Mahan: Krause's Food and the Nutrition Care Process, 13th Edition

Test Bank

Chapter 2: Energy

MULTIPLE CHOICE

1. A particular food provides 100 kilocalories. How many kilojoules does this equal?
   a. 420
   b. 480
   c. 4,200
   d. 4,800

   ANS: A
   One kilocalorie is equal to 4.184 kilojoules (100 kcal × 4.2 kJ/kcal = 420 kJ).

   REF: p. 26

2. Which of the following conditions is necessary to obtain an accurate measure of a patient's basal metabolic rate (BMR)?
   a. Test at the end of the day when the patient is ready to go to sleep.
   b. Test 4 to 6 hours after the last meal.
   c. Test in the morning after the patient has awakened.
   d. Test in environmental conditions equal to body temperature.

   ANS: C
   For an accurate measurement of BMR, the test should be performed when the body is using its minimum amount of energy, usually in the morning after waking, and at least 10 to 12 hours after the last meal so as to not include the thermic effect of food. Climates above 86°F increase metabolism because of sweat gland activity.

   REF: pp. 24, 26

3. If a patient's body temperature were 104.6°F, what would the BMR be compared with normal?
   a. 58% of normal
   b. 135% of normal
   c. 142% of normal
   d. 178% of normal

   ANS: C
   An increase in body temperature increases the BMR by 7% for every degree Fahrenheit above the normal 98.6°F (104.6 – 98.6 = 6°F; 6°F × 7% ÷ °F = 42%).

   REF: p. 26

4. How does an elevation in body temperature with fever affect the metabolic rate?

a. It does not change the metabolic rate.
b. It increases the metabolic rate by 7% per degree Fahrenheit above normal.
c. It increases the metabolic rate by 14% per degree Fahrenheit above normal.
d. It decreases the metabolic rate by 7% per degree Fahrenheit above normal.

ANS: B
A fever causes an increase in body temperature. For every degree Fahrenheit above the normal 98.6°F, the BMR increases by 7%.

REF: p. 26

5. Which of the following does NOT increase the thermic effect of food (TEF)?
a. Carbohydrates
b. Fat
c. Regular eating schedule
d. Spicy foods

ANS: B
Although dietary fat provides the highest concentration of energy, metabolism of fat is highly efficient, with only 4% of calories wasted. This partly explains the obesigenic aspect of dietary fat. The TEF after intake of carbohydrates and proteins tends to be higher than after fat intake. Following a regular eating schedule results in a higher TEF than irregular eating. The use of spice and mustard increases metabolism more than unspiced meals.

REF: p. 26

6. What is the clinical method for measuring human energy expenditure?
a. Bomb calorimetry
b. Indirect calorimetry
c. Doubly labeled water
d. Direct calorimetry

ANS: B
Indirect calorimetry is commonly used in hospital settings. The piece of equipment is known as a metabolic cart or monitor. Other methods of measuring energy expenditure include doubly labeled water and direct calorimetry; however, these are not practical for clinical practice. Bomb calorimetry measures the energy available from food.

REF: pp. 27–28

7. When is basal metabolism at its highest rate?
a. During the digestion of a meal
b. During periods of sleep
c. During periods of exercise
d. During periods of rapid growth

ANS: D

Because basal metabolism only accounts for the proportion of energy necessary for support of life functions, it does not include energy increase after eating (TEF) or during exercise (AT). During infancy, childhood, adolescence, and pregnancy, basal metabolism increases as FFM increases.

REF: p. 25

8. Which of the following best describes the contribution of physical activity to total energy expenditure?
   a. It accounts for 10% of total energy expenditure.
   b. Its contribution to total energy expenditure increases with age.
   c. Its contribution to total energy expenditure is most consistent during childhood.
   d. It is the most variable component of total energy expenditure.

   ANS: D
   Activity thermogenesis is highly variable and dependent on body size and the efficiency of individual habits of motion. Whereas the thermic effect of food tends to be about 10% of TEE, AT can range from 100 kcal/d in sedentary people to 3000 kcal/d in highly active people. AT tends to decrease with age, and it tends to be variable during childhood.

   REF: p. 26

9. What does indirect calorimetry measure?
   a. The amount of heat produced by the body at rest
   b. The energy potential of foods consumed
   c. Oxygen consumption and carbon dioxide excretion
   d. The resting metabolic rate

   ANS: C
   Indirect calorimetry measures gas exchange that results from metabolism. The oxygen consumption and carbon dioxide excretion can be used to estimate a resting metabolic rate. Direct calorimetry measures heat production, either from humans in a controlled environment, or from food, by incinerating the food and measuring the amount of heat released.

   REF: p. 27

10. The respiratory quotient (RQ) is highest after consumption of a diet that is primarily composed of what?
    a. Carbohydrate
    b. Protein
    c. Fat
    d. Mixed macronutrients

    ANS: A
    The RQ compares the carbon dioxide produced with the oxygen consumed when energy substrates are metabolized. The RQ for carbohydrate is 1. The RQs for protein, fat, and a mixed diet are, respectively, 0.82, 0.7, and 0.85.

