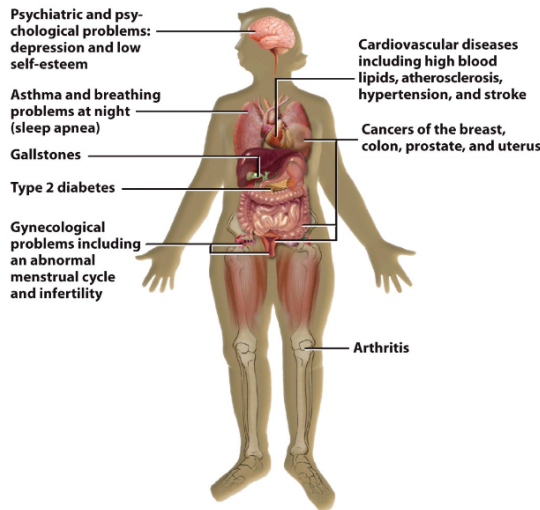


# Chapter 9: Energy Balance and Weight Management

BPK 110

Having too much Body Fat



- A weight that minimizes health risks
- Weight is often used to determine health status – ex. Body Mass Index
- Weight in kilograms/(Height in meters)<sup>2</sup>
- <18.5= underweight
- 18.5-25 = healthy weight
- 25+ = overweight
- 30+ = obese
- But what is *more* important than BMI is having mostly **lean body mass** (muscle, bone, internal organs) and minimal/relatively low levels of body fat
- = healthy **body composition**
- (BMI is a poor measure of body composition)**

**Methods for Determining Body Composition:** skinfold, underwater weighing, bioelectrical impedance, air displacement

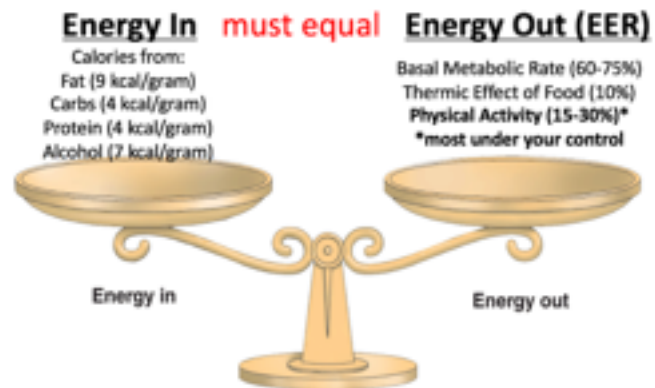
Visceral vs Subcutaneous Fat

- visceral (around organs) = higher health risks
- subcutaneous (under the skin)
- waist circumference is used along w BMI to estimate visceral fat
- If BMI = obese and WC > 102cm for men and 88cm for women = increased health risk

**Energy Balance:** persons weight to remain the same, energy in = energy out

**BMR:** largest component of energy expenditure

- determined by genetics
- factors that increase BMR: higher lean body muscle mass, exercise, greater height and weight, male gender, pregnancy, growth, fever, caffeine, etc



### Storing and Retrieving Energy

- if you're trying to manage your weight, the primary dietary factor you must regulate is your Caloric intake
  - we store most excess energy as fat within adipocytes
  - when fat is gained, adipocytes increased in size and number
  - when fat is lost, adipocytes decrease in size alone!

If BMI = obese and WC > 102cm for men and 88cm for women = increased health risk

### Energy Imbalance

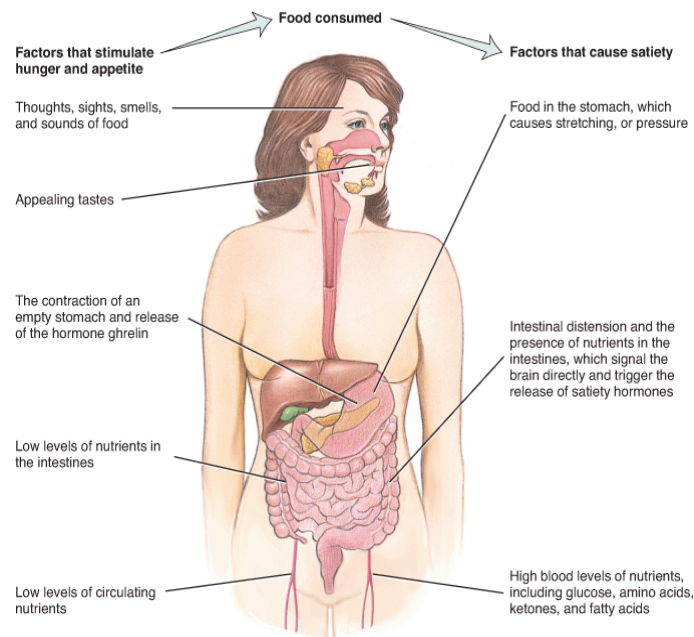
- only 15% of Canadians meet the new recommendations for physical activity (150 min/wk)
- sedentary lifestyles are more common (recommendation: sit <2 hrs at a time)
- its very easy to out eat exercise, but nearly impossible to our exercise overeating

### What determines body size and shape?

#### Genes and Weight Status

- genes have a significant role in determine your body shape/size
  - 75% of BMI variations attributed to genes, 25% to lifestyle

### Regulation of Food Intake and Body Weight



### Key Molecules involved in Acute regulation of energy balance

- **neuropeptide Y** promotes feeding, energy storage
- **ghrelin** levels vary throughout the day, promotes appetite at certain times of day
  - its levels increase when sleep is compromised
- **peptide YY** reduces appetite following intake of Calories at a meal

