Nutrient Biochemistry

Multiple Choice Questions

1. Cachexia is best described as a complicated metabolic syndrome characterized by which of the following? A) Weight loss due exclusively to reduced caloric intake B) Muscle mass loss with or without fat mass loss, often associated with an inflammatory process C) Exclusively fat mass loss due to increased protein turnover D) Rapid weight gain due to insulin resistance

2. What is the major cause of the abnormal metabolic cascade seen in cachexia? A) Excess ghrelin B) Excess myostatin C) Cytokine excess D) Insulin excess

3. Which of the following hormonal changes contributes to the catabolic, hypermetabolic state in cachexia? A) Increased insulin-like growth factor-1 (IGF-1) B) Increased testosterone C) Decreased glucagon D) Increased cortisol and catecholamines

4. According to the diagnostic criteria, a patient with a known chronic disease and a BMI less than 20 kg/m2 must have at least how many additional factors (e.g., loss of muscle mass, asthenia, low albumin) to be diagnosed with cachexia? A) 1 B) 2 C) 3 D) 4

5. Which biomarker indicates the presence of inflammation in the diagnostic criteria for cachexia? A) Albumin less than 3.2 g/dL or increased C-reactive protein B) Increased ghrelin or reduced myostatin C) Increased IGF-1 or decreased cortisol D) Blood glucose greater than 200 mg/dL

6. Which pharmacological treatment for cachexia is noted to be effective ONLY in AIDS patients? A) Megestrol acetate B) Corticosteroids C) Cannabinoids D) Omega-3 fatty acids

7. Anorexia nervosa is characterized by deficits in which neurotransmitters, affecting the corticolimbic system? A) GABA and glutamate B) Dopamine and serotonin C) Acetylcholine and histamine D) Norepinephrine and epinephrine

8. According to NICE guidelines, which of the following criteria places a patient at high risk for refeeding problems? A) BMI < 18.5 B) Unintentional weight loss > 10% in the past six months C) Little or no nutritional intake for > 5 days D) Low levels of potassium, phosphate, or magnesium before feeding

9. During early starvation leading to refeeding syndrome, the basal metabolic rate decreases by as much as 20-25%. What is the primary energy source shift during this period? A) From protein to carbohydrate B) From fat and protein to carbohydrate C) From carbohydrate to fat and protein D) From carbohydrate to ketones exclusively

10. How does Binge Eating Disorder (BED) differ from standard substance addiction physiologically? A) Patients develop a strong physical tolerance to high-sugar foods. B) Patients show severe withdrawal symptoms when denied high-fat foods. C) Patients experience an

addictive response but do not develop tolerance or show withdrawal symptoms. D) Patients lack reward sensitivity to high-sugar foods.

11. Which genetic receptors have been implicated in the risk factors for Binge Eating Disorder? A) Mu-opioid (OPRM1) and dopamine (DRD2) receptors B) Serotonin (5-HT2C) and histamine (H1) receptors C) Glutamate (NMDA) and GABA-A receptors D) Cannabinoid (CB1) and acetylcholine (ACh) receptors

12. To establish a diagnosis of Bulimia Nervosa, binging and inappropriate compensatory behaviors must occur at least: A) Once a week for one month B) Twice a week for three months C) Once a week for three months D) Three times a week for six months

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13. Of the ingested carbohydrates in a typical diet, approximately what percentage is in the form of polysaccharides (mainly starch)? A) 30% B) 50% C) 60% D) 90%

14. Which of the following disaccharides contributes approximately 10% of ingested carbohydrates? A) Maltose B) Sucrose C) Lactose D) Trehalose

15. Oligosaccharides like raffinose and stachyose are indigestible by human pancreatic and intestinal enzymes. How are they primarily digested? A) By salivary amylase in the mouth B) By stomach acid and pepsin C) By bacterial enzymes in the colon D) By pancreatic lipase in the duodenum

16. According to the lecture, which of the following is true regarding low Glycemic Index (GI) foods? A) They tend to be high in carbohydrates and low in fat. B) They tend to be high in fat, and low in carbohydrate and fiber. C) They are always high in soluble fiber. D) They cause rapid spikes in postprandial insulinemia.

17. A food has a Glycemic Index of 72 and contains 20 grams of total carbohydrates per serving. What is its Glycemic Load (GL)? A) 10 B) 14.4 C) 20 D) 36

18. Why is it nutritionally recommended to combine legumes with cereals (e.g., rice and beans)? A) It increases the overall GI of the meal for better energy. B) It provides a perfect pairing to get complete proteins while bringing down the overall GI. C) It prevents the fermentation of resistant starch in the colon. D) It allows salivary amylase to break down the (1-6) linkages more efficiently.

