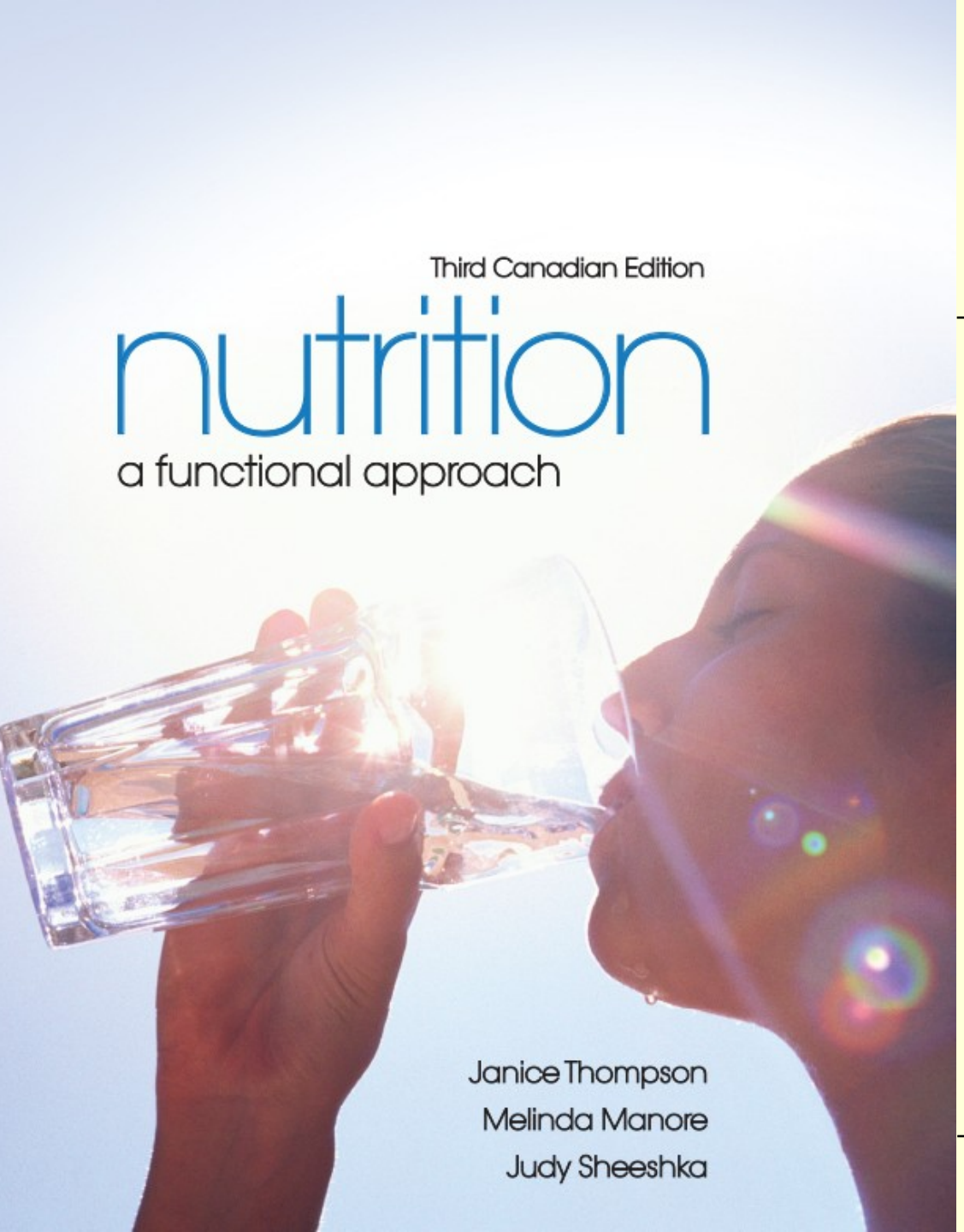

CHAPTER

11

Achieving and Maintaining a Healthful Body Weight and In Depth

What Is a Healthful Body Weight?

