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Clinical Exercise Physiology

Obesity

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Presentation Content

- Definition
- Scope
- Pathophysiology
- Clinical Considerations
- Exercise Testing
- Treatment
- Exercise Prescription

Definition

- **Overweight and obesity—defined by WHO as excessive fat accumulation that may impair health**
- **Commonly rated using the body mass index (BMI)**
  - BMI = $\frac{\text{weight (kg)}}{\text{height}^2 \text{ (m)}}$ or $\frac{\text{weight (lb) x 703}}{\text{height}^2 \text{ (in.)}}$
- **Body composition and waist circumference can be useful to risk stratify**
  - Increased risk:
    - Men $\geq$35 in. (88 cm)
    - Women $\geq$40 in. (100 cm)

Table 1

Table 7.1 Body Weight–Related Classifications

	Underweight	Normal	Overweight	Mildly obese (class I)	Moderately obese (class II)	Morbidly obese (class III)
BMI*	<18.5	18.5-24	25-29	30-34	35-39	≥40
% over ideal weight**	NA	0-10%	10-20%	20-40%	40-100%	>100%
% fat*	<20	20-25	26-31	32-37	38-45	>45
Waist circumference **	NA	NA	High	Very high	Very high	Extremely high

*BMI: body mass index (kg · m^{-2}).

**Weight: percent over standard height–weight tables.

*Fat (%): calculated body fat expressed as percent of total weight.

**Waist circumference: risk additive to BMI of overweight- or obesity-related comorbidities for values ≥40 in. for men and ≥35 in. for women.

Adapted from National Institutes of Health 1998.

Scope

- **Prevalence in all portions of population continues to rise; variable by race and sex**
- **Rising fastest in the extreme obesity category**
- **Not isolated to United States**

(continued)

Table 2

Table 7.2 Current (2003-2006) U.S. Population and Age-Adjusted Body Weight Demographics (87)

Population	Overweight and obese	Normal weight or underweight	Overweight	Obese
Males	73%	29%	39%	34%
Females	61%	39%	26%	35%
All	67%	34%	33%	34%
White males	72%	26%	39%	33%
Black males	72%	27%	36%	36%
Hispanic males	77%	22%	47%	30%
White females	57%	37%	24%	33%
Black females	81%	18%	27%	54%
Hispanic females	74%	25%	31%	43%

Scope *(continued)*

- **Can begin in childhood, but 70% of occurrences begin in adulthood**
- **Although multifactorial, increase is related to societal values of reduced physical activity and increased food intake**
- **Obesity is very costly:**
- **Insurance costs are rising for treatment.**
- **Individual costs are rising for those who self-pay to lose weight.**

Table 3

Table 7.3 Estimated U.S. Medical Spending, in Billions of Dollars, Attributable to Overweight and Obesity

Insurance category	OVERWEIGHT AND OBESITY	
	MEPS	NHEA
Private	$49.4	$74.6
Medicaid	$8.1	$27.6
Medicare	$19.7	$34.3
Total	$85.7	$146.6

MEPS = Medical Expenditure Panel Survey

NHEA = National Health Expenditure Accounts

Pathophysiology

- **A result of longstanding exercise imbalance (positive energy balance)**
- **Leads to 111K to 635K deaths per year in the United States**

(continued)

Pathophysiology *(continued)*

- **Increases risk of:**
  - Diabetes
  - Hypertension
  - Dyslipidemia
  - Metabolic syndrome
  - Atherosclerotic disease (heart, periphery, cerebrum)
  - Osteoarthritis
  - Depression
  - Gallbladder disease
  - Eating disorders
  - Gastroesophageal disease
  - Liver disease (NASH)
  - Sleep apnea
  - Hyperuricemia and gout
  - Cancer
  - Polycystic ovary syndrome
  - Low back pain and other joint pain
  - Fetal defects during pregnancy

Clinical Considerations

- **Signs and symptoms**
  - Fatigue and dyspnea
  - Difficulty with physical activity
- **History and physical examination**
  - Review risks with patient
    - Assess physical factors as appropriate
    - Assess exercise history
  - Determine patient's readiness to change by asking "Have you been trying to lose weight?"
    - No, and I do not intend to in the next 6 mo (precontemplation)
    - No, but I intend to in the next 6 mo (contemplation)
    - No, but I intend to in the next 30 d (preparation)
    - Yes, but for less than 6 mo (action)
    - Yes, for more than 6 mo (maintenance)

