ESPEN LLL Course Topic 23 - Nutrition in Obesity





THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM



Module 23.3

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Objectives





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- 1. To understand the principles of interdisciplinary obesity therapy
- 2. To know the various nutritional and behavioural interventions needed for obesity therapy in adults
- 3. To know about the multimodal approach to treat obesity
- 4. To know about the benefits and risks of formula diets for obesity therapy
- 5. To be familiar with post-intervention follow-up and weight maintenance strategies
- To know about costs and reimbursement of obesity therapy





. Introduction

Topics

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- 2. Non-surgical lifestyle therapy (nutrition, exercise, behaviour)
- 3. Drugs supporting or obstructive to therapy of obesity
- 4. The multimodal approach: Outcome, costs and responsibilities
- 5. Interface with bariatric surgery
- 6. Weight maintenance strategies

ESPEN Definition of Obesity





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- Obesity is defined as a pathologically increased fat mass, which is associated with an increased health risk.
- 2. Obesity is not defined by a body mass index above the normal range.
- 3. Also non-obese can have an increased BMI; e.g. body builders, pts. with edema, ascites, etc.



Fat is not just fat





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A "simple" measure for the assessment of the visceral fat depot is the measurement of the waist circumference (WCF), which is made more difficult in the obese by the fact that no waist is recognizable.

The measurement of WCF in the overweight, and possibly also grade I obesity, allows a better estimation of metabolic risk than BMI alone.



Measurement of WCF.

The WCF is in the amount of "halfway between lower margin ribs and upper margin pelvic scoop" measured in expiration.

Lean ME, Han TS, Morrison CE. BMJ 1995;311:158-61. Nazare JA, Smith J, Borel AL, et al. Am J Cardiol. 2015;115:307-15.

Clinical presentation





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THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM Obesity is a chronic, systemic disease that requires a multidisciplinary treatment approach at both the diagnostic and the therapeutic level.

It is rarely spontaneously reversible and is associated with increased morbidity, mortality, and reduced quality of life.

Obese people have a higher prevalence of co-morbid mental disorders than normal-weight people (obese OR 2.0 and overweight OR 1.4, respectively), with depressive disorders the most common ones.

Bischoff SC, Boirie Y, Cederholm T, et al. Clin Nutr. 2016 Nov 16 Sowemimo OA, Yood SM, Courtney J, et al. Surg Obes Relat Dis. 2007;3:73-7. Baumeister H, Härter M. Int J Obes (Lond). 2007;31:1155-64.

Clinical presentation





SOCIETY



Therapeutic principles





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Treatment of obesity starts with a careful assessment of the individual patient's history. NUTRITION AND

> To treat the patient appropriately and to evaluate the treatment options correctly, a **phase-dependent therapy** is needed.

> Usually, this needs an interdisciplinary approach according to a "case management".



The therapeutic principles differ significantly in the weight reduction and the weight maintenance phases. In the reduction phase negative energy balance is in the foreground; later a balanced energy balance and the nutritional composition predominate. Therefore, no nutritional concepts are to be expected which are suitable for successful weight loss as well as for long-term weight stabilization. But in the past exactly this was often expected.



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Therapeutic principles



Current recommendations for weight loss therapy largely follow the recommendations in selected major guidelines:

- 1. The US guideline "Management of Overweight and Obesity in Adults" (AHA/ACC/TOS Guideline 2013)
- 2. The European Guidelines for Obesity Management in Adults (EASO Guidelines 2015 + extensions)
- 3. The UK guideline "Obesity: identification, assessment and management" (NICE 2014)
- 4. The Scottish guideline "Management of Obesity" (SIGN 2010)
- The German guideline "Interdisciplinary guideline of quality S3 for Prevention and treatment of obesity" (DAG/DDG/DGE/DGEM 2015)
- 1. Jensen MD, Ryan DH, Apovian CM, et al. J Am Coll Cardiol. 2014;63(25 Pt B):2985-3023.
- 2. Yumuk V, Tsigos C, Fried M, Schindler K, Busetto L, Micic D, Toplak H; Obesity Management Task Force of the European Association for the Study of Obesity. Obes Facts. 2015;8(6):402-24.
- 3. National Institute for Health and Care Excellence (NICE). Obesity: Guidance on the prevention of overweight and obesity in adults and children [CG189]. Published 2014. https://www.nice.org.uk/guidance/cg189
- 4. Scottish Intercollegiate Guidelines Network(SIGN). Management of Obesity. A national clinical guideline. Published February 2010. ISBN 978 1 905813 57 5. www.sign.ac.uk
- Hauner H, Berg A, Bischoff SC, et al. Interdisziplinäre Leitlinie der Qualität S3 zur «Prävention und Therapie der Adipositas». Version 2.0, 2014. www.awmf.org/leitlinien/detail/II/050-001.html



Indication for specific obesity therapy



The indication for the treatment of obesity and obesity is based on BMI and body fat distribution, taking into account comorbidities, risk factors and patient preferences.