19. Salivary and pancreatic amylases act on the interior alpha (1-4) linkages of starch but cannot break the outer glucose-glucose links. What are the final breakdown products of amylase action? A) Glucose and fructose B) Maltose and maltotriose C) Sucrose and lactose D) Dextrins and cellulose

20. What happens to starch granules when cooked, and how does this affect digestion? A) Heat gelatinizes the granules, decreasing their susceptibility to amylase. B) Heat crystallizes the

granules, increasing their susceptibility to amylase. C) Heat gelatinizes the granules, increasing their susceptibility to amylase. D) Heat degrades the granules into resistant starch, bypassing amylase digestion.

21. Which of the following is an end product of resistant starch fermentation by gut bacteria in the colon? A) Long-chain fatty acids B) Short-chain fatty acids (e.g., butyrate, propionate) C) Amino acids and peptides D) VLDL and HDL

22. How does resistant starch (RS) affect postprandial glucose and insulin response? A) It increases the glycemic load by adding digestible starch. B) It dilutes the digestible starch content, lowering the glycemic load and reducing the response. C) It spikes insulin levels due to the rapid release of maltotriose. D) It slows gastric emptying but has no effect on blood glucose.

23. Which of the following is NOT a health benefit of inulin mentioned in the lecture? A) Regulating lipid metabolism B) Enhancing mineral absorption C) Increasing blood sugar levels D) Reducing the risk of colon cancer

24. How do insoluble fibers like cellulose contribute to bowel regularity? A) They are fermented into short-chain fatty acids that lubricate the colon. B) They undergo fermentation and add bulk to the stool. C) They cannot undergo fermentation, so they add bulk to the stool and soften it by absorbing water. D) They trap cholesterol components to prevent loose stools.

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25. While fiber itself does not contribute to bone strength, which fiber supplement contains calcium as an ingredient to aid bone health? A) Psyllium (Metamucil) B) Methylcellulose (Citrucel) C) Calcium polycarbophil (Fibercon) D) Wheat dextrin (Benefiber)

26. How do soluble fibers, like those found in oat bran and dried beans, help prevent heart disease? A) By adding bulk to the stool and speeding colonic transit B) By entrapping cholesterol components in the blood, helping lower cholesterol C) By increasing the oxidation of cholesterol to bile acids D) By stimulating the release of GLP-1

27. What is the proposed mechanism by which high-fiber diets reduce the incidence of colon cancer? A) Fiber increases the absorption of luminal chemicals that fight tumors. B) The bulk action of fiber speeds colonic transit and may absorb carcinogenic agents. C) Fiber fermentation creates high amounts of methane, which kills cancer cells. D) Fiber increases insulin sensitivity, directly preventing colonic cell mutation.

28. High fructose corn syrup (HFCS) is considered a primary cause of overweight and obesity. Which of the following conditions is NOT directly abetted by weight gain from HFCS according to the lecture? A) Fatty liver disease B) Dyslipidemia C) Type 1 diabetes D) Heart disease

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29. Which of the following correctly pairs the semi-essential amino acids? A) Lysine and Methionine B) Arginine and Histidine C) Leucine and Isoleucine D) Tryptophan and Phenylalanine

30. Which of the following is an example of an incomplete protein source? A) Eggs B) Poultry C) Almonds D) Fish

31. The amino acid pool is depleted by the synthesis of nitrogen-containing small molecules. Which of the following are examples of these molecules? A) Glycogen and fatty acids B) Ketone bodies and CO2 C) Purines and pyrimidines D) Creatine and urea

32. During prolonged starvation (vs. the postabsorptive state), what becomes the main source of glucose for the body? A) Liver glycogen B) Gluconeogenesis C) Muscle glycogen D) Dietary intake

33. How does kidney gluconeogenesis change from the postabsorptive state to prolonged starvation? A) It goes from being the primary glucose source to a minor one. B) It remains exactly the same. C) It goes from a minor role to becoming an important glucose source. D) It stops completely to conserve amino acids.

34. Which of the following proteins would have the highest rate of turnover (synthesis and degradation)? A) Collagen B) Myofibrillar proteins C) Peptide hormones D) Plasma albumin

35. An adult patient is in a state where their nitrogen excretion equals their nitrogen intake. This condition is known as: A) Positive nitrogen balance B) Negative nitrogen balance C) Nitrogen balance D) Nitrogen deficiency

36. A patient suffering from advanced cancer and starvation would likely be in which nitrogen balance state? A) Positive nitrogen balance B) Negative nitrogen balance C) Nitrogen balance D) Neutral nitrogen balance

37. Removing the alpha-amino group from an amino acid is an obligatory step in catabolism. What are the two sequential processes required for this? A) Transamination followed by Oxidative Deamination B) Oxidative deamination followed by Transamination C) Carboxylation followed by Decarboxylation D) Hydroxylation followed by Methylation

38. Once the alpha-amino group is removed from an amino acid, the nitrogen can be incorporated into other compounds or excreted as: A) Ammonia B) Urea C) Uric acid D) Creatinine

39. What is the recommended daily allowance (RDA) for dietary protein in most countries? A) 0.5 grams per kg of body weight per day B) 0.8 grams per kg of body weight per day C) 1.2 grams per kg of body weight per day D) 2.0 grams per kg of body weight per day

40. After a high-protein lunch compared to a normal-protein lunch, which hormone response is typically LOWER? A) Ghrelin B) PYY C) GLP-1 D) Insulin

41. Why is GLP-1 lower after a high-protein meal compared to a normal-protein, higher-carbohydrate meal? A) Amino acids inhibit GLP-1 secretion directly. B) Carbohydrates are potent stimulators of GLP-1 release. C) Protein causes faster gastric emptying, reducing GLP-1 secretion time. D) Protein increases leptin, which antagonizes GLP-1.