A healthful weight

- Is appropriate for your age and physical development
- Is maintained without constant dieting
- Is acceptable to you
- Is based on family history of body shape and weight
- Promotes good eating habits and allows for regular physical activity

Evaluating Body Weight

A person's actual weight is not the only factor to consider

Determining if a person's body weight is healthful should include

- Determining the body mass index (BMI)
- Measuring body composition
- Assessing the pattern of fat distribution

Evaluating Body Weight

Body mass index

- Expresses the ratio of a person's weight to the square of his or her height
- BMI = weight (kg)/height $(m)^2$
- BMI values below 18.5 or above 30 have increased risks of health problems
- BMI results are distorted in people with high muscle mass (athletes and lactating women)

Evaluating Body Weight

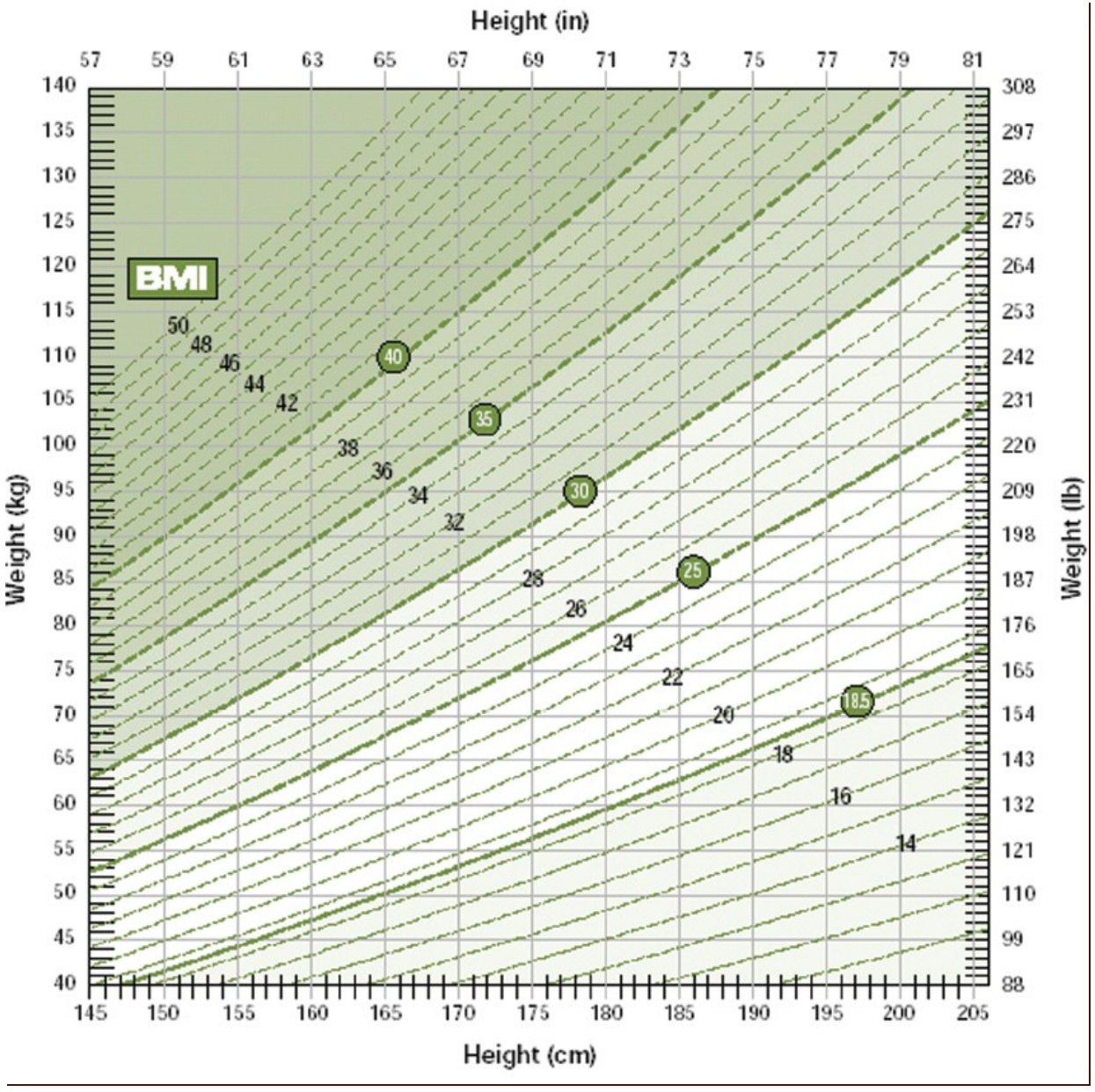

Figure 11.1

Evaluating Body Weight

Why is BMI important?