According to the guidelines, the indications for the treatment of obese and obese people, are if the following criteria are met:

- 1. A BMI \geq 30 kg/m² (Asia: \geq 28 kg/m²) or
- 2. Overweight with a BMI between 25 and <30 kg/m² and simultaneous presence of
 - related health disorders (e.g. hypertension, T2DM) or
 - abdominal obesity or
 - diseases that are aggravated by obesity (e.g. arthrosis) or
 - a high level of psychosocial distress.

ducation and Culture DG

Lifelong Learning Programme



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Indication for specific obesity therapy



This guideline-oriented indication for obesity therapy, which is predominantly based on BMI, can be questioned on the basis of recent findings on the pathophysiology and the risk factors for obesity. Depending on the age of the person, a BMI of 25-30 kg/m2 ("overweight") may not be a risk factor, and is even associated with a better probability of survival among those over 60 years of age than those with a BMI <25 kg/m² [14].

Perhaps even more important here is the concept of the "healthy obese", who – despite a BMI > 30 kg/m^2 – has no cardiometabolic risks such as ectopic fat deposition in internal organs

Sharma A, Lavie CJ, Borer JS, et al. Am J Cardiol. 2015;115:1428-34. Stefan N, Kantartzis K, Machann J, et al. Arch Intern Med. 2008;168:1609-16.







THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM The goal of obesity therapy is to reduce the body weight in the long term in combination with a change in behaviour, which aims to improve obesity-associated risk factors, reduce obesity-related illnesses, reduce the risk of premature mortality, incapacitation and early retirement, and improve quality of life.

Choice of the most suitable endpoints of obesity therapy remains controversial. Lowering body weight is certainly not the only conceivable endpoint. Others are: fat mass, metabolic risk parameters, QoL etc.

However, body weight can be reliably measured without great effort and therefore continues to be a global target parameter that correlates with many comorbidities. Preservation of muscle mass needs to be kept in mind.

Millstein RA. J Nutr Metab. 2014;2014:421-423.



ESPEN 2. Non-surgical lifestyle therapy

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+ Formula diet (LCD)

+ Drugs supporting weight loss



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Principles of therapy



Phase 1: Energy consumption> Energy intake (Therapy) Negative energy balance for a limited time! Goal definition necessary (how much in which period?) Minimum: -500 kcal/d, otherwise a change in weight will initially be completely absent due to weight-retaining regulatory mechanisms. By reducing the energy intake by 500-1000 kcal/d a weight reduction of 0.5-1.0 kg body weight per week (or 2-4 kg per month) is realistic.

Phase 2: Energy consumption = energy consumption (Maintenance) Stabilization of achievement (consolidation phase)

Goals:

- BMI 25-35: 5-10% weight reduction
- BMI 35-40: 10-20% weight reduction
- BMI> 40: 20-30% weight reduction

This is less than half of the patient's expectations!

- \rightarrow To compare the patient's expectations with the expected results
- → To discussed which contributions the patient is willing and able to consider (motivation, time and financial participation)



Principles of therapy



Ways to achieve the goals

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM 1. increase energy consumption ???More exercise, more NEATHigher REE (more muscle mass)

2. Reduce energy intake

Reduce calorie intake Avoid food substrates that cause hunger ("LOGI diet") Behavior modification

3. Lifestyle and behavioral modification Behavior therapy & coaching Social changes Family therapy



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2.1 Nutrition (7 points)



- 1. Eating habits are subject to years of experience and it requires a high degree of responsibility and sensitivity when engaging in their restructuring. All changes must be carefully communicated and practiced and be practicable in the long term.
- 2. As a result, a **lifestyle change** should result in sustained weight loss. With all sorts of crash diets, one-sided diets and total fasting, only short-term successes can usually be achieved.
- 3. The **nutritional history** should be taken at the beginning of each nutritional therapy as well as in its course by a state-certified dietician (or nutritionist) or a qualified doctor. A structured anamnesis sheet can be used for the initial consultation.
- 4. A nutritionally **balanced diet**, which ensures the supply of protein and micronutrients on demand, should be ensured. This is possible using commercially available foods, provided the energy intake does not fall below 1200 kcal. Thus energy-yielding dietary substrates (fat, CH) need to be reduced instead of a global reduction of all nutrients.