42. Which circulating amino acid signals the hypothalamus and activates mTOR pathways to promote satiety after a high-protein meal? A) Tryptophan B) Leucine C) Glutamine D) Alanine

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43. When metabolic rate rises due to infection or injury, body protein is mobilized primarily for: A) Building new immune cells exclusively B) Use as a fuel (amino acid oxidation) and supply of carbon for gluconeogenesis C) Synthesis of structural collagen D) Storage as adipose tissue

44. Simply administering more calories and amino acids does not easily reduce nitrogen loss in a hypermetabolic disease state because: A) The body cannot absorb enteral nutrition during stress. B) The metabolic factors causing the condition must be identified and corrected. C) Amino acids are instantly converted to urea regardless of caloric intake. D) Insulin resistance prevents cellular uptake of amino acids.

45. Which of the following are the three categories of factors that produce a hypermetabolic state in disease? A) Stress hormones, Cytokines, Lipid mediators B) Stress hormones, Acute phase proteins, Lipid mediators C) Cytokines, Antioxidants, Stress hormones D) Lipid mediators, Antibodies, Cytokines

46. Which specific amino acid administration is noted to produce a pharmacologic effect in improving certain disease states? A) Phenylalanine and Tyrosine B) Glutamine and Arginine C) Lysine and Methionine D) Tryptophan and Histidine

47. Kwashiorkor typically occurs in children around one year of age after weaning, predominantly because their diet consists of: A) High-fat, low-protein foods B) High-protein, low-calorie foods C) Predominantly carbohydrates with protein deficiency D) Purely synthetic milk formulas

48. Which of the following is a typical symptom of Kwashiorkor but NOT of Marasmus? A) Extreme muscle wasting B) Edema C) Anemia D) Arrested growth

49. Marasmus occurs in children usually younger than one year of age when breast milk is supplemented with thin watery gruels. What is the primary deficiency in Marasmus? A) Protein only B) Dietary protein and calories C) Essential vitamins only D) Calories only

50. Victims of Marasmus differ from victims of Kwashiorkor in that Marasmus victims do NOT show: A) Weakness or anemia B) Edema or changes in plasma proteins C) Muscle wasting or arrested growth D) Irritability or lethargy

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Answer Key

1. B
2. C
3. D
4. C
5. A
6. C
7. B
8. D
9. C
10. C
11. A
12. C
13. C
14. C
15. C
16. B
17. B *(Calculation: (72 x 20) / 100 = 14.4)*
18. B
19. B
20. C
21. B
22. B
23. C
24. C
25. C
26. B

27. B
28. C
29. B
30. C
31. C
32. B
33. C
34. C
35. C
36. B
37. A
38. B
39. B
40. C
41. B
42. B
43. B
44. B
45. A
46. B
47. C
48. B
49. B
50. B

Blank questions

1. Cachexia is a complicated metabolic syndrome characterized by _____ mass loss with or without fat mass loss.
2. The major cause of the abnormal metabolic cascade resulting in cachexia is _____ excess.
3. In cachexia, an excess of myostatin and increased glucagon, cortisol, and catecholamines produce a _____, hypermetabolic state.
4. Diagnostic criteria for cachexia include a BMI of less than 20 kg/m2 in the presence of a known chronic disease and at least 3 other factors, including inflammation evidenced by an albumin level less than 3.2 g/dL or increased _____.
5. Among the pharmacological treatments for cachexia, _____ are noted to be effective only in AIDS patients.
6. Anorexia nervosa patients have deficits in the neurotransmitters dopamine and _____, which affects the corticolimbic system.
7. During early starvation, the body switches from using carbohydrate to using fat and _____ as the main source of energy.
8. The net result of metabolic and hormonal changes in early starvation is that the basal metabolic rate decreases by as much as _____%.

9. According to NICE guidelines, a patient with a BMI less than _____ is considered at high risk for refeeding problems.
10. Unlike standard substance addiction, individuals with binge eating disorder experience an addictive response to certain foods but do not develop _____ or show withdrawal symptoms.
11. Risk factors for binge eating disorder include the involvement of mu-opioid receptors and _____ receptors genes.
12. Bulimia nervosa is characterized by episodes of binge eating followed by recurrent inappropriate _____ behavior to prevent weight gain.
13. To establish a diagnosis of bulimia nervosa, the binging and compensatory episodes must occur at least once a week for _____ months.