**Key Molecules involved in Chronic Regulation of Energy Balance**

- **lipoprotein lipase** - an enzyme on adipocytes that captures triglycerides and promotes fat storage
  - more fat cells = more LPL
- LPL levels increase following weight loss!!
  - adding to the difficulty in keeping weight off

	Site of greatest LPL activity	Effect on Body Fat Distribution
Women	breasts, hips, thighs	pear shape
Men	abdomen	apple shape

**Key Molecules involved in Chronic Regulation of Energy Balance: Leptin**

- **leptin**- released by adipocytes, inhibits appetite and promotes energy expenditure
  - **obese individuals may have leptin resistance**

**Managing Body Weight**

- to lose fat, individuals needs to expend more energy than they consume
- some people have to restrict/burn a lot more kcal to lose fat
- a 5-15% reduction in body weight is significantly associated w reduced risk of disease

**Strategies for reducing energy intake**

- portion control, eating breakfast, eating foods promote satiety/satiation
- know the Caloric value of foods, control hunger, avoid mindless eating

But why of people put weight back on once lost?

- 10% decrease in BW associated with 20-25% decrease in energy expenditure
- Weight reducers have lower satiety
- Decreased EEE, thyroid hormones, leptin
- Increase in fat storing enzyme lipoprotein lipase
- Fat cells shrink when weight is lost, don't go away
- Formerly obese indiv requires approx 300-400 kcal less per day to maintain same weight as a person who never gained weight!

Psychological Modification

- think of all behaviour change as a long-term commitment, so goals should be: SMART (specific, measurable, attainable, realistic, timely)
- changing behaviour requires a change in the thought processes that lead to that behaviour
- must reduce barriers
- cognitive behavioural therapy may be effective

Suggestions for Weight Gain: intake extra calories

**Diets and Fad Diets**

Dieting

- any strategy that promotes a Caloric deficit through decreased energy intake or increased expenditure will typically produce a decrease in weight

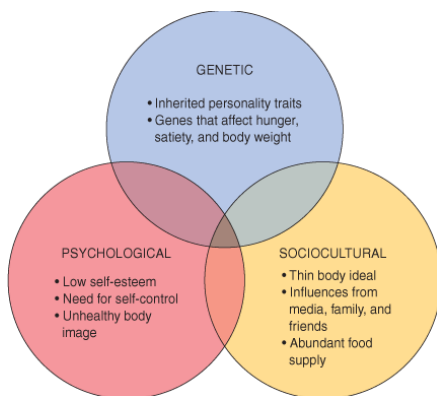
Healthy Diets vs. Fad diets

A healthy diet . . .	A fad diet . . .
Promotes a healthy dietary pattern that meets nutrient needs, includes a variety of foods, suits food preferences, and can be maintained throughout life.	Limits food selections to a few food groups or promotes rituals such as eating only specific food combinations. As a result, it may be limited in certain nutrients and in variety.
Promotes a reasonable weight loss of 250 g to 1 kg (½ to 2 lb.) per week and does not restrict kilocalories to less than 1,200 per day.	Promotes rapid weight loss of much more than 1 kg (2 lb.) per week.
Promotes or includes physical activity.	Advertises weight loss without the need to exercise.
Is flexible enough to be followed when eating out and includes foods that are easily obtained.	May require a rigid menu or avoidance of certain foods or may include "magic" foods that promise to burn fat or speed up metabolism.
Does not require costly supplements.	May require the purchase of special foods, weight-loss patches, expensive supplements, creams, or other products.
Promotes a change in behaviour. Teaches new eating habits. Provides social support.	Does not recommend changes in activity and eating habits, recommends an eating pattern that is difficult to follow for life, or provides no support other than a book that must be purchased.
Is based on sound scientific principles and may include monitoring by qualified health professionals.	Makes outlandish and unscientific claims, does not support claims that it is clinically tested or scientifically proven, claims that it is new and improved or is based on some new scientific discovery, or relies on testimonials from celebrities or connects the diet to trendy places such as Beverly Hills.

Weight Loss Surgery

- weight loss is typically required *before* the surgery can take place
- **gastric bypass** - bypasses the greater part of the stomach. only a small amount of food can be accepted, promoting satiety (more permanent)
- **gastric banding** - places a band around the stomach to restrict stretch, promoting satiety (less perm)

Eating Disorders



**Distinguishing among eating disorders Table 9.3**

Characteristic	Eating disorder		
	Anorexia nervosa	Bulimia nervosa	Binge-eating disorder
Prevalence	1% females, 0.3% males	1.5% females, 0.5% males	3.5% females, 2% males
Body weight	Below normal (<85% of recommended)	Usually normal	Above normal
Binge eating	Possibly	Yes, at least twice a week for three months	Yes, at least twice a week for six months
Purging, excessive exercising, or use of laxatives	Possibly	Yes, at least twice a week for three months	No
Restricts food intake	Yes	Yes	Yes
Body image	Dissatisfaction with body and distorted image of body size	Dissatisfaction with body and distorted image of body size	Dissatisfaction with body and distorted image of body size
Fear of being fat	Yes	Yes	Possibly
Self-esteem	Low	Low	Low
Menstrual abnormalities	Absence of at least three consecutive periods	No	No
Typical age of onset	Preadolescence/adolescence	Adolescence/young adults	Adults of all ages