BMI provides an important clue to overall health

Underweight (BMI <18.5)

Normal weight (BMI 18.5-24.9)

Overweight (BMI 25.0-29.9)

Obesity (BMI 30.0+)

Evaluating Body Weight

Limitations of the Body Mass Index

The BMI is not appropriate for those who are:

Evaluating Body Weight

Method		Limitations
Underwater weighing: Considered the most accurate method. Estimates body fat within a 2%–3% margin of error. This means that if your underwater weighing test shows you have 20% body fat, this value could be no lower than 17% and no higher than 23%. Used primarily for research purposes.		• Must be comfortable in water. • Requires trained technician and specialized equipment. • Does not work well with obese people. • Must abstain from food for at least 8 hours and from exercise for at least 12 hours prior to testing.

Figure 11.2

Evaluating Body Weight

Method	Limitations
Skinfolds: Involves "pinching" a person's fold of skin (with its underlying layer of fat) at various locations of the body. The fold is measured using a specially designed caliper. When performed by a skilled technician, it can estimate body fat with an error of 3%–4%. This means that if your skinfold test shows you have 20% body fat, your actual value could be as low as 16% or as high as 24%.	• Less accurate unless technician is well trained. • Proper prediction equation must be used to improve accuracy. • Person being measured may not want to be touched or to expose their skin. • Cannot be used to measure obese people, as their skinfolds are too large for the caliper.

Figure 11.2

Evaluating Body Weight

Method	Limitations
Bioelectrical impedance analysis (BIA): Involves sending a very low level of electrical current through a person's body. As water is a good conductor of electricity and lean body mass is made up of mostly water, the rate at which the electricity is conducted gives an indication of a person's lean body mass and body fat. This method can be done while lying down, with electrodes attached to the feet, hands, and the BIA machine. Hand-held and standing models (which look like bathroom scales) are now available. Under the best of circumstances, BIA can estimate body fat with an error of 3%–4%.	• Less accurate. • Body fluid levels must be normal. • Proper prediction equation must be used to improve accuracy. • Should not eat for 4 hours and should not exercise for 12 hours prior to the test. • No alcohol should be consumed within 48 hours of the test. • Females should not be measured if they are retaining water due to menstrual cycle changes.

Figure 11.2

Evaluating Body Weight

Method	Limitations
Dual-energy x-ray absorptiometry (DXA): The technology is based on using very low level x-rays to differentiate among bone tissue, soft (or lean) tissue, and fat (or adipose) tissue. It involves lying for about 30 minutes on a specialized bed fully clothed, with all metal objects removed. The margin of error for predicting body fat ranges from 2% to 4%.	• Expensive; requires trained technician with specialized equipment. • Cannot be used to measure extremely tall, short, or obese people, as they do not fit properly within the scanning area.

Figure 11.2

Evaluating Body Weight

Method	Limitations
Bod Pod: A machine that uses air displacement to measure body composition. This machine is a large, egg-shaped chamber made from fibreglass. The person being measured sits inside wearing a swimsuit. The door is closed and the machine measures how much air is displaced. This value is used to calculate body composition. It appears promising as an easier and equally accurate alternative to underwater weighing in many populations, but it may overestimate body fat in some African-American men.	• Expensive. • Less accurate in some populations.