14. Of ingested carbohydrates, approximately 60% is in the form of polysaccharides, mainly _____.
15. The disaccharides sucrose and lactose contribute approximately 30% and _____% of ingested carbohydrates, respectively.
16. Oligosaccharides such as raffinose and stachyose cannot be digested by pancreatic and intestinal enzymes, but are digested by _____ enzymes in the colon.
17. The glycemic index is a value used to measure how quickly a specific food increases _____ levels.
18. A food with a glycemic index rating of 70 or above is classified as having a _____ GI.
19. Glycemic load uses the glycemic index and the amount of total _____ per serving to estimate how much blood sugar levels will rise in total.
20. A glycemic load of 20 or higher is categorized as _____ GL.
21. Combining legumes with cereals helps bring down the overall GI of the meal and is the perfect pairing to get _____ proteins.
22. Fruits usually have a moderate GI, but when combined with a dairy product, the dairy _____ help to reduce the peak in glycemia.

23. Salivary and pancreatic amylases act on the interior alpha (1–4) linkages of starch but cannot break the outer glucose-glucose links, resulting in the final breakdown products: maltose and _____.

24. The heat of cooking gelatinizes starch granules, which increases their susceptibility to _____ digestion.

25. A proportion of starch known as _____ starch is indigestible even after prolonged incubation with amylase.

26. The end products of the fermentation of resistant starch in the colon are short-chain fatty acids, carbon dioxide, hydrogen, and _____.

27. Resistant starch can dilute the digestible starch content of a meal, thereby lowering the _____ load.

28. Inulin is a type of _____ that is not digested or absorbed in the stomach, but helps beneficial bacteria grow in the bowel.

29. Soluble dietary fiber includes pectin and _____, while insoluble fiber includes cellulose and hemicellulose.

30. Insoluble fiber usually cannot undergo fermentation by bacteria in the colon, so it adds _____ to the stool and contributes to bowel regularity.

31. While fiber itself does not contribute to bone strength, the fiber supplement calcium _____ in Fibercon contains calcium as an ingredient to help with good bone health.

32. Dietary fiber enhances _____ and may prevent overeating because high-fiber diets tend to have more volume and fewer calories.

33. Soluble fibers help lower cholesterol and prevent heart disease by entrapping _____ components in the blood.

34. Insoluble fiber maintains bowel movements by absorbing water, which softens the stool and prevents _____.

35. High-fiber diets maintained long-term reduce the incidence of _____ cancer, partly because the bulk action of fiber speeds colonic transit and reduces the absorption of luminal chemicals.

36. Added sugars and high _____ corn syrup are considered primary causes of overweight and obesity.

37. Weight gain abetted by high-calorie foods containing HFCS can contribute to heart disease, diabetes, fatty liver disease, and _____, an abnormal level of cholesterol and other fats in the blood.

38. On hydrolysis, proteins yield a group of simple organic compounds of low molecular weight called _____ amino acids.

39. Amino acids classified as _____ essential are not synthesized in the body in adequate amounts and require dietary supplementation, such as arginine and histidine.

40. Incomplete proteins are deficient in one or more of the _____ amino acids.

41. The amino acid pool is supplied by the degradation of body proteins, dietary protein, and the synthesis of _____ amino acids from simple intermediates of metabolism.

42. The amino acid pool is depleted by the synthesis of body protein, synthesis of nitrogen-containing small molecules, and synthesis of glucose, glycogen, fatty acids, _____ bodies, or $CO_2 + H_2O$.

43. During the postabsorptive state, the main glucose source is liver _____, whereas during starvation, it is gluconeogenesis.

44. During prolonged starvation, the brain shifts from using glucose as its primary fuel to using mostly _____.

45. Proteins whose concentrations need to be regulated, such as enzymes and peptide hormones, have relatively _____ rates of synthesis and degradation.

46. Structural proteins such as _____ and myofibrillar proteins have relatively long lifetimes and slow turnover rates.

47. If the nitrogen content of foods exceeds that excreted, the condition is called _____ nitrogen balance, commonly seen in infants, children, pregnancy, and athletes.

48. If the nitrogen excreted exceeds that of the food eaten, the condition is called _____ nitrogen balance, seen in illness, starvation, and advanced cancer.

49. Metabolism of amino acids requires two processes to remove the alpha-amino group: a transamination reaction followed by _____ deamination.

50. Once removed, the alpha-amino group nitrogen can be incorporated into other compounds or excreted as _____ by the urea cycle.

51. The recommended daily allowance (RDA) for dietary protein in most countries is _____ grams per kg of body weight per day.

52. After a high-protein lunch, satiety and energy expenditure are significantly higher, despite a reduction in the hormone _____, which normally promotes satiety.

53. Carbohydrates are potent stimulators of _____ release, which is why a normal-protein, higher-carbohydrate meal results in higher levels of it compared to a high-protein meal.