Exercise Testing

- **Routine testing is not indicated.**
- **Testing may be a barrier to exercise participation particularly if announced just before a class occurs.**
- **Alternate modes should be available for those with difficulty walking.**
- **Testing should generally follow normal procedures.**

Treatment

- **General options**
  - Diet
  - Exercise
  - Behavior change
  - Pharmacotherapy
  - Surgery

(continued)

Treatment *(continued)*

- **Goals**
  - NIH recommends 10% weight loss
  - BMI $\leq$25 kg/m^2 considered normal weight
  - Need to determine goals with respect to patient desires
    - Average obese female patient wishes to lose 35% of current weight
- **See figure 7.3 for a systematic approach to management based on body mass index and other risk factors.**

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Treatment *(continued)*

- **Diet therapy**
  - Calorie restriction
    - Should be based on measured or estimated RMR + physical activity
    - ~3,500 kcal deficit for 1 lb weight loss
  - Micro- and macronutrients
  - Types
    - Hypocaloric—restrict to 500 to 750 kcal/d
    - High protein, low carbohydrates
      - Meal replacements
        - » Partial
        - » Complete (VLCD)

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Treatment *(continued)*

- **Behavioral therapy**
  - Stages of change
    - Precontemplation
    - Contemplation
    - Preparation
    - Action
    - Maintenance
  - Cognitive-behavioral
  - Motivational interviewing
  - Lapse/relapse planning
- **Address emotional issues**
- **Seek professional help when necessary**

(continued)

Treatment *(continued)*

- **Exercise**
  - Value
    - Preventing becoming overweight or obese
    - Minor additional rate of weight loss when combined with diet and behavior change
    - Maintenance of weight loss
      - National Weight Control Registry suggests 2,500 to 2,800 kcal/wk expenditure for best maintenance
      - May require 60 to 90 min/d

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Treatment *(continued)*

- **Pharmacotherapy**
  - Many FDA-approved drugs have been removed from the market, including
    - Fenfluramine and Meridia
  - Approved drugs
    - Phentermine (Adipex)—appetite suppressant
    - Orlistat (Zenical, Alli)—intestinal lipase inhibitor
  - Most medications produce 5% to 10% weight loss

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Treatment *(continued)*

- **Surgery**
  - Produces the greatest amount of weight loss and best long-term weight maintenance
    - Possible >50% excess weight loss (~25% actual)
    - 10-yr loss ranges from 15% to 25% (actual)
  - There is some minor surgical risk—for example, death and infection (1% death risk, 15% morbidity risk)
  - Type of surgery will affect outcomes
    - Intestinal bypass
    - Adjustable gastric banding

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Exercise Prescription

- **Cardiovascular exercise**
  - Aim at 2,000+ kcal expended per week
    - Mode—weight bearing if possible
    - Frequency—daily
    - Intensity
      - 50% to 60% peak VO_2 if new to exercise
      - Upper end = 60% to 80% heart rate reserve
    - Duration
      - 20 to 30 min/d if new to exercise
      - Target of 60 to 90 min/d

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Exercise Prescription *(continued)*

- **Resistance exercise**
  - Use standard criteria:
    - 60% to 80% of 1RM
    - 8 to 15 repetitions
    - Two sets with 2 to 3 min rest between each bout
    - Perform 2 to 3 d/wk
  - Goals:
    - Improve skeletal muscle endurance and strength
    - Maintenance of resting metabolic rate (i.e., prevent a decline)

Table 7

Table 7.7 Pharmacology Review

Medication name and class	Primary effects	Exercise effects	Special considerations
Phentermine (Adipex-P, Ionamin)	Appetite suppression	None	May acutely increase heart rate and blood pressure
Lorcaserin hydrochloride (Belviq)	Satiety enhancement	None known	Average weight loss 3 to 3.7% of body weight
Phentermine and topiramate (Qsymia)	Appetite suppression	None known	May acutely increase heart rate and blood pressure
Orlistat (Xenical, Alli)	Intestinal lipase inhibitor	None	Can cause intestinal discomfort, flatulence, and oily stools

Conclusion

- **Exercise and behavior change are vitally important for any successful weight loss or control effort.**
- **Clinical exercise physiologists are well suited to provide preventive and active weight loss counseling.**
- **The issue of overweight and obesity is very important, and the impact on overall health will likely be large over the next several decades.**