    REF: p. 27

11. Studies have shown that which factor(s) is(are) the primary determinant of an individual's resting energy expenditure (RMR)?
    a. The amount of lean body mass
    b. The amount of adipose tissue
    c. A person's age, gender, and health status
    d. The individual's body weight

    ANS: A
    The lean body mass, or fat-free mass, accounts for about 80% of the variance in RMR. Although the body weight and composition are affected by a person's age, gender, and health status, the amount of metabolically active tissue that exists within the overall lean body mass contributes to the overall metabolic rate.

    REF: p. 24

12. Which of these best describes the change in the metabolic rate during pregnancy?
    a. It decreases as a result of a decrease in maternal physical activity.
    b. It increases as a result of fetal growth.
    c. It increases as a result of fetal growth and maternal cardiac output.
    d. It decreases as a result of an increase in maternal adipose tissue.

    ANS: C
    Hormonal changes that occur during pregnancy support the changes in the maternal body to support the growth of the fetus. These changes include the growth of metabolically active tissue in the uterus, placenta, and fetus. Additionally, blood volume is increased, and cardiac workload increases. Because the metabolic rate is dependent on metabolically active tissues, as these increase and the heart's work increases, the overall metabolic rate increases.

    REF: pp. 25–26

13. A dish has 60 g of carbohydrate, 35 g of protein, and 25 g of fat. How many total kilocalories are in the dish?
    a. 480 kcal
    b. 555 kcal
    c. 605 kcal
    d. 655 kcal

    ANS: C
    One gram of carbohydrate provides 4 kcal. One gram of protein provides 4 kcal. One gram of fat provides 9 kcal. Therefore, (60 g carb × 4 kcal ÷ g carb) + (35 g prot × 4 kcal ÷ g prot) + (25 g fat × 9 kcal ÷ g fat) = 240 kcal + 140 kcal + 225 kcal = 605 kcal.

    REF: pp. 29–30

14. How many kilocalories are in 4 oz of 40-proof schnapps?
    a. 28 kcal
    b. 64 kcal
    c. 128 kcal

d. 240 kcal

ANS: C
The kilocalorie equivalent of an alcoholic drink is equal to the volume of drink times the proof × 0.8 kcal/proof/fl oz. 4 fl oz × 40-proof × 0.8 kcal/proof/fl oz = 128 kcal.

REF: pp. 29–30

15. How is the determination of the physical activity level (PAL) categories beyond sedentary different from the sedentary category?
a. They are based on METs.
b. They are based on the pace of walking.
c. They are based on the total time spent doing physical activity.
d. They are based on types of physical activity.

ANS: B
Beyond the sedentary category, the PAL category is determined according to the energy expended by a person walking a set pace of 3 to 4 miles per hour. Low-active, active, and highly active PALs are equivalent to walking 2 miles, 7 miles, and 17 miles per day, respectively, at 3 to 4 mph. Metabolic equivalents (METs) are another means by which to determine energy expenditure during physical activity, but they are not used in the EER estimation. Determination of physical activity energy expenditure using METs does consider the type, or intensity, of physical activity and total time spent doing physical activity.

REF: p. 30

16. In research regarding the measurement of activity-related energy expenditure, what method is used to validate uniaxial and triaxial monitors of human movement?
a. Doubly labeled water
b. Indirect calorimetry
c. Heart rate monitor
d. Physical activity questionnaire

ANS: A
As doubly labeled water has become the research method of choice in regard to measurements of total energy expenditure as well as the individual components of energy expenditure, comparisons of other techniques are made to it. Indirect calorimetry can be used for activity energy expenditure but not in free-living situations. The heart rate monitor has not been found to be reliable in measurement of physical activity in individuals. Physical activity questionnaires would be used as a less expensive alternative to movement monitors and are not used for validation of other techniques.

REF: p. 23

17. A respiratory quotient of 0.64 would most likely occur in which of these patients?
a. A pregnant woman
b. A patient with diabetic ketoacidosis
c. A trauma patient in the ICU

d. Someone who had just eaten a high fat meal

ANS: B
The respiratory quotient provides information on the time of fuel the body is burning for energy. A mixed fuel meal yields a respiratory quotient of 0.82. Burning fat exclusively is 0.7. Burning ketones results in a respiratory quotient less than or equal to 0.65.

REF: pp. 23

18. Only _____has been developed for use in a hospitalized population.
a. Indirect calorimetry
b. The Harris-Benedict equation
c. The Mifflin-St. Jeor equation
d. Doubly labeled water

ANS: A
Doubly labeled water is really only used in research settings. Both the Harris-Benedict and Mifflin-St. Jeor energy expenditure equations were developed using healthy individuals. Indirect calorimetry is done using a metabolic cart in clinical situations and is well accepted for REE in hospitalized patients.

REF: pp. 23–24