54. Circulating amino acids such as _____ can signal the hypothalamus and activate pathways such as mTOR, promoting satiety after a high-protein meal.
55. When metabolic rate rises due to infection or injury, body protein is mobilized for use as a fuel (amino acid oxidation) and for supply of carbon for _____.
56. The factors that produce a hypermetabolic state in disease are categorized into stress hormones, cytokines, and _____ mediators.
57. Providing anabolic hormonal stimuli such as insulin and _____ hormone has been administered to improve nitrogen balance in disease states.
58. Administration of specific amino acids, such as glutamine and _____, can produce a pharmacologic effect in improving the disease state.
59. Kwashiorkor occurs when there is a deficiency of _____ only, frequently seen in children after weaning whose diet consists predominantly of carbohydrates.
60. Marasmus occurs when there is a deficiency of dietary protein and _____, usually in children younger than one year of age. Unlike Kwashiorkor, Marasmus victims do not show edema.

Multiple Choice Questions

1. Nutritional biochemistry specifically examines the health benefits gained from eating: A) Processed meats B) Organic fruits and vegetables C) Synthetic supplements D) Fermented dairy products
2. If the strict conditions for measuring Basal Metabolic Rate (BMR) are not met, the measurement is referred to as Resting Metabolic Rate (RMR), which is typically higher than BMR by: A) 5% to 10% B) 10% to 20% C) 20% to 30% D) 30% to 40%
3. Which organ accounts for the highest percentage of the body's total energy expenditure at rest? A) Skeletal muscle B) Brain C) Liver D) Heart
4. The indirect method of calculating RMR involves measuring: A) The rate of heat loss from the body B) Oxygen consumption and carbon dioxide production C) Body surface area and core temperature D) Electrical conductivity of tissues
5. Which of the following factors DECREASES resting energy expenditure (REE)? A) Hyperthyroidism B) Caffeine consumption C) Hypothyroidism D) Cold weather
6. Adaptive thermogenesis differs from obligatory thermogenesis in that it: A) Is the energy required to digest and absorb nutrients B) Reflects alterations in metabolism due to

ambient temperature or emotional stress C) Is strictly dependent on the macronutrient composition of food D) Accounts for exactly 10% of total energy expenditure

7. The energy expended during activities of daily living, excluding sports or fitness exercise, is termed: A) Basal Metabolic Rate B) Thermic Effect of Food C) Non-exercise Activity Thermogenesis (NEAT) D) Obligatory Thermogenesis
8. The Recommended Dietary Allowance (RDA) is set at approximately how many standard deviations above the Estimated Average Requirement (EAR)? A) 1 SD B) 2 SD C) 3 SD D) 4 SD
9. Which Dietary Reference Intake standard is used when experimental data are inadequate to determine an EAR or RDA for an essential nutrient? A) Tolerable Upper Intake Level (UL) B) Adequate Intake (AI) C) Recommended Dietary Allowance (RDA) D) Estimated Average Requirement (EAR)
10. According to the Acceptable Macronutrient Distribution Ranges (AMDR), what is the acceptable range for protein intake as a percentage of total calories? A) 5-10% B) 10-35% C) 20-35% D) 45-65%
11. Which vegetable subgroup is particularly high in carotenoids (provitamin A) and vitamin C? A) Dark green vegetables B) Legumes C) Starchy vegetables D) Red and orange vegetables
12. On a food label, ingredients are listed in which order? A) Alphabetical order B) Ascending order by weight C) Descending order by weight D) By nutritional importance
13. The Daily Reference Value (DRV) on a nutrition facts panel is based on a reference diet of 2000 kcal. What is the macronutrient breakdown for this reference diet? A) 35% fat, 55% carb, 10% protein B) 20% fat, 65% carb, 15% protein C) 30% fat, 50% carb, 20% protein D) 40% fat, 40% carb, 20% protein
14. Which of the following is a biomedical assessment of nutritional status? A) Skin-fold thickness B) Fecal fat test C) Dietary diary D) Medical history
15. The % Daily Value for protein is NOT required on a food label unless: A) The food contains more than 5% fat B) The food is labeled as high protein or low protein C) The food contains animal products D) The food has added amino acids
16. Which enzyme secreted in the mouth is responsible for the initial breakdown of saturated fatty acids? A) Salivary amylase B) Lingual lipase C) Pepsinogen D) Bromelain
17. Low levels of vitamin B12 leading to anemia can be caused by a lack of: A) Pepsinogen B) Hydrochloric acid or intrinsic factor C) Bicarbonate D) Gastrin

18. In the small intestine, bile primarily functions to break down: A) Long-chain fatty acids (LCFA) B) Unsaturated fats C) Starch D) Proteins

19. Which of the following herbs is known to stimulate the release of digestive enzymes and improve digestion, according to the lecture? A) Ginger B) Cayenne pepper C) Aloe vera D) Peppermint

20. The appendix is nicknamed "the colon's oil can" because it: A) Absorbs water from chyme B) Lubricates contents coming out of the small intestine C) Produces digestive enzymes D) Stores bile

