucose is necessary for operation of Krebs cycle in all tissues. Therefore optimal regulation of glucose metabolism is of paramount importance. The present series of investigations have shown that there is a very close link between insulin action in the periphery and the glucose stimulated insulin response (fig. 14). The regulations are counterdirected and in most instances maintain glucose homeostasis. At first sight physical training induces a decreased glucose stimulated B-cell response which resembles the diabetic state. However, the decreased secretory capacity of the B-cell is accompanied by increased peripheral insulin sensitivity, and thus represent an appropriate adaptation. The studies have shown that this adaptive interrelationship between B-cell capacity and peripheral insulin sensitivity is present throughout a large span of levels of physical activity. The mechanism for the interrelationship is not known, but it has been shown that the same inverse interrelation between insulin sensitivity and B-cell secretion is present in other physiological conditions e.g. obesity (Polonsky et al.1988), fasting (Brady et al.1981; Bjorkman& Eriksson, 1985) and after dexamethazone treatment (Beard et al.1984).

Evidenzklasse: IV.

125. Monego ET, Peixoto MdR, Jardim PC, Sousa AL, Braga VL, Moura MF. Different therapies in the treatment of obesity in hypertensive patients. *Arq Bras Cardiol* 1996;66(6):343-7

PURPOSE: To evaluate the efficacy and tolerability of different therapies associated with diet in the treatment of hypertensive obese patients. METHODS: In a clinical study we randomly evaluated 39 hypertensive obese patients (body mass index (BMI) or = 30 kg/m<sup>2</sup>). After 45 days of diet the patients were again randomly distributed in 3 groups and received in double blind way: group 1-hypocaloric diet+placebo; group 2-hypocaloric diet+dexfenfluramine; group 3-hypocaloric diet +spiruline +fucus +gelatin. We followed their progress during 12 weeks under medication and further 24 weeks without. We evaluated the groups comparing: weight, BMI, blood pressure and side-effects. RESULTS: Twenty seven patients completed the observation. In those patients from groups 1 and 3 no changes in any of parameters were observed. In group 2 we observed a clear loss of weight (-3.8 Kg) and a fall in BMI. Blood Pressure changes were only observed in group 2 (-9.6%). The only patients to maintain weight loss after the termination of use of medicines were those from group 2. We did not observe any side-effects. CONCLUSION: In hypertensive obese patients, when isolated diet is not enough to control weight loss, dexfenfluramine could be useful in association with a controlled diet. The drug assists in weight loss, does not promote side-effects and does not interfere in the treatment of blood pressure.

Evidenzklasse: Ib.

126. Müller MJ. Obesity. *Internist (Berl)* 1996;37(1):101-18

Lernziel- Ziel dieser Weiterbildung ist es, den Leser eine differenzierte Sichtweise der Fettsucht, ihr klinisches Erscheinungsbild, das mit ihr verbundene Gesundheitsrisiko, ihre Ursachen und ihre Behandlung zu vermitteln, um ihm einen besseren (sprich erfolgreicherem ) Zugang zu der Prävention und der Behandlung der Adipositas zu ermöglichen.

Evidenzklasse: IV.

127. National Institute of Health Consensus Development Panel. Gastrointestinal surgery for severe obesity. NIH consensus conference. *Nutrition* 1996;12(6):397-402

The 1991 Consensus Development Panel was instrumental both in establishing criteria for selection of patients for surgical treatment and in recognition of operations that have been shown to be safe and reasonably effective in the long term. The Panel may have been premature in endorsement of any form of banded gastroplasty because the long-term weight loss results of these procedures are frequently disappointing. It seems likely that a consensus panel on the same subject would be worthwhile in the next decade to carefully evaluate such procedures as biliopancreatic bypass and the various laparoscopic techniques for gastric banding. In 1996 surgery remains the only effective treatment for patients with medically severe (morbid) obesity.

Evidenzklasse: IV.

128. National Task Force on the Prevention and Treatment of Obesity. Weight cycling. *Jama* 1994;272(15):1196-1202

OBJECTIVE--To address concerns about the effects of weight cycling and to provide guidance on the risk-to-benefit ratio of attempts at weight loss, given current scientific knowledge. DATA SOURCES--Original reports obtained through MEDLINE and psychological abstracts searches for 1966 through

1994 on weight cycling, "yo-yo dieting," and weight fluctuation, supplemented by a manual search of bibliographies. **STUDY SELECTION**--English-language articles that evaluated the effects of weight change or weight cycling on humans or animals. **DATA EXTRACTION**--Studies were reviewed by experts in the fields of nutrition, obesity, and epidemiology to evaluate study design and the validity of the authors' conclusions based on published data. **DATA SYNTHESIS**--The majority of studies do not support an adverse effect of weight cycling on metabolism. Many observational studies have shown an association between variation in body weight and increased morbidity and mortality. However, most of these studies did not examine intentional vs unintentional weight loss, nor were they designed to determine the effects of weight cycling in obese, as opposed to normal-weight, individuals. **CONCLUSIONS**--The currently available evidence is not sufficiently compelling to override the potential benefits of moderate weight loss in significantly obese patients. Therefore, obese individuals should not allow concerns about hazards of weight cycling to deter them from efforts to control their body weight. Although conclusive data regarding long-term health effects of weight cycling are lacking, nonobese individuals should attempt to maintain a stable weight. Obese individuals who undertake weight loss efforts should be ready to commit to lifelong changes in their behavioral patterns, diet, and physical activity.

Evidenzklasse: IV.

129. National Task Force on the Prevention and Treatment of Obesity. Long-term pharmacotherapy in the management of obesity. *Jama* 1996;276(23):1907-15

**OBJECTIVES:** To examine the rationale for long-term use of medications in the management of obesity, to provide an overview of published scientific information on their safety and efficacy, and to provide guidance to patients and practitioners regarding risks and benefits of treatment. **DATA SOURCES:** Original reports and reviews obtained through electronic database searches on anorexiants supplemented by a manual search of bibliographies. **STUDY SELECTION:** English-language articles that discussed the role of medications in the treatment of human obesity, and studies that evaluated their safety and efficacy for a minimum of 24 weeks. **DATA EXTRACTION:** Studies were reviewed by experts in the fields of nutrition, obesity, and eating disorders to evaluate study design and the validity of authors' conclusions. **DATA SYNTHESIS:** The long-term use of medications in the management of obesity is consistent with the current consensus that obesity responds poorly to short-term interventions. Net weight loss attributable to medication is modest, ranging from 2 to 10 kg, but patients taking active drug are more likely to lose 10% or more of initial body weight. Weight loss tends to reach a plateau by 6 months. Weight remains below baseline throughout treatment, although some studies show partial weight regain despite continued drug therapy. Most adverse effects are mild and self-limited, but rare serious outcomes have been reported. **CONCLUSIONS:** Pharmacotherapy for obesity, when combined with appropriate behavioral approaches to change diet and physical activity, helps some obese patients lose weight and maintain weight loss for at least 1 year. There is little justification for the short-term use of anorexiants, but few studies have evaluated their safety and efficacy for more than 1 year. Until more data are available, pharmacotherapy cannot be recommended for routine use in obese individuals, although it may be helpful in carefully selected patients.

Evidenzklasse: IV.

130. O'Brien WF. Weight control in women: a challenge to the obstetrician-gynecologist. *Obstet Gynecol* 1996;88(5):888-90

Obesity is a major problem in American women, and there is great concern with regard to weight control among both the obese and the nonobese. Vast sums of money are spent in the area of weight reduction, often with little or no benefit. Although obesity affects longevity adversely, weight loss has not been clearly associated with a decrease in mortality risk. Reduction in weight, however, can decrease risk factors for certain diseases and improve the quality of life. Current methods of weight control include diet, exercise, surgery, and medication. Several studies have shown that, in contrast to previous supposition, medical management should be long term. Recent investigations into the basic mechanisms of appetite control, moreover, suggest that more physiologic management methods will be available in the near future.

Evidenzklasse: IV.

131. O'Dea K. Marked improvement in carbohydrate and lipid metabolism in diabetic Australian Aborigines after temporary reversion to traditional lifestyle. 1984;33:596-603

**Summary** - The rationale for the present study was that temporarily reversing the urbanization process in diabetic Aborigines should improve all aspects of their carbohydrate and lipid metabolism that are linked to insulin resistance. Ten full-blood, diabetic Aborigines from the Mowanjum Community (Derby, Western Australia) agreed to be tested before and after living for 7 wk as hunter-gatherers in their traditional country in northwestern Australia. They were middle aged (53.9 ± 1.8 yr) and overweight (81.9 ± 3.4 kg), and all lost weight steadily over the 7wk period (average, 8 kg). A detailed analysis of food intake over 2 wk revealed a low-energy intake (1200 kcal/person/day). Despite the high contribution of animal food to the total energy intake (64%), the diet was low in total fat (13%) due to the very low fat

content of wild animals. Oral glucose tolerance tests (75 g glucose) were conducted in the urban setting and repeated at the end of 7 wk of traditional lifestyle. The marked improvement in glucose was due to both a fall in fasting glucose (11.6 ± 1.2 mM before, 6.6 ± 0.8 mM after) and an improvement in postprandial glucose clearance (incremental area under the glucose curve: 15.0 ± 1.2 mmol/L/h before, 11.7 ± 1.2 mmol/L/h after). Fasting plasma insulin concentration fell (23 ± 2 mU/L before, 12 ± 1 mU/L after) and the insulin response to glucose improved (incremental area under the insulin curve: 61 ± 18 mU/L/h before, 104 ± 21 mU/L/h after). The marked fall in fasting plasma triglycerides (4.0 ± 0.5 mM before, 1.2 ± 0.1 mM after) was due largely to the fall in VLDL triglyceride concentration (2.31 ± 0.31 mM before, 0.20 ± 0.03 mM after). In conclusion, the major metabolic abnormalities of type II diabetes were either greatly improved or completely normalized in this group of Aborigines by relatively short reversal of the urbanization process. At least three factors known to improve insulin sensitivity (weight loss, low-fat diet, and increased physical activity) were operating in this study and would have contributed to the metabolic changes observed.

Evidenzklasse: IIb.

132. Owen N, Bauman A, Booth M, Oldenburg B, Magnus P. Serial Mass-Media Campaigns to Promote Physical Activity: Reinforcing or Redundant. *Am J Public Health* 1995;85:244-8

Changes associated with two serial, nationwide, mass-media-based campaigns to promote physical activity conducted by the National Heart Foundation of Australia in 1990 and 1991 were examined. Surveys conducted before and after each campaign found statistically significant differences in message awareness (46% vs 71% in 1990; 63% vs 74% in 1991). In 1990, there were significant increases in walking, particularly among older people, and in intentions to exercise. No such changes were apparent in 1991. In the case of these two campaigns, conducted 1 year apart, the second may have been redundant.

Evidenzklasse: IIb.

133. Pekkarinen T, Takala I, Mustajoki P. Two year maintenance of weight loss after a VLCD and behavioural therapy for obesity: correlation to the scores of questionnaires measuring eating behaviour. *Int J Obes Relat Metab Disord* 1996;20(4):332-7

OBJECTIVE: To investigate changes in weight, Three Factor Eating Questionnaire and Binge eating scores during a two-year period from the start of a VLCD (Nutrilett) and behavioural modification therapy for obesity. DESIGN: Prospective study of a 17-weeks weight loss programme with one- and two-year follow-up visits. SUBJECTS: 62 healthy, overweight subjects without previous eating disorders. The mean (± SD) age 41 ± 8 years and BMI 36.4 ± 2.6 kg/m<sup>2</sup>. MAIN OUTCOME MEASURES: Weight loss, Binge eating scale, Bulimic Investigatory Test and Three Factor Eating Questionnaire before and after therapy and at 1 and 2 year control visits. RESULTS: The mean weight loss (± SD) at the end of the treatment was 14.9 ± 4.6 kg (n = 59) and at the two-year control 5.8 ± 7.6 kg (n = 57). After two years 20 (32%) patients had a weight loss of more than 10% (good result), 24 patients a weight loss of 0-10% of their initial weight (partial result) and 13 patients weighed more than before therapy (poor result). The mean binge eating, disinhibition and hunger scores decreased in all patients by the end of the therapy. At the end of two years these improvements in the scores were maintained in patients with a good result but the scores returned to the pretreatment levels in the patients with partial or poor result. The mean restraint scores increased in all patients after treatment and were maintained in those with a good or partial result. CONCLUSIONS: VLCD combined with behaviour modification is a useful mode of therapy for obesity with low drop-out rate and majority (71%) of patients below pretreatment weight at the two-year control. One third of the patients succeeded to maintain positive changes in the scores measuring eating behaviour which was associated with sustained weight loss.

Evidenzklasse: IIb.

134. Perry M. Treating obesity in people with learning disabilities. *Nurs Times* 1996;92(35):36-8

Obesity in people with learning disabilities should not be dismissed as untreatable. Such people have the same right to a healthy weight as the rest of the population. Equally, they should have the right to remain overweight if they so choose, provided their choice is an informed one. This paper reviews the reasons people with learning disabilities may become obese, addresses how this problem may be tackled and highlights some of the ethical issues involved in weight reduction for this client group.

Evidenzklasse: IV.

135. Pietilainen KH, Virtanen SM, Rissanen A, Rita H, Maenpaa J. Diet, obesity, and metabolic control in girls with insulin dependent diabetes mellitus. *Arch Dis Child* 1995;73(5):398-402

OBJECTIVE--To investigate whether girls with insulin dependent diabetes mellitus (IDDM) were more overweight than nondiabetic girls, and how diet, insulin treatment, metabolic control, age, and pubertal status were related to body weight and fat content. DESIGN--Case-control study. SUBJECTS AND METHODS--48 IDDM girls aged 10-19 years and controls matched for age and social class participated in the study. Overweight was assessed by body mass index (BMI), relative weight, and body fat from skinfold thicknesses. Food consumption data were collected by a 48 hour recall method. RE-

SULTS--The girls with IDDM were more overweight than control girls according to all measures of obesity (for example, mean BMI 20.3 v 18.9 kg/m<sup>2</sup>). The daily insulin dose/body weight correlated positively with BMI and per cent body fat. CONCLUSIONS--Girls with IDDM are more overweight than their peers, which indicates that a more effective prevention of obesity is needed in the treatment of diabetes.

Evidenzklasse: III.

136. Pi-Sunyer FX. Obesity: advances in understanding and treatment. IBC's Second Annual International Symposium on Obesity: Advances in Understanding and Treatment. Washington, DC, USA, 4-6 March 1996. *Mol Med Today* 1996;2(10):410-1

Obesity is a growing health problem worldwide. Prevalence rates in Europe, the USA, Canada and Australia, as well as countries in South America, Africa and Asia have risen steeply in the past two decades. This symposium addressed new advances in the understanding of the etiology of obesity and the efforts to find treatment solutions.

Evidenzklasse: IV.

137. Poppitt SD. Energy density of diets and obesity. *Int J Obes Relat Metab Disord* 1995;19(5):20-6

kein Abstract, Evidenzklasse: IV.

138. Prentice AM, Goldberg GR, Murgatroyd PR, Cole TJ. Physical activity and obesity: problems in correcting expenditure for body size. *Int J Obes Relat Metab Disord* 1996;20(7):688-91

OBJECTIVE: To explore the best method of adjusting energy expended on physical activity (AEE) for differences in body size. Many publications have expressed AEE per kg body weight (i.e. using weight 1.0 as denominator). This makes the unjustified assumption that all activities are weight-dependent.

DESIGN: Retrospective analysis of data from ninety-two 24-h whole-body calorimetry measurements in women, and 574 doubly-labelled water measurements in men and women to calculate the optimal exponents of body weight for adjusting AEE. RESULTS: The analysis proved that weight 1.0 over-corrects for size differences and yields invalid conclusions about relationships between physical activity and obesity. An exponent close to 0.5 is more appropriate for sedentary lifestyles. However the correct exponent is itself dependent on the relative mix of weight-dependent and non-weight-dependent activities undertaken. CONCLUSION: We conclude that it is impossible to recommend a generalizable coefficient for adjusting AEE, and that great caution must be exercised when interpreting AEE data from individuals of markedly different body sizes.

Evidenzklasse: III.

139. Puska P, Iacono JM, Nissinen A, Vartiainen E, Dougherty R, Pietinen P. Dietary fat and blood pressure: an intervention study on the effects of a low-fat diet with two levels of polyunsaturated fat. *Prev Med* 1985;14:573-84

The role of dietary fat in human blood pressure control was studied among 84 middle-aged subjects (mainly couples) in two semi-rural communities in North Karelia, Finland. The families were randomly allocated into two groups that, after a baseline period of two weeks, changed their diet for a 12-week intervention period so that the proportion of energy derived from fats was similarly reduced in both groups, from 38 to 24 %, but the polyunsaturated/saturated fatty acid (P/S) ratio was increased - from 0.2 to 0.9 in group I and to 0.4 in group II. After the intervention period both groups switched back to their usual diet for a period of five weeks. During the intervention period, total serum cholesterol was reduced by 16% in group I and 14 % in group II. Mean body weight and urinary sodium, potassium, calcium, and magnesium excretion changes were small or nonexistent. Mean systolic blood pressure decreased 4 mmHg in group I (  $p < 0.01$ ) and 3 mmHg in group II (  $p < 0.01$ ), and mean diastolic blood pressure decreased 5 mmHg (  $p < 0.001$ ) and 4 mmHg (  $p < 0.01$ ), respectively. The reductions were reversed during the switch-back period (  $p < 0.01$ ). These results confirm previous findings of the blood-pressure-reducing effect of a low-fat/high- P/S diet. Although a number of possible confounding factors can be ruled out, the dietary constituent accounting for blood pressure change cannot be ascertained definitely. The results showed no significant further blood pressure reduction with more than a moderately increased P/S ratio when the saturated fat intake was markedly reduced.

Evidenzklasse: Ib.

140. Rand CS, Stunkard AJ. Obesity and psychoanalysis: treatment and four-year follow-up. *Am J Psychiatry* 1983;140:1140-4

Psychoanalysts provided information about 84 obese patients and 63 patients of normal weight at the beginning of this study, 18 months later, and 4 years later. Treatment lasted from 3 to more than 7 years. Although obesity was the chief complaint of only 6% of the obese patients, their weight loss and maintenance of it compared favorably with results reported for other psychological treatments for obesity. Severe body image disparagement was present in 39% of the obese patients at the beginning of treatment but in only 18% at the 4-year follow-up. Most patients improved in their chief complaint and presenting symptoms. The study indicates that large-scale collaborative research in psychoanalysis is feasible.

Evidenzklasse: IIb.

141. Resnicow K. School-based obesity prevention: Population versus high risk interventions. *Ann NY Acad Sci* 1993;699:154-166; kein Abstract, Evidenzklasse: IV.

142. Richards RJ, Thakur V, Reisin E. Obesity-related hypertension: its physiological basis and pharmacological approaches to its treatment. *J Hum Hypertens* 1996;10(3):59-64

Obesity-related hypertension is a common pathological disorder that can occur at any age and in any sex or race. Some of the metabolic, endocrinologic, adrenergic, and hemodynamic changes associated with this condition are reversed, in part, by weight reduction, which coincidentally decreases blood pressure (BP) in obese hypertensive patients. However, a major problem for obese hypertensives is dietary noncompliance. Consequently, a pharmacologic approach to obesity-related hypertension that meets the specific requirements of this complex pathological condition should be recommended when the initial nonpharmacological approach fails. Diuretics and beta-adrenergic blocking agents have been shown to be effective in decreasing BP in obese hypertensives, but they also decrease insulin sensitivity and increase cholesterol and lipoprotein concentrations. Calcium channel blockers, alpha 1-adrenoreceptor blocking, and angiotensin-converting enzyme inhibitor agents may offer an efficient and safe antihypertensive approach in obese hypertensive patients.

Evidenzklasse: IV.

143. Rippe JM. Overweight and health: communications challenges and opportunities. *Am J Clin Nutr* 1996;63(3 Suppl):470-3

Overweight is associated with multiple adverse health consequences, many of which have been addressed by the experts participating in this Roundtable on Healthy Weight organized by the American Health Foundation. While research and vigorous debate continue on the etiology, treatment, and prevention of obesity, health care professionals face a crucial challenge: effectively communicating current knowledge of the links between overweight and adverse health outcomes. Communications challenges that must be overcome include the clutter of diverse messages, distrust of experts, the anti-diet movement, public confusion, and misunderstandings about scientific reports. An effective communications strategy needs to focus on simple, friendly messages that are consistent with scientific evidence yet understandable to individuals in ways that promote acknowledgment of personal responsibility and promote action.

Evidenzklasse: IV.

144. Riva G. The role of emotional and socio-cognitive patterns in obesity: eating attitudes in obese adolescents before and after a dietary-behavioural therapy. *Psychol Rep* 1996;79(1):35-46

The aim was to examine attitudes towards eating in a group of obese and nonobese female adolescents (N = 200), in particular whether obese subjects have characteristic attitudinal patterns associated with obesity. Analysis concluded that our sample, both overweight and normal subjects, share the negative stereotypic attitudes towards obese persons. However, there was a considerable difference in emotional evaluation of eating behaviour. If normal subjects attribute a strong negative emotional connotation, obese subjects not only did not recognise the "abnormality" of overeating, but preferred it. This can be explained by the presence of an association of strength and power with overeating: at the moment of eating, obese subjects feel themselves "strong" and even "superior," thereby compensating for their rather weak and fragile personalities. The emotional evaluation of eating behavior did not change after a 10-week dietary/behavioural treatment.

Evidenzklasse: IIb.

145. Robison JI, Rogers MA. Adherence to exercise programmes. Recommendations. *Sports Med* 1994;17:39-52

Despite the widespread dissemination of information concerning the negative health consequences associated with sedentary living, adult physical activity in many industrialised nations remains well below recommended levels. Approximately 50% of individuals who start an aerobic exercise programme will stop within the first 6 months, even though it is well known that to obtain the health benefits associated with physical activity, participation must be maintained. Programmes involving the use of behaviour management techniques appear to increase short term adherence to exercise. Recently, an adherence rate of greater than 95% over 6 months was achieved in a large group of university employees who participated in aerobic training using a 'behavioural treatment packages' approach. Unfortunately, inconsistencies in the literature on definitions and measurement of adherence make valid comparisons among studies difficult. Also, long term follow-up of behavioural intervention methods and their effect on exercise adherence is generally lacking. It is likely that strategies to increase physical activity participation in the general population will demand multiple levels of intervention (personal, organisational, environmental and societal) if they are to succeed in the long term.

Evidenzklasse: IV.

146. Rollnick S. Behaviour change in practice: targeting individuals. *Int J Obes Relat Metab Disord* 1996;20(1):22-6

This paper describes the emergence of motivational interviewing in the addictions field, and the development of broader negotiating methods for use in medical consultations about behaviour change. It is

argued that much of this material should be relevant to the treatment of obesity in brief medical consultations. It should be possible to encourage patients to be much more active in the consultation, and for practitioners to avoid some of the pitfalls of ineffective advice-giving. Four potentially relevant clinical strategies are described.

Evidenzklasse: IV.

147. Rössner S. Long-term intervention strategies in obesity treatment. *Int J Obes Relat Metab Disord* 1995;19(Suppl 7):29-35

Obesity is a chronic condition, requiring long-term treatment. In addition to various combinations of diet, exercise and behavioural modifications, weight-reducing drugs will be useful in different situations. Weight loss expectations must be realistic. Drugs which control appetite, nutritional partitioning and thermogenesis may have various roles in different stages of the long-term treatment strategies. Combinations and intermittent regimens will probably result in optimal retained weight loss for the individual, but will be difficult to evaluate systematically.

Evidenzklasse: IV.

148. Rössner S, Barkeling B, Asp A, Flaten H, Fuglerud P. Effects of weight loss on single meal eating behaviour in obese subjects. *Int J Obes Relat Metab Disord* 1996;20(3):287-9

In 22 obese patients the eating pattern during a single meal as evaluated by the universal eating monitor VIKTOR was assessed after one year of treatment, initially with VLCD (Nutrilett) followed by combined long term diet, exercise and behavioural modification, underscoring the importance of appropriate meal habits. A mean weight loss from 117 to 101 kg was achieved. Before treatment a decelerated eating curve was found; after treatment this curve changed significantly towards a flatter and more linear shape.

Evidenzklasse: IIb.

149. Russell CM, Williamson DF, Byers T. Can the Year 2000 objective for reducing overweight in the United States be reached? A simulation study of the required changes in body weight. *Int J Obes Relat Metab Disord* 1995;19(3):149-53

AIM: The purpose of this analysis was to estimate the magnitude of weight change required in the six-year period between 1994 and the Year 2000 if Americans are to reach the Healthy People 2000 goal for reduction of overweight among those ages 20-74 to no more than 20% among all adults and no more than 30% among black women. Prevention of weight gain among the non-overweight is compared with that of weight loss among the overweight as strategies for reaching this goal. DESIGN: Data from the First National Health and Nutrition Examination Survey (NHANES I) and the Nutrition Examination Survey Epidemiologic Follow-up Study (NHEFS) were used to estimate 6-year weight change of persons aged 20 to 72 at the Year 2000. Men, white women, and black women were examined in addition to the overall population. Given a baseline prevalence of 24.7%, overweight in the year 2000 was projected for three simulated interventions: no weight gain among non-overweight persons (prevention-only), weight loss among overweight persons (weight-loss-only), and prevention-plus-weight-loss. In addition, the Year 2000 overweight prevalence was projected under different baseline prevalence scenarios of 26% and 34%. OUTCOME MEASURE: Prevalence of overweight; overweight determined by body mass index (  $\geq 27.3$  kg/m<sup>2</sup> for women and  $\geq 27.8$  kg/m<sup>2</sup> for men). RESULTS: Prevention-only was successful in reducing the overall prevalence of overweight from 24.7% to 20%. Weight-loss-only required a 5.3 kg weight loss to achieve the overall goal of 20% and 8.4 kg weight loss to achieve the goal within all three race-sex strata. Prevention-plus-weight-loss required only 3.8 kg of weight loss to achieve the goals within the three race-sex strata. Prevention-only was not successful in reducing the overall prevalence of overweight to 20% when the 26% and 34% baseline scenarios were used. Weight-loss-only required 6.3 and 11.2 kg; prevention-plus-weight-loss required 1.2 and 6.6 kg of weight loss using the 26% and 34% baselines, respectively. CONCLUSIONS: Prevention of weight gain among those who are not already overweight could achieve substantial changes in the prevalence of overweight, even in a 6-year time period. However, given the increasing trend in overweight, the Year 2000 goal for the reduction in prevalence of overweight will not be reached.