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2.1 Nutrition (7 points cont.)

- 5. The frequently asked question of whether a predominant "**low-fat diet**" or "**low-carb diet**" should be preferred is overrated, since studies show that both strategies can be effective. Certainly, fat reduction in food is not the only valid strategy, as was sometimes assumed in the past.
- 6. Individual studies even suggest that "**low carb**" is more effective than "low fat" in terms of weight loss, reduction of insulin resistance and quality of life improvement. This may be due to activation of the central reward system and starvation-inducing effects of sugar.
- 7. The "low-carb" or "low-fat" principle should be linked to a "high protein" strategy, because protein will satisfy hunger. In contrast, sugars (mono- and disaccharides), sugar alcohols and alcohol can induce hunger, and thus need to be particularly avoided.

2.2 Formula diets





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- Formula diets are dietary foods for special medical purposes such as obesity treatment (as part of a multimodal program!)
- Industrially produced nutrients on a milk protein or soy protein base and serve for complete or partial replacement of meals
- When meals are completely replaced, a daily ration should contain at least 800 kcal and be fully balanced
- Can be taken exclusively over a period of max. 12 wks. A sufficient fluid intake of at least 2-3 L/d is essential.
- Formula approaches are clearly superior to weight reduction programmes without formula diet that usually achieve less than 10% RWL and less than 30% EWL.
- Formula approaches are, however, inferior to bariatric surgery in terms of weight loss since surgery usually achieves a RWL of 20-40% and an EWL of 50-60%.



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2.3 Exercise therapy in the obese



- Only a few will succeed. If achieved, it is a sustainable action.
- Physical activity may be measured in practice by accelerometers, questionnaires (Baecke, IPAQ) or activity diaries (MET conversion); such measurements may be activity enhancing.
- Before starting physical training, the exercise capacity should be examined by means of exercise ECG, lactate diagnostics and / or spiroergometry.

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Lifelong Learning Programme



2.4 Motivation & behavioural Education and Culture DG Lifelong Learning Programme therapy in the obese

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One way of motivating those with obesity to diet and physical activity could be to combine it with cognitive-behavioural procedures. The requires:

- The identification and modification of unrealistic ideas about body weight after treatment
- The treatment of dissatisfaction with one's own body image
- The naming of other important treatment goals (self-confidence, partnership, physical well-being and fitness, etc.)
- The appreciation of what has been achieved so far and the acceptance of the non-changeable (e.g. body proportions)



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3. Drugs supporting or obstructive to therapy of obesity

In most international guidelines, drugs are considered as a possible adjunctive measure to obesity therapy in patients with a BMI > 27 kg/m² and co-morbidities, or at a BMI > 30 kg/m².

Mechanisms of action include decreased intestinal absorption of food substrates (e.g., orlistat), decreased appetite (e.g., rhimonabant, liraglutide, semaglutide), or increase in energy expenditure (e.g., sibutramine).

Effectiveness is rather low, e.g. 2.9 kg after one year for orlistat. Common side effects are therefore GI complaints such as diarrhoea, steatorrhoea and flatulence.

Apovian CM, Aronne LJ, Bessesen DH, et al. J Clin Endocrinol Metab 2015;100:342-62.

GLP-1-Receptor-Agonists





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- Semaglutide (Ozempic®) has been developed for the treatment of T2DM, approved in the EU since 2017 (for T2DM), also suitable for obesity.
- Estimated mean RWL was -2.3% for the placebo group versus -6.0% to -13.8% (0.05 to 0.4 mg) for the semaglutide groups.
- It is a long-acting GLP-1 analogue. The effects include the promotion of insulin secretion and the inhibition of glucagon secretion. It is injected subcutaneously once a week.
- The drug is structurally and pharmacologically related to liraglutide (Victoza®), which must be injected once daily

Pi-Sunyer X, Astrup A, Fujioka K, et al. N Engl J Med. 2015;373:11-22. O'Neil PM, Birkenfeld AL, McGowan B, et al. Lancet. 2018;392:637-649.

Semaglutide Trial





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O'Neil PM, et al. Lancet. 2018;392:637-649.

