



**Anatomy & Physiology, 11th or 12th ed. (can be International 12th ed.)**  
by Ross and Wilson

**CLASS: G210 - C**  
**Part Three Test Questions**

**Part three of your test covers chapters 10 - 18**

## **Chapter 10**

1. Inflammation of the upper respiratory tract can be caused by inhaling irritants but is commonly due to infection. Such infections are usually caused by viruses that lower the resistance of the respiratory tract to other infections. This allows \_\_\_\_\_ to invade the tissues.
2. Pulmonary emphysema usually develops as a result of \_\_\_\_\_ inflammatory conditions or irritation of the airways. On microscopic examination, the lung tissue is full of large, irregular cavities created by the destruction of alveolar walls.
3. Asthma is a common inflammatory disease of the airways associated with episodes of \_\_\_\_\_ over-reactivity of the airway smooth muscle.

**Note:** In Get Healthy Now, Professor Null explains a milk allergy's changing symptoms: "Even if the symptoms are not the same, the underlying allergy may be. A child who has suffered milk-associated asthma, for instance, may have severe acne as a teenager. The milk allergy is still there, but its symptoms have moved to a different organ system, often misleading the patient and physician into thinking that the original allergy has been outgrown." According to Alternative Medicine, up to half of all infants may be sensitive to cows' milk. As a result, symptoms of an underlying milk allergy may start as early as infancy, only manifested as eczema, a symptom that may remain later on in childhood and adulthood. Furthermore, in addition to asthma and eczema, an underlying milk allergy may manifest as bronchitis, sinusitis, autoimmune disorders, frequent colds and ear infections and even behavioral problems.

4. Cystic fibrosis is one of the most common \_\_\_\_\_ diseases affecting 1 in 2500 babies. It is estimated that almost 5% of people carry the abnormal recessive gene which must be present in both parents to cause the disease.

## Chapter 11

5. There is a main theme within the list of functions of digestible carbohydrates: \_\_\_\_\_ and heat.
6. Amino acids (proteins broken down) are used for:
  - A. Growth and \_\_\_\_\_ of body cells and tissues.
  - B. Synthesis of \_\_\_\_\_, plasma proteins, antibodies and some hormones.
  - C. Provision of \_\_\_\_\_ when there is not enough carbohydrate in the diet and fat stores are depleted.
7. Fats provide the most \_\_\_\_\_ source of chemical energy and heat. They transport and store fat-soluble vitamins A, D, E, and K. They form the \_\_\_\_\_ sheaths and are needed to form steroid hormones.
8. \_\_\_\_\_ is needed for absorption of fat-soluble vitamins in the small intestine.
9. Vitamin A: The first sign of deficiency is \_\_\_\_\_.
10. Vitamin D regulates calcium and \_\_\_\_\_ metabolism/absorption.
11. Vitamin E is a group of eight tocopherols. As an antioxidant it protects membrane \_\_\_\_\_ from being destroyed in oxidative reactions.
12. Vitamin K is synthesized in the \_\_\_\_\_ intestine by bacteria and significant amounts are absorbed.
13. Vitamin K is required by the \_\_\_\_\_ for the production of prothrombin and factors VII, IX, and X, all essential for the clotting of blood.
14. The Vitamin B complex is a group of water-soluble vitamins that promote activity of \_\_\_\_\_ involved in the chemical breakdown (catabolism) of nutrients to release energy.
15. Vitamin B1 is thiamin and it is essential for the complete aerobic release of energy from \_\_\_\_\_. Deficiency causes beriberi which includes the symptoms of polyneuritis, causing degeneration of motor, sensory and some autonomic nerves.

**Note:** Neuritis is the inflammation of one or more nerves. The characteristic symptoms of neuritis include pain and tenderness; impaired sensation, strength, and reflexes. Your autonomic nervous system is the part of your nervous system that controls involuntary actions, such as the beating of your heart and the widening or narrowing of your blood vessels. When something goes wrong in this system, it can cause serious problems, including: blood pressure and heart problems, trouble with breathing and swallowing, and erectile dysfunction in men.

16. B2 (riboflavin) is involved with carbohydrate and protein metabolism, especially in the eyes and skin. Deficiency leads to \_\_\_\_\_ of the skin, commonly around the mouth and inflammation of the tongue. B3 is niacin which is associated with energy- releasing reactions in cells.