Evidenzklasse: III.

150. Sagar PM. Surgical treatment of morbid obesity. *Br J Surg* 1995;82(6):732-9

Morbid obesity significantly reduces life span and is associated with much co-morbid pathology. Diet, behavioural therapy and drug therapy are largely unsuccessful. Surgical treatment offers the best hope. This review summarizes the rationale for treatment and the available surgical options.

Evidenzklasse: IV.

151. Sanchez-Carracedo D, Saldana C, Domenech JM. Obesity, diet and restrained eating in a Mediterranean population. *Int J Obes Relat Metab Disord* 1996;20(10):943-50

OBJECTIVE: To evaluate links between obesity, gender and restrained eating in a representative sample of adolescents in Catalonia, Spain. DESIGN: Several surveys were conducted in which measurements were taken of a sample of adolescents living in the city of Barcelona. SUBJECTS: 610 subjects (57% girls and 43% boys) with ages ranging between 15-17, from 22 schools in Barcelona. MEA-



SUREMENTS: Weight, height, Body Mass Index (BMI) as measurement of obesity, subscale "Diet" of the Eating Attitudes Test (EAT) as measurement of concern for dieting, and subjects' negative or affirmative responses to the questions as to whether they were following a diet at the time of the study.

RESULTS: 15% of the sample was found to be obese (13.5% presented grade I obesity-BMI 25-29.9 kg/m<sup>2</sup>, 1.3% presented grade II obesity-BMI 30-40 kg/m<sup>2</sup>, 0.2% presented grade III obesity-BMI 40 kg/m<sup>2</sup>). Dieting has a strong influence on normal-weight female adolescent populations in Spain. Such girls are more concerned about dieting and are more likely to follow a diet independent of the extent to which they are overweight. Obese subjects are more likely to show greater concern for their diet and to be on a diet than those of normal-weight. The restrained behaviour observed in obese subjects is not related to the type of restraint evaluated using instruments such as the "Diet" subscale of the EAT.

CONCLUSION: Our results show a lower prevalence of obesity in Spain (a European sample) than in the United States. But the prevalence of obesity is not insignificant. It would appear that there is no linear relationship between the degree of excess weight and the restraint boundary. The prevalence of restrained eating behaviour among young adolescent girls in Spain is high. Given the dangers of such attitudes, it is becoming increasingly necessary to develop preventive programmes to combat them.

Evidenzklasse: III.

152. Saris WH. Exercise with or without dietary restriction and obesity treatment. *Int J Obes Relat Metab Disord* 1995;19(4):113-6

If short term weight loss is the main treatment objective, it is clear that exercise does not give any success. Dietary restriction can potentially induce much faster rates of weight loss. Adding exercise and especially weight training, to a diet-induced weight loss programme induces small improvements in the change in FFM/FM and possible RMR after a relatively long period. Exercise treatment alone is an option for longterm treatment with relatively small changes in body weight and body composition. Especially in obese subjects energy intake and expenditure compensation does not occur. Although it is not the scope of this review exercise seems to be the ideal option for successful maintenance of a reduced body weight.

Evidenzklasse: IV.

153. Saris WHM. *Physical Activity and Body Weight Regulation*, 1996; Buch, Evidenzklasse: IV.

154. Satellite Symposium. Obesity-Developing New Standards for Medical Intervention. Satellite symposium. Barcelona, 14 May 1996. *Fortschr Med Suppl* 1996;176:3-15, kein Abstract, Evidenzklasse: IV.

155. Segal KR. Exercise and thermogenesis in obesity. *Int J Obes Relat Metab Disord* 1995;19(4):80-7 kein Abstract, Evidenzklasse IV.

156. Seltzer CC, Mayer J. An effective weight control program in a public school system. *Am J Public Health* 1970;60:679-89

To deal with adult obesity, the authors propose to tackle the problem with obese children and adolescents when dietary habits are more capable of modification. In such young people, extreme physical inactivity is the focal point of the problem. An effective weight control program, comprising increased physical exercise, dietary education, and psychological support, can be introduced in a public school system. Various aspects are discussed.

Evidenzklasse: IV.

157. Siggaard R, Raben A, Astrup A. Weight loss during 12 week's ad libitum carbohydrate-rich diet in overweight and normal-weight subjects at a Danish work site. *Obes Res* 1996;4(4):347-56

The effect of 12 week's ad libitum carbohydrate-rich, low-fat diet on total body weight, lean body mass, and fat mass was studied in a group of healthy subjects at a Danish work-site (I) (n = 50, BMI = 28.4 +/- 0.7 kg/m<sup>2</sup>). Sixteen subjects served as controls (C) (BMI = 27.0 +/- 1.0 kg/m<sup>2</sup>). After 12 weeks the I subjects had decreased their fat intake from 39.0 +/- 1.1 energy-% (E%) to 28.0 +/- 1.2 E% and increased their carbohydrate intake from 46.0 +/- 1.1 E% to 56.4 +/- 1.1 E% (p 0.05 vs. C). Moreover, a significant loss of body weight (4.2 +/- 0.4 kg) and fat mass (4.4 +/- 0.6 kg) was observed in I (p 0.05 vs. C). The weight loss in I was not regained at 24 and 52 weeks' follow-up (82% of I participating) compared to baseline. The cost per kg lost weight amounted to \$14.7 / person. In conclusion, instructions at a work site in ad libitum intake of a carbohydrate-rich, low-fat diet resulted in a significant loss of body weight and fat mass in overweight and normal-weight subjects.

Evidenzklasse: IIb.

158. Strobel RJ, Rosen RC. Obesity and weight loss in obstructive sleep apnea: a critical review. *Sleep* 1996;19(2):104-15

Clinic-based and epidemiological studies demonstrate a strong association between obesity and obstructive sleep apnea. However, defining the causal relationship between excess body weight and sleep-disordered breathing remains difficult. Potential mechanisms to be considered include: (1) alterations in upper airway structure; (2) alterations in upper airway function; (3) alterations in the balance between ventilatory drive and load and (4) obesity-induced hypoxemia. Additional evidence for the role of obesity in obstructive sleep apnea comes from clinical studies of weight loss in patients with sleep-

disordered breathing. Significant weight loss has been reported in most studies, which has been associated with varying degrees of improvement in sleep-disordered breathing, oxygen hemoglobin saturation, sleep architecture and daytime performance. Surgical and nonsurgical approaches to weight loss have been evaluated, although most studies to date suffer from methodological limitations including lack of random assignment to treatment groups, confounding of treatment interventions, absence of untreated controls and lack of adequate follow-up assessment. Implications for research and clinical practice are discussed.

Evidenzklasse: IV.

159. Stubbs RJ, Ritz P, Coward WA, Prentice AM. Covert manipulation of the ratio of dietary fat to carbohydrate and energy density: effect on food intake and energy balance in free-living men eating ad-libitum. *Am J Clin Nutr* 1995;62:330-337

OBJECTIVE: High-fat, high energy-density (HF, HED) diets promote an increase in energy intakes relative to low-fat lower-energy density diets (LF, LED). This study examined whether HF diets promote higher levels of energy intake when isoenergetically dense (IE) relative to LF (high carbohydrate) diets, as predicted by glucostatic and glycogenostatic models for energy intake regulation. SUBJECTS: Six normal-weight healthy men [mean age (SD) = 37.33 (13.32 y) mean weight = 73.03 (5.14 kg), mean height = 1.80 (0.05 m)]. DESIGN: Six men were each studied three times (factorial design) during 14-d throughout which they had ad libitum access to one of three covertly-manipulated diets. The fat, carbohydrate (CHO) and protein in each diet (as % energy) were 20:68:12, [low-fat (LF)]; 40:48:12, [medium-fat (MF)]; 60:28:12 [high-fat (HF)], with 2-d maintenance (1.4 x BMR, MF) beforehand. Within each diet every item was of the same composition and offered as a 3-d rotating menu. MEASUREMENTS: Energy and nutrient intakes, body weight, subjective pleasantness and satisfaction of the food. RESULTS: Energy intakes were 10.69, 11.02 and 10.90 MJ/d on the LF, MF and HF diets respectively. The increase in energy intake that occurred in previous studies when the energy density of the diet was increased by addition of fat was not apparent when LF, MF and HF diets were of the same energy density. CONCLUSION: Neither carbohydrate nor fat intake were tightly regulated. These data do not support an entirely glucostatic or glycogenostatic model of food intake regulation.

Evidenzklasse: IIb.

160. Stunkard AJ. Current views on obesity. *Am J Med* 1996;100(2):230-6

Although the disorders associated with obesity have been extensively studied, little attention has been paid to the fact that obesity is itself a chronic disease. This misunderstanding of the nature of obesity has contributed to the stigmatization of obese persons and to the use of inappropriate or inadequate treatment regimens. Although the etiology of obesity is still unclear, genetic, metabolic, and social factors are all believed to play a role in its development and progression. Behavioral therapy, exercise, very-low-calorie diets, drug therapy, and surgery affect the treatment of obesity of differing levels of severity. The regaining of weight following treatments other than surgery is very frequent, in part because periods of weight loss are rarely followed by maintenance programs. An increasing awareness of the chronic, multifactorial nature of obesity will ideally lead to the development of new long-term treatment programs that are safe and effective. Such programs are urgently needed in light of new data that show that the prevalence of obesity is increasing in the United States, as much as 30% in the last decade.

Evidenzklasse: IV.

161. Suter PM, Gutzwiller F. Obesity. Various aspects in daily practice. *Schweiz Rundsch Med Prax* 1992;81(18):596-600

Overweight and obesity are the most often encountered disease conditions in general practice. Recent evidence of the importance of fat distribution is discussed. The basic therapeutic approach for the most effective therapy of obesity is probably the combination of a dietary (hypocaloric), a behavioral and a physical activity approach. In this general overview the physiologic background of abdominal obesity and some selected therapeutic implications are discussed.

Evidenzklasse: IV.

162. Svendsen OL, Hassager C, Christiansen C. Physical exercise as a supplement to diet. Effect on body composition, resting metabolic rate and cardiovascular risk factors in postmenopausal overweight women. *Ugeskr Laeger* 1994;156(41):6035-8

One hundred and twenty-one healthy, overweight, postmenopausal women were randomly assigned to three groups: controls (no intervention), a 4200 kJ/day diet, or 4200 kJ/day diet with combined aerobic and anaerobic exercise, for 12 weeks. One hundred and eighteen women completed the study. The loss of weight was similar in the two intervention groups, but compared with the diet-only group, the diet-plus-exercise group lost significantly more fat (7.8 vs 9.6 kg) and no lean tissue mass (1.2 vs 0.0 kg). The resting metabolic rate was increased in the diet-plus-exercise group as compared to the controls (11% vs 4%, p 0.009). The cardiovascular risk factors (serum lipids and lipoproteins (except high density lipoprotein), systolic blood pressure, and the waist-to-hip ratio) decreased significantly in both intervention groups, as compared to the controls. There were no consistent, major differences between

groups in changes in total body, spinal, or forearm bone mineral density. In conclusion, overweight postmenopausal women benefit from addition of combined aerobic and anaerobic exercise to an energy-restrictive diet.

Evidenzklasse: Ib.

163. Svendsen OL, Krotkiewski M, Hassager C, Christiansen C. Effects on muscle of dieting with or without exercise in overweight postmenopausal women. *J Appl Physiol* 1996;80(4):1365-70

The main aim of this study was to investigate the effect of an energy-restrictive, high-protein diet with or without exercise on muscle morphology and biochemistry. Moderately overweight postmenopausal women (49-58 yr, body mass index: 25-42 kg/m<sup>2</sup>) were randomly assigned to three groups for 12 wk of intervention; namely, a control group, a group on a 4.2 MJ/day diet, and a group on 4.2 MJ/day diet combined with aerobic and anaerobic exercise. Muscle morphology and biochemistry analysis were performed in 69 and 58 women, respectively. In contrast to the diet-only group, the diet-plus-exercise group significantly increased the muscle fiber areas by 20-25%, the number of capillaries per muscle fiber type I by approximately 20%, and the activities of citrate synthase by approximately 35% and hexokinase by approximately 20% (P 0.05). There were no statistically significant changes in any other muscle variable (P 0.05). The respiratory exchange ratio decreased in both intervention groups by 2-4% (P 0.01). It is concluded that 12-wk period of an energy-restrictive high-protein diet was not associated with major changes in muscle morphology or biochemistry. The addition of exercise to the diet led to an adaptive increase in muscle fiber areas and in the oxidative capacity of the muscles.

Evidenzklasse: Ib.

164. Tanaka K, Nakanishi T. Obesity as a risk factor for various diseases: necessity of lifestyle changes for healthy aging. *Appl Human Sci* 1996;15(4):139-48

Recent research observations indicate that obesity is a significant independent predictor of cardiovascular disease (particularly coronary heart disease and stroke). Aside from the metabolic abnormalities, there are severe social and psychological consequences of obesity. It is clear that obesity is associated, to a large extent, with lifestyle. There is no single best way to treat obesity. In general, the lifestyle therapies include behavioral modification, nutritional adjustments, and exercise conditioning. In treating obesity, the major emphasis is particularly placed upon decreasing energy intake and, to a lesser extent, upon increasing energy expenditure. However, food restriction induces a decline in resting energy expenditure which is related to the decline in body mass. Numerous reports indicate that, although decreasing energy intake is undoubtedly the most obvious and effective way to reduce fat, it also induces a significant amount of fat-free tissue loss. Regular exercise is a significant variable to consider in understanding and treating obesity, since it is the principal discretionary component of energy expenditure. In particular, aerobic exercise definitely plays an important role in preventing obesity in most persons. This article reviews the importance of lifestyle behaviors such as regular exercise and proper diet for prevention and maintenance of chronic diseases, along with definitions of some important words and multidimensional information regarding the epidemiology of obesity. Strategies for weight reduction are discussed.

Evidenzklasse: IV.

165. Taylor CB, Fortmann SP, Flora J, Kayman S, Barrett DC, Jatulis D, et al. Effect of long term Community Health Education on body mass index. *Am J Epidemiol* 1991;134:235-49

Being overweight is a risk factor for cardiovascular heart disease and other medical problems. The purpose of this study was to examine the effect of a community-wide cardiovascular risk reduction trial (the Stanford Five-City Project) on body mass index. In the Stanford Five-City Project, two treatment cities (n = 122,800) received a 6-year mass media and community organization cardiovascular risk reduction intervention. Changes in the treatment cities were compared with two control cities (n = 197,500) for changes in knowledge of risk factors, blood pressure, plasma cholesterol level, smoking rate, body mass index, and resting pulse rate after 5-1/3 years of the education program. Both cohort and cross-sectional (independent) samples were used in the study. In the independent surveys, subjects in the treatment communities gained significantly less weight than subjects in the control communities (0.57 kg compared with 1.25 kg) over 6 years. In the cohort, there were no significant overall differences. The study provides some evidence that a community health education program may help reduce weight gain over time, but more effective methods must be developed if this important risk factor is to be favorably affected in broad populations.

Evidenzklasse: IIb.

166. Tosetti C, Corinaldesi R, Stanghellini V, Pasquali R, Corbelli C, Zoccoli G, et al. Gastric emptying of solids in morbid obesity. *Int J Obes Relat Metab Disord* 1996;20(3):200-5

OBJECTIVE: To evaluate the effect of weight loss induced by dietetic treatment, with or without an intragastric balloon, on gastric emptying of obese subjects. SUBJECTS: 20 morbidly obese subjects (21-54 years, 45.3-58.0 kg/m<sup>2</sup>) and 20 healthy controls (21-56 years, 20.3-24.8 kg/m<sup>2</sup>). DESIGN: Parallel study of a 4 month, low calorie dietetic treatment with or without a 500 ml intragastric balloon. RESULTS: In basal conditions, obese subjects had accelerated gastric emptying as compared to

healthy controls. At the end of the dietetic treatment period, a significant decrease of body weight was obtained. Patients also showed a slowing of gastric emptying. Both the weight loss and the slowing of gastric emptying occurred irrespective of the presence or absence of the intragastric balloon. CONCLUSION: The present findings are compatible with the hypothesis that gastric emptying, food intake and body weight are integrated parameters in subjects with morbid obesity.

Evidenzklasse: IIb.

167. Troisi RJ, Heinold JW, Vokonas PS, Weiss ST. Cigarette smoking, dietary intake, and physical activity: effects on body fat distribution--the Normative Aging Study. *Am J Clin Nutr* 1991;53:1104-11. Studies have indicated that although smokers weigh less than nonsmokers, smokers have greater waist-to-hip circumference ratios after adjustment for age and body mass index (BMI). The purpose of this investigation was to determine whether factors associated with smoking, such as dietary intake, alcohol intake, and physical activity, modified or confounded the relationship between smoking and body fat distribution. The study used cross-sectional data for 765 men aged 43-85 y from the Normative Aging Study. Current smokers were found to have a greater amount of central adiposity, as represented by the abdomen-to-hip circumference ratio (abdomen-hip ratio), than did former smokers and people who never smoked after adjustment for age, BMI, dietary and alcohol intakes, and physical activity. Multiple-linear-regression analysis revealed that physical activity was negatively associated with and alcohol intake was positively associated with the abdomen-hip ratio. These results suggest a direct effect of smoking on body fat distribution, independent of other smoking-related behaviors.

Evidenzklasse: III.

168. Turner RC, Mann JI, Iceton G, Oakes S, Smith A, Moore J, et al. UK prospective study of therapies of maturity-onset diabetes. Effect of diet and sulphonyurea, insulin or biguanide therapy on fasting plasma glucose and body weight over a year. A multicentre study. *Diabetologia* 1983;24:404-11. A multi-centre, prospective randomised study of the therapy of maturity-onset diabetes has been started, and we report progress of the first 286 patients with 1-year follow-up. Newly presenting patients (aged 25-65 years inclusive) were initially treated by diet and divided into three categories. (1) Forty-one patients (14%) were 'primary diet failure' in that they continued to have symptoms or their fasting plasma glucose remained >15 mmol/l. Their therapy was allocated randomly to insulin, chlorpropamide or glibenclamide, and doses adjusted to try to maintain a fasting plasma glucose <6 mmol/l. Insulin produced a similar decrease in fasting plasma glucose to sulphonylurea therapy (median fasting plasma glucose fell from 15.4 to 8.0 mmol/l and from 15.5 to 8.6 mmol/l, respectively). (2) After 3-4 months diet, 161 patients (56%) were asymptomatic but had a fasting plasma glucose > 6 mmol/l. In the 'main randomisation' their therapy was allocated to diet only, or diet plus chlorpropamide, glibenclamide or a basal insulin supplement from ultralente insulin. On diet alone, fasting plasma glucose remained constant over 1-year follow-up (from 7.7 to 7.6 mmol/l), whereas it was reduced significantly by insulin (from 8.0 to 6.4 mmol/l), chlorpropamide (8.6 to 6.1 mmol/l) and glibenclamide (7.8 to 6.5 mmol/l). On diet alone, weight remained unchanged over 1 year but increased significantly on insulin, chlorpropamide or glibenclamide (median change ideal body weight +3.5%, +4% and +4%, respectively). Obese patients (> 20% over ideal weight) did not differ from normal weight diabetic subjects in either fasting plasma glucose or weight changes. Insulin therapy was associated with few hypoglycaemic episodes, with 8% of patients on ultralente insulin alone reporting an episode compared with 7% on chlorpropamide. Fifty-one patients (86%) randomised to insulin remain on it 1 year later. (3) After 3-4 months on diet, 84 patients (30%) after dieting had a fasting plasma glucose < 6 mmol/l. During the following year on diet alone 34 patients were less well controlled with a fasting plasma glucose > 6 mmol/l and were included in a 'delayed randomisation'. Thus 83% of all patients entered into the study had their therapy randomised by 1 year. Insulin and sulphonylurea therapy are equally effective in reducing glycaemia, and the study is being extended to determine if either therapy will prevent the complications of diabetes or have untoward long-term side effects.

Evidenzklasse: Ib.

169. Tweedle DEF. Surgical treatment for morbid obesity. *British Journal of Surgery* 1995;82:1701. Brief, Evidenzklasse: IV.

170. Upritchard JE, Ball MJ. Fat and calcium intake in women dieters. *Am J Clin Nutr* 1996;63(1):67-71. Low-fat diets are widely recommended to treat hyperlipidemia and obesity and to reduce the risk of coronary heart disease, but concern has been expressed that they may not provide adequate calcium. This study assessed the calcium intake of 247 women from Otago, New Zealand aged 50-65 y consuming a variety of diets. Calcium intake was not reduced in women consuming a lipid-lowering or weight-reducing diet compared with nondieters. Intake was also similar in women consuming 25 - 30%, or 33% of energy from fat, indicating that calcium intake is not specifically compromised in a low-fat diet. The mean calcium intake of 754 mg/d was, however, below that recommended, with 80% of women receiving 1000 mg Ca/d and one-third 600 mg. Thus, most women need to increase their calcium intake irrespective of dietary energy and fat intakes.

Evidenzklasse: III.

171. Vajro P, Fontanella A PC, Orso G, Tedesco M, de Vincenzo A. Persistent hyperaminotransferemia resolving after weight loss in obese children. *Pediatr* 1994;25(2):239-41  
 Nine obese children were referred to our liver disease unit of asymptomatic, long-standing (range, 4 to 49 months) hypertaminotransferase, i.e., of unknown origin. Ultrasonography showed a "bright" liver in most patients. A hypocaloric diet was prescribed, and the hepatic abnormalities of the compliant patients showed a prompt and persistent improvement that paralleled the loss of excess weight.  
 Evidenzklasse: III.
172. Van Gaal LF. Verbesserung kardiovaskulärer Risikofaktoren durch mäßiggradige Gewichtsreduktion. *Fortschr Med* 1996;114(Suppl 176):6-7  
 kein Abstract, Evidenzklasse: IV.
173. Wadden TA, Foster GD. *Behavioural assessment and treatment of markedly obese patients*. New York: Guilford Press, 1992; Buch, Evidenzklasse: IV.
174. Wadden TA, Foster GD, Letizia KA. One-year behavioral treatment of obesity: comparison of moderate and severe caloric restriction and the effects of maintenance therapy. *J Consult Clin Psychol* 1994;62:165-71  
 This study compared the weight losses of 49 obese women randomly assigned to a 52-week behavioral program combined with either moderate or severe caloric restriction. Subjects in the balanced deficit diet (BDD) condition were prescribed a 1,200-kcal/day diet throughout treatment, and those in the very-low-calorie diet (VLCD) condition were given a 420-kcal/day liquid diet for 16 weeks and a 1,200-kcal/day diet thereafter. The VLCD subjects lost significantly more weight than the BDD subjects at all periods through Week 26, at which time mean losses were 21.45 and 11.86 kg, respectively. VLCD subjects, however, regained weight during the next 26 weeks of weekly therapy and during a 26-week weight maintenance program that provided biweekly meetings. Mean weight losses at the end of the maintenance program were 10.94 and 12.18 kg, respectively. Reports of binge eating declined in both groups, and no relationship was observed between binge eating and weight loss or attrition.  
 Evidenzklasse: IIb.
175. Watkins PJ. Guidelines for good practice in the diagnosis and treatment of non-insulin-dependent diabetes mellitus. Report of a Joint Working Party of the British Diabetic Association. *Journal of the Royal College of Physicians of London* 1993;27(3):259-266  
 The guidelines were prepared by a working party of physicians, general practitioners, specialist nurses, public health physicians, an economist, and a patient. They should be of value in establishing locally agreed guidelines. Non-insulin-dependent diabetes (NIDDM) affects more than 1% of the population, and 70-80% of all people with diabetes have this form of disorder. Care of these patients by general practitioners is rapidly increasing and perhaps the majority will, at least in the early stages, be treated in primary care. The working party encourages the formation of district diabetes committees involving both general practitioners and hospital specialists to support and maintain the best standards of diabetes care.  
 Evidenzklasse: IV.
176. Wechsler JG. Conservative therapy of obesity. *Zentralbl Chir* 1996;121(5):358-62  
 The essentials of conservative treatment of obesity are supervision by a physician, psychological advice, nutritional information and physical activity. A very successful therapy of massively obese is induced by modified fasting. Drugs should be used only as an adjunct to the diet and should be prescribed only for a limited time period.  
 Evidenzklasse: IV.
177. Westerterp KR, Meijer GL, Schoffelen, Janssen EME. Body mass, body composition and sleeping metabolic rate before, during and after endurance training. *Eur J App Physiol* 1994;69:203-8  
 Metabolic rate, more specifically resting metabolic rate (RMR) or sleeping metabolic rate (SMR), of an adult subject is usually expressed as a function of the fat-free mass (FFM). Chronic exercise is thought to increase FFM and thus to increase RMR and SMR. We determined body mass (BM), body composition, and SMR before, during, and after an endurance training programme without interfering with energy intake. The subjects were 11 women and 12 men, aged 37 (SD 3) years and body mass index 22.3 (SD 1.5) kg.m<sup>-2</sup>. The endurance training prepared subjects to run a half marathon competition after 44 weeks. The SMR was measured overnight in a respiration chamber. Body composition was measured by hydrostatic weighing. Measurements were performed at 0, 8, 20, 40, and 90 weeks after the start of the training. The BM had decreased from a mean value of 66.6 (SD 6.9) to 65.6 (SD 6.7) kg (P 0.01), fat mass (FM) had decreased from 17.1 (SD 3.9) to 13.5 (SD 3.6) kg (P 0.001), and FFM had increased from 49.5 (SD 7.3) to 52.2 (SD 7.6) kg (P 0.001) at 40 weeks. Mean SMR before and after 40 weeks training was 6.5 (SD 0.7) and 6.2 (SD 0.6) MJ.day<sup>-1</sup> (P 0.05). The decrease in SMR was related to the decrease in BM (r = 0.62, P = 0.001). At 90 weeks, when most subjects had not trained for nearly a year, BM and SMR were not significantly different from the initial value while FM and FFM had not changed since week 40 of training.(ABSTRACT TRUNCATED AT 250 WORDS).  
 Evidenzklasse: IIb.