	Therapeutic Group	Drugs promoting weight gain	Alternative Drugs	Comments
ESPEN THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM	Antidepressants	Paroxetine Mirtazapine Amitriptlyline Escitalopram Lithium	Fluoxetine Sertraline Citalopram Escitalopram Bupropion Venlafaxine	Fluoxetine and Brupropion more consistently cause weight loss
	Antipsychotics	Olanzapine Quetiapine Risperidone Pherphenazine	Ziprasidone Aripripazol Haloperidol	Alternative drugs produce less weight gain
	Antihypertensives	β-blockers w/o a vasodilating component (Atenolol, Metoprolol, Propranolol)	ACE inhibitors ARB blockers Calcium channel blockers	
	Antidiabetics	Sulfonylureas Glitinides Thiazolidinediones Insulin	Metformin GLP 1agonists Pramlintide DPP-4 inhibitors SGLT-2 inhibitors α-glucosidase inhibitors	Weight sparing diabetes medications do not cause hypoglycemia and do not need adjustment for physical exercise.
	Steroid hormones	Prednisone Prednisolone	Nonsteroidal anti- inflammatory drugs	
	Contraceptive Drugs	Oral contraceptives	Injectable contraceptives	Conflicting results. Limited evidence of weight gain when using progestin-only contraceptives.
	Antiepileptic Drugs	Valproic acid Gabapentin Carbamazepine	 Felbamate Topiramate Zonisamide Lamotrigine Levetiracetam Phenytoin 	Alternative drugs may cause weight loss (1) or weight neutral (2)
	Antiretroviral Drugs	Protease Inhibitors		Frequent weight gain, increased deposition of visceral adipose tissue and lipodystrophy



→ Interface with bariatric surgery (module 23.4)
 → Weight maintenance strategies



Effectiveness of different weight reduction measures



THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM	Intervention	Effect ¹	References
	Nutrition, exercise and behavioural therapy as individual measures	1-2 kg. RWL² < 5%	Guidelines
	Multimodal therapy with nutritional, exercise and beha-vioural therapy in combination for at least six months ("basic therapy")	4-5 kg. RWL 5-10%	Guidelines
	Multimodal therapy for at least six months combined with initial formula diet for max. 12 weeks	10-30 kg. RWL 15-26%	Bischoff SC, et al. Int J Obes (Lond). 2012
	Bariatric surgery	20-50 kg. RWL 20-40%	Sjöström L. J Intern Med. 2013.



Multimodal conservative therapy How does it work?



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- **Duration**: 6-12 months, Nutrition, exercise, behavior
- **Group therapy:** (8-15 pts. 1x/wk), individual therapy possible
- Multimodal: Nutrition-Exercise-Behavior
 + Weight/Laboratory controls and Doctor visits
- Staff: Nutritionists, Physician
 +/- Movement Therapist
 +/- Psychologist / Behavioral Therapist
- Infrastructure: practice or obesity center +/- sports,
 - +/- teaching materials
- **Recommended**: with formula diet (LCD) during the first 6-12 weeks under medical supervision

In Germany: e.g. OPTIFAST®52 programme, DocWeight, programme etc.





Results from the German Optifast®52 study (N = 8.296)



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Body weight loss

Females: -19,6 kg Males: -26,0 kg Relative Weight loss: -18% Excess weight loss: -46%

Associated diseases

- Prevalence Met Syndrome: -50%
- □ Hypertension: from 47% to 29%
- □ Type 2 Diabetes: from 11% to 4%

Bischoff SC, et al. Int J Obes. 2012;36:614-24.



Preservation of muscle mass during multimodal conservative therapy (Optifast®52 program)

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Table 2. Bioelectrical impedance analysis

	Men	Men		Women		All	
	Mean	P value	Mean	P value	Mean	P value	
Basal metabolic rate, kcal/day							
Week 0	2087.2 ± 245.0		1539.4 ± 132.6		1710.9 ± 309.1		
Week 26	1902.1 ± 223.2	8.3E-13	1452.6 ± 120.6	5.8E-18	1585.6 ± 259.1	3.0E-23	
Week 52	1945.6 ± 222.8	6.3E-09	1469.9 ± 125.9	1.3E-13	1627.0 ± 277.8	5.3E-19	
ECM/BCM (index)							
Week 0	0.92 ± 0.11		1.07 ± 0.15		1.03 ± 0.15		
Week 26	0.96 ± 0.17	0.005	1.14 ± 0.15	5.3E-06	1.09 ± 0.18	8.9E-08	
Week 52	0.93 ± 0.13	NS	1.11 ± 0.17	NS	1.05 ± 0.18	NS	

Values are means \pm SD and are given separately for men and women. BCM, body cell mass; ECM, extracellular mass. Bioelectrical impedance analysis was performed on *day 0* and at *weeks 26* and 52. Metabolic rate was measured using a Nutriguard-MS multi-frequency impedance analysator with NutriPlus 5.4.1 software (Data Input). *P* values are given for *day 0* vs. *weeks 26* and 52.