17. B6, pyridoxine, is associated with amino acid \_\_\_\_\_.

**Note:** Vitamin B6 helps the body make several neurotransmitters. It is needed for normal brain development and function, and helps the body make the hormones serotonin, norepinephrine, and melatonin. Your body needs B6 in order to absorb vitamin B12 and to make red blood cells and cells of the immune system.

18. B12 is essential for \_\_\_\_\_ synthesis, and deficiency leads to megaloblastic anemia. It is also required for the formation and maintenance of myelin, the fatty substance that surrounds and protects some \_\_\_\_\_.

19. Deficiency of B12 causes irreversible damage such as \_\_\_\_\_ neuropathy and/or subacute spinal cord degeneration.

20. The presence of intrinsic factor in the \_\_\_\_\_ is essential for vitamin B12 absorption, and deficiency is usually associated with insufficient intrinsic factor.

**Note:** The most common cause of vitamin B12 deficiency is inadequate absorption. The most common reasons for inadequate absorption are:

- Overgrowth of bacteria, Candida, or parasites in the small intestine
- Malabsorption conditions (inflammatory bowel disease, celiac disease, etc.)
- Surgery that removes the part of the small intestine where vitamin B12 is absorbed
- Drugs such as antacids (Tums, Prilosec, Omeprazole, Nexium, Prevacid, etc.)
- Metformin (used to reduce blood sugar levels in diabetics)
- Decreased stomach acidity (common among older people - over 50)

21. Folic acid (B9, folate) is essential for DNA synthesis, and when lacking, mitosis (cell division) is impaired. Deficiency at \_\_\_\_\_ and during early pregnancy is linked to an increased incidence of spin bifida.

**Note:** Folic acid is crucial for brain function and it plays an important role in mental and emotional health. Folic acid also works with vitamin B12 to help make red blood cells and it helps iron work properly in the body. Folic acid, B6, B12 and other nutrients control blood levels of the amino acid homocysteine (homocysteine is an amino acid and breakdown product of protein metabolism).

22. Pantothenic acid (B5) is associated with amino acid metabolism. No deficiency diseases have been \_\_\_\_\_.

**Note:** "Pantothenic acid is a component of coenzyme A (CoA), an essential coenzyme in a variety of reactions that sustain life... The synthesis of essential fats, cholesterol, and steroid hormones requires CoA, as does the synthesis of the neurotransmitter, acetylcholine, and the hormone, melatonin. Heme, a component of hemoglobin, requires a CoA-containing compound for its synthesis. Metabolism of a number of drugs and toxins by the liver requires CoA." - *Linus Pauling Institute Micronutrient Information Center, 2016, lpi.oregonstate.edu*

23. Biotin (B7) is synthesized by microbes in the intestine and it is associated with the metabolism of carbohydrates, \_\_\_\_\_, and some amino acids.

**Note:** Biotin Deficiency: "Symptoms include hair loss, dry scaly skin, cracking in the corners of the mouth, swollen and painful tongue that is magenta in color, dry eyes, loss of appetite, fatigue, insomnia, and depression. People who have been on parenteral nutrition -- nutrition given through an IV -- for a long period of time, those taking antiseizure medication or antibiotics long-term, and people with conditions like Crohn's disease that make it hard to absorb nutrients are more likely to be deficient in biotin." - *University of Maryland Medical Center, 2016*

24. Vitamin C is easily \_\_\_\_\_ by heat, aging, chopping, salting, and drying. The daily requirement (to avoid the disease scurvy!) is 40 mg and after (2-4\*) or (4-6\*) months deficiency becomes apparent. (\*Depends on book edition)

25. Calcium is involved in blood clotting, and \_\_\_\_\_ and muscle function.

26. Phosphates are an essential part of nucleic acids (DNA and RNA), cell membranes, and \_\_\_\_\_ storage molecules inside cells (such as adenosine triphosphate ATP).

27. Sodium is the most common **extracellular** cation and is involved in muscle contraction, transmission of \_\_\_\_\_ impulses along axons and maintenance of water and electrolyte balance.