21. Which hormone, produced by G cells, stimulates acid secretion primarily through an indirect pathway involving ECL cells and histamine? A) Secretin B) GIP C) Gastrin D) CCK

22. Somatostatin acts as a(n) _____ for gastrin secretion. A) Stimulator B) Main inhibitor C) Indirect activator D) Bypass factor

23. Which hormone is produced by S cells of the duodenal mucosa in response to acidic chyme? A) Gastrin B) Secretin C) GIP D) GLP-1

24. Glucose insulinotropic peptide (GIP) stimulates the pancreas to release insulin and also promotes: A) Glycogenolysis B) Fat storage C) Gluconeogenesis D) Protein catabolism

25. The incretin effect describes the phenomenon where: A) Intravenous glucose causes greater insulin release than oral glucose B) Oral glucose causes greater insulin release than intravenous glucose C) Protein ingestion inhibits insulin release D) Fatty acids inhibit gastric emptying

26. During the intestinal phase of digestion, which reflex inhibits gastric secretion and motility? A) Gastrocolic reflex B) Enterogastric reflex C) Vagovagal reflex D) Defecation reflex

27. What is the medical term for an intense desire to consume a specific food? A) Polyphagia B) Pica C) Food craving D) Hyperphagia

28. The craving of non-food items as food is defined as: A) Anorexia B) Pica C) Aphagia D) Orexia

29. Which of the following is the most powerful central stimulant of appetite, particularly with a preference for carbohydrates? A) AgRP B) POMC C) NPY D) BDNF

30. Agouti-Related Peptide (AgRP) stimulates appetite by acting as a competitive inhibitor of: A) Serotonin receptors B) NPY receptors C) Melanocortin receptors MC3-R and MC4-R D) Leptin receptors

31. Deficiencies in Proopiomelanocortin (POMC) can cause: A) Early-onset obesity and adrenal insufficiency B) Severe weight loss and hyperactivity C) Increased melanin production D) Suppression of ACTH

32. Which hormone is secreted by adipocytes and reduces appetite, primarily existing to prevent starvation? A) Ghrelin B) Leptin C) Insulin D) PYY 3-36

33. Why is administering leptin analogs generally ineffective for appetite suppression in humans? A) Leptin breaks down too quickly in the blood B) Leptin exists to prevent starvation, not to lose weight; only slight fat loss occurs with amylin C) Leptin cannot cross the blood-brain barrier D) Leptin stimulates ghrelin production

34. Glucagon-like peptide-1 (GLP-1) is secreted by cells of the gut in proportion to: A) The fat content of the meal B) The amount of energy ingested C) The protein content D) Stomach distension

35. Which hormone is often referred to as the "hormonal clock" and the "hunger hormone"? A) Ghrelin B) Leptin C) PYY 3-36 D) Insulin

36. In obese individuals, the post-meal rise in PYY 3-36 is typically: A) Exaggerated B) Reduced C) Unchanged D) Delayed by 2 hours

37. After gastric bypass surgery, the levels of PYY 3-36 after meals become: A) Exaggerated B) Reduced C) Unchanged D) Suppressed completely

38. Systemic inflammatory mediators such as TNFα, IL-1, and IL-6 influence appetite by: A) Stimulating NPY neurons B) Negatively influencing appetite C) Increasing ghrelin secretion D) Enhancing dopamine reward pathways

39. How does zinc supplementation affect appetite? A) It decreases leptin levels B) It increases brain sensitivity to leptin, reducing appetite C) It stimulates ghrelin release D) It blocks serotonin receptors

40. Which neurotransmitter shows the most consistent inhibition of food intake and may directly influence the melanocortin pathway? A) Dopamine B) Noradrenaline C) Serotonin (5-HT) D) Acetylcholine

41. What effect does dietary fat have on appetite when combined with refined carbohydrates? A) Decreases appetite B) Increases appetite C) Has no effect D) Suppresses ghrelin

42. A person's BMR measurement requires them to be in a specific state. Which of the following is NOT a condition for a true BMR measurement? A) 12-14 hours of caloric fasting B) Restful sleep the night before C) Room temperature maintained at 20°C D) No strenuous activity 1 hour before

43. Discretionary kcalories are defined as: A) Calories required for basal metabolism B) The kcalories remaining after meeting all nutrient needs with nutrient-dense foods C) The calories burned through physical activity D) The maximum calories allowed by the Tolerable Upper Intake Level
44. Which of the following is NOT one of the top 8/9 food allergens required on food labels? A) Peanuts B) Soy C) Rice D) Sesame
45. Which phase of digestion is triggered by the sight, smell, or thought of food? A) Cephalic phase B) Gastric phase C) Intestinal phase D) Absorptive phase
46. During the gastric phase, which of the following stimuli promotes gastrin production? A) High acidity in the stomach B) Distention of the stomach C) Presence of chyme in the duodenum D) Secretin release
47. Which term describes overeating specifically characterized by an increased number of meals? A) Hyperphagia B) Polyphagia C) Orexia D) Anorexia
48. Which hormone or neuropeptide is released during fasting or starvation to promote energy conservation and reduce metabolic rate? A) POMC B) BDNF C) NPY D) Serotonin
49. Ghrelin is secreted by which specific cells of the gastric fundus? A) G cells B) S cells C) K cells D) A-cells
50. Which of the following dietary components typically increases appetite? A) High protein diet B) Fiber C) Refined carbohydrates D) Balanced omega-6:omega-3 fats