178. Wilson GT. Behavioral Treatment of Childhood Obesity: Theoretical and Practical Implications. *Health Psychol* 1994;13:371-2

The impressive 10-year success of behavioral treatment of childhood obesity stands in marked contrast to the disappointing long-term results obtained with obese adults. It may be easier to teach children healthy eating and activity habits. Parents also regulate access to food, thereby reducing the importance of self-control. Whether treatment of childhood obesity affects the later development of an eating disorder is a question that calls for future research.

Evidenzklasse: IV.

179. Wing RR. Changing diet and exercise behaviours in individuals at risk of weight gain. *Obesity Res* 1995;3(suppl 2):277-282

To date, there have been very few studies on the primary prevention of obesity and/or weight gain. This paper identifies three time periods that might be appropriate for such efforts at weight gain prevention--the 25 to 35 year age window, the perimenopausal period, and the year following successful weight loss. Research is encouraged that compares these three time periods and various intervention strategies. Several different approaches to primary prevention are identified, including group treatment programs with weekly meetings vs. less intensive, community-based interventions; focusing on those who are currently at ideal body weight vs. including those who are overweight as well; and targeting weight gain prevention per se vs. attempting to produce modest weight losses and/or modify cardiovascular risk factors. This paper suggests that primary prevention efforts should include exercise, changes in quality and quantity of food consumed, behavior modification, and some degree of therapist contact, but the manner in which these changes should be implemented to produce long-term habit change remains unclear.

Evidenzklasse: IV.

180. Wing RR, Jeffrey RW, Burton LR, Thorson C, Sperber Nissinoff K, Baxter JE. Food provision vs structured meal plans in the behavioural treatment of obesity. *Int J Obes* 1996;20:56-62

Objective: Providing overweight patients with the food they should eat has been shown to significantly improve weight loss in a behavioral treatment program. The objective of this study was to examine the contribution of three components of food provision to these positive effects: the specific meal plans indicating what foods should be eaten at each meal; the food itself; and the fact that the food was provided free. Subjects: 163 overweight women. Design: Randomized, controlled study with subjects assigned to one of four conditions: (1) A standard behavioral treatment program (SBT) with weekly meetings for 6 months; (2) SBT plus structured meal plans and grocery lists; (3) SBT plus meal plans plus food provision, with subjects sharing the costs; or (4) SBT plus meal plans plus free food provision.

Results: Subjects in group 1 lost significantly less weight than subjects in groups 2 - 4 at the end of the six month program (- 8.0 kg vs - 12.0, - 11.7 and -11.4 kg, respectively) and at follow-up one year later (- 3.3 kg vs - 6.9, -7.5 and - 6.6 kg respectively). No significant differences were seen in weight loss between groups 2 - 4, suggesting that the component of food provision that is responsible for its success is the provision of highly structured meal plans and grocery lists. Subjects receiving meal plans were more likely to exhibit an eating pattern of three meals/day, had more definite plans regarding what to eat and reported more favorable changes in foods stored in their homes and in perceived barriers to weight loss. Conclusions: Providing structured meal plans and grocery lists improves outcome in a behavioral weight control program; no further benefit is seen by actually giving food to patients.

Evidenzklasse: Ib.

181. Winick M. Understanding and treating obesity. *Am J Public Health* 1996;86(7):925-6; Kommentar, Evidenzklasse: IV.

182. Wirth A. Non-pharmacological therapy of metabolic syndrome. *Herz* 1995;20(1):56-69

The metabolic syndrome usually goes along with abdominal obesity: diabetes type II, hypertension, dyslipidemia, and gout are often associated. The common characteristic is the resistance to insulin action. Reasons for the metabolic syndrome are--besides a genetic determination--overnutrition, physical inactivity, and alcohol consumption. Therefore, a causal therapy aims at the elimination of these factors. Consequently, the non-pharmacological therapy of the metabolic syndrome should be emphasized. The most important treatment is the reduction of body weight in the presence of obesity which is relevant for almost 90% of the patients. Body weight can rapidly be diminished by hypocaloric diets. Both, conventional reducing diets or formula diets may be used for weight reduction. Total fasting should not be performed for several reasons. For minor weight reduction or weight maintenance following a period of rapid weight loss with a hypocaloric diet, increased physical activity also lowers weight or prevents relapsing. Aims of therapeutical procedures are the elimination or amelioration of insulin resistance and subsequently the diseases of the metabolic syndrome. Both methods, reducing diet and physical training, act on various factors related to insulin resistance. For example, hypocaloric diets activate thyroxine kinase of the insulin receptor and reduce glucose and insulin in plasma. Physical training reduces not only insulin and glucose in plasma but also free fatty acids in addition and increases capillary density in skeletal muscle. Using the glucose clamp technique, diets and training are

equally effective in improving glucose metabolism. Compared to these non-pharmacological methods drugs are less convincing. Since the non-pharmacological treatment implies behavioral changes with regard to nutrition, physical activity and alcohol consumption, simple instructions are not sufficient. Usually long-lasting changes in life style are necessary in order to achieve health improvement. Therefore, health care programs on individual or social basis are required in order to improve nutrition and increase physical activity. However, long-acting effects are difficult to achieve in adults; more promising is the prevention of insulin resistance.

Evidenzklasse: IV.

183. Wirth A, Hauner H. Obesity. *Internist (Berl)* 1996;37(6):647-52; Brief, Evidenzklasse: IV.

184. Woo R, Garrow JS, Pi-Sunyer FX. Effects of exercise on spontaneous caloric intake in obesity. *Am J Clin Nutr* 1982;36:470-77

The effect of increased physical activity on energy intake and balance was investigated in six obese women (mean 167% above ideal body weight) voluntarily hospitalised for metabolic balance studies. Three 19-day treatments - one sedentary and two with treadmill exercise which increased daily expenditure to 110% (mild) and 125% (moderate) of sedentary expenditure - were imposed on each subject. Individual daily expenditure and ad libitum intake were determined by activity diaries and covert monitoring, respectively. Subjects selected and did not change an intake level which allowed for energy balance during the sedentary period only. Therefore, the difference between intake and expenditure between treatments was significantly different (sedentary 11, mild -114, and moderate - 369 kcal/day). The negative balance observed with mild and moderate exercise was obtained because while expenditure was raised with exercise, no compensatory increase in intake occurred. Moderate, realistic levels of activity did not regulate intake.

Evidenzklasse: IIb.

185. Woo R, Pi-Sunyer FX. Effect of increased physical activity on voluntary intake in lean women. *Metabolism* 1985;34:836-841

To determine the effect of exercise-related factors on food intake, five nonobese women (mean  $\pm$  SEM of the percent of desirable body weight.  $97 \pm 5$ ) were hospitalized as part of a metabolic experiment. Excess amounts of a mixed food diet were provided on platters to the subjects. They served themselves from these and ate freely. Intake was estimated covertly by weighing the platters before and after serving. Expenditure was monitored with daily activity diaries and indirect calorimetry determinations of all the activities recorded. After a five-day evaluation phase, each subject underwent three 19-day treatment periods in which physical activity was modified. Total daily expenditure was increased to  $114 \pm 4\%$  of the sedentary treatment for a mild exercise period and  $129 \pm 3\%$  for a moderate period. Corresponding voluntary intakes during exercise were  $117 \pm 5\%$  and  $122 \pm 6\%$  of sedentary treatment. Although moderate exercise (mean  $772 \pm 40$  kcal/d) was greater than mild ( $378 \pm 83$  kcal/d), the increased intake levels of the two were comparable. However, the resulting energy balances of  $10 \pm 71$  kcal/d for sedentary,  $64 \pm 43$  kcal/d for mild and  $-116 \pm 92$  kcal/d for moderate treatments were not different. Therefore, in a paradigm which permits maintenance of a voluntary balanced energy state during an inactive period, compensatory intake responses to exercise occur. Unlike obese women who do not match their intakes to energy expended as physical activity, nonobese women demonstrate hyperphagic responses.

Evidenzklasse: IIb.

186. Worsley A, Coonan W, Worsley A. The First Body Owner's Programme: An integrated school-based physical and nutrition education programme. *Health Promotion* 1987;2:39-49

The principal aim of the first Body Owner's programme was to compare and contrast the effects of behavioural self-monitoring and traditional health education strategies in the teaching of a combined physical and nutrition programme to ten-year-olds. Classes of children were randomly assigned (four classes to each treatment) to either (a) Control programme - 50 minutes daily physical education with an emphasis on endurance activities; or (b) Self-monitoring of physical and dietary behaviours plus daily physical education (PE) as in the control programme; or (c) Health education - two half-hour lessons per week devoted to a physical health and nutrition curriculum, plus daily PE; or (d) Combined self-monitoring and health education, plus daily PE. Four classes of ten-year olds which did not participate in the daily programme were included in a subsidiary group to enable the evaluation of the effects of daily physical education. The intervention lasted for approximately five months, before and after which seven groups of dependent variables were measured on each child. These included: biomedical and motor performance variables (e.g. body fat indices); dietary behaviours; food beliefs and attitudes; perceptions of common physical activities; ratings of relaxation and classroom behaviours; and self concepts and personal values. In the combined treatment, changes were observed in biomedical status (improved physical health), motor performance, and in behaviours and beliefs. Self-monitoring alone was associated with similar changes in biomedical variables and in behaviour variables, though these were generally less pronounced than in the combined treatment. Health education yielded effects mainly in the cognitive domain. The implications of the results for disease risk reduction and for health

education are outlined.

Evidenzklasse: Ib.

187. Yoshida T, Sakane N, Umekawa T, Sakai M, Takahashi T, Kondo M. Mutation of beta 3-adrenergic-receptor gene and response to treatment of obesity. *Lancet* 1995;346(8987):1433-4  
kein Abstract, Evidenzklasse: III.

188. Zuber J, Gromus B, Potreck-Rose F, Koch U. Differential indications for ambulatory group therapy of obesity--exemplified by "interdisciplinary therapy of obesity". *Psychother Psychosom Med Psychol* 1992;42(3-4):110-9

The article deals with reflections about the differential indication for out-patient group therapy treatment of patients suffering from a considerable overweight by the example of the "Interdisciplinary therapy of obesity". First the conception of the "Interdisciplinary therapy of obesity" is presented. Within the context of evaluation of the therapy program, especially the results of a long-term follow-up study and the special conditions for severely obese people are dealt with. Empirical results and clinical experiences build the foundations to work out differential indication criteria like therapy motivation, degree of overweight and degree of psychological strain. On this basis modifications of the therapy program are suggested in the form of three different kinds of treatment, taking into account the clinically different groups of obese people.

Evidenzklasse: IV.

#### 11.3.4. Zitierte und evaluierte Literatur (mit Abstracts)

1. Abenham L, Moride Y, Brenot F. Appetite-suppressant drugs and the risk of primary pulmonary hypertension. *N Engl J Med* 1996;335:609-16

Background: Recently in France, primary pulmonary hypertension developed in a cluster of patients exposed to derivatives of fenfluramine in appetite suppressants (anorexic agents), which are used for weight control. We investigated the potential role of anorexic agents and other suspected risk factors for primary pulmonary hypertension. Methods: In a case control study, we assessed 95 patients with primary pulmonary hypertension from 35 centers in France, Belgium, the United Kingdom, and the Netherlands and 355 controls recruited from general practices and matched to the patients' sex and age. Results: The use of anorexic drugs (mainly derivatives of fenfluramine) was associated with an increased risk of primary hypertension (odds ratio with any anorexic-drug use, 6.3; 95 percent confidence interval, 3.0 to 13.2). For the use of anorexic agents in the preceding year the odds ratio was 10.1 (95 percent confidence interval, 3.4 to 29.9). When anorexic drugs were used for a total of more than three months, the odds ratio was 23.1 (95 percent confidence interval, 6.9 to 77.7). We also confirmed an association with several previously identified risk factors: a family history of pulmonary hypertension, infection with the human immunodeficiency virus, cirrhosis, and use cocaine or intravenous drugs. Conclusions: The use of anorexic drugs was associated with the development of primary pulmonary hypertension. Active surveillance for this disease should be considered, particularly since the use of anorexic drugs is expected to increase in the near future.

Evidenzklasse: III.

2. Arzneimittelkommission der deutschen Ärzteschaft. Rückruf von Ponderax (Fenfluramin) und Isomeride (Dexfenfluramin). *Dt Arztebl* 1997;94:C-2063; Mitteilung, Evidenzklasse: IV.

3. Benotti PN, Forse RA. Safety and long-term efficacy of revisional surgery in severe obesity. *Am J Surg* 1996;172(3):232-5

BACKGROUND: A National Institutes of Health Consensus Conference in 1991 established gastric surgery as accepted therapy for the treatment of severe obesity. The increasing prevalence of obesity in the United States, and the increasing numbers of patients undergoing gastric surgery for severe obesity, result in substantial numbers of patients being considered for revisional surgery. The indications and efficacy of revisional surgery remain controversial. METHODS: Sixty-three patients were followed prospectively after undergoing revisional surgery for obesity between 1981 and 1994. All patients had previously undergone obesity operations. Weight data were recorded at the time of original obesity surgery, at revisional surgery, and at most current follow-up. Complications following revisional surgery were monitored. RESULTS: The follow-up in the group is 98%. Revisional surgery after obesity surgery was associated with a 0% mortality rate and a serious complication rate of 16%. Body mass index (BMI) at the time of original surgery was 50 +/- 10 kg/m<sup>2</sup>, at revisional surgery 39 + 9 kg/m<sup>2</sup>, and at recent follow-up 34 +/- 10 kg/m<sup>2</sup> (P 0.001 vs original BMI). Those patients whose original BMI was 50 kg/m<sup>2</sup> lost significantly more weight (P 0.0001) than those with an original BMI 50 kg/m<sup>2</sup>. CONCLUSIONS: Revisional gastric surgery is safe and does provide patients with the opportunity to achieve long-term weight control.

Evidenzklasse: IIa.



4. Blundell JE. Dietary fat and control of energy intake: evaluating the effects of fat on meal size and postmeal satiety. *Am J Clin Nutr* 1993;57:772-778

Three separate experiments in lean subjects confirmed that a 1.52 MJ (352 kcal) carbohydrate supplement at breakfast suppressed appetite 90 min later but had no effect on a test meal given after 270 min. A 1.52 MJ (362 kcal) fat supplement produced no detectable action on measures of appetite at any time point. Therefore, fat and carbohydrate do not have identical effects on the appetite profile. In a further study in obese subjects, a novel experimental design was used to assess the satiating efficiency and compensatory response of fat. Eating from a range of either high-fat or high-carbohydrate foods, obese subjects voluntarily consumed twice as much energy from the fat items, thereby indicating a weak action of fat on satiation. In turn, this large intake of fat exerted a disproportionately weak effect on satiety. These studies suggest that the appetite-control system may have only weak inhibitory mechanisms to prevent the passive overconsumption of dietary fat. The results indicate how this action could induce a positive energy balance and lead to a gradual upward drift in body mass index.

Evidenzklasse: III.

5. Bray G. Coherent, preventive and management strategies for obesity. The Origins and Consequences of Obesity. *Ciba Foundation Symposium* 1996c;201:228-254

The increased risk of morbidity and mortality from obesity, central body fat and weight gain, and the benefits of weight reduction argue that the cost associated with obesity could be beneficially affected by prevention of weight gain or induction of weight loss. Genetic, metabolic and demographic predictors of weight gain have been identified that allow the selection of high risk individuals. Among the metabolic predictors are a low metabolic rate, insulin sensitivity and a high respiratory quotient. Demographic predictors include current smokers, certain dieting behaviours, lower socioeconomic class, a low level of education, use of contraceptives, status post-partum and rapid weight gain in childhood. Several studies suggest that weight gain can be prevented. Targets for such strategies might be high risk families, current smokers, those who are planning to stop smoking and those with a low metabolic rate. For those who fail primary prevention, treatment may be appropriate. The greater the degree of excess weight, the greater the risk and the more appropriate treatment becomes to reduce body weight.

Evidenzklasse: IV.

6. Bray GA, Blackburn GL, Ferguson JM. Sibutramine - dose response and long-term efficacy in weight loss, a double-blind study. *Int J Obes* 1994;18(suppl 2):60.

Sibutramine (SIB), a monoamine reuptake inhibitor with a unique chemical structure and pharmacological profile has shown early promise as a weight loss agent. The primary objective of the present study was to evaluate the dose range and long-term efficacy of SIB when used as a weight loss agent in an obese healthy population. 1047 eligible patients were randomized to SIB 1, 5, 10, 15, 20, or 30 mg or placebo (PLA) and underwent treatment for 24 weeks. 683 patients (65%) completed the study and 1024 patients were evaluable for efficacy. Data presented below illustrate weight loss in the evaluable population by last observation carried forward analysis (LOCF). For the evaluable population mean weight loss achieved over 24 weeks was: PLA -0.9 kg; SIB1 -1.8 kg, SIB5 -3.1 kg; SIB10 -4.4 kg; SIB15 -5.3 kg; SIB20 -5.8 kg; SIB30 -6.5 kg. The 5-30 mg doses separated from PLA at both the week 12 and 24 time points ( $p < 0.001$ ). A dose response relationship for weight loss was clearly evident and examination of the mean log dose response curve suggests that the linear portion of the curve lies between 5 and 15 mg. The majority of mean weight loss occurred during the first 12 weeks of therapy and for the 5 mg dose is maintained out to 24 weeks. However, for the 10-30 mg groups continued mean weight loss is seen between 12 and 24 weeks. These data suggest that SIB in doses between 5 and 30 mg is effective for the long-term treatment of healthy obese patients and appears to be well-tolerated at all doses. Ongoing analysis of safety data may further define the dose range. Supported by a grant from Boots Pharmaceuticals.

Evidenzklasse: Ib.

7. Bremer JM, Scott RS, Lintott CJ. Dexfenfluramine reduces cardiovascular risk factors. *Int J Obes* 1994;18:199-205

This study investigated the potential for dexfenfluramine to improve biochemical and clinical risk factors for cardiovascular disease, in obese dyslipidaemic individuals. Dexfenfluramine, the dextro isomer of fenfluramine, has been shown to aid weight reduction and lower blood lipids in normal subjects, and to improve glucose tolerance and insulin sensitivity in subjects with diabetes mellitus. Twenty-nine overweight (mean weight 83.3 +/- 11.3 kg), hyperlipidaemic (mean total cholesterol 7.3 +/- 1.2 mol/l) subjects participated in a 12-week randomized double-blind parallel study of dexfenfluramine versus placebo. After an eight-week dietary run-in phase, subjects were randomised to treatment with either dexfenfluramine or placebo for 12 weeks. During the run-in, energy intakes fell in both groups (5.5% for dexfenfluramine, 5% for placebo, no significant difference between groups). Dietary composition improved, fat as a percentage of energy decreased (14%,  $P < 0.001$ , for dexfenfluramine; 11.7%,  $P < 0.05$ , for placebo), and carbohydrate increased (8.5%,  $P < 0.05$ , for dexfenfluramine; 5.6%, not significant, for

placebo). During the treatment period, energy intakes in the dexfenfluramine group were further reduced by 7.5%, whereas there was no change in the placebo group ( $P = 0.02$  between dexfenfluramine and placebo groups); however, nutrient composition remained constant for both groups. Side-effects were formally reported by 40% of subjects during the initial four weeks' treatment with dexfenfluramine with three subjects withdrawing from the study. Side-effects were largely resolved by week 4. Both groups lost weight similarly during the run-in but there were no significant changes in any biochemical parameters. (ABSTRACT TRUNCATED AT 250 WORDS).

Evidenzklasse: Ib.

8. Buemann B, Tremblay A. Effects of exercise training on abdominal obesity and related metabolic complications. *Sports Med* 1996;21(3):191-212

Excessive deposition of visceral adipose tissue is known to predispose to cardiovascular diseases. Considerable epidemiological and experimental evidence suggests that many physiological factors are involved in the aetiology of premature atherosclerosis associated with visceral obesity. Insulin resistance is frequently associated with abdominal obesity, and probably plays an important role in the pathophysiology of hypertriglyceridaemia, low levels of plasma high-density lipoprotein (HDL)-cholesterol, hypertension and reduced fibrinolytic activity. Exercise training may counteract the aberrant metabolic profile associated with abdominal obesity both directly and as a consequence of body fat loss. Exercise may increase insulin sensitivity, favourably alter the plasma lipoprotein profile and improve fibrinolytic activity. Changes in the activity of insulin-sensitive glucose transporters and of skeletal muscle lipoprotein lipase are some of the possible explanations for the increased insulin sensitivity and improved blood lipid profile associated with regular exercise. This review presents physical training as a relevant nonpharmacological tool in the treatment of abdominal obesity and associated metabolic disorders. The impact of regular exercise on the different aspects of the insulin resistance syndrome is discussed. The roles of gender, age and the state of insulin resistance on the metabolic effect of physical training are also considered.

Evidenzklasse: IV.

9. Bundesärztekammer, Deutsche Gesellschaft für Ernährung e.V. D, Zentralinstitut für die Kassenärztliche Versorgung in der BRD. *Gesund Essen, Leitlinien für die ärztliche Ernährungsberatung und Ernährungstherapie*. ISSN 0945-1951 ed. Köln: Bundesärztekammer, 1995; Buch, Evidenzklasse: IV.

10. Cannistra LB, Davis SM, Bauman AG. Valvular Heart Disease Associated with Dexfenfluramine. *New England J of Medicine* 1997;337(9):636; Brief, Evidenzklasse: IV.

11. Connolly HM, Crary JL, McGoan MD, Hensrud D, Edwards B, Edwards W, et al. Valvular Heart Disease Associated with Fenfluramine-Phentermine. *New England J of Medicine* 1997;337(9):581-88  
Background - Fenfluramine and phentermine have been individually approved as anorectic agents by the Food and Drug Administration (FDA). When used in combination the drugs may be just as effective as either drug alone, with the added advantages of the need for lower doses of each agent and perhaps fewer side effects. Although the combination has not been approved by the FDA, in 1996 the total number of prescriptions in the United States for fenfluramine and phentermine exceeded 18 million.  
Methods - We identified valvular heart disease in 24 women treated with fenfluramine-phentermine who had no history of cardiac disease. The women presented with cardiovascular symptoms or a heart murmur. As increasing numbers of these patients with similar clinical features were identified, there appeared to be an association between these features and fenfluramine-phentermine therapy. Results - Twenty-four women (mean [ $\pm$ SD] age, 44 $\pm$ 8 years) were evaluated 12.3 $\pm$ 7.1 months after the initiation of fenfluramine-phentermine therapy. Echocardiography demonstrated unusual valvular morphology and regurgitation in all patients. Both right-sided and left-sided heart valves were involved. Eight women also had newly documented pulmonary hypertension. To date, cardiac surgical intervention has been required in five patients. The heart valves had a glistening white appearance. Histopathological findings included plaque-like encasement of the leaflets and chordal structures with intact valve architecture. The histopathological features were identical to those seen in carcinoid or ergotamine-induced valve disease. Conclusions - These cases arouse concern that fenfluramine-phentermine therapy may be associated with valvular heart disease. Candidates for fenfluramine-phentermine therapy should be informed about serious potential adverse effects, including pulmonary hypertension and valvular heart disease

Evidenzklasse: IIb.

12. Cousins JH, Rubovits DS, Dunn JK, Reeves RS, Ramirez AG, Foreyt JP. Family versus individually orientated intervention for weight loss in Mexican American Women. *Pub Health Rep* 1992;107:549-55  
Mexican Americans are more likely to be obese than non-Hispanic whites, yet little research has been conducted on the treatment of obesity in Mexican Americans. The purpose of this study was to compare a family-based intervention with a traditional program oriented to the individual for achieving weight loss by obese Mexican American women. A total of 168 obese women were randomly assigned to one of three groups. Group 1 served as a comparison group and received only printed materials on nutrition, exercise, and behavioral principles of weight loss. Subjects in the individual group (group 2) recei-

ved the same printed information, but they also attended classes led by bilingual registered dietitians. Subjects in the family group (group 3) received materials and attended classes that emphasized a family-oriented approach to making changes in eating habits and exercise behavior. Spouses and children attended classes with subjects in this group. Results revealed a significant linear trend in both body mass index and weight reduction across the groups, with losses greatest in the family group, followed by the individual group, and at least in the comparison group. Both the individual and the family groups lost significantly more weight than the comparison group, although the difference between these two groups was not statistically significant. The results suggest that a culturally and linguistically appropriate program can achieve significant weight reduction among Mexican Americans. More research should be conducted on the effects of family and other types of social support on weight loss by Mexican Americans.

Evidenzklasse: Ib.