Hohenester et al. Am J Physiol 2018;315:G329-38.



Costs of validated multimodal

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1st trial:

- \$ 292 per kg of weight loss per year
- * \$ 115,397 per QALY

(Quality adjusted life year: a measure of sustained improvement in quality of life)

2nd trial

- ***** \$ 155-546 per kg of weight loss per year
- * \$ 34,630-54,130 per QALY
- The majority of the costs are not needed for the products (formula diet or pharmaceuticals), but for the necessary staff to carry out the programmes

Tsai AG, Wadden TA, Volger S, et al. Int J Obes (Lond). 2013;37 Suppl 1:S31-7. Finkelstein EA, Kruger E. Obesity (Silver Spring). 2014;22:1942-51.



5. Interface with bariatric surgery





 \rightarrow module 23.4

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Surgical therapy is highly effective!

but ...

Not the only effective measure!

Problem "Indication": When is conservative therapy "exhausted"?

Problem Acceptance: Most patients have decided

Problem long-term outcome: recurrence rate - safety - aftercare

→ Case management with an interdisciplinary treatment concept!



Non-surgical versus surgical obesity therapy



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Surgical

- More weight reduction (EWL 50% vs 30-40%)
- More reduction of comorbidities such as diabetes or other cardiometabolic disorders
- Less drop-off rate
- Faster success
- Less weight gain after intervention

Non-surgical

- Less muscle mass loss (sarcopenia)
- Fewerr complications from malnutrition (macro and micronutrients)
- More acceptance
- Lower costs
- Lower long-term risks
- Less restriction in eating habits



6. Weight maintenance strategies



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	Nutrition	Energy reduction	High-protein, low-sugar diet	
		Low-fat diet	Prefer MUFA and PUFA; avoidance of SFA	
			Probiotics? Drugs?	
			Mediterranean diet	
	Exercise	Sports activity	Everyday movement (NEAT)	
		Fitness	Power training	
	Others	Moderate alcohol consumption	Sleep 6-8h per 24h	
		Nicotine abstinence	Change of social environment	
			Regular weighing	
			Coach partner	

Estruch R, Martínez-González MA, Corella D, et al. Lancet Diabetes Endocrinol. 2016;4:666-676.





Clinical Information

Obesity Facts



European Guidelines for Obesity Management in Adults

Volkan Yumuk^a Constantine Tsigos^b Martin Fried^c Karin Schindler^d Luca Busetto^e Dragan Micic¹ Hermann Toplak^g for the Obesity Management Task Force of the European Association for the Study of Obesity

General Advice {level 3, 4}

- Decrease energy density of foods and drinks
- Decrease the size of food portions
- Avoid snacking between meals
- Do not skip breakfast and avoid eating in the night time
- Manage and reduce episodes of loss of control or binge eating.

V Yumuk et al. Obes Facts 2015; 8(6): 402-424

ESPEN Further Recommendations





Intermittent fasting

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Reduces energy input by about 500 kcal and positively affects the metabolism (i.e., less risk of fatty liver, etc.)

INTERMITTENT FASTING 16/8



- Intermittent modified fasting Modified fasting 1-2 days per week with 25% energy consumption (about 600-800 kcal/d)
- Meal replacement

about 200 kcal liqid meal e.g. as a substitute for lunch



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Summary **Nutritional Therapy**



For grade I obesity (BMI 30- <35 kg / m²) and pre-obesity:

- Basic programme (Low fat or Low carb or both)
- Additional formula diet can be used if $BMI > 30 \text{ kg/m}^2$

For obesity grade II + III (BMI > $35 \text{ kg} / \text{m}^2$):

Only two options:

- multimodal conservative weight reduction programmes with formula, or
- bariatric surgery

For weight maintenance

- High-protein, low-sugar diet, low energy density, Mediterranean diet
- Intermittent fasting (16/8h) or Intermittent modified fasting (2/5d)
- Meal replacement (formula 1-2/d)
- Everyday movement (NEAT), Power training, Coach partner
- Regular weighing, Sleep 6-8h per 24h, Change of social environment



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Key Messages



- Primary obesity therapy should be with a non-surgical approach, but bariatric surgery may be needed if the problem cannot otherwise be solved
- Non-surgical obesity therapy comprises nutrition, exercise and behavioural therapy ("basic therapy") with or without formula diet
- Formula diet as initial therapy (up to 12 weeks) is indicated if more than 10 kg body weight reduction is intended
- Successful and sustained obesity therapy needs a clear structure, a well-trained team of professionals, and coverage of costs
- Every successful weight reduction requires a subsequent weight maintenance strategy