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Fill-in-the-Blank Questions (30 Questions)

1. Nutritional biochemistry examines the health benefits gained from eating organic _____ and _____.
2. A kilocalorie is the amount of energy required to raise the temperature of 1 _____ of water by 1° Celsius.
3. If the strict conditions for measuring Basal Metabolic Rate (BMR) are not met, the energy expenditure is referred to as the _____ Metabolic Rate.
4. The organ that accounts for approximately 27% of the body's total energy expenditure is the _____.
5. The thermic effect of food that reflects alterations in metabolism due to changes in ambient temperature or emotional stress is called _____ thermogenesis.

6. The Estimated Average Requirement (EAR) is the average daily nutrient intake level estimated to meet the requirement of _____ percent of healthy individuals in a particular life stage and gender group.
7. The Recommended Dietary Allowance (RDA) is calculated as the Estimated Average Requirement (EAR) plus two _____.
8. The highest level of daily nutrient intake that has no adverse health effects in almost all individuals is the Tolerable _____ Intake Level (UL).
9. According to the Acceptable Macronutrient Distribution Ranges (AMDR), the adequate intake of carbohydrates for adults is _____ to _____ percent of total calories.
10. The USDA food patterns sort the vegetable group into five subgroups, one of which is _____ vegetables, which are especially good sources of vitamins A, C, K, folate, and calcium.
11. On a food label, the FDA developed Daily Values using two standards: Reference Daily Intakes (RDIs) for micronutrients, and Daily Reference _____ (DRV) for energy-producing nutrients.
12. A food diary typically requires recording the specific types and exact amounts of food eaten in "real time" for a period of _____ to _____ days.
13. In the mouth, the enzyme _____ lipase is responsible for the initial breakdown of saturated fatty acids.
14. In the stomach, the release of _____ factor is necessary for the absorption of vitamin B12.
15. The appendix is nicknamed "the colon's _____" because it lubricates the contents that come out of the small intestine.
16. The hormone _____ is produced by G cells and stimulates acid secretion mainly through an indirect pathway involving ECL cells and histamine.
17. Secretin stimulates the secretion of _____ by the pancreas, which stabilizes the pH of the chyme in the duodenum.
18. The phenomenon where oral glucose causes a greater insulin release than intravenous glucose is known as the _____ effect.
19. The gastrointestinal tract has its own nervous system called the _____ Nervous System.
20. During the intestinal phase of digestion, the _____ reflex inhibits gastric secretion and motility.

21. Overeating characterized by an increased meal size is termed _____, whereas overeating characterized by an increased number of meals is termed _____.
22. The main regulatory organ in the brain for human appetite is the _____.
23. The most powerful central stimulant of appetite, particularly with a preference for carbohydrates, is Neuropeptide _____ (NPY).
24. Agouti-Related Peptide (AgRP) acts as a competitive inhibitor of melanocortin receptors MC3-R and _____.
25. Proopiomelanocortin (POMC) is a prohormone that gives rise to several biologically active peptides, including α-MSH and _____.
26. Low levels of Brain-derived neurotrophic factor (BDNF) are linked to _____, obesity, and metabolic syndrome.
27. Leptin is secreted by _____ and acts to reduce appetite and decrease food consumption.
28. The hormone PYY 3-36 is produced by the small and large intestines and is considered an important mealtime _____.
29. Ghrelin is secreted by A-cells of the gastric fundus and is commonly referred to as the _____ hormone.
30. Adequate levels of the mineral _____ increase brain sensitivity to leptin, thereby reducing appetite.

True/False Questions (30 Questions)

1. Nutritional biochemistry only examines the effects of synthetic drugs on disease treatment.
2. Body weight is a reliable indicator of both macronutrient and micronutrient adequacy.
3. Women generally have resting metabolic rates that are approximately 5% to 10% lower than men.
4. The direct method of calculating RMR involves measuring the rate of oxygen consumption and carbon dioxide production.
5. Caffeine and nicotine are known to stimulate metabolic rate.
6. The thermic effect of food (TEF) known as obligatory thermogenesis reflects alterations in metabolism due to changes in ambient temperature and emotional stress.