13. Curfman GB. Diet Pills Redux. *N Eng J Med* 1997;337:629-630; kein Abstract, Evidenzklasse: IV.

14. Dattilo AM, Kris-Etherton PM. Effects of weight reduction on blood lipids and lipoproteins: a meta-analysis. *Am J Clin Nutr* 1992;56:320-8

Studies designed to examine effects of weight reduction by dieting on total cholesterol (TC), low-density-lipoprotein cholesterol (LDL-C), high-density-lipoprotein cholesterol (HDL-C), very-low-density-lipoprotein cholesterol (VLDL-C), and triglycerides (TGs) have reported inconsistent results. The purpose of this study was to quantify effects of weight loss by dieting on lipids and lipoproteins through the review method of meta-analysis. Results from the 70 studies analyzed indicated that weight reduction was associated with significant decreases ( $P \leq 0,001$ ) and correlations ( $P \leq 0,05$ ) for TC ( $r = 0,32$ ), LDL-C ( $r = 0,29$ ), VLDL-C ( $r = 0,38$ ), and TG ( $r = 0,32$ ). For every kilogram decrease in bodyweight, a 0.009-mmol/L increase ( $P \leq 0,01$ ) in HDL-C occurred for subjects at a stabilized, reduced weight and a 0.007-mmol/L decrease ( $P \leq 0,05$ ) for subjects actively losing weight. Our results indicate that weight reduction through dieting can be viable approach to help normalize plasma lipids in overweight individuals.

Evidenzklasse: IIb.

15. Davis K, Christoffel KK. Obesity in pre-school and school-age children: treatment early and often is best. *Arch Pediatr Adolesc Med* 1994;148:1257-61

Objective: To determine if timing and frequency of interventions affect the outcome of treatment of obesity in pediatric patients. Design: Retrospective chart review; comparison of subgroups defined by age and frequency of visits.

Setting: A nutrition evaluation clinic, an outpatient referred care clinic at a metropolitan hospital. Participants: All 93 obese children, aged 1 to 10 years, seen within 1 year and with one or more subsequent visits in the next year. Obesity was defined as greater than 120% ideal body weight for height age (IBWH). Mean percent IBWH was 171% (median, 199%; range, 127% to 251%). Interventions: (1) Initial visit. Comprehensive history and physical examination, by physician, registered dietician, and licensed clinical social worker; design of individualized care plan, including prescribed frequency and size of meals and snacks; and type, frequency, and duration of exercise. (2) Subsequent visits (after 1 month, then with frequency tailored to need). Review of progress, adjustment of energy intake and expenditure; management of biopsychosocial obstacles to needed changes. Measurements/ Main Results: Four patient groups were defined by two variables: age (pre-school vs school-age children) and frequency of visits in 1 year (two to three vs four or more) Groups were compared on change in mean percent IBWH and on mean change in percent IBWH. All groups showed significant change in percent IBWH ( $P \leq 0,040$  for school-age children,  $P \leq 0,012$  for pre-school children). For all visits, the mean change was more than twice as great for pre-school as for school-age children ( $4,7 \pm 5,4$  vs  $1,9 \pm 4,8$ ,  $P = 0,027$ ). Conclusions (1) The most successful treatment of preadolescent obesity may be in pre-school children with frequent visits. (2) A randomized trial is warranted to test this possibility. (3) Many of the techniques used to treat early obesity can be adapted for prevention and intervention in early obesity during the preschool years, and this is the preferred approach.

Evidenzklasse: IIb.

16. Deutsche Adipositas-Gesellschaft. Richtlinien zur Therapie der Adipositas. *Adipositas* 1995;9:7-10  
Aufgrund ihres häufigen Vorkommens stellt die Adipositas eines der wichtigsten Gesundheitsprobleme in Deutschland dar. Die jährlichen Kosten für die Behandlung der Adipositas und ihrer Folgen belaufen sich schätzungsweise auf ca. 30 Milliarden DM. Die Adipositas bedroht nicht nur zahlreiche Organfunktionen, sondern führt zu schwerwiegenden psychosozialen Problemen. Hauptursachen für die Entstehung der Adipositas sind sowohl gesundheitsschädigende Lebensgewohnheiten (Über- und Fehlernährung, Bewegungsmangel) als auch genetische Faktoren. Die folgenden Ausführungen beziehen sich ausschließlich auf die Adipositas bei Erwachsenen. Für Kinder und Jugendliche müssen andere Richtlinien zugrundegelegt werden. Schlußfolgerung: Die Adipositas ist eine chronische Erkrankung, die ein individuelles und langfristiges Therapiekonzept erfordert. Diätetische Maßnahmen, Bewegungs- und Verhaltenstherapie sind parallel anzuwendende Behandlungsverfahren, die nicht nur

die Lebensqualität, sondern auch die Lebenserwartung verbessern können. Bei Extremformen kann ein operatives Vorgehen indiziert sein.

Evidenzklasse: IV.

17. Dietz WH. Therapeutic strategies in childhood obesity. *Horm Res* 1993;39(suppl 3):86-90. Childhood obesity leads to approximately 30% of adult obesity. However, the natural history of childhood obesity that persists into adulthood suggests that the obese child who becomes an obese adult will have more severe adult obesity than adults whose obesity began in adulthood. Therefore, to the extent that the severity of obesity predicts morbidity, persistence of childhood obesity may be expected to account for a disproportionate share of the adult sequelae of obesity. Fifty-year follow-up studies of a cohort with adolescent obesity have demonstrated that the mortality and morbidity of cardiovascular disease was significantly increased compared with a cohort that was lean throughout adolescence. Furthermore, the effect of adolescent obesity on adult morbidity and mortality appeared independent of the effects of adolescent obesity on adult weight status. Because truncal fat is deposited during adolescence, adolescent onset obesity may entrain both adult obesity and the effects of adolescent onset obesity on mortality and morbidity. These observations suggest that successful treatment of childhood and adolescent obesity is an effective approach to the prevention of severe adult disease. Recently, follow-up of children treated with diet, exercise and behaviour modification showed significantly lower weights 10 years later than children treated in other ways (p 0.01). These and other family-based treatments appear to be the most appropriate approaches to the treatment of childhood obesity. However, the prevalence of childhood and adolescent obesity suggests that even the most successful treatment may be of limited benefit if it relies on the traditional medical model (doctor/patient interaction).(ABSTRACT TRUNCATED AT 250 WORDS).

Evidenzklasse: IV.

18. Drent ML, Larsson I, William-Olsson T, Quaade F, Czubyko F, von Bergmann K, et al. Orlistat (Ro 18-0647), a lipase inhibitor, in the treatment of human obesity: a multiple dose study. *Int J Obes* 1995;19:221-6

OBJECTIVE: To evaluate efficacy and tolerability of the lipase inhibitor Orlistat (RO 18-0647) in doses of 10, 60 and 120 mg three times a day in addition to a mild hypocaloric diet containing 30 % of calories as fat. DESIGN: 4 week single-blind placebo run-in period of diet alone followed by a 12 week double-blind, placebo-controlled, randomized treatment period. SETTINGS: Five European outpatient clinics specializing in endocrinology and/or the treatment of obesity, one central laboratory. SUBJECTS: Of 237 healthy obese subjects meeting the inclusion criteria, 188 showed compliance to the diet during the run-in period and were randomized for the treatment period. MAIN OUTCOME MEASURES: Primary efficacy criterion was the difference in weight loss after 12 weeks of treatment between the Orlistat treated groups and the diet alone group. Secondary efficacy criteria were changes in serum total, HDL- and LDL-cholesterol. RESULTS: Compared to placebo a mean (+/- s.e.) additional weight loss of 0.63 +/- 0.54 kg with 30 mg a day (P= 0.246), 0.71 +/- 0.55 kg with 180 mg a day (P= 0.190) and 1.75 +/- 0.54 kg with 360 mg a day was seen (P= 0.001) of Orlistat was observed. Overall data indicated dose-dependency. Small decreases were seen in total and LDL-cholesterol (significant in the 180 and 360 mg a day groups) and LDL- to HDL-cholesterol ratio (significant in the 360 mg a day group only). Mild, mostly gastrointestinal side effects were observed more frequently in the Orlistat groups and caused premature withdrawal from the study in only four patients. No marked laboratory abnormalities were shown, including the lipid-soluble vitamins A,D and E. CONCLUSION: Orlistat, in an apparently dose-dependent manner, leads to additional weight loss compared to diet alone and overall, is well tolerated.

Evidenzklasse: Ib.

19. Epstein LH. Exercise in the treatment of childhood obesity. *Int J Obes Relat Metab Disord* 1995b;19(4):S117-21

Research on exercise in the treatment of childhood obesity is reviewed. The role of activity or sedentary behaviors in the development of obesity is discussed, with a conceptual model for understanding choice of being sedentary or active presented. Research that assesses the effects of exercise alone and diet plus exercise on child weight control are reviewed, as well as new research on modifying access to sedentary behaviors. Treatment research suggests exercise alone is not sufficient, with the combination of diet plus exercise more effective for long-term than short-term changes. Finally, suggestions for new research are presented.

Evidenzklasse: IV.

20. Epstein LH, Coleman KJ, Myers MD. Exercise in treating obesity in children and adolescents. *Med Sci Sports Exerc* 1996a;28(4):428-35

This paper reviews the use of exercise programs with obese children and adolescents. Studies included for review met two criteria: 1) children or adolescents were defined as obese using objective criteria for obesity, and 2) obese children or adolescents were provided either different types of exercise programs or an exercise program compared with a no-exercise control condition. Thirteen controlled

outcome studies were identified. Experimental design, methods, and outcomes are presented and evaluated for each study. Factors that should be considered in research testing exercise interventions are discussed, including adherence, diet, age, gender, and type of exercise. In addition, the potential for exercise programs in the prevention of obesity in childhood and adolescence is discussed. The results support the continued use of exercise in combination with diet for child and adolescent obesity treatment, but the limited number of controlled studies indicates the need for more research in the area. The potential for exercise programs in the prevention of obesity in childhood and adolescence is discussed.

Evidenzklasse: IIa.

21. Epstein LH, Valoski A, Wing RR, McCurley J. Ten-year outcomes of behavioral family-based treatment for childhood obesity. *Health Psychol* 1994;13:373-83

We report 10-year treatment outcomes for obese children in 4 randomized treatment studies. At 10 years, 34% decreased percentage overweight by 20% or more, and 30% were not obese. Significant effects were observed when parents and children were targeted and reinforced for weight loss in comparison with nontargeted controls and for children given lifestyle or aerobic exercise in comparison with a calisthenics control. Thirty-four percent of the variance in change in percentage overweight was predicted from sex, baseline percentage overweight, self-monitoring weight, meals eaten at home, and family and friends' support for eating and exercise. Results show long-term changes in children depend on the treatment, and evidence converges on the importance of the family and other sources of support for eating and activity change.

Evidenzklasse: Ib.

22. Ernst E, Matrai A. Normalisation of haemorheological abnormalities during weight reduction in obese patients. *Nutrition* 1987;3:337-9

Changes in blood flow occur in obese patients and have been postulated to be related to cardiovascular risk. The present study investigates whether these changes are reversible upon weight reduction. A group of morbidly obese subjects, who showed significant hemorrheologic abnormalities as compared with controls, participated in a program aimed at normalizing body weight by a hypocaloric diet (1000 kcal/day). At monthly intervals blood rheology was quantified by measuring hematocrit, blood and plasma viscosity, blood cell filterability and red cell aggregation. After one month none of the parameters had changed significantly. After 2 months there was a slight but significant increase in blood cell filterability. After 3 months filterability had improved further. In addition, there was a fall in plasma and blood viscosities, hematocrit and red cell aggregation. At the end of the program most hemorrheologic variables in obese subjects were no longer statistically different from those in controls. It is concluded that the hemorrheologic deficit of obesity can be reversed by long-term, hypocaloric weight reduction and that the normalization of the flow properties of blood is linked to a reduction in cardiovascular risk.

Evidenzklasse: IIb.

23. Evans JS, Harries C, Dennis I, Dean J. General practitioners' tacit and stated policies in the prescription of lipid lowering agents. *Br J Gen Pract* 1995;45((390)):15-18

**BACKGROUND.** Research into general practitioners' prescribing behaviour with regard to lipid lowering agents has relied on survey methods which presume that doctors have insight into their prescribing behaviour and can describe it accurately. **AIM.** This study set out to measure the tacit policies used by general practitioners in prescribing lipid lowering agents and to compare these with their stated policies. **METHOD.** Effects of 13 separate cues on decisions to prescribe were examined. The cues included cholesterol levels and a number of associated risk factors for coronary heart disease. Doctors rated 130 imaginary cases presented by a computer. Thirty five general practitioners in the Plymouth area participated in the study. Their ages ranged from 31 to 55 years and all but four were men. The raw data in each case was a rating of the likelihood that the doctor would prescribe for the patient described. These were converted into statistical weightings by use of multiple linear regression. The pattern of (standardized) weights constituted the tacit policy for each doctor. Stated policies were measured in a subsequent interview by asking doctors to rate the influence of each cue. **RESULTS.** Both tacit and stated policies diverged widely between different doctors. Most doctors overestimated the number of cues that had actually influenced their decisions, and many believed that they had taken into account associated factors for coronary heart disease when they had not. On lifestyle related risks doctors were generally less likely to treat overweight people and most stated this as their policy. Most were also less likely to treat smokers but some had the opposite policy. Those less likely to treat smokers were also less likely to treat obese patients. There was also considerable variation in the extent to which the doctors took account of the attitude of the patient to receiving treatment. **CONCLUSION.** Doctors' policies are highly variable and particularly inconsistent in the treatment of smokers. Relevant risk factors may be ignored--even though they are understood--because the risk assessment involved is too psychologically complex a task to be performed intuitively. Decision aids and clear protocols are needed in this area.

24. Everhart J. Contribution of Obesity and Weight Loss to Gallstone Disease. *Ann Intern Med*

1993;119(10):1029-35

**OBJECTIVE:** To examine the relation of obesity and weight loss to the formation of gallstones according to pertinent clinical and research issues. **DATA SOURCES AND EXTRACTION:** Original reports obtained through a MEDLINE search from 1966-1992 on gallstones plus obesity or reducing diets, supplemented by a manual search of bibliographies, a Current Contents title search from 1991 to 1992 on gallstones and gallbladder, and expert opinion. Only studies of humans were cited. **DATA SYNTHESIS:** For women, but less so for men, obesity is a strong risk factor for gallstones, and this risk is increased during weight loss. Between 10 % and 25 % of obese men and women may develop gallstones within a few months of beginning a very low calorie diet, and perhaps one third of these will develop symptoms of gallstones. Persons with the highest body mass index before weight loss and those who lose weight most rapidly appear to be at the greatest risk for gallstones. Treatment with ursodeoxycholic acid (ursodiol) during weight loss dieting is the only proven prevention for the formation of gallstones. Issues to be resolved include how different diets affect the risk for developing gallstones, the identification of other risk factors for gallstone formation during weight loss, the effect of weight loss among people with preexisting gallstones, and the optimum means of preventing gallstones during weight loss. **CONCLUSIONS:** During weight loss, particularly among the obese, an increased risk exists for symptomatic gallstone formation. This acute risk offers the opportunity to investigate the cause of gallstones and possibly to prevent them.

Evidenzklasse: IV.

25. Ewbank P, Darga L, Lucas C. Physical activity as a predictor of weight maintenance in previously obese subjects. *Obes Res* 1995;3(3):257-263

We examined the association between exercise and weight loss maintenance in a group of 45 previously obese subjects 2 years post very-low-calorie diet (VLCD) to suggest exercise goals for this population. At baseline, subjects weighed a mean 100 kg and had a mean total cholesterol (TC) of 5.8 mmol/L. With VLCD they lost an average 28 kg and decreased their TC by 1.6 mmol/L. Two years post-VLCD their weight and lipids were measured and they completed a physical activity survey (Paffenbarger). Subjects were grouped into tertiles by reported exercise levels: low active (< 850 kcals per week), moderate active (850-1575 kcals per week) and high active (> 1575 kcals per week). Walking accounted for the greatest calorie expenditure (65%). Analysis of variance showed that baseline characteristics and weight and blood lipid changes during the VLCD did not differ ( $P > 0.05$ ) among groups. At follow-up, high active patients maintained significantly greater weight loss, had a lower percent regain and a significantly greater decrease in total cholesterol ( $P < 0.05$ ) than less active patients. Multiple regression analysis indicated that total exercise calories independently predicted overall weight loss and percent regain ( $r = 0.66$  and  $r = 0.62$ , respectively). Exercise calories also predicted total cholesterol change ( $r = -0.37$ ). The high active group walked more miles (16.2 per week) than the low and moderate active groups (4.8 and 9.1 per week, respectively) and exercised more days per week (5.3 vs. 1.9 and 3.7).

26. Fletcher GF, Balady G, Blair SM, Blumenthal J, Caspersen C, Chaitman B, et al. Statement on exercise: benefits and recommendations for physical activity programs for all Americans: a statement for health professionals by the Committee on Exercise and Cardiac Rehabilitation of the Council on Clinical Cardiology, American Heart Association. *Circulation* 1996;94:857-62; kein Abstract, Evidenzklasse: IV.

27. Flodmark CE, Ohlsson T, Rydén O, Sveger T. Prevention of Progression to Severe Obesity in a Group of Obese Schoolchildren Treated With Family Therapy. *Pediatrics* 1993;91:880-4

**STUDY OBJECTIVE.** To evaluate the effect of family therapy on childhood obesity. **DESIGN.** Clinical trial. One year follow-up. **SETTING.** Referral from school after screening. **PARTICIPANTS.** Of 1774 children (aged 10 to 11), screened for obesity, 44 obese children were divided into two treatment groups. In an untreated control group of 50 obese children, screened in the same manner, body mass index (BMI) values were recorded twice, at 10 to 11 and at 14 years of age. **INTERVENTION.** Both treatment groups received comparable dietary counseling and medical checkups for a period of 14 to 18 months, while one of the groups also received family therapy. **RESULTS.** At the 1-year follow-up, when the children were 14 years of age, intention-to-treat analyses were made of the weight and height data for 39 of 44 children in the two treatment groups and for 48 of the 50 control children. The increase of BMI in the family therapy group was less than in the conventional treatment group at the end of treatment, and less than in the control group ( $P = .04$  and  $P = .02$ , respectively). Moreover, mean BMI was significantly lower in the family therapy group than in the control group ( $P = .05$ ), and the family therapy group also had fewer children with BMI 30 than the control group ( $P = .02$ ). The reduction of triceps, subscapular, and suprailliac skinfold thicknesses, expressed as percentages of the initial values, was significantly greater in the family therapy group than in the conventional treatment group ( $P = .03$ ,  $P = .005$  and  $P = .002$ , respectively), and their physical fitness was significantly better ( $P = .05$ ). **CONCLUSIONS.** Family therapy seems to be effective in preventing progression to severe obesity during adolescence if the treatment starts at 10 to 11 years of age.

Evidenzklasse: IIa.

28. Frost G, Masters K, King C, Kelly M, Hasan U, Heavens P, et al. A new method of energy prescription to improve weight loss. *J Hum Nutr Dietetics* 1991;4:369-73

Clinical outcome audit was carried out on two groups of obese out-patients for a 3-month follow-up period. In the first audit group of 35 patients (A1), energy intake was prescribed by diet history, whereas in the second audit group of 27 patients (A2) energy intake was prescribed from an estimate of individual energy requirements based on age, sex and activity. There was no significant difference in age of initial BMI between the two groups and the failure-to-attend rate was the same in each group. Patients in Group A2 received a significantly higher energy prescription ( $P=0.001$ ) than Group A1, but this was still significantly more restricted than the recommended 500 kcal energy deficit from energy expenditure ( $P<0.05$ ). Weight loss was significant in both groups, but was greater in Group A2 than in Group A1. There was no significant correlation between weight loss and energy deficit. In a selected group of patients from Group A2 who were prescribed energy intake close to the recommended deficit of 500 kcal, weight loss was found to be significantly greater ( $P<0.05$ ) when compared to the weight loss in Group A1. Results suggest that a diet prescription with an energy deficit below the estimated energy requirements does not lead to greater weight loss and probably reduces compliance. Estimating individual energy requirements rather than using dietary assessment may improve weight loss.

Evidenzklasse: III.

29. Galvao-Tales A, Graves L, Burke CW. Free cortisol in obesity: effect of fasting. *Acta Endocrinol* 1976;81:321-9

Plasma and urinary corticosteroids were measured in 13 obese subjects before and after high and low protein diets, and after fasting. During isocaloric high and low protein diets, urinary 17-oxogenic steroids and to a lesser extent urinary free cortisol excretion rose and fell in parallel with protein intake. Plasma unbound cortisol levels were not much changed by high or low protein intake. However, during 7 to 11 days total fasting, there was a highly significant rise in plasma unbound cortisol at 24.00. A smaller rise occurred at 09.00. The overall effect was a considerable diminution of the day-night variation of plasma unbound cortisol levels during fasting, and a rise in prevailing unbound cortisol levels and urinary free cortisol excretion. In 3 subjects tested these changes were reversed immediately by glucose re-feeding.

Evidenzklasse: IIb.

30. Garner DM, Wooley SC. Confronting the failure of behavioural and dietary treatments for obesity. *Clin Psych Rev* 1991;11:573-8

This review questions the appropriateness of behavioral and dietary treatments of obesity in light of overwhelming evidence that they are ineffective in producing lasting weight loss. The stigmatization of obesity, the overstatement of health risk and the pervasive influence of the lucrative diet industry have maintained public demand for dietary treatment. However, decades of research on the biology of weight regulation make clear the unlikelihood of success with dietary treatment, information which the health professions have been slow to integrate. Recommendations are made for improving life-style, health risk factors, body image, and the self-esteem of the obese without requiring weight loss.

Evidenzklasse: IV.

31. Garrow JS. Exercise in the treatment of obesity: a marginal contribution. *Int J Obes Relat Metab Disord* 1995a;19(Suppl 4):126-9, kein Abstract, Evidenzklasse: IV.

32. Garrow JS, Summerbell C. Meta-analysis: effect of exercise, with and without dieting on the body composition of overweight subjects. *Eur J Clin Nutr* 1995b;49:1-10

OBJECTIVE: To determine if physical training conserves fat-free mass (FFM) in overweight men or women during weight loss. DESIGN: Journals published between 1966 and 1993 were searched by MEDLINE and by handsearch to obtain all reports on human subjects in which the effect of exercise on body composition was studied in at least two concurrent treatment groups, of which at least one group did, and one group did not, undergo an exercise programme designed to promote fat loss. The relation between loss of weight, and loss of FFM, was examined by linear regression analysis among exercising and non-exercising groups of men or women. SUBJECTS: Twenty-eight publications reported results on 226 sedentary men in 13 groups, 233 exercising men in 14 groups, 199 sedentary women in 23 groups, and 258 exercising women in 28 groups. RESULTS: Aerobic exercise without dietary restriction among men caused a weight loss of 3 kg in 30 weeks compared with sedentary controls, and 1.4 kg in 12 weeks among women, but there was little effect on FFM. Resistance exercise had little effect on weight loss, but increased FFM by about 2 kg in men and 1 kg in women. Regression analysis shows that for a weight loss of 10 kg by diet alone the expected loss of FFM is 2.9 kg in men and 2.2 kg in women. When similar weight loss is achieved by exercise combined with dietary restriction the expected loss of FFM is reduced to 1.7 kg in men, and women. It is probable that the FFM conserved by exercise during weight loss contains more water and potassium than average FFM. The subjects studied were not severely obese. CONCLUSIONS: Aerobic exercise causes a modest loss in weight without dieting. Exercise provides some conservation of FFM during weight loss by dieting, pro-

bably in part by maintaining glycogen and water. SPONSORSHIP: Rank Department of Human Nutrition, University of London

Evidenzklasse: IIb.

33. Goldstein DJ. Beneficial health effects of modest weight loss. *Int J Obes Relat Metab Disord* 1992;16:397-415

The medical effects of modest weight reduction (approximately 10 % or less) in patients with obesity-associated medical complications were reviewed. The National Library of Medicine MEDLINE database and the Derwent RINGDOC database were searched to identify English language studies that examined the effects of weight loss in obese patients with serious medical complications commonly associated with obesity (non-insulin dependent diabetes mellitus (NIDDM or type II), hypertension, hyperlipidemia, hypercholesterolemia, and cardiovascular disease). Studies in which patients experienced approximately 10 % or less weight reduction were selected for review. Studies indicated that, for obese patients with NIDDM, hypertension or hyperlipidemia, modest weight reduction appeared to improve glycemic control, reduce blood pressure, and reduce cholesterol levels, respectively. Modest weight reduction also appeared to increase longevity in obese individuals. In conclusion, a large proportion of obese individuals with NIDDM, hypertension, and hyperlipidemia experienced positive health benefits with modest weight loss. For patients who are unable to attain and maintain substantial weight reduction, modest weight loss should be recommended, even a small amount of weight loss appears to benefit a substantial subset of obese patients.

Evidenzklasse: IV.

34. Griffiths J, Brynes AE, Frost G. Sibutramine in the treatment of overweight non-insulin dependent diabetics. *Int J Obes* 1995;19(Suppl 2):41.

Sibutramine (SIB), a balanced serotonin and noradrenaline uptake inhibitor, is a new anti-obesity agent. This double-blind, placebo controlled study looked at weight change and changes in glycaemic control in overweight Non-Insulin Dependent Diabetic (NIDDM) patients treated with SIB 15mg once daily (am) for 12 weeks. 91 patients entered the study and 83 completed 12 weeks treatment. Patients with NIDDM of at least 6 months duration a body mass index of >26 and ≤35 and a fasting glucose of >7 and <12 mmol/l were included; concurrent treatment with any antidiabetic medication was allowed. Mean weight loss to endpoint (intent to treat) on SIB was 2.4 kg compared to 0.1 on placebo  $p < 0.001$ . There was little overall change in mean fasting glucose to endpoint, +0.1 and +0.3 mmol/l in the SIB and placebo groups respectively. However, endpoint glycosylated haemoglobin (%) reduced by 0.4 in the SIB group compared to no change in the placebo group; 95%CI for the difference between groups was -0.9, 0.2. Fifteen (35%) SIB patients had a fall in glycosylated haemoglobin of ≥ 1% compared to 2 (5%) placebo patients. These 15 SIB patients had larger mean reductions in weight (-3.7 kg) and fasted glucose (-2.1 mmol/l) than the SIB group as a whole. SIB was well tolerated with 193 and 169 adverse events reported in the SIB and placebo groups respectively. In conclusion these results indicate an improvement in glycaemic control with increasing weight loss induced by SIB.