Figure 11.2

Evaluating Body Weight

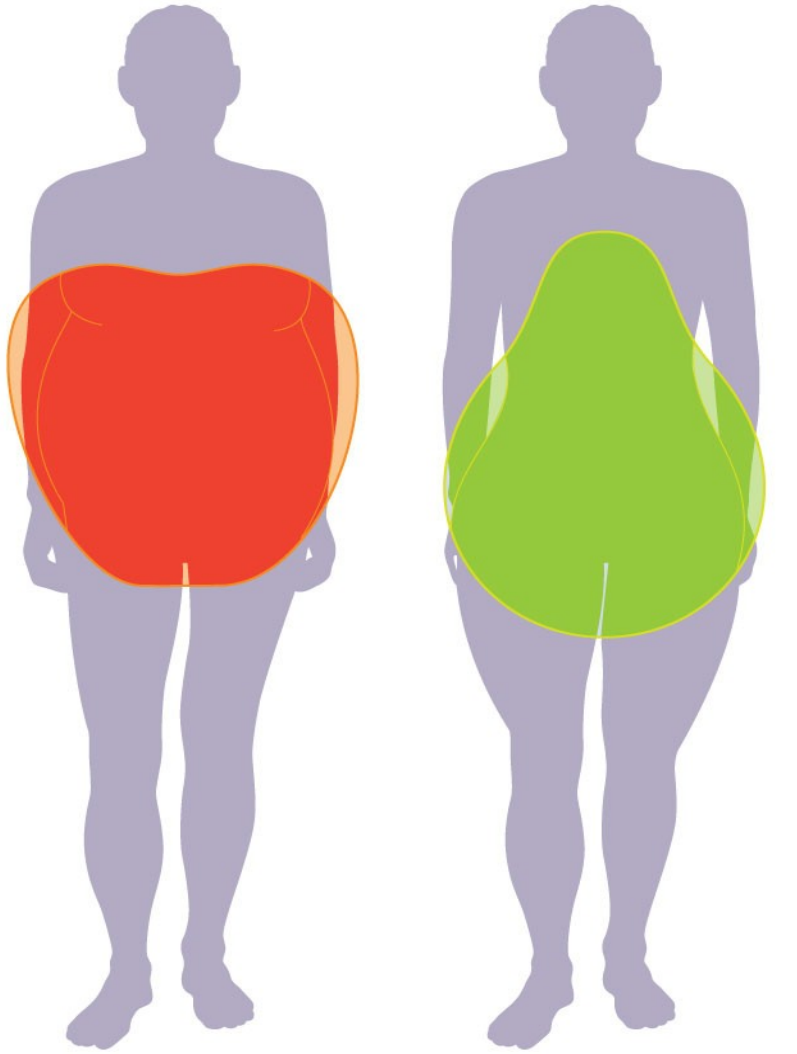

Figure 11.3: a, b

Gaining or Losing Weight

Whether a person gains or loses weight depends on

- Energy intake versus energy expenditure
- Genetic factors
- Composition of the diet
- Childhood weight
- Behavioural factors
- Social factors

Energy Balance

Energy balance

- Occurs when energy intake = energy expenditure
- Energy intake = kcal from food
- Energy expenditure

Energy Balance

Basal metabolic rate (BMR)

- Energy expended to maintain basal, or resting, functions of the body
- 60–75% of total energy expenditure
- More lean tissue increases your BMR
- BMR decreases with age, 3–5% per decade after age 30

Energy Balance

Thermic effect of food (TEF)

- Energy expended to digest, absorb, transport, metabolize, and store food
- 5 – 10% of total expenditure
- Lowest for fat and highest for protein and carbohydrate

Energy Balance

Physical activity

- 15–35% of daily energy expenditure
- Includes both lower-intensity and higher-intensity activities
- Factors that influence energy expended
  - The more muscle groups used, the greater the energy expenditure
  - Intensity
  - Duration
  - Body size

Energy Balance

Estimated Energy Requirements

- Number of kcal needed/day to maintain current weight
- Includes BMR and physical activity
- Multiple ways of calculating EER

Energy Balance

Estimated Energy Requirements

- Textbook (pg 377)
  - **Men:**
    - BMR = kg body weight x 24
    - EER = BMR + (BMR x %AL)
  - **Women:**
    - BMR = kg body weight x 22
    - EER = BMR + (BMR x %AL)

Energy Balance

Estimated Energy Requirements

- Health Canada
  - **Men 19+:**
    - EER = 662 - (9.53 x age) + PA x [(15.91 x weight) + (539.6 x height)]
  - **Women 19+:**
    - EER = 354 - (6.91 x age) + PA x [(9.36 x weight) + (726 x height)]

Energy Balance

Estimated Energy Requirements

- Harris Benedict Equation
  - **Men 19+:**
    - BMR = 88.362 + (13.397 x weight) + (4.799 x height) - (5.677 x age)
    - EER = BMR x AF
  - **Women 19+:**
    - BMR = 447.593 + (9.247 x weight) + (3.098 x height) - (4.330 x age)
    - EER = BMR x AF

Energy Balance

Estimated Energy Requirements

- Mifflin-St. Jeor Equation
  - **Men:**
    - BMR = (10 x weight) + (6.25 x height) - (5 x age) + 5
    - EER = BMR x AF
  - **Women:**
    - BMR = (10 x weight) + (6.25 x height) - (5 x age) - 16
    - EER = BMR x AF