7. The Estimated Average Requirement (EAR) is the average daily intake level sufficient to meet the requirements of nearly all (97-98%) of individuals in a group.
8. Adequate Intake (AI) is used instead of RDA when a nutrient is considered essential but experimental data are inadequate to determine an EAR.
9. According to ADMR, the acceptable range of fat intake for adults is 10-35% of total calories.
10. Legumes are counted in both the vegetable and protein food groups.
11. Discretionary kcalories represent the calories remaining after a person has consumed enough nutrient-dense foods to meet all nutrient needs for the day.
12. On a food label, ingredients are listed in ascending order by weight.
13. The % Daily Value for protein is always required on the Nutrition Facts Panel regardless of health claims.
14. Anthropometric measures of nutritional status include plasma LDL-C and fecal fat tests.
15. Salivary amylase in the mouth is responsible for the initial breakdown of saturated fatty acids.
16. The intrinsic factor released in the stomach is necessary for the absorption of vitamin B12.
17. Bile breaks down long-chain fatty acids (LCFA), while pancreatic lipase finalizes the breakdown of unsaturated fats.
18. Proteolytic enzymes such as bromelain and papain can help break down protein and are beneficial for people with pancreatic problems.
19. Gastrin stimulates acid secretion primarily through a direct pathway rather than an indirect pathway.
20. Secretin inhibits gastric juice secretions and gastric motility, which slows digestion in the stomach.
21. The parasympathetic nervous system inhibits activity in the gastrointestinal tract, while the sympathetic nervous system activates it.
22. The cephalic phase of digestion is triggered by the sight, smell, or thought of food.
23. During the gastric phase, high acidity in the stomach is a stimulus that promotes gastrin production.
24. Hyperphagia refers to an increased number of meals, while polyphagia refers to an increased meal size.

25. The neurons that regulate appetite appear to be mainly dopaminergic.
26. Neuropeptide Y (NPY) is released during fasting or starvation to promote energy conservation and reduce metabolic rate.
27. Agouti-Related Peptide (AgRP) stimulates appetite by acting as a competitive inhibitor of melanocortin receptors.
28. Leptin analogs are highly effective for appetite suppression and weight loss in the general obese population.
29. In obese individuals, the post-meal rise in PYY 3-36 is exaggerated compared to non-obese individuals.
30. Serotonin (5-HT) shows the most consistent inhibition of food intake and may directly influence the melanocortin pathway.

Answer Key

PART 1: Multiple Choice Answers

1. B | 2. B | 3. C | 4. B | 5. C | 6. B | 7. C | 8. B | 9. B | 10. B
2. D | 12. C | 13. A | 14. B | 15. B | 16. B | 17. B | 18. A | 19. A | 20. B
3. C | 22. B | 23. B | 24. B | 25. B | 26. B | 27. C | 28. B | 29. C | 30. C
4. A | 32. B | 33. B | 34. B | 35. A | 36. B | 37. A | 38. B | 39. B | 40. C
5. B | 42. C | 43. B | 44. C | 45. A | 46. B | 47. B | 48. C | 49. D | 50. C

PART 2: Fill-in-the-Blank Answers

1. fruits, vegetables
2. kilogram (kg)
3. Resting
4. liver
5. adaptive
6. 50 (or fifty)
7. standard deviations (or SD)
8. Upper
9. 45, 65

10. dark green
11. Value
12. 3, 7
13. Lingual
14. intrinsic
15. oil can
16. Gastrin
17. bicarbonate
18. incretin
19. Enteric
20. enterogastric
21. hyperphagia, polyphagia
22. hypothalamus
23. Y
24. MC4-R
25. ACTH
26. hyperphagia
27. adipocytes (or adipose tissue)
28. terminator
29. hunger
30. zinc

PART 3: True/False Answers

1. FALSE (It is a multidisciplinary science studying health, diet, and organic foods)
2. FALSE (Reflects energy adequacy, not macro/micronutrient adequacy)
3. TRUE
4. FALSE (Indirect measures O2/CO2; direct measures heat loss)
5. TRUE

6. FALSE (That describes adaptive thermogenesis; obligatory is for digesting/absorbing)
7. FALSE (That is RDA; EAR meets 50%)
8. TRUE
9. FALSE (10-35% is protein; fat is 20-35%)
10. TRUE
11. TRUE
12. FALSE (Descending order by weight)
13. FALSE (Not needed unless a claim like high/low protein is made)
14. FALSE (Those are biomedical; anthropometric are physical measures like BMI/skinfolds)
15. FALSE (Lingual lipase breaks down saturated fats; amylase breaks down starch)
16. TRUE
17. TRUE
18. TRUE
19. FALSE (Indirect pathway via ECL cells/histamine is the most important)
20. TRUE
21. FALSE (Parasympathetic activates, sympathetic inhibits)
22. TRUE
23. FALSE (Low acidity promotes gastrin; high acidity inhibits it)
24. FALSE (Hyperphagia = meal size; Polyphagia = meal number)
25. FALSE (They are mainly serotonergic)
26. TRUE
27. TRUE
28. FALSE (Ineffective for weight loss; prevents starvation)
29. FALSE (The post-meal rise is reduced in obesity, exaggerated after bypass)
30. TRUE