Evidenzklasse: Ib.

35. Guy-Grand B, Apfelbaum M, Crepaldi G, Gries A, LeFebvre P, Turner P. International trial of long-term dexfenfluramine in obesity. *Lancet* 1989a;2:1142-5

In a randomised, placebo-controlled, double-blind study, 822 obese patients of both sexes were given either dexfenfluramine (dF), 15 mg twice daily (404), or placebo (418) in addition to a calorie-restricted diet for 1 year. Patients in both groups lost weight significantly in the first 6 months; after 6 months dF patients had a higher cumulative mean weight loss. Drop-out rates were lower in dF patients than in placebo patients, mainly because of dissatisfaction with weight loss in the latter group. More than twice as many dF patients as placebo patients achieved a given weight loss; but more dF patients than placebo patients had transient side-effects (tiredness, diarrhoea, dry mouth, polyuria, and drowsiness).

Evidenzklasse: Ib.

36. Harrell JS, Johnston LF, Griggs TR, Schaefer P, Carr EG, Jr., McMurray RG, et al. An occupation based physical activity intervention program: improving fitness and decreasing obesity. *Aaohn J* 1996;44(8):377-84

The purpose of this quasi-experimental study was to determine the effectiveness of an occupation based health and fitness program. Subjects were 1,504 police trainees (85% male, 15% female) with an ethnic distribution of 82% white, 16% African American, and 2% other. Data were collected at 25 sites across the state of North Carolina. The sites were randomly assigned to either the experimental group (implemented the intervention) or the control group (continued usual training). As compared with controls, subjects at the experimental sites improved significantly in cardiovascular fitness (aerobic power), general muscular strength (number of sit ups per minute), and flexibility, and lowered their body fat. The intervention required minimal equipment and was taught primarily by peers who received a 1 week training program. This occupational approach to improving health could be particularly useful in occupations with many workers who seldom engage in leisure time physical activity.

Evidenzklasse: IIb.



37. Hauner H. Strategie der Adipositas therapie. *Der Internist* 1997;3:244-250

Die gesundheitlichen Risiken der Adipositas sind außerordentlich ernstzunehmen, nicht weniger die volkswirtschaftlichen Folgelasten, für die astronomisch hohe Zahlen im 11stelligen DM-Bereich geschätzt werden. Der seit einiger Zeit zur Einschätzung des Körpergewichts verwendete Body Mass Index (BMI; definiert als Körpergewicht in kg, dividiert durch Körpergröße in  $m^2$ ), für manchen Leser vielleicht ein etwas abstrakter Begriff, sei an einem Beispiel verdeutlicht: Das Gewicht eines 180 cm großen Mannes gilt bis 80,7 kg als "normal" (BMI bis 24,9), ab dann bis ca. 96,8 kg (BMI bis 29,9) als "mäßig übergewichtig" und erst darüber als "behandlungsbedürftig übergewichtig". Dies entspricht den Richtlinien, die die Deutsche Adipositas-Gesellschaft herausgegeben hat. Man wird einräumen, daß es schwerfällt, im ärztlichen Alltag auch die oberen Grenzwerte unreflektiert hinzunehmen. Die vorliegende Übersicht behandelt Voruntersuchungen, Therapieplanung und -ziele sowie die verschiedenen Methoden der Ernährungsbehandlung unter Berücksichtigung psychologisch notwendiger Maßnahmen, besonders zur Änderung des Eßverhaltens und zur Langzeitbetreuung. Darüber hinaus werden medikamentöse und chirurgische Möglichkeiten der Adipositas therapie aufgezeigt.

Evidenzklasse: IV.

38. Hauptman JB, Jeunet FS, Hartmann D. Initial studies in humans with a novel gastro-intestinal lipase inhibitor RO 18-0647 (tetrahydrolipstatin). *Am J Clin Nutr* 1992;55:309-313

Excessive intake of dietary fat contributes to the development and maintenance of both obesity and hyperlipidemia. Inhibition of gastrointestinal lipases could decrease the amount of ingested fat that is absorbed systemically by preventing the hydrolysis of triglycerides. Ro18-0647, a chemically synthesized derivative of the natural product lipstatin, inhibits the action of gastrointestinal lipases. Initial studies in humans have shown that 18-0647 can reliably increase fecal fat excretion. Ro 18-0647 has also been shown to be well tolerated in the majority of normal volunteers and obese patients studied. Further research must be conducted to determine whether clinical endpoints of weight loss of cholesterol lowering can be produced by using this new pharmacologic principle.

Evidenzklasse: IV.

39. Hell E, Lang B. 10 years experience with vertical banded gastroplasty for operative therapy of morbid obesity. *Zentralbl Chir* 1996;121(5):363-9

Since 1985 vertical banded gastroplasty has been performed in a consecutive series of 300 morbid obese patients. Two years after operation the average weight loss was 46 kg or 67% of the initial overweight. There was one postoperative and one late death. The reintervention rate was 2% per year for the first 5 years. In the treatment of morbid obesity vertical banded gastroplasty is an effective procedure, rapid and simple to perform and without irreversible changes of the digestive tract.

Evidenzklasse: IIb.

40. Huang MH, Yang RC, Hu SH. Preliminary results of triple therapy for obesity. *Int J Obes Relat Metab Disord* 1996;20(9):830-6

OBJECTIVE: To evaluate the effectiveness of triple therapy in treatment of simple obesity. SUBJECTS: Forty-five cases of simple obesity with a body mass index (BMI) above 30 kg/m<sup>2</sup> and percentage of body fat more than 25% in males, and 30% in females were collected. Subjects were composed of 8 males and 37 females ranging in age from 16 to 70 years old with a mean age of 33.8 years. METHODS: The triple therapy for obesity included weekly auricular acupuncture, diet control and aerobic exercise counseling for eight weeks. The reduction in body weight and body fat were measured upon just completing the therapeutic course. The changes of body weight in follow-up at one month and one year later were also analyzed respectively. RESULTS: The results showed a 4.4 +/- 2.9 kg reduction in body weight and a 5.6 +/- 3.0% reduction in body fat after completing the treatment course. Five cases had their body weight reduced to within the normal range, 18 cases showed a marked effect (body weight reduced by more than 5 kg and body fat reduced more than 5%), 16 cases were considered effective (body weight reduced by 2-5 kg and body fat reduced by 1-5%), and 6 cases were considered to be ineffective (body weight reduced by less than 2 kg and body fat reduced by less than 1%). The rate of effectiveness was 86.7%. The rate of body weight rebound (weight regained more than 1.5 kg) was 6.7% and 18.9% one month and one year later, respectively. The effectiveness of weight reduction was significant correlated with the compliance of participants with each therapeutic method, but not with age. No special side effects were noted during or after the treatment except for two cases who had intolerable pain when receiving auricular acupuncture. CONCLUSION: The triple therapy resulted in a satisfactory body weight reduction and a good maintenance of the target weight after treatment. Furthermore, more frequent aerobic exercise during the treatment course contributed greatly to body weight reduction and maintenance, as indicated by the correlation analysis.

Evidenzklasse: IIb.

41. Husemann B, Reiners V. Initial outcome of vertical gastroplasty in treatment of morbid obesity. *Zentralbl Chir* 1996a;121(5):370-5

The VBG enables a significant weight loss from an initial weight of 138.9 kg (mean value, n = 387) to 87.3 kg after 36 months. BMI is reduced from 48.9 to 30.8 kg/m<sup>2</sup>. Even the pathological metabolic

disorders are improved like the rate of metabolic syndrome (8.4% to 2.2%). The postoperative complication rate is low with a lethality of 0.26% or a thrombosis rate of 1,03%. The relative high rate of patients with ineffective weight loss (30-40%) should not lead to the consequence to stop the procedure, but to improve the pre-operative screening.

Evidenzklasse: III.

42. Institute of Medicine. *Weighing the options: criteria for evaluating weight-management programs*. Washington, D.C.: National Academy Press, 1995; Buch, Evidenzklasse: IV.

43. International Obesity Task Force. Managing the global epidemic of obesity. *Draft for WHO Technical Consultation, Geneva 1997*; Entwurf, Evidenzklasse: IV.

44. James WPT. Dietary aspects of obesity. *Postgrad Med J* 1984b;60(suppl 3):50-55.

A new FAO report on how to estimate the energy and protein requirements of individuals is imminent and has direct application to the management of obese patients. Energy needs, although variable from individual to individual, are reasonably stable unless gross overfeeding or prolonged semi-starvation occurs; unconscious appetite control is surprisingly important. No longer will energy needs be expressed per kg body weight, a reference point difficult to apply to obese subjects anyway. There are now equations for estimating basal metabolic rate (BMR) these can be applied to obese subjects to give BMR in MJ per day; for kcal from kJ divide by 4.184. The equations apply to all races although North Europeans and Americans tend to have high values and Indians low. An obese patient has a higher BMR than a normal person of the same height. Lean body mass is increased in obesity so some long-term loss is inevitable with slimming and accounts for the persistent fall in the BMR on weight loss. Energy and protein needs are just the beginning of dietary management. Obese patients are prone to cardiovascular and gall bladder disease. A low fat diet is important and a polyunsaturated : saturated ratio (P:S) of 0.5 to 1.0 is appropriate: higher ratios will exacerbate cholestasis in the biliary tract which can be precipitated by weight loss. New evidence suggests that cereal fibre intake is important for preventing secondary bile salt recycling from the colon with its effect on biliary cholesterol saturation. Therefore longterm high cereal (not bran) fibre intakes are as important in obese patients as is a low fat diet. High carbohydrate diets produce a slightly higher metabolism rate than isoenergetic-diets. Low sugar diets lead to slightly lower energy intakes. Trace element deficient diets can lead to obesity so the obese patient and his family should be advised and shown how to permanently adjust to a 'prudent' diet. The short term approach to management is usually a waste of time.

Evidenzklasse: IV.

45. James WPT, Avenell A, Broom J, Witehead J. A one year trial to assess the value of orlistat in the management of obesity. *Int J Obesity* 1997;21(3):24-30

**OBJECTIVES:** This paper describes the methodology of a multicentre study designed to assess the efficacy and tolerability of orlistat 120 mg tid as therapy for inducing weight loss in excess of that achieved with a moderately calorie-restricted diet alone. The results from a single centre are presented to illustrate the nature of the response. **DESIGN:** This was a double-blind, randomized, parallel-group, placebo-controlled multicentre study. A four-week, single-blind, placebo run-in period preceded a 52 week double-blind treatment period during which patients received either orlistat or placebo three times a day. At the start of the run-in period, all patients were placed on a diet containing approximately 30 % of calories as fat and designed to cause an energy deficit of approximately 600 kcal/d. **SUBJECTS:**

Patients of either sex, more than 18 y of age, with a body mass index (BMI) between 30 and 43 kg/m<sup>2</sup> were eligible for enrolment. **MEASUREMENTS:** Efficacy assessments included: measurements of body weight; anthropometry; quality of life; blood pressure; serum lipids; fasting serum glucose and insulin. Safety assessments included: adverse events; vital signs; ECG; renal and gallbladder ultrasound; haematology; serum biochemistry. **OUTCOME:** In the single centre there was a reduction in body weight of 5.5±4.5 (s.d.) kg (5.7 % reduction) in the placebo group and 8.6 ± 5.4 kg in the orlistat-treated group (8.4 % reduction) by six months. Thereafter, the placebo group tended to relapse whereas the orlistat group maintained their weight loss ( 2.6 % vs 8.4 % reduction from initial value at 52 weeks). Total and LDL cholesterol fell by 0.05 mmol/l (1.6%) and 0.14 mmol/l (4.2%), respectively, in orlistat-treated patients. The drop-out rate was 48 % in the placebo group and 39 % in the orlistat group. Intestinal symptoms related to orlistat were significantly increased compared to placebo but were well tolerated. Fat soluble vitamin levels remained within the normal range in the treatment group; the reduction seen in alpha-tocopherol levels in patients receiving orlistat was normalized by the decrease in plasma cholesterol concentrations. Beta-carotene and vitamin D concentrations also decreased in orlistat-treated patients. **CONCLUSIONS:** This preliminary analysis suggests that orlistat, when used with a health-promoting low-fat and moderately energy-restricted diet, confers advantages in the long-term management of obesity.

Evidenzklasse: Ib.

46. Jeffery RW, Wing RR, Thorson C. Strengthening Behavioural Interventions for Weight Loss: A Randomized Trial of Food Provision and Monetary Incentives. *J Consult Clin Psychol* 1993;61:1038-45 Behavioral treatments for obesity seek to modify eating and exercise behaviors by a change in their

antecedents and consequences. More direct modification of antecedents and consequences by (a) the provision of food to patients and (b) the provision of financial rewards for weight loss was hypothesized to improve treatment outcomes. Two hundred two men and women were randomly assigned to no treatment, standard behavioral treatment (SBT), SBT plus food provision, SBT plus incentives, or SBT plus food provision and incentives. The major finding was that food provision significantly enhanced weight loss. Weight losses with SBT averaged 7.7, 4.5, and 4.1 kg at 6, 12, and 18 months, respectively, compared with 10.1, 9.1, and 6.4 kg, respectively, at the same intervals with the addition of food. Food provision also enhanced attendance, completion of food records, quality of diet, and nutrition knowledge. We conclude that the provision of food to weight-loss patients is a promising methodology that deserves further exploration.

Evidenzklasse: Ib.

47. Jones SP, Smith IG, Kelly F, Gray JA. Long term weight loss with sibutramine. *Int J Obes* 1995;19(suppl 2):41.

Sibutramine (SIB) is a novel balanced serotonin and noradrenaline reuptake inhibitor (SNRI) with anti-obesity properties. This was a multicentre, randomized, double-blind, placebo-controlled parallel-group study in 12 UK General Practice centres to evaluate SIB 10mg and 15mg once daily (a.m.) in obese patients treated for up to one year. Of 485 patients with a Body Mass Index of between 27 and 40 kg/m<sup>2</sup> who entered the study, 256 completed 12 months treatment; at baseline the treatment groups were comparable for demographic characteristics, weight and BMI. Active weight loss continued over the first 6 months and remained essentially stable thereafter with weight loss in completers being 1.8 (n=76), 4.8 (n=80) and 6.1(n=93)kg in the placebo, 10mg and 15mg SIB groups respectively (p<0.01 SIB vs placebo); weight loss to endpoint for all patients was 1.6 (n=157), 3.3 (n=154) and 4.4 (n=153)kg respectively (p<0.001 SIB vs placebo). Endpoint waist hip ratio also decreased significantly on SIB vs placebo: -0.01 (n=125) on placebo, -0.04 (n=124) and -0.03 (n=132) on SIB 10 and 15mg respectively (p<0.01). Only 13% of patients withdrew due to adverse events. with no significant differences between the three groups. SIB was well tolerated with 67%, 76% and 82% of patients reporting an adverse event in the placebo, 10mg and 15mg SIB groups respectively. The commonest adverse events in the SIB groups were headache, infection, constipation, dry mouth and pharyngitis. In conclusion SIB, 10 and 15 mg, produces significant and sustained weight loss over a 12 month period.

Evidenzklasse: Ib.

48. Karlsson J, Sjostrom L, Sullivan M. Swedish obese subjects (SOS)--an intervention study of obesity. Two-year follow-up of health-related quality of life (HRQL) and eating behavior after gastric surgery for severe obesity. *Int J Obes Relat Metab Disord* 1998;22(2):113-126

OBJECTIVE: To examine the effects of weight loss on health-related quality of life (HRQL) in subjects with severe obesity. DESIGN: Controlled clinical trial of the outcomes of surgical vs conventional weight reduction treatment. SUBJECTS: The first 487 surgical cases and their conventionally treated, matched controls were followed for two years in the Swedish Obese Subjects (SOS) intervention study. MEASUREMENTS: A battery of generic and study-specific self-assessment instruments or subscales was used to characterize HRQL in the severely obese (BMI) > or = 34 kg/m<sup>2</sup> for males and BMI > or = 38 kg/m<sup>2</sup> for females). Measures of general health perceptions (general health rating index; current health), mental well-being (mood adjective check list; pleasantness, activation and calmness), mood disorders (hospital anxiety and depression scale; anxiety and depression) and social interaction (sickness impact profile), were supplemented by obesity-specific modules on obesity-related psychosocial problems and eating behavior (three-factor eating questionnaire; restrained eating, disinhibition and perceived hunger). Assessments were conducted prior to treatment and repeated after 6, 12 and 24 months. RESULTS: Poor HRQL before intervention was dramatically improved after gastric restriction surgery, while only minor fluctuations in HRQL scores were observed in the conventionally treated controls. Peak values were observed in the surgical group at 6 or 12 months after intervention with a slight to moderate decrease at the two-year follow-up. The positive changes in HRQL after two years were related to the magnitude of weight loss, that is, the greater the weight reduction, the greater the HRQL improvements. Eating behavior improved accordingly. CONCLUSION: Quality of life in the severely obese is improved by substantial weight loss. Most patients benefit from weight reduction surgery, while HRQL in surgical patients with minor reduction in overweight is less positive. Further research is needed to determine outcome predictors of the surgical management of severe obesity and to ensure that HRQL improvements are maintained.

49. Katan M, Grundy S, Willett W. Beyond low-fat diets. *N Engl J Med* 1997;337(8):563-566; kein Abstract, Evidenzklasse: IV.

50. Kayman S, Bruvold W, Stern JS. Maintenance and relapse after weight loss in women: behavioural aspects. *Am J Clin Nutr* 1990;52:800-7

Obese women who regained weight after successful weight reduction (relapsers, n = 44); formerly obese, average-weight women who maintained weight loss (maintainers, n = 30); and women who had always remained at the same average, nonobese weight (control subjects, n = 34) were interviewed.

Most maintainers (90%) and control subjects (82%) exercised regularly, were conscious of their behaviors, used available social support (70% and 80%, respectively), confronted problems directly (95% and 60%, respectively), and used personally developed strategies to help themselves. Few relapsers exercised (34%), most ate unconsciously in response to emotions (70%), few used available social support (38%), and few confronted problems directly (10%). These findings suggest the advisability of development and prospective evaluation of individualized treatment programs designed to enhance exercise, coping skills, and social support.

Evidenzklasse: III.

51. Kiddy DS, Hamilton-Fairley D, Bush A, Short F, V. A, Reed MJ, et al. Improvement in endocrine and ovarian function during dietary treatment of obese women with polycystic ovary syndrome. *Clinical Endocrinology* 1992;36:105-11

**OBJECTIVE:** Obese women with polycystic ovary syndrome have a greater frequency of menstrual disturbance and of hirsutism than lean women with the syndrome. Initial studies have demonstrated a marked improvement in endocrine function following a short-term, very low calorie diet. The purpose of this study was to examine the effect of long-term calorie restriction on clinical as well as biochemical abnormalities in obese women with polycystic ovary syndrome. **DESIGN:** We performed a within-group comparison of clinical and biochemical indices before and during dietary treatment. **PATIENTS:** Twenty-four obese women with polycystic ovary syndrome (mean weight 91.5 (SD 14.7) kg) were scheduled for treatment for 6-7 months with a 1000 kcal, low fat diet. Nineteen of the 24 had menstrual disturbances, 12 had infertility and 19 were hirsute.

**MEASUREMENTS AND RESULTS:** Thirteen subjects lost more than 5 % of their starting weight (range 5.9-22 %). In this group there was no significant change in gonadotrophin or total serum testosterone levels but there was a marked increase in concentrations of sex hormone-binding globulin (pre-treatment: 23.6 (9.5); post-treatment 36.3 (11.8) nmol/l,  $P=0.002$ ) and a reciprocal change in free testosterone levels (77 (26) vs 53 (21) pmol/l,  $P=0.009$ ). These changes were accompanied by a reduction in fasting serum insulin levels (median (range) 11.2 (5.2-32) vs 2.3 (0.1-13.8) mU/l,  $P=0.018$ ) and the insulin response to 75 g oral glucose. There were no significant changes in these indices in the group who lost < 5% of their initial body weight. Of the 13 women who lost > 5% of their pretreatment weight, 11 had menstrual dysfunction. Amongst these women, nine of 11 showed an improvement in reproductive function, i.e. they either conceived (five) or experienced a more regular menstrual pattern. There was a reduction in hirsutism in 40 % of the women in this group. By contrast, in the group who lost less than 5 % of their initial weight, only one of the eight with menstrual disturbances noted an improvement in reproductive function and none had a significant reduction in hirsutism. **CONCLUSIONS:** These data indicate that moderate weight loss during long-term calorie restriction is associated with a marked clinical improvement which reflects the reduction in insulin concentrations and reciprocal changes in SHBG. The improvement in menstrual function and fertility may therefore be consequent upon an increase in insulin sensitivity which, directly or indirectly, affects ovarian function.

Evidenzklasse: IIb.

52. Knip M, Nuutinen O. Long term effects of weight reduction on serum lipids and plasma insulin in obese children. *Am J Clin Nutr* 1993 1993;57:490-3

The long-term metabolic effects of weight reduction on serum lipids and plasma insulin were evaluated in 32 obese children with a mean (+/- SD) relative weight of 160.9 +/- 20.1 % before and after active treatment for 1 y and after observation for another 4 y. The obese subjects had higher serum triglyceride and plasma insulin concentrations initially but lower high-density-lipoprotein (HDL)-cholesterol concentrations and a lower ratio of HDL cholesterol to total cholesterol (TC) than 29 normal-weight children. There was a decrease of 15.8 % in relative weight over the first year with a parallel decrease in serum triglyceride and plasma insulin, whereas HDL cholesterol and the ratio of HDL cholesterol to TC increased ( $P=0.001$ ). These changes remained stable over the second year. At 5 y the obese subjects still had a reduced weight (12.8 % lower than initially) and higher HDL cholesterol. These results indicate that weight reduction in obese children is associated with a change in serum lipids toward normal and reduced peripheral hyperinsulinemia.

Evidenzklasse: IIb.

53. Law MR, Frost CD, Wald NJ. How much does dietary salt reduction lower blood pressure? Analysis of data from trials of salt reduction. *Brit Med J* 1991;302:819-24

**OBJECTIVE:** To determine whether the reduction in blood pressure achieved in trials of dietary salt reduction is quantitatively consistent with estimates derived from blood pressure and sodium intake in different populations, and if so, to estimate the impact of reducing dietary salt on mortality from stroke and ischaemic heart disease. **DESIGN:** Analysis of the results of 68 crossover trials and 10 randomised controlled trials of dietary salt reduction. **MAIN OUTCOME MEASURE:** Comparison of observed reductions in systolic blood pressure for each trial with predicted values calculated from between population analysis. **RESULTS:** In the 45 trials in which salt reduction lasted four weeks or less the observed reductions in blood pressure were less than those predicted, with the difference between ob-

served and predicted reductions being greatest in the trials of shortest duration. In the 33 trials lasting five weeks or longer the predicted reductions in individual trials closely matched a wide range of observed reductions. This applied for all age groups and for people with both high and normal levels of blood pressure. In people aged 50-59 years a reduction in daily sodium intake of 50 mmol (about 3g of salt), attainable by moderate dietary salt reduction would, after a few weeks, lower systolic blood pressure by an average of 5 mm Hg, and by 7 mm Hg in those with high blood pressure (170 mmHg); diastolic blood pressure would be lowered by about half as much. It is estimated that such a reduction in salt intake by a whole Western population would reduce the incidence of stroke by 26 % and of ischaemic heart disease by 15 %. CONCLUSIONS: The results from the trials support the estimates from the observational data in the accompanying two papers. The effect of universal moderate dietary salt reduction on mortality from stroke and ischaemic heart disease would be substantial - larger, indeed, than could be achieved by fully implementing recommended policy for treating high blood pressure with drugs. However, reduction also in the amount of salt added to processed foods would lower blood pressure by at least twice as much and prevent some 70 000 deaths a year in Britain as well as much disability.

54. Law MR, Wald NJ, Thompson SG. By how much and how quickly does reduction in serum cholesterol concentration lower risk of ischaemic heart disease? *BMJ* 1994;308:367-73

OBJECTIVE: To estimate by how much and how quickly a given reduction in serum cholesterol concentration will reduce the risk of ischaemic heart disease. DESIGN: Data on the incidence of ischaemic heart disease and serum cholesterol concentration were analysed from 10 prospective (cohort) studies, three international studies in different communities, and 28 randomised controlled trials (with mortality data analysed according to allocated treatment to ensure the avoidance of bias). MAIN OUTCOME MEASURE: Decrease in incidence of ischaemic heart disease or mortality for a 0.6mmol/l (about 10 %) decrease in serum cholesterol concentration. RESULTS: For men results from the cohort studies showed that a decrease of serum cholesterol concentration of 0.6 mmol/l (about 10 %) was associated with a decrease in incidence of ischaemic heart disease of 54 % at age 40 years, 39 % at age 50, 27 % at 60, 20 % at 70, and 19 % at 80. The combined estimate from the three international studies (for ages 55-64 years) was 38 % (95 % confidence interval 33 % to 42 %), somewhat greater than the cohort study estimate of 27 %. The reductions in incidence of ischaemic heart disease in the randomised trials (for ages 55-64 years) were 7 % (0 to 14 %) in the first two years, 22 % (15 % to 28 %) from 2.1-5 years, and 25 % (15 % to 35 % after five years, the last estimate being close to the estimate of 27 % for the long term reduction from the cohort studies. The data for women are limited but indicate a similar effect. CONCLUSIONS: The results from the cohort studies, international comparisons, and clinical trials are remarkably consistent. The cohort studies, based on half a million men and 18 000 ischaemic heart disease events, estimate that a long term reduction in serum cholesterol concentration of 0.6 mmol/l (10 %) which can be achieved by moderate dietary change, lowers the risk of ischaemic heart disease by 50 % at age 40, falling to 20 % at age 70. The randomised trials, based on 45 000 men and 4000 ischaemic heart disease events show that the full effect of the reduction in risk is achieved by five years.

55. Lean M, Han T, Prvan T, Richmond P, Avenell A. Weight loss with high and low carbohydrate 1200 kcal diets in free living women. *Eur J Clin Nutr* 1997b;51(4):243-8

This randomised controlled trial examined anthropometric changes and cardiovascular benefits of six months of weight management in 110 free living women, aged 18-68 y and BMI 25-50 kg/m<sup>2</sup>, who received 1200 kcal/d diet treatments of either high (58% energy, n = 57) or low (35% energy, n = 53) carbohydrate (CHO) content. Body weight, plasma total, HDL and LDL cholesterol, triglyceride and blood pressure were measured. Examination at three months showed women on high CHO lost (mean +/- s.e.m) 4.3 +/- 0.5 kg and those on low CHO lost 5.6 +/- 0.6 kg of body weight. Changes in risk factors did not significantly differ between the two diet treatments throughout the study. However those on high CHO diets significantly lowered their plasma total cholesterol by 0.33 mmol/l (95% CI: 0.10, 0.55), LDL cholesterol by 0.23 mmol/l (0.02, 0.43) and HDL cholesterol by 0.05 mmol/l (0.03, 0.10), while women on low CHO diets lowered only plasma triglyceride by 0.28 mmol/l (0.08, 0.48). Blood pressure did not change significantly on either diet. After six months, women on high CHO lost 5.6 +/- 0.8 kg and those on low CHO lost 6.8 +/- 0.8 kg. On the high CHO diet, total cholesterol remained significantly below the baseline value at 0.34 mmol/l (0.13, 0.56), triglyceride was significantly lowered by 0.27 mmol/l (0.10, 0.45), and HDL cholesterol returned to the baseline value. On the low CHO diet, triglyceride remained the only risk factor to be significantly improved. A subgroup of 46 postmenopausal women lost significantly (P < 0.05) more weight on the low CHO diet than high CHO diet. In conclusion, these results provided some support for preferring a high CHO diet to a lower CHO approach in weight management, from the point of view of risk reduction, but do not indicate a consistently more rapid weight loss with either diet.

Evidenzklasse Ib.

56. Lean MJ. Sibutramine - a review of clinical efficacy. *Int J Obes* 1997a;21(suppl 1):30-36.

Controlled studies have shown that sibutramine produces dose-related weight loss when given in the range 5-30mg per day, with optimal doses of 10 and 15mg per day. Weight loss with sibutramine is 3-5kg better than placebo at 24 weeks, and weight loss is maintained to 52 weeks at doses of 10 and 15mg. By six months, 69% of patients treated with sibutramine 15mg achieve a 5% or greater reduction in their baseline weight. The weight loss achieved with sibutramine was similar to that achieved with dexfenfluramine over 12 weeks (4.5kg compared with 3.2kg). Sibutramine-induced weight loss has been found to be accompanied by a significant reduction in waist/hip ratio, and decreases in plasma triglycerides, total cholesterol and low density lipoprotein (LDL) cholesterol. There were also increases in high density lipoprotein (HDL) cholesterol. In patients with type II diabetes sibutramine-induced weight loss was accompanied by a shift towards improved glycaemic control. In controlled studies, 84% of sibutramine treated patients reported adverse events, compared with 71% of patients receiving placebo. The most frequently reported adverse events are related to pharmacologic actions of sibutramine, and included dry mouth, decreased appetite, constipation and insomnia.

Evidenzklasse: IV.

57. Leibel RL, Rosenbaum M, Hirsch J. Changes in energy expenditure resulting from altered body weight. *New Eng J Med* 1995;332:621-8

BACKGROUND: No current treatment for obesity reliably sustains weight loss, perhaps because compensatory metabolic processes resist the maintenance of the altered body weight. We examined the effects of experimental perturbations of body weight on energy expenditure to determine whether they lead to metabolic changes and whether obese subjects and those who have never been obese respond similarly. METHODS: We repeatedly measured 24-hour total energy expenditure, resting and nonresting energy expenditure, and the thermic effect of feeding in 18 obese subjects and 23 subjects who had never been obese. The subjects were studied at their usual body weight and after losing 10 to 20 % of their body weight by underfeeding or gaining 10 % by overfeeding. RESULTS: Maintenance of a body weight at a level 10 percent or more below the initial weight was associated with a mean (+/-SD) reduction in total energy expenditure of 6+/- 3kcal per kilogram of fat-free mass per day in the subjects who had never been obese (P<0.001) and 8+/-5 kcal per kilogram per day in the obese subjects (P<0.001). Resting energy expenditure and nonresting energy expenditure each decreased 3 to 4 kcal per kilogram of fat-free mass per day in both groups of subjects. Maintenance of body weight at a level 10 percent above the usual weight was associated with an increase in total energy expenditure of 9+/-7 kcal per kilogram of fat-free mass per day in the subjects who had never been obese (P<0.001) and 8+/-4 kcal per kilogram per day in the obese subjects (P<0.001). The thermic effect of feeding and nonresting energy expenditure increased by approximately 1 to 2 and 8 to 9 kcal per kilogram of fat-free mass per day, respectively, after weight gain. These changes in energy expenditure were not related to the degree of adiposity or the sex of the subjects. CONCLUSIONS: Maintenance of a reduced or elevated body weight is associated with compensatory changes in energy expenditure, which oppose the maintenance of a body weight that is different from the usual weight. These compensatory changes may account for the poor long-term efficacy of treatments for obesity.

Grad der Empfehlung : IIb.

58. Loro AJ, Orleans CS. Binge Eating in Obesity: preliminary findings and guidelines for behavioral analysis and treatment. *Addictive Behaviors* 1981;6:155-66

Binge eating is a complex behavioral problem that often contributes to obesity and complicates standard behavioral weight reduction treatment. This paper reviews previous investigations of binge eating in overweight populations and presents new data from 280 participants in an intensive weight reduction program. These data corroborate clinical impressions that binge eating is frequently accompanied by interpersonal, self-esteem, and stress management deficits. Related preliminary findings aid in a functional analysis of binge behavior patterns and provide empirical support for diagnostic criteria suggested for bulimia in the Diagnostic and Statistical Manual III (DSM-III). Guidelines for a functional analysis of binge eating are presented and suggestions for a comprehensive behavioral and dietary approach to binge eating are outlined. Programmed bingeing is given special attention as one useful therapeutic strategy.

Evidenzklasse: IV.

59. MacMahon SW, Wilcken DE, Macdonald GJ. The effect of weight reduction on left ventricular mass. A randomized controlled trial in young, overweight hypertensive patients. *N Engl J Med* 1986;314(6):334-9

We compared the effects of weight reduction, metoprolol, and placebo on M-mode echocardiographic measurements of the thickness and mass of the left ventricular wall in a 21-week, randomized controlled trial that enrolled 41 young, overweight patients with hypertension. At the end of the follow-up period, the patients in the weight-reduction group had lost an average of 8.3 kg, and their blood pressure had decreased by an average of 14/13 mm Hg, as compared with 12/8 mm Hg in the metoprolol group and 9/4 mm Hg in the placebo group. In the weight-reduction group, interventricular septal and posterior-wall thickness decreased by 14 percent and 11 percent, respectively, and left ventricular

mass decreased by 20 percent (16 percent when adjusted for body-surface area). Decreases in inter-ventricular septal and posterior-wall thickness and in left ventricular mass in the weight-reduction group were significantly greater than those in the placebo group. The changes in thickness of the interventricular septum and the left ventricular mass in the weight-reduction group were also greater than those in the metoprolol group. Changes in weight, independent of changes in blood pressure, were directly associated with changes in left ventricular mass. We conclude that weight reduction decreases left ventricular mass in overweight hypertensive patients and that control of obesity is important not only for the treatment of hypertension but also for the prevention of left ventricular hypertrophy.

Evidenzklasse: Ib

60. Mensink RP, Katan MB. Effect of dietary fatty acids on serum lipids and lipoproteins. A meta-analysis of 27 trials. *Arterioscler and Throm Vasc Biol* 1992;12:911

To calculate the effect of changes in carbohydrate and fatty acid intake on serum lipid and lipoprotein levels, we reviewed 27 controlled trials published between 1970 and 1991 that met specific inclusion criteria. These studies yielded 65 data points, which were analyzed by multiple regression analysis using isocaloric exchanges of saturated (sat), monounsaturated (mono), and polyunsaturated (poly) fatty acids versus carbohydrates (carb) as the independent variables. For high density lipoprotein (HDL) we found the following equation:  $\Delta$  HDL cholesterol (mmol/l) =  $0.012 \times (\text{carb-sat}) + 0.009 \times (\text{carb-mono}) + 0.007 \times (\text{carb-poly})$  or, in milligrams per deciliter,  $0.47 \times (\text{carb-sat}) + 0.34 \times (\text{carb-mono}) + 0.28 \times (\text{carb-poly})$ . Expressions in parentheses denote the percentage of daily energy intake from carbohydrates that is replaced by saturated, cis-monounsaturated, or polyunsaturated fatty acids. All fatty acids elevated HDL cholesterol when substituted for carbohydrates, but the effect diminished with increasing unsaturation of the fatty acids. For low density lipoprotein (LDL) the equation was  $\Delta$  LDL cholesterol (mmol/l) =  $0.033 \times (\text{carb-sat}) - 0.006 \times (\text{carb-mono}) - 0.014 \times (\text{carb-poly})$  or, in milligrams per deciliter,  $1.28 \times (\text{carb-sat}) - 0.24 \times (\text{carb-mono}) - 0.55 \times (\text{carb-poly})$ . The coefficient for polyunsaturates was significantly different from zero, but that for monounsaturates was not. For triglycerides the equation was  $\Delta$  triglycerides (mmol/l) =  $-0.024 \times (\text{carb-sat}) - 0.022 \times (\text{carb-mono}) - 0.028 \times (\text{carb-poly})$  or, in milligrams per deciliter,  $-2.22 \times (\text{carb-sat}) - 1.99 \times (\text{carb-mono}) - 2.27 \times (\text{carb-poly})$ . Thus replacement of carbohydrates by fat lowered serum triglycerides independent of the nature of the fat. Replacement of saturated by unsaturated fatty acids raised the HDL to LDL cholesterol ratio, whereas replacement by carbohydrates had no effect. Thus, under isocaloric, metabolicward conditions the most favorable lipoprotein risk profile for coronary heart disease was achieved if saturated fatty acids were replaced by unsaturated fatty acids with no decrease in total fat intake. Extrapolation of our data to free-living populations requires more insight into effects of diet on body weight; if high-oil diets promote obesity, then their favorable effects on serum lipids will be lost.

Evidenzklasse: IIa.

61. National Institutes of Health Consensus Development Conference Statement. Gastrointestinal surgery for severe obesity:.. *Am J Clin Nutr* 1992;55:487-619

The National Institutes of Health Consensus Development Conference of Gastrointestinal Surgery for Severe Obesity brought together surgeons, gastroenterologists, endocrinologists, psychiatrists, nutritionists, and other health care professionals as well as the public to address: the nonsurgical treatment options for severe obesity, the surgical treatments for severe obesity and the criteria for selection, the efficacy and risks of surgical treatments for severe obesity, and the need for future research on and epidemiological evaluation of these therapies. Following 2 days of presentations by experts and discussion by the audience, a consensus panel weighed the evidence and prepared their consensus statement. Among their findings, the panel recommended that (1) patients seeking therapy for severe obesity for the first time should be considered for treatment in a non-surgical program with integrated components of a dietary regimen, appropriate exercise, and behavioral modification and support, (2) gastric restrictive or bypass procedures could be considered for well-informed and motivated patients with acceptable operative risks, (3) patients who are candidates for surgical procedures should be selected carefully after evaluation by a multidisciplinary team with medical, surgical, psychiatric, and nutritional expertise, (4) the operation be performed by a surgeon substantially experienced with the appropriate procedures and working in a clinical setting with adequate support for all aspects of management and assessment, and (5) lifelong medical surveillance after surgical therapy is a necessity. The full text of the consensus panel's statement follows.

Evidenzklasse: IV.

62. NHLBI Obesity Education Initiative, Panel E. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. Washington: National Institutes of Health, 1998, kein Abstract, Evidenzklasse: IV.

63. OConnor HT, Richman RM, Steinbeck KS, Caterson ID. Dexfenfluramine treatment of obesity: a double blind trial with post trial follow up. *Int J Obes Relat Metab Disord* 1995;19:181-9

OBJECTIVE: As successful weight management demands a long term approach, a better understanding of weight changes during and for significant periods after cessation of dexfenfluramine therapy is

essential to the evaluation of the drug's effectiveness in clinical practice. This study aimed to investigate additional benefits to weight loss during 6 months treatment with dexfenfluramine in 60 patients enrolled in a weight loss programme. DESIGN: Sixty obese subjects (21 males; 39 females) were randomised to dexfenfluramine (15 mg twice daily) or placebo for six months. Fifty one (27 dexfenfluramine; 24 placebo) subjects completed the double blind, randomised, placebo controlled clinical trial. RESULTS: After a one month "run in" phase and six months treatment, weight loss in the dexfenfluramine group was significantly greater than placebo, 9.7 +/- 1.1 kg vs 4.9 +/- 0.9 kg (mean +/- s.e.m.); P=0.002. Reduction in body fat, 5.0 +/- 0.7 kg vs. 1.0 +/- 0.9 kg; P= 0.002 and waist circumference, 10.5 +/- 1.9 cm vs 5.7 +/- 1.1 cm; P= 0.04 was also greater in the dexfenfluramine group. Despite significant weight loss, waist to hip ratio (WHR) did not change in either group. The dexfenfluramine group reported a significantly greater incidence of nausea, dry mouth and dizziness which tended to decrease as treatment progressed. No subjects withdrew due to drug induced side effects. Reduction in serum triglyceride levels and an increase in HDL cholesterol (in female subjects) in conjunction with a reduction in fasting insulin, collectively support an improved cardiovascular risk profile in the dexfenfluramine group. Despite significant weight loss, these risk factor measurements worsened in the placebo group. After cessation of dexfenfluramine therapy, there was a significantly greater weight regain indicating a loss of treatment effect. By 5 months after cessation of dexfenfluramine, the treatment effect was negated with weight loss in the dexfenfluramine (6.0 +/- 1.6 kg) and placebo 6.2 +/- 1.3 kg) group, similar. CONCLUSION: The results of this study support the longer term use of dexfenfluramine therapy for patients with chronic obesity.

Evidenzklasse: Ib.

64. Pavlou K, Krey S, Steffee W. Exercise as an adjunct to weight loss and maintenance in moderately obese subjects. *Am J Clin Nutr* 1989;49(5):1115-1123; kein Abstract. Evidenzklasse 1b.

65. Perri M, Sears SJ, Clark J. Strategies for improving maintenance of weight loss. Toward a continuous care model of obesity management. *Diabetes Care* 1993a;16(1):200-209

The management of obesity represents an important objective in the care of many NIDDM patients. In recent years, progress has been made in increasing initial weight reductions, but poor long-term maintenance of weight loss remains a vital clinical concern. This article reviews the challenge of weight-loss maintenance and recommends the adoption of a continuous care model of obesity management. Strategies to improve the long-term maintenance of weight loss are described, and empirical tests of their effectiveness are reviewed. Collectively, the findings suggest that, after treatment for obesity, multifaceted programs comprised of continued professional contact, skills training, social support, and exercise, can enhance the long-term maintenance of weight loss.

Department of Clinical and Health Psychology, University of Florida, Gainesville 32610-0165.

66. Pfohl M, Luft D, Blomberg I, Schmülling RM. Long-term changes of body weight and cardiovascular risk factors after weight reduction with group therapy and dexfenfluramine. *Int J Obes* 1994;18:391-5

The aim of this work was to investigate the long-term changes of body weight and cardiovascular risk factors after weight reduction with dexfenfluramine (dF) compared to placebo (pl) and additional group therapy. There was a 3 year follow-up of obese patients after 1 year double-blind, randomized treatment with 30 mg dF or pl and group therapy. The work was carried out at the outpatient clinic of University Hospital, Tübingen. Forty-eight (24 dF, 24 pl) patients were investigated with more than 120 % of ideal body weight. Body weight, blood pressure, blood glucose, serum cholesterol and triglycerides were measured. During 1 year of treatment body weight fell by 11.2 % (dF) and 9.1 % (pl) (P<0.001 for time, n.s. for dF/pl), systolic blood pressure by 7.3 and 9.9 mm Hg (P=0.044/n.s.). There were no significant changes of serum cholesterol, triglycerides, and blood glucose. At the follow-up of 22 (11/11) patients 3 years later, the dF group had regained more than the lost weight; the placebo group had lost 2.4 % of the initial body weight. Serum cholesterol (dF + 0.64/pl + 0.65 mmol/l, P = 0.010/n.s.), triglycerides (+0.74/+0.59 mmol/l, P= 0.002/n.s.), and blood glucose (+0.56/ +0.81 mmol/l, P=0.001/n.s.) increased significantly. Systolic blood pressure increased slightly, diastolic blood pressure did not change significantly. Without appropriate prevention of weight regain even combined weight reduction therapy over a period of one year results in weight regain and deterioration of cardiovascular risk factors.

Evidenzklasse: Ib.

67. Pories WJK, MacDonald KJ, Morgan EJ, Sinha MK, Dohm GL, Swanson MS, et al. Surgical treatment of obesity and its effect on diabetes: 10 year follow-up. *Am J Clin Nutr* 1992;55(2 suppl):582-5

Since 1980 we have performed the identical Greenville gastric bypass (GGB) procedure on 479 morbidly obese patients with an acceptable morbidity and a mortality rate of 1.2%. The weight loss in the series was well maintained over the follow-up period of 10 y. The GGB can control non-insulin dependent diabetes mellitus (NIDDM) in most patients. The group of 479 patients included 101 (21 %) with NIDDM and another 62 (13 %) who were glucose impaired. Of these 163 individuals, 141 reverted to normal and only 22 (5 %) remained with inadequate control of their carbohydrate metabolism. Those patients who were older or whose diabetes was of longer duration were less likely to revert to normal



values. The gastric bypass operation is an effective approach for the treatment of morbid obesity. Along with its control of weight, the operation also controls the hyperglycemia, hyperinsulinemia, and insulin resistance of the majority of patients with either glucose impairment or frank NIDDM.

Evidenzklasse: IIb.

68. Porikos KP, Hesser MF, van Itallie TB. Caloric regulation in normal weight men maintained on a palatable diet of conventional foods. *Physiol Behav* 1982;29:293-300

The spontaneous food intake of six normal-weight male volunteers was measured for 24 days while the subjects were inpatients on a metabolic unit. They were fed a palatable diet of conventional foods and were kept unaware that their food intake was being measured. On days 7-18 the caloric content of their diet was covertly reduced by 25% by substituting aspartame-sweetened analogues for all menu items containing sucrose. Subjects did not alter their food intake for 3 days. Then between days 4-6 on the aspartame diet, they increased their intake to compensate for 40% of the missing calories. Food intake stabilized at 85% of baseline and remained the same of the rest of the 12-day dilution period. Subjects did not show a shift in either sweetened or unsweetened food choices while their diet was being diluted. In adjusting for the missing calories, they simply ate more of their customary diet. The replacement of sucrose by aspartame tended to curb the weight gain observed in the baseline diet.

Evidenzklasse: IIb.

69. Pudel V, Westenhöfer J. *Ernährungsphysiologie. Eine Einführung*: Hogrefe, 1998; Buch, Evidenzklasse: IV.

70. Rand CSW, MacGregor AMC. Successful weight loss following obesity surgery and the perceived liability of morbid obesity. *Int J Obes* 1991;15:577-9

Patients (n = 47) who lost 45 kg (100 lb) or more and who successfully maintained weight loss for at least three years following gastric restrictive surgery for morbid obesity viewed their previous morbidly obese state as having been extremely distressful. In spite of the strong proclivity for people to evaluate their own worst handicap as less disabling than other handicaps, patients said they would prefer to be normal weight with a major handicap (deaf, dyslexic, diabetic, legally blind, very bad acne, heart disease, one leg amputated) than to be morbidly obese. All patients said they would rather be normal weight than a morbidly obese multi-millionaire.

Evidenzklasse: IIb.

71. Rand CSW, MacGregor AMC. Morbidly obese patients' perceptions of social discrimination before and after surgery for obesity. *South Med J* 1990;83:1390-5

Morbidly obese patients' perceptions of obesity-related prejudice and discrimination were assessed before and 14 months after operation for obesity. Preoperatively, the 57 consecutive patients perceived overwhelming prejudice and discrimination at work, within the family, and in public places. After a weight loss of more than 45.5 kg (100lb), these patients perceived little or no prejudice or discrimination. We examine factors contributing to the change in patients' perceptions and comment upon patients' perceptions of the negative attitudes held by health professionals toward obese patients.

Evidenzklasse: IIb.

72. Reisin E, Abel R, Modan M, Silverberg DS, Eliahou HE, Modan B. Effect of weight loss without salt restriction on the reduction in blood pressure in overweight hypertensive patients. *N Eng J Med* 1978;298:1-6

Overweight patients with uncomplicated essential hypertension were followed up biweekly for six months. 24 not receiving antihypertensive-drug therapy (Group I) and 83 on regular but inadequate (despite drug manipulation) antihypertensive-drug therapy (Group II). All patients in Group I and 57 randomly selected patients from Group II (IIa) participated in a weight-reduction program. The remaining 26 from Group II (IIb) did not receive a dietary program. Salt intake was in the normal range in all three groups. All patients on the dietary program lost at least 3 kg (mean 10,5 kg) and all but two showed a meaningful reduction in blood pressure; 75 per cent of Group I and 61 per cent of Group II a returned to normal blood pressure. The weight and blood-pressure reductions were highly significant (P=0.001), were present in both sexes and all ages, and were directly associated. In Group II b, no significant change in blood pressure or weight occurred (P>0.30).

Evidenzklasse: IIb.

73. Richman RM, Webster P, Salgo AR, Mira M, Steinbeck KS, Caterson ID. A shared care approach in obesity management: the general practitioner and a hospital based service. *Int J Obesity* 1996;20:413-19

Objective: To describe the process of establishing a Shared Care obesity management programme between general practitioners and a hospital based specialist obesity service and to compare outcomes of the Shared Care programme (SC) to an established hospital based programme (MOS). - Design: A comparative study of two obesity management programmes. Patients were matched on gender, age and BMI (kg/m<sup>2</sup>). - Subjects: 29 female and eight male (age: 47.0+-2 years, BMI 35.9+-0.8 kg/m<sup>2</sup>) patients enrolled in the Shared Care programme (SC) were matched to 81 female and 20 male (age:45.8+-1.1 years, BMI 35.7+-0.4kg/m<sup>2</sup>) patients enrolled in a hospital based programme (MOS).-

Main outcome measures.: Relative and absolute weight loss and retention rate were compared between the programmes at 10 and 26 weeks. Food habits were assessed at enrolment and week 10 of the programme in the SC group by a Food Habits Questionnaire and cognitive restraint, disinhibition and hunger were assessed by the eating Inventory Questionnaire.- Results: Shared Care patients (n=28) lost significantly more weight than MOS patients (n=60) (SC 4.8±0.6 kg and MOS 2.6±0.4 kg; p=0.0016) over the 10 weeks of the programme. At 26 weeks both groups demonstrated a 5 kg weight loss. There was a significant improvement in food habits, and cognitive restraint, disinhibition and hunger over the 10 weeks of the programme in the SC group. Patient satisfaction was reflected in a better retention rate at 26 weeks by the Shared Care group. - Conclusions: The study demonstrated that the obese patient managed in a shared setting achieved better weight loss in the short term and attrition was lower in the longer term than similar patient attending a specialist service based in hospital.

Evidenzklasse: IIb.

74. Rissanen A, Pietinen P, Siljamaki-Ojansuu U, Piirainen H, Reissel P. Treatment of hypertension in obese patients; efficacy and feasibility of weight and salt reduction programs. *Acta Med Scand* 1985;218:149-56

The effect of three different nutrition counselling programs on well established hypertension was studied in 64 obese patients regularly attending a hypertension clinic. The 12 month program of weekly-monthly group sessions focused on weight reduction (W group, n=24), salt restriction (S group, n=17) or both (WS group, n=23). The mean (+/-SEM) weight decreased by 6.9±0.7 kg in the W group (p<0.001) and by 5.0 ±0.6 kg (p<0.001) in the WS group during the first three months of the study and levelled off thereafter. The weight changes in the S group were small during the trial. The mean 24-hour urinary sodium excretion in the WS and S groups was reduced by about 35 and 50 mmol, respectively, during the first months of the study, and fell thereafter somewhat in the S group but not in the WS group. Sodium excretion remained unchanged in the W group. Systolic and diastolic blood pressure (BP) fell significantly in the W and WS groups during the first months of the study. BP remained thereafter stable in most patients but declined further in one fifth of them. BP changed little during the trial in the S group. By 12 months, BP control was improved in 67, 61 and 12 % of the patients in the W, WS and S groups, respectively. Improved BP control was strongly related to weight loss but not to reduced sodium excretion. Weight reduction programs with even modest success help most obese patients with established hypertension, whereas moderate salt intake restriction gives little added benefit.

Evidenzklasse: IIb.

75. Rocchini AP, Katch V, Anderson J, Hinderliter J, Becque D, Martin M, et al. Blood pressure in obese adolescents: effect of weight loss. *Paediatrics* 1988;82:16-23

The BP distribution of a group of 72 obese adolescents was determined both before and after weight loss. Weight loss was produced by a program of caloric restriction and behavior change alone (n=26) or with a combination of caloric restriction, behavior change, and exercise (n=25). It was demonstrated that obese adolescents have a BP distribution that is skewed 1 SD to the right of normal (P<.01), and that with weight loss this distribution was no longer different from that of the general population. It was also shown that a weight loss program that incorporates exercise and caloric restriction produces the most desirable effect on BP reduction (ie, greatest decrease in resting systolic BP and greatest decrease in exercise diastolic and mean BP). Finally, it was demonstrated that obese adolescents have structural changes present in the forearm resistance vessels and that these structural changes are reversed to the greatest extent in the weight loss program that includes exercise.

Evidenzklasse: IIb.

76. Rössner S. *Factors Determining the Long-Term Outcome of Obesity Treatment*. Philadelphia: Lippincott, 1992; Buch, Evidenzklasse: IV.

77. Royal College of Physicians. Statement: Withdrawal of Recommendations. London: Royal College of Physicians, 1997b

Following the decision by Servier to withdraw the drugs fenfluramine and dexfenfluramine for use in the treatment of obesity, the decision being consequence of new evidence on safety, the Royal College of Physicians is withdrawing the recommendations on the use of anti-obesity drugs in this report. The information leading to today's US Food and Drug Administration ban on the use of the drugs was not available when the College working party produced the report. The report did contain details of the then existing evidence on safety, and noted the absence of safety data for the use of the drugs for a period of over twelve month. The advice contained in the report relating to the management of obesity with diet, exercise and behaviour therapy is still appropriate as are the recommendations on the setting up of obesity clinics and monitoring arrangements for patients.

78. Royal College of Physicians. Overweight and obese patients. - Principles of management of overweight and obese patients with particular reference to the use of drugs. London: Royal College of Physicians, 1997a

Summary and Recommendations: Overweight and obesity are serious medical problems which require

appropriate and effective management by suitably trained members of a multidisciplinary team. A weight loss of 5-10% of the initial body weight reduces the health risks associated with obesity. The aims of treatment should be modest weight loss maintained for the long term, with treatment methods and goals decided for each individual after careful assessment of comorbid conditions. The first-line strategy for weight loss and its maintenance is a combination of supervised diet, exercise and behaviour modification. This approach must be pursued throughout, even when adjunctive therapies are used. Anti-obesity drugs may be justified in adult patients at medical risk from obesity (body mass index (BMI) 30 kg/m<sup>2</sup> or greater) where dietary methods have been unsuccessful in achieving 10% weight reduction after at least three months from the start of the episode of managed care. Rapid weight relapse is frequent after short-term use (12 weeks or less) of anti-obesity drugs; only dexfenfluramine is currently licensed in the UK for use beyond 12 weeks. Dexfenfluramine should be prescribed for no longer than 12 weeks in the first instance, and weight loss should then be assessed. The drug should be stopped in those obese patients who have not achieved a 10% weight reduction from the start of the episode of managed care. If a 10% weight loss is attained, the drug may be continued beyond this initial period, provided that body weight is continually monitored and weight not regained. The absence of extensive safety data beyond 12 months means that the use of dexfenfluramine cannot presently be recommended as part of routine management after this period of time. Prescribers of centrally acting anti-obesity drugs must be aware of the rare, but serious, risk of primary pulmonary hypertension, the onset of which may be insidiously asymptomatic. All obese patients receiving drug therapy should be subjected to regular review. There should be written notification to the patient's general practitioner (GP) when a prescription for an anti-obesity drug is initiated by another physician. There is an ethical duty to point out the advantage of this to the patient, who should also be told of the risk of conflicting treatment or misdiagnosis when the GP is not informed. Randomised controlled trials, which extend beyond one year, are required to evaluate the long-term efficacy and safety of anti-obesity drug therapy as adjunctive treatment. The use of dexfenfluramine should also be closely monitored through postmarketing surveillance and the Prescription Event Monitoring Drug Safety Research Unit.

Evidenzklasse: IV.

79. Schick RR, Schusdziarra V. Therapie der Adipositas. *Internist* 1993;34:1078-81

Zweifelsfrei ist die Adipositas die bedeutungsvollste Zivilisationskrankheit, ein wesentlicher Risikofaktor von Herz- und Kreislauferkrankungen, Hypertonie, Diabetes und degenerativen Skelettkrankheiten. In der täglichen Arbeit führt die aufklärende und leider häufig erfolglose Beratung über die Adipositas-Problematik nicht selten zur Frustration beim Patienten und Arzt. Ist der Körpermassenindex über  $>25 \text{ kg/m}^2$  [ $\text{Körpergewicht (kg): Körpergröße (m)}^2$ ]; liegt definitionsgemäß eine Adipositas vor. Das bedeutet, daß z.B. eine Person von 170 cm Größe, ab einem Gewicht über 72,3 kg als adipös zu bezeichnen ist. In dieser Übersicht werden die therapeutischen Möglichkeiten der Adipositas-Therapie aufgezeigt. Die konservative Behandlung ist hierzulande um ein neues Medikament, einen Appetitzügler, bereichert worden.

Evidenzklasse: IV.

80. Scottish Intercollegiate Guideline Network. Obesity guideline amended following withdrawal of fenfluramine and dexfenfluramine. Edinburgh: SIGN, 1997

The guideline Obesity in Scotland: Integrating Prevention with Weight Management, published in November 1996, recommended drug therapy under medical supervision for carefully selected patients, as an adjunct to diet therapy and lifestyle management. Newly published evidence from the US of valvular heart disease in patients on combination therapy (Conolly et al., 1997) and FDA warning of unpublished evidence of ECG changes in patients taking anti-obesity medication has led the manufacturer of Adifax (dexfenfluramine) and Ponderax (fenfluramine) to withdraw the drugs from sale. Recommendations on the use of anti-obesity drugs contained in a report from the Royal College of Physicians of London published in May 1997 have also been withdrawn (Royal College of Physicians, 1997). Most drugs previously used for promoting weight loss have not been evaluated for their effectiveness and safety over periods of one year or more. As a result of the withdrawal of fenfluramine and dexfenfluramine, the SIGN guideline presently does not recommend any drug for the management of obesity. This statement replaces the recommendation on drug therapy in section 8, stage 6e of the guideline (pg. 27). References to drug therapy should also be deleted from: summary of recommendations; scheme for weight management in primary care (pg. 17); criteria for selection of patients for surgical treatment (pg. 32); algorithm for establishing weight goals (pg. 57). These changes do not affect any other section of the guideline and the recommendations relating to prevention of obesity and weight management with support schemes, diet, behaviour modification and exercise are still appropriate. An update version of the guideline will appear on the SIGN website later this month.

81. Scottish Intercollegiate Guidelines Network. Obesity in Scotland. Integrating Prevention with Weight Management. A National Clinical Guideline Recommended for Use in Scotland. Edinburgh: SIGN, 1996

Summary of Recommendations: Management of almost all overweight and obese patients should be undertaken (C) and evaluated in the primary health care, community or commercial sectors. The priority in obesity management should be weight management with risk factor reduction (A), rather than major weight loss. The goal should be modest weight loss rather than a return to ideal or normal weight (C). Weight assessment: Schemes should be developed to allow adult and children's BMIs to be measured and recorded, with a system for alerting the patient and centre to adverse increases. Waist measurements should also be recorded. (B). Risk factor management: Smoking cessation should be a higher priority than weight loss and combined (B) with a weight maintenance system. Overweight and obese hypertensives should be managed for excess weight (B). Hyperlipidaemic patients should receive dietary lipid lowering advice in addition to weight management (A). A weight management programme should include the following elements: Support from trained personnel in a group setting (A). Dietary change involving the patient's household (A), following the dietary principles outlined in Annex 7 (B). Behaviour modification techniques (A). Exercise management- a scheme to increase physical activity (A). Drug therapy for carefully selected patients with specified drugs under medical supervision (A). Long term drug therapy should be evaluated (C). Prevention: Families and individuals at risk of weight gain should receive regular preventive advice (C). A new professional awareness of BMI and public awareness of waist measures should be promoted to aid preventive weight management programmes (C). Specialist care: Regional tertiary referral centres should be established in Scotland (C). The specialty of obesity management should be recognised for higher medical training (C). Surgery: Patients should only be considered for surgery following non-surgical treatment and multidisciplinary team evaluation (B). Most patients selected for surgery will have a BMI >40 or >35 plus high risk, life-threatening co-morbid conditions (B). Gastric restriction procedures should only be used with well-informed and motivated patients with acceptable surgical risks (B). Jejunio-ileal bypass surgery should not be used in obesity management (B). Surgery should be undertaken by an experienced surgeon in an appropriate clinical setting, with medical surveillance (B). A centre of expertise in the surgical management of obesity should be established (C).

Evidenzklasse: IV.

82. Singh RB, Niaz MA, Ghosh S, Rastogi SS. Effect on mortality and reinfarction of adding fruits and vegetables to a prudent diet in the Indian experiment of infarct survival (IEIS). *J Am Coll Nutr* 1993;12:255-261

The effects of antioxidant-rich foods as adjuncts to a prudent diet were compared for 12 weeks in a randomized, single-blind and controlled trial in 204 (group A) and 202 (group B) patients with acute myocardial infarction. There was a significant decrease in cardiac end points in group A compared to group B (37 vs 58, p 0.01) after 12 weeks. Within intervention group A, those 108 patients with greater adherence to the intervention program showed a greater reduction in cardiac end points (14 vs 58, p 0.001), and a significant decrease in total mortality (6 vs 28, p 0.001), including cardiac mortality (6 vs 25, p 0.01) compared to group B. Underlying these beneficial effects, antioxidant-rich foods caused a significantly smaller rise in lactate dehydrogenase (LDH) cardiac enzyme in group A than in group B (427.8 vs 561.6 IU/dL), indicating that the protective influence of such a diet may be observed within 1 week. The subset of group A patients showing reduction in mortality also had a lesser rise in LDH and greater reduction in blood lipids, blood glucose and blood pressures. Antioxidant-rich foods also caused a significant decrease in blood lipids with a lower decrease in high-density lipoprotein cholesterol in group A than in group B. Assay of serum level of antioxidants and long-term follow-up may confirm our observations.

Evidenzklasse: Ib.

83. Skender ML, Goodrick GK, Del Junco DJ, Reeves RS, Darnell L, Gotto A, et al. Comparison of 2-year weight loss trends in behavioral treatments of obesity: Diet, exercise, and combination interventions. *J Am Diet Assoc* 1996;96:342-6

OBJECTIVE: The effects of three cognitive- behavioral weight control interventions for adults were compared: diet only, exercise only, and a combination of diet and exercise. This article reports 2-year follow-up data. DESIGN: The three interventions were compared in a randomized, experimental design. SUBJECTS: A total of 127 men and women who were at least 14 kg overweight (according to height-weight tables) were recruited from an urban community and assigned randomly to the experimental conditions. INTERVENTION: The dietary intervention was a low-energy eating plan adjusted to produce a 1 kg/week loss of weight. The exercise component involved training in walking and a home-based program of up to five exercise periods per week. There were 12 weekly instructional sessions, followed by 3 biweekly and 8 monthly meetings. All sessions were led by registered dietitians. OUTCOME MEASURES: Changes in body weight. STATISTICAL ANALYSIS: Analysis of variance for weight changes and repeated measures analysis of variance for weight change trends. RESULTS: At 1 year, no significant differences were noted among the three groups. The diet-only group lost 6.8 kg, the exercise-only group lost 2.9 kg, and the combination group lost 8.9 kg (P=.09). During the second year, the diet-only group regained weight- reaching 0.9 kg above baseline; the combination group regained

to 2.2 kg below baseline; and the exercise-only group regained slightly to 2.7 kg below baseline ( $P=.36$ ). Repeated measures analysis of variance showed a group-by-time interaction ( $P=.001$ ); data for the dieting groups best fit a U-shaped regain curve ( $P=.001$ ).

APPLICATIONS: The results suggest that dieting is associated with weight loss followed by regain after treatment ends, whereas exercise alone produces smaller weight losses but better maintenance. The large outcome variability and unequal difficulty of the regimens across groups limit the generalizability of the findings.

Evidenzklasse: Ib.

84. Stamler J, Farinano E, Mojonier LM, Hall Y, Moss D, Stamler R. Prevention and control of hypertension by nutritional-hygienic means. Long-term experience of the Chicago Coronary Prevention Evaluation Program. *Jama* 1980;243(18):1819-23

In the Chicago Coronary Prevention Evaluation Program (CPEP), 115 men had definite mild hypertension at entry; another 101 men had high-normal diastolic blood pressure (BP). The nutritional-hygienic nonpharmacologic CPEP regimen achieved years-long moderate weight loss, slowing of pulse rate, and reduction in serum cholesterol levels. Sustained falls in BP were recorded - about 10/13 mm Hg for hypertensive men, resulting in long-term normalization of BP, and about 7/4 mm Hg for men with high-normal BP at entry. Change in weight and change in BP were significantly correlated. Long-term improvements in eating and exercise habits yielding moderate sustained weight loss are apparently useful in preventing high BP in hypertension-prone persons and in controlling established "mild" hypertension.

Evidenzklasse: IIb.

85. Stern JS, Hirsch J, Blair SN, Foreyt JP, Frank A, Kumanyika SK, et al. Weighing the options: criteria for evaluating weight-management programs. The Committee to Develop Criteria for Evaluating the Outcomes of Approaches to Prevent and Treat Obesity. *Obes Res* 1995;3(6):591-604

The United States is experiencing an epidemic of obesity among both adults and children. Approximately 35 percent of women and 31 percent of men age 20 and older are considered obese, as are about one-quarter of children and adolescents. While government health goals for the year 2000 call for no more than 20 percent of adults and 15 percent of adolescents to be obese, the prevalence of this often disabling disease is increasing rather than decreasing. Obesity, of course, is not increasing because people are consciously trying to gain weight. In fact, tens of millions of people in this country are dieting at any one time; they and many others are struggling to manage their weight to improve their appearance, feel better, and be healthier. Many programs and services exist to help individuals achieve weight control. But the limited studies paint a grim picture: those who complete weight-loss programs lose approximately 10 percent of their body weight, only to regain two-thirds of it back within 1 year and almost all of it back within 5 years. These figures point to the fact that obesity is one of the most pervasive public health problems in this country, a complex, multifactorial disease of appetite regulation and energy metabolism involving genetics, physiology, biochemistry, and the neurosciences, as well as environmental, psychosocial, and cultural factors. Unfortunately, the lay public and health-care providers, as well as insurance companies, often view it simply as a problem of willful misconduct - eating too much and exercising too little. Obesity is a remarkable disease in terms of the effort required by an individual for its management and the extent of discrimination its victims suffer. While people often wish to lose weight for the sake of their appearance, public health concerns about obesity relate to this disease's link to numerous chronic diseases that can lead to premature illness and death. The scientific evidence summarized in Chapter 2 suggests strongly that obese individuals who lose even relatively small amounts of weight are likely to decrease their blood pressure (and thereby the risk of hypertension), reduce abnormally high levels of blood glucose (associated with diabetes), bring blood concentrations of cholesterol and triglycerides (associated with cardiovascular disease) down to more desirable levels, reduce sleep apnea, decrease their risk of osteoarthritis of the weight-bearing joints and depression, and increase self-esteem. In many cases, the obese person who loses weight finds that an accompanying comorbidity is improved, its progression is slowed, or the symptoms disappear. Healthy weights are generally associated with a body mass index (BMI; a measure of whether weight is appropriate for height, measured in  $\text{kg}/\text{m}^2$ ) of 19-25 in those 19-34 years of age and 21-27 in those 35 years of age and older. Beyond these ranges, health risks increase as BMI increases. Health risks also increase with excess abdominal/visceral fat (as estimated by a waist-hip ratio [WHR] 1.0 for males and 0.8 for females), high blood pressure (140/90), dyslipidemias (total cholesterol and triglyceride concentrations of 200 and 225 mg/dl, respectively), non-insulin-dependent diabetes mellitus, and a family history of premature death due to cardiovascular disease (e.g., parent, grandparent, sibling, uncle, or aunt dying before age 50). Weight loss usually improves the management of obesity-related comorbidities or decreases the risks of their development. The high prevalence of obesity in the United States together with its link to numerous chronic diseases leads to the conclusion that this disease is responsible for a substantial proportion of total health-care costs. We estimate that today's health-care costs of obesity exceed \$70 billion per year. (ABSTRACT TRUNCATED AT 400 WORDS).

Evidenzklasse: IV.

86. Stunkard AJ. *Prevention of obesity*. London: Guildford Press, 1995; Buch, Evidenzklasse: IV.

87. Sullivan M, Karlsson J, Sjostrom L, Backman L, Bengtsson C, Bouchard C, et al. Swedish obese subjects (SOS)--an intervention study of obesity. Baseline evaluation of health and psychosocial functioning in the first 1743 subjects examined. *Int J Obes Relat Metab Disord* 1993;17((9)):503-512

This part of an on-going intervention trial analyses impacts of obesity on psychosocial factors and health. The study sample comprised 800 obese men (BMI > or = 34 kg/m<sup>2</sup>) and 943 women (BMI > or = 38 kg/m<sup>2</sup>) ranging in age from 37 to 57 years. All participants completed standardized health-related quality of life measures, a validated obesity-specific eating inventory and study-specific questionnaires on current and past health status, use of medical care and medications, socioeconomic status, dietary habits, physical activity habits, weight history and familial history of obesity. Chronic patients and population samples were used as reference. The obese reported distinctly poorer current health and less positive mood states than the reference subjects, women being worse than men. Anxiety and/or depression on a level indicating psychiatric morbidity were more often seen in the obese and again women reported more affliction than men. Furthermore, the average poor mental well-being was worst than in chronically ill or injured patients, such as rheumatoid, cancer survivors and spinal cord injured persons. Predictors of perceived health and psychosocial functioning could be discerned using a comprehensive system of statistical analyses (16-28% explained variance). A background of both somatic and psychiatric morbidity was decisive for the health and psychosocial functioning in the obese; joint symptoms and angina pectoris dominated among somatic variables. Physical inactivity was the most prominent of traditional risk factors. The number of dieting attempts and body image were important weight correlates. Our results provide further evidence to the effect that severe obesity is a crippling condition.

Evidenzklasse: III.

88. Toubro S, Astrup A. Randomised comparisons of diets for maintaining obese subjects' weight after major weight loss: ad lib, low fat, high carbohydrate diet v fixed energy intake. *Brit Med J* 1997;314:29-34

OBJECTIVE: To compare importance of rate of initial weight loss for long term outcome in obese patients and to compare efficacy of two different weight maintenance programmes. DESIGN: Subjects were randomised to either rapid or slow initial weight loss. Completing patients were re-randomised to one year weight maintenance programme of ad lib diet or fixed energy intake diet. Patients were followed up one year later. SETTING: University research department in Copenhagen, Denmark. SUBJECTS: 43 (41 women) obese adults (body mass index 27-40) who were otherwise healthy living in or around Copenhagen. INTERVENTIONS: 8 weeks of low energy diet (2 MJ/day) or 17 weeks of conventional diet (5 MJ/day), both supported by an anorectic compound (ephedrine 20 mg and caffeine 200 mg thrice daily); one year weight maintenance programme of ad lib, low fat, high carbohydrate diet or fixed energy intake diet (<=7.8 MJ/day), both with reinforcement sessions 2-3 times monthly. Main outcome measures: Mean initial weight loss and proportion of patients maintaining a weight loss of > 5 kg at follow up. RESULTS: Mean initial weight loss was 12.6 kg (95 % confidence interval 10.9 to 14.3 kg) in rapid weight loss group and 12.6 (9.9 to 15.3 kg) in conventional diet group. Rate of initial weight loss had no effect on weight maintenance after 6 or 12 months of weight maintenance or at follow up. After weight maintenance programme, the ad lib group had maintained 13.2 (8.1 to 18.3) kg of initial weight loss of 13.5 (11.4 to 15.4) kg, and the fixed energy intake group had maintained 9.7 (6.1 to 13.3) kg of the initial 13.8 (11.8 to 15.7) kg weight loss (group difference 3.5 (-2.4 to 9.3) kg). Regained weight at follow up was greater in fixed energy intake group than in ad lib group (11.3 (7.1 to 15.5) kg v 5.4 (2.3 to 8.6)kg, group difference 5.9 (0.7 to 11.1) kg P<0.03). At follow up, 65 % of ad lib group and 40 % of fixed energy intake group had maintained a weight loss of >5 kg (P<0.07). CONCLUSION: Ad lib, low fat, high carbohydrate diet was superior to fixed energy intake for maintaining weight after a major weight loss. The rate of the initial weight loss did not influence long term outcome.

Evidenzklasse: Ib.

89. Tuck ML, Sowers J, Dornfield L KG, Maxwell M. The effect of weight reduction on blood pressure, plasma renin activity and plasma aldosterone levels in obese patients. *N Eng J Med* 1981;304:930-3  
We investigated the relation between changes in the renin-aldosterone axis and reduction in blood pressure in 25 obese patients placed on a 12-week reducing diet, sodium intake was either medium (120mmol) or low (40mmol). Plasma renin activity (PRA) declined with weight loss, so that by 12 weeks there was a significant decrease in PRA (P<0.01) as well as plasma aldosterone (P<0.05), regardless of sodium intake was equal to that with medium intake. The reduction in PRA but not in aldosterone correlated with weight loss in both sodium-intake groups (r=0.58). Mean arterial pressure fell significantly and equally in both groups, correlating with weight loss throughout the study (r=0.56) and with PRA from the fourth through 12th weeks (r=0.48). These results demonstrate that weight loss is accompanied by reductions in PRA and aldosterone; PRA reductions, irrespective of sodium intake, may contribute to the decline in blood pressure.

Evidenzklasse: IIb.

90. Wabitsch M, Hauner H, Heinze E, Böckmann A, Benz R, Mayer H, et al. Body fat distribution and steroid hormone concentrations in obese adolescent girls before and after weight reduction. *Journal of Clinical Endocrinology and Metabolism* 1995;80(12):3469-3474

The aim of this study was to investigate the role of body fat distribution on steroid hormone serum concentrations in obese adolescent girls before and after weight reduction. Ninety-two girls (age 15.1 +/- 0.7 yr) with a mean body mass index of 31.2 +/- 4.6 kg/m<sup>2</sup> participated in this 6-week intervention study. Initially, girls with abdominal obesity (waist to hip ratio, >0.86; n=30) had higher levels of total and free testosterone and lower levels of sex hormone-binding globulin as well as lower morning levels of total and free cortisol than girls with gluteal-femoral obesity (waist to hip ratio, <0.80; n=31) independent of their body mass index. After a mean weight loss of 8.3 +/- 2.8 kg by a standardized weight loss program, significant reductions were observed in estradiol, total and free testosterone, dehydroepiandrosterone sulfate, and the ratio of LH to FSH, whereas sex hormone-binding globulin and free cortisol levels increased significantly. Decreases in total and free testosterone and increases in total and free cortisol were significantly greater in the girls with abdominal obesity than in the girls with gluteal-femoral obesity. Our results suggest that obese girls with an abdominal pattern of fat distribution exhibit more pronounced steroid hormone aberrations, in particular a high androgenic activity, than girls with a gluteal-femoral pattern of fat distribution. The reduction of excess body weight by a conventional treatment regimen is associated with a remarkable improvement of steroid hormone abnormalities in this particular subtype of obese adolescent girls.

Evidenzklasse: IIb.

91. Wadden T, Van Itallie T, Blackburn G. Responsible and Irresponsible Use of Very -Low-Calorie Diets in the Treatment of Obesity. *Jama* 1990b;263(1):83-85

America's most celebrated weight loss was announced on November 15, 1988, when Oprah Winfrey disclosed to her 18 million television viewers that she had lost 30.5 kg (67lb) in 4 months by consuming a medically supervised very-low-calorie diet (New York Times. November 24, 1988: B17). Ms Winfrey's announcement sparked a frenzy of interest among the nation's dieters, reminiscent of that which greeted the appearance of the liquid protein diets in 1976 and 1977 and the Cambridge Diet in the early 1980s. Sadly consumption of these diets was inadequately supervised; at least 58 deaths were reported among users of liquid protein products and 6 deaths in persons who consumed the Cambridge Diet. Current very-low-calorie diets that provide essential nutrients and high-quality proteins are unquestionably safer than their liquid protein predecessors, as noted in a timely report prepared by the American Medical Association's Council on Scientific Affairs. But the recent and zealous marketing of various formula products to physicians, as well as the public's appetite for such diets, could lead to yet another round of complications and fatalities. We are particularly alarmed by the possible consumption of very-low-calorie diets by persons who are not severely overweight or who do not receive appropriate medical supervision. Moreover, the prescription of these diets by physicians untrained in their use is cause for anxiety. We will discuss these concerns after first reviewing the conditions under which very-low-calorie diets are responsibly used.

Evidenzklasse: IV.

92. Wadden TA. Treatment Of Obesity By Moderate And Severe Caloric Restriction. Results of Clinical Research Trials. *Annals Internal Medicine* 1993;119:688-693

Recent studies of the treatment of obesity by moderate and severe caloric restriction show that patients treated in randomized trials using a conventional 1200 kcal/d reducing diet, combined with behavior modification, lose approximately 8,5 kg in 20 weeks. They maintain approximately two thirds of this weight loss 1 year later. patients treated under medical supervision using a very-low-calorie diet (400-800 kcal/d) lose approximately 20 kg in 12 to 16 weeks and maintain one half to two thirds of this loss in the following year. Both dietary interventions are associated with increasing weight regain over time, although regain can be minimized with the recognition that obesity, in many cases, is a chronic condition that requires continuing care. Patients who participate in a formal weight-loss maintenance program, exercise regularly, or both are likely to achieve the best long-term results.

Evidenzklasse: IV.

93. Wadden TA, Stenberg JA, Letizia KA, Stunkard AJ, Foster GD. Treatment of obesity by very low calorie diet, behavior therapy, and their combination: a five-year perspective. *Int J Obes* 1989;13(suppl2):39-46.

Seventy-six obese women with a mean age of 42.1 years and weight of 106.0kg were randomly assigned to one of three treatments: (a) very low calorie diet alone; (b) behavior therapy alone; or their combination (i.e.combined treatment). Weight losses for the three conditions at the end of treatment were 13.1, 13.0, and 16.8 kg respectively, with losses for combined treatment significantly greater than those for the two other conditions. Weight losses 1 year after treatment were 4.7, 6.6, and 10.6 kg, respectively. A significantly greater percentage of subjects in the behavior therapy alone (36 per cent) and combined treatment conditions (32per cent ) maintained their full end-of-treatment weight losses

than the very low calorie diet alone condition (5 per cent). Five years after treatment, a majority of subjects in all three conditions had returned to their pretreatment weight, and 55 percent of the total sample had received additional weight reduction therapy. The short and long term effects of treatment are discussed in terms of their implications for practice and research.

Evidenzklasse: IIb.

94. Wadden TA, Stunkard AJ, Rich L, Rubin CJ, Swedidel G, McKinney S. Obesity in Black adolescent Girls: A Controlled Clinical Trial of Treatment by Diet, Behavior Modification, and Parental Support. *Pediatrics* 1990a;85:345-52

Recent findings indicate that nearly 50 % of black American women are obese and that adolescence is a critical period for the development of their obesity. This study investigated the efficacy of a behavioral weight control program in 36 black female adolescents with a mean age of 14.0 years, weight of 95.0 kg, and height of 163.2 cm. All subjects participated in the same 16-week program but had different levels of parent participation: (1) child alone with no parent participation; (2) mother and child treated in the same session; and (3) mother and child treated in separate but concurrent session. At the end of the 16-week program, children in the three conditions lost 1.6, 3.7 and 3.1 kg, respectively. Differences among conditions were not statistically significant; however, a secondary analysis revealed that the greater the number of sessions attended by mothers, the greater their daughters' weight losses.

Weight reduction was associated with significant improvements in body composition, serum total cholesterol concentrations, and psychological status. Results are discussed in terms of the need to improve the maintenance of weight loss in adolescents and to explore possible differences between black and white females in their preferred body types.

Evidenzklasse: IIb.

95. Wardle J. Obesity and behaviour change: matching problems to practice. *Int J Obes Relat Metab Disord* 1996;20(1):1-8; kein Abstract, Evidenzklasse: IV.

96. Wechsler G, Schusdziarra V, Hauner H, Gries A. Therapie der Adipositas. *Deutsches Ärzteblatt* 93 1996b;36:a-2214

Die Adipositas wird in Deutschland in zunehmendem Maße zu einem gesundheitspolitischen Problem. Die Akut- und Folgekosten der Adipositas steigen nach Schätzungen des Bundesgesundheitsministeriums weiter an. Die Ursachen sind multifaktoriell, wobei genetische Aspekte zunehmend an Bedeutung gewinnen. Dementsprechend vielschichtig und verwirrend sind zahllose Therapieansätze. Das Spektrum reicht von der Psychotherapie, Diätetik, Bewegungstherapie und Medikamenten bis zu interventionellen Verfahren wie dem Magenballon und der Operation. Außenseiter, Exoten und Betrüger versprechen Wunderheilungen. Der Beitrag soll kritische Standortbestimmung und Empfehlung zugleich sein.

97. Wechsler JG. Aktuelle Therapie der Adipositas. *Dtsch. med. Wschr.* 1997;122:1287-90

Die Adipositas stellt eines der wichtigsten Gesundheitsprobleme in Deutschland dar. Sie hat zentrale Bedeutung für die Entwicklung des metabolischen Syndroms, und sie führt direkt zum Auftreten von Fettstoffwechselstörungen, arterieller Hypertonie, Diabetes mellitus, Fettleberhepatitis, Hyperurikämie, Gallensteinleiden und Gelenkbeschwerden.

Evidenzklasse: IV.

98. Weigle DS, Sande KJ, Iverius P-H, Monsen ER, Brunzell JD. Weight Loss Leads to a Market Decrease in Nonresting Energy Expenditure in Ambulatory Human Subjects. *Metabolism* 1988;37(10):930-6

The extent to which the resting and nonresting components of 24-hour energy expenditure decrease after weight reduction has not been prospectively assessed in ambulatory, weight-stable, reduced-obese humans. Accordingly, 24-hour energy expenditure was estimated as the weight-stabilizing (+50 g/d) daily caloric intake of a defined liquid diet in a cross-sectional study of ten reduced-obese subjects after a 23.2% ± 9.4% weight loss and 18 obese subjects at baseline weight. A regression analysis demonstrated an 18% decrease in the mean daily energy requirement of the reduced-obese subjects compared with that of subjects of the same relative body weight who had never dieted. Strong linear relationships were noted between estimated 24-hour energy expenditure and fat-free mass (FFM), and between resting metabolic rate (RMR) and FFM in the subjects at baseline weight. In six reduced-obese men, the 24-hour energy expenditure was only 75.7% ± 5.6% of the value predicted by regression analysis for the decreased FFM. In these six subjects the RMR was 97.4% ± 7.5% of that predicted for the decreased FFM, suggesting that essentially all the energy savings relative to FFM in the reduced-obese state occurred in nonresting energy expenditure. In a subsequent group of seven subjects studied longitudinally before and after a 21.6% ± 2.3% weight loss, the decrease in nonresting energy expenditure accounted for 582 ± 276 kcal/d or 71% of the decrease in estimated 24-hour energy expenditure. These data suggest a decrease in the nonresting energy expenditure of ambulatory reduced-obese individuals, which is greater than previously appreciated. A substantial increase in physical activity would be necessary in any weight loss maintenance program to overcome the energy savings of the reduced-obese state.



Evidenzklasse: IIa.

99. Weintraub M. Long-term weight control: The National Heart, Lung and Blood Institute funded multimodal intervention study. Introduction. *Clin Pharmacol Ther* 1992a;51:581-585; kein Abstract, Evidenzklasse: IV.

100. Weintraub M, Sundaesan PR, Madan M, Schuster B, Balder A, Lasagna L, et al. Long-term weight control study. I-VII. *Clin Pharmacol Ther* 1992b;51:586-641

#### **Study I: (weeks 0 to 34)**

To investigate the value of anorexiants as an adjunct to other forms of weight control therapy, we studied 121 people in a 34 week, double-blind clinical trial of 60 mg extended-release fenfluramine plus 15 mg phentermine resin versus placebo added to behavior modification, caloric restriction, and exercise. Participants weighed 130 % to 180 % (154 %  $\pm$  1.2 %, mean  $\pm$  SEM) of ideal body weight (1983 Metropolitan Life Tables) and were in good health. By week 34, participants receiving active medication lost an average of 14.2  $\pm$  0.9 kg, or 15.9%  $\pm$  0.9 of initial weight (n=58), versus a loss of 4.6  $\pm$  0.8 kg or 4.9  $\pm$  0.9 of initial weight by subjects taking placebo (n=54;  $p$  < 0.001). On visual analog scales, participants rated fenfluramine plus phentermine as more helpful than placebo (50.3  $\pm$  0.5 versus 20.3  $\pm$  0.3) and not bothersome (fenfluramine plus phentermine, 17.4  $\pm$  0.3 versus 13.5  $\pm$  0.2). Blood pressure decreased and pulse remained unchanged in both groups. Dry mouth was the most common adverse effect in subjects receiving fenfluramine plus phentermine; all adverse effects decreased after 4 weeks. Only nine participants left the study in the first 34 weeks. Two subjects from each group left the study as a result of adverse effects. Overall, fenfluramine plus phentermine used in conjunction with behavior modification, caloric restriction, and exercise aided weight loss and continued to be efficacious for 34 weeks.

#### **Study II: (weeks 34 to 104)**

Between weeks 34 and 104, we explored different schema for administering fenfluramine plus phentermine in open-label fashion. At week 34, the original placebo group participants began taking fenfluramine plus phentermine (placebo-to-active group). Those receiving fenfluramine plus phentermine between weeks 6 and 34 either continued to receive medication or began targeted intermittent therapy. Participants who did not lose 10 % of initial weight received an augmented dose (60 mg fenfluramine plus 30 mg phentermine). The placebo-to-active group lost an additional 9.1  $\pm$  0.8 kg (mean  $\pm$  SEM) in the period from week 34 to week 60. At week 60, they were assigned to either continue medication, intermittent therapy, or augmented therapy. More than 68 % (83) of the original participants completed up to study week 104. At that point, overall weight loss was 10.8  $\pm$  0.7 kg (11.6  $\pm$  0.8 % of initial weight); participants who continued to receive fenfluramine plus phentermine lost 1.6  $\pm$  0.8 kg, participants receiving intermittent therapy lost 11.6  $\pm$  1.3 kg and participants receiving augmented therapy lost 6.5  $\pm$  1.5 kg. Although 41 % of the participants complained of dry mouth, neither serious adverse effects nor evidence of medication abuse appeared. There were 29 dropouts in the period from weeks 34 to 104. Sixteen of those were related to medication (adverse effects, lack of efficacy, and fear of medication). Overall, fenfluramine plus phentermine used in conjunction with behavior modification, caloric restriction, and exercise continued to be efficacious for up to 2 years.

#### **Study III: (weeks 104 to 156)**

Between weeks 104 and 156 we attempted to optimize response by adjusting the doses of fenfluramine and phentermine. Dosing changes were based on an algorithm that aimed to achieve 120 % of ideal body weight (IBW) while minimizing adverse effects. The dose groups were as follows: stage I, 30 mg fenfluramine plus 15 mg phentermine in the morning; stage II - continuous or targeted intermittent, 60 mg fenfluramine plus 15 mg phentermine in the morning; stage III, 60 mg fenfluramine plus 30 mg phentermine in the morning; stage IV, 60 mg fenfluramine plus 30 mg phentermine in the morning and 30 mg fenfluramine in the evening; and stage V, 60 mg fenfluramine plus 30 mg phentermine in the morning and 60 mg fenfluramine in the evening. Seventy-seven participants began this segment of the study and 59 completed to week 156. Completers of this segment of the study gained an average of 2.7  $\pm$  0.5 kg between weeks 104 and 156 but remained 9.4  $\pm$  0.8 kg (10.5 %) below baseline. On average, weight loss from baseline by group was as follows: for stage I (n=2), 14.1  $\pm$  6.8 kg; for stage II continuous (n=14), 10.9  $\pm$  0.7 kg; for stage II targeted intermittent (n=7), 8.8  $\pm$  2.4 kg; for stage III (n=9), 7.7  $\pm$  2.6 kg, for stage IV (n=8), 10.5  $\pm$  2.6 kg; and for stage V (n=19), 8.4  $\pm$  2.4 kg. Upward dose adjustment (n=36) resulted in further weight loss in 11 and no gain in six participants. Twelve participants were  $\leq$  120 % of their IBW's and 24 additional participants were  $\leq$  130 % of their IBW's at week 156. Visual analog scales indicated maintained medication effect and, even with increased doses, less medication bother. Of the 18 participants who dropped out of the study during this phase, three left because of adverse effects. At week 156, 14 participants had 21 complaints (dry mouth (7), central nervous system (6), gastrointestinal (6), and cardiovascular (2)). Overall, fenfluramine plus phentermine in conjunction with behavior modification, caloric restrictions, and exercise continued to help participants maintain weight loss for up to 3 years. Medication dose adjustment provided a modest additional benefit in some participants.

#### **Study IV: (weeks 156 to 190)**

To assess continued efficacy of anorexiant after 3 years of use, 52 participants (43 % of those starting) entered a second double-blind trial to compare 60 mg sustained-release fenfluramine plus 15 mg phentermine resin versus placebo added to behavior modification, caloric restriction, and exercise. Although participants in both the active medication and placebo groups gained weight, participants receiving fenfluramine plus phentermine (n=27) gained significantly ( $p < 0.01$ ) less (4.4 +/- 0.5 kg or 5.3 % +/- 0.5 % of initial weight) than participants receiving placebo (n=24) (6.9 +/- 0.8 kg or 8.5 % +/- 1.1 % of initial weight). At week 190, both groups were still below their initial weight (fenfluramine plus phentermine group, 5.0 +/- 1.4 kg; placebo group, 2.1 +/- 1.2 kg;  $p < 0.01$ ). Overall 12 participants (23.5 % of those still in the study) were  $\geq 10$  % below initial weight. One participant dropped out during this phase because of personal reasons and loss of medication efficacy. During the 30 weeks, participants receiving fenfluramine plus phentermine had 26 moderate or severe complaints versus eight participants receiving placebo. Fenfluramine plus phentermine provided better appetite control and only slightly more bother. Analysis of participant response in this phase by treatment assignment in the first double-blind phase (weeks 6 to 34) indicated that initial receipt of medication did not have negative learning effects. Eleven participants receiving active medication between weeks 6 and 34 and receiving placebo between weeks 160 to 190 gained 5.1 +/- 1.0 kg. In contrast, 13 participants originally taking placebo gained 8.3 +/- 9 kg in this second double-blind phase. Participants titrated to higher doses of medication in the period from weeks 104 to 156 had a greater increase in their weights during the second double-blind study.

#### **Study V: (weeks 190 to 210)**

Participants who completed up to week 190 in the long-term weight control study were monitored after cessation of medication between weeks 190 and 210. Caloric restriction, behavior modification sessions, exercise reinforcement, and physician visits continued. We assessed whether or not participants had reset their weight control mechanisms and compared the effect of stopping medication under open-label conditions (weeks 190 to 210) with the results of stopping anorexiant under double-blind conditions (weeks 160 to 190). At week 210, participants were, on average, 1.4 +/- 1.0 kg (mean +/- SEM, 1.5 % +/- 1.1 %) below their weights at baseline (week 0). Of the 48 participants who remained in the study, 13 were still 5 % or more and seven were 10 % or more below their initial weights. On average, participants gained 2.7 +/- 0.5 kg (3.2 %) in the period from weeks 190 to 210. Those who had been taking medication in the period from weeks 160 to 190 gained weight at a somewhat faster rate than those who had been taking placebo. However, participants who had transferred from fenfluramine plus phentermine to no medication in this phase gained at a slower rate than participants who had changed from fenfluramine plus phentermine to placebo under double-blind conditions at week 160 (0.195 kg per week versus 0.277 kg per week). The findings indicate that participants had difficulty maintaining weight loss without anorexicant medications. Despite long periods of time at weights much lower than baseline, permanent resetting of weight control mechanisms could not be shown for most participants.

#### **Study VI: (Individual participant response patterns)**

We analyzed the individual response patterns of all 121 participants who entered the study. Fifty-one participants completed up to week 190. In 26 completers, the response pattern consisted of an initial beneficial effect ( $\geq 6$  months of weight loss  $\geq 10$  % from baseline) and later success (weight loss of  $\geq 10$  % from baseline at week 160). These successful participants had lost 14.1 +/- 1.0 kg (mean +/- SEM); 15.9 % +/- 0.9 % of initial weight at week 160 and 8.1 +/- 1.2 kg (9.1 % +/- 1.3 % of initial weight) at week 190. A second pattern observed in 16 completers consisted of initial benefit and later partial success (loss of 0.1 % to 9.9 % at week 160). Other response patterns observed in completers included showing initial benefit only (n=3) and no success (n=6). Seventy of the 121 participants left the study before week 190. There were 22 "dropout successes" who had consistent weight loss for 1 year and more and were (10 %) below their initial weights at time of dropout. Fifteen "dropouts with initial benefit" stayed in the study for  $\geq 1$  year with initial benefit (weight loss  $\geq 10$  % from baseline maintained for  $\geq 6$  months). Medication-related reasons accounted for only 10 of the 37 dropouts in the group with initial or later benefit. Minimal benefit was seen in 17 dropouts. Another 16 were in the study less than 1 year. Analysis of individual participant responses made some other generalizations possible. Participants receiving continuous medication lost more weight and had fewer adverse effects than those receiving targeted intermittent medication. Upward dose adjustment appeared to help 24 participants achieve the criteria for late or partial success. Analyses of individual participant responses can suggest ways to optimize anorectic medication use for individual patients.

#### **Study VII: (weeks 0 to 210)**

We analyzed serum total cholesterol, triglycerides, and lipoprotein profile changes occurring in the participants (N=121) through 210 weeks of the study. On average, baseline lipid levels were within normal limits. The most constant changes occurred in the high-density lipoprotein cholesterol (HDL-C), serum total cholesterol/HDL-C ratios, and triglyceride levels. HDL-C increased significantly ( $p < 0.01$ ), compa-

red with baseline, by 10 % at week 34 and 15 % at week 54, 19 % at week 104 and 27 % at week 139. At week 210, 20 weeks after treatment had ended, HDL-C was 15 % higher than baseline. At weeks 34, 54, 104 and 139, the serum total cholesterol/HDL-C ratio was significantly decreased, compared with baseline, by 9 %, 19 %, 17 % and 25 %, respectively. At week 210, serum total cholesterol/HDL-C ratio was 8 % less than week 0. Compared with baseline, triglyceride levels decreased significantly by 21 %, 31 %, 29 % and 29 % at weeks 34, 54, 104 and 139, respectively. At week 210, triglyceride levels were 16 % below baseline. Total cholesterol levels and low-density lipoprotein cholesterol (LDL-C) showed less dramatic changes. Patterns of lipid and lipoprotein changes were qualitatively similar between men and women. However, greater decreases in serum total cholesterol, LDL-C, and triglyceride levels were observed in participants with high (n=0) compared with low (n=10) baseline lipid levels. Cholesterol changes were not affected by anorexiants. However, triglyceride levels at week 34 were significantly ( $p < 0.025$ ) less in the participants treated with anorexiants. Overall, participants in the long-term weight control study had beneficial changes in their lipid profiles, thus decreasing their risk of coronary heart disease.

Evidenzklasse: Ib.

101. Westenhöfer J, Pudell V. Failed and successful dieting: risks of restrained eating and chances of cognitive control. In: Angel A, Anderson C, Bouchard D, Lau L, Leiter L, Mendelson R, editors. *Progress in Obesity Research*. London: John Libbey, 1996:481-7

102. WHO. Obesity; Preventing and managing the global epidemic. Genf: WHO, 1998; Report, Evidenzklasse : IV.

103. Willett WC, Stampfer M, Manson J, Van Itallie TB. New weight guidelines for Americans: justified or injudicious. *Am J Clin Nutr* 1991;53:1102-3

The US Department of Agriculture (USDA) has issued revised suggested weights for adults in the newly published Dietary Guidelines for Americans (1). These weight guidelines received widespread publicity, particularly because they represent a substantial increase from earlier recommendations. Most notable were the increased suggested weights for people 35 y and older compared with those 19-34 y. For example for a person (man or woman) 6 ft (183 cm) tall, the suggested range is 140-184 lb (63,6-83,6 kg) for ages 19-34 y and (...) for ages  $\geq 35$  y. This compares with an upper limit of 168 lb (76,4 kg) for a man of medium frame from the 1959 Metropolitan Life Insurance Company tables (2) with no suggested weight gain with increasing age. The new suggested weights are said to be derived from the National Research Council (NRC) Report of (...). However, the NRC report contains no specific suggested weights and makes only very general recommendations; no increase in ideal weight is recommended in that report. Thus the basis of these new recommendations is unclear. It is likely that they are derived from the publication by Andres et al (4) based on age-specific analyses of life-insurance data. As we (5) pointed out before, these analyses are fatally flawed because the effects of cigarette smoking were not controlled for. Cigarette smokers tend to weigh appreciably less than do nonsmokers but have high rates of death from many causes because of their smoking. This phenomenon tends to create an artifactual increase in mortality for lighter people and to shift the apparent optimal relative weight toward higher levels. Because the adverse effects of smoking tend to accumulate over many decades, this bias will be seen primarily for older people and to a very minimal degree in people  $< 35$  y of age. The result is an apparent shift toward higher optimal relative weights as people grow older. Moreover the generation of smokers who began smoking heavily as teen-agers has only recently entered the age of high rates of cancer and coronary heart disease (6), so that the more current (...) data are more seriously biased than the earlier reports. The smoking effect on the relation between body weight and mortality is clearly evident in that a substantial proportion of the excess mortality for lighter individuals is due to cigarette (...) lung cancer (6). A second important bias in many studies is a failure to consider the effect of disease on body weight. Many diseases even before diagnosis, can cause weight loss and also increase the risk of death. The observation that excess mortality in underweight individuals tends to occur primarily early (...) whereas overweight-related mortality is delayed (7) supports the presence of an artifact due to underlying disease. Inclusion of early mortality (that which occurs soon after weight is ascertained) in an analysis of body weight and mortality will tend to bias the apparent optimal weights upward. As with cigarette smoking this bias will be more pronounced at older ages when the diseases associated with weight loss are more common causes of death. A third source of bias in many studies is the inappropriate control in the analysis for the physiological effects of obesity, especially hypertension and diabetes, which mediate the effect of obesity on various adverse outcomes, especially cardiovascular disease. Many of the analyses from the insurance data do not directly adjust for these intermediate variables, but because an obese individual with hypertension or diabetes is less likely to be accepted for insurance than an obese person without those risk factors, the distorting effect on the relation between weight and mortality is similar (8). The bias again will be toward higher apparent optimal weights because of selective partial exclusion of obese persons with adverse risk factors attributable to the excess weight. Like the first two biases discussed, the effect will be stronger for older individuals. Not only is the apparent basis of the recent recommendations

for increased weights for people aged >35 y fundamentally invalid, there is also no biological rationale for recommending that persons increase their weight as they grow older; indeed, there is much evidence to the contrary. Such weight gain is almost always exclusively an increase in fat mass. The new guidelines suggest an average weight gain of approximately 15 lb (6.9 kg) between early (ages 19-34 y) and later adulthood (>=35 y). In the Nurses' Health Study such a weight gain was associated with a 50 % increase in the risk of diabetes (9). Similarly, a material increase in blood pressure and a reduction in high-density-lipoprotein concentrations would also be expected from a weight gain of this magnitude. The only plausible benefit from an increase in fat mass would be a reduction in the risk of hip fracture. For a 5-ft-5 in (165cm) woman weighing 110 lb (50 kg), a 15 lb (6.8 kg) increase in weight was associated with an estimated 30 % increase in risk of coronary heart disease (10). Although some sections of the new guidelines are sensible, we recommend that the USDA immediately cease the circulation of the current recommendations and compose a new committee qualified to consider guidelines for recommended weights. As noted earlier (5), the ideal data do not exist on which to base recommendations because virtually all are biased toward higher optimal ranges of weight. However, among the major published guidelines, the 1959 Metropolitan Life tables (2) are probably least biased because the distorting impact of cigarette smoking was less at this earlier period. Major weight increases in adulthood are likely to increase rather than decrease the risk of morbidity and mortality. Obesity is a major and increasing problem in America; what we do not need from our government is encouragement to get fatter.

Evidenzklasse: IV.

104. Wing RR. Behavioural treatment of obesity, its application to type II diabetes. *Diabetes Care* 1993;16:193-9

This review describes the improvements made in the behavioral treatment of obesity from the 1970s to the present, and then provides a comparable overview of progress that has been made in the behavioral treatment of obese patients with type II diabetes by Wing et al. (13-19) at the University of Pittsburgh. Evidence is presented to show that structured exercise, VLCDs, and intensification of treatment programs may be useful in improving the long-term outcome of behavioral weight-loss interventions.

Evidenzklasse: IV.

105. Wing RR. Behavioural treatment of severe obesity. *Am J Clin Nutr* 1992;55(2 Suppl):545-551  
Behavioral approaches to obesity are usually employed in the context of short-term (10-20 wk) treatment interventions. These programs produce weight losses averaging 10 kg at the end of the program and 6.6 kg at 1 y follow-up. Improvements in long-term results may depend on a shift to a chronic disease model of obesity treatment, in which patients remain in ongoing care for extended periods of time. Highly structured diets and supervised exercise warrant further investigation as components of such a chronic disease approach to the treatment of severe obesity.

Evidenzklasse: IV.

106. Wirth A, Kroger H. Improvement of left ventricular morphology and function in obese subjects following a diet and exercise program. *Int J Obes Relat Metab Disord* 1995;19(1):61-6

The aim of this work was to compare left ventricular performance during weight reduction induced by either physical training and diet or diet alone. Forty-three moderately obese subjects received a hypocaloric diet of 800 kcal/d for 4 weeks; 22 of them were also subjected to an exercise program. By means of echocardiography, left ventricular dimensions and systolic time intervals were determined. Heart rate and blood pressure were measured at rest and during exercise. The addition of physical training resulted in a more favourable change in weight loss (-8.3 vs -6.3 kg), heart rate (-14 vs -7 bpm), systolic (-17 vs -8 mm Hg), and diastolic (-11 vs -6 mm Hg) blood pressure. Left ventricular mass (LVM) was diminished more pronouncedly by combined therapy (-10.0%) as compared to diet alone (-4.7%). Changes in LVM were correlated with weight loss but not with alterations in heart rate and blood pressure. Fractional shortening and mean circumferential fiber shortening velocity did not improve significantly whereas the ratio of preejection period/left ventricular ejection time (PEPi/LVETi) was shortened in the diet and diet plus exercise group by -10.7 and -17.9%, respectively. It was concluded that exercise training in combination with a hypocaloric diet reduces left ventricular dimensions, LVM and PEPi/LVETi more distinctly than diet alone.

Evidenzklasse: Ib

107. Wood OB, Popovich NG. Nonpharmacologic treatment of obesity. *J Am Pharm Assoc (Wash)* 1996;36(11):636-50

Experts agree that overweight and obesity pose a significant public health problem in the United States. Obesity is considered to be a complex, multifactorial disease involving genetics, physiology, psychology, and environment, and is influenced by cultural messages. Comorbidities linked to obesity include coronary heart disease, stroke, hypertension, diabetes mellitus, gout, dyslipidemias, cholecystitis, and gallstones. Pharmacists can help patients with dietary goals by understanding sound principles of weight management.

Evidenzklasse: IV.