28. Potassium is the most common **intracellular** cation and is involved in many chemical activities inside cells including muscle \_\_\_\_\_, transmission of nerve impulses and maintenance of water and electrolyte balance.
29. Iron is necessary for the oxidation of carbohydrates and the synthesis of some hormones and neurotransmitters. Iron deficiency is a relatively \_\_\_\_\_ condition, and causes anemia if iron stores become sufficiently depleted (deficiency exists before anemia; that is, low iron is problematic before anemia is diagnosed).
30. Iodine is found in seafoods and in vegetables grown in soil rich in iodine. In parts of the world where iodine is deficient in soil, very small quantities are added to table salt to prevent \_\_\_\_\_ (goiter is an advanced symptom of iodine deficiency).

## Chapter 12

31. The activities in the digestive system can be grouped under five main headings:
- A. \_\_\_\_\_
  - B. \_\_\_\_\_
  - C. \_\_\_\_\_
  - D. \_\_\_\_\_
  - E. \_\_\_\_\_
32. The \_\_\_\_\_ canal is also known as the gastrointestinal (GI) tract.
33. The alimentary canal and its related accessory organs are supplied by nerves from both divisions of the \_\_\_\_\_ nervous system (parasympathetic and sympathetic).
34. One pair of cranial nerves (vagus nerves) supplies most of the alimentary canal and the accessory organs. Sacral nerves supply the most distal part of the tract. The effects of parasympathetic stimulation increases muscular activity, especially \_\_\_\_\_.
35. Saliva contains the enzyme \_\_\_\_\_ that begins the breakdown of complex sugars, including starches, reducing them to the disaccharide maltose.
36. Hydrochloric acid \_\_\_\_\_ ingested microbes and provides the acid environment needed for effective digestion of pepsins.

37. Pepsinogens are activated to pepsins by hydrochloric acid and by pepsins already present in the stomach. These enzymes begin the digestion of \_\_\_\_\_, breaking them into smaller molecules.
38. Intrinsic factor (a protein) is necessary for the absorption of vitamin \_\_\_\_\_ from the ileum.
39. Functions in the stomach include the preparation of iron for absorption further along the tract - the acid environment of the stomach solubilizes iron salts, which is \_\_\_\_\_ before iron can be absorbed.
40. The small intestine is continuous with the stomach at the \_\_\_\_\_ sphincter. The small intestine is a little over 5 meters (almost 16 1/2 feet!) long and leads into the large intestine at the ileocecal valve.
41. Pancreatic juice functions: Trypsinogen and chymotrypsinogen are inactive enzyme precursors activated by enterokinase, an enzyme in the \_\_\_\_\_, which converts them into the active proteolytic enzymes (breaks down protein) trypsin and chymotrypsin.
42. Lipase converts fats to fatty acids and glycerol. To aid the action of lipase, \_\_\_\_\_ emulsify fats (reduce the size of globules, increasing their surface area).
43. Bile is secreted by the \_\_\_\_\_. Bile salts make cholesterol and fatty acids soluble, enabling both these and fat-soluble vitamins (A, D, E, K) to be readily absorbed.
44. The large intestine is \_\_\_\_\_ colonized by certain types of bacteria, which synthesize vitamin K and folic acid. They include *Escherichia coli*, *Enterobacter aerogenes*, *Streptococcus faecalis*, and *Clostridium perfringens*. These microbes are commensals, i.e. normally harmless, in humans. However, they may become pathogenic if transferred to another part of the body.

**Note:** The average human digestive tract contains as many as 1,000 species of microorganisms. Most of the organisms are either harmless or helpful under normal, balanced circumstances. If something upsets the balance of these organisms in your digestive tract harmless bacteria can grow out of control and lead to illness. When you take an antibiotic to treat an infection, the drug destroys either some or most of the normal, helpful bacteria. Without enough normal and helpful bacteria, *C. difficile* can quickly grow out of control. The antibiotics that most often lead to *C. difficile* infections include fluoroquinolones, cephalosporins, clindamycin and penicillins. Once established, *C. difficile* produces toxins that attack the lining of the intestine.

45. The function of the \_\_\_\_\_ pancreas is to produce pancreatic juice containing enzymes that digest carbohydrates, proteins and fats.
46. Distributed throughout the pancreas gland are groups of specialized cells called the pancreatic islets (islets of Langerhans). The islets have no ducts so the \_\_\_\_\_ diffuse directly into the blood.
47. The endocrine pancreas secretes the hormones \_\_\_\_\_ and glucagon, which are principally concerned with control of blood glucose levels.
48. The liver contains hepatic macrophages (Kupffer cells) whose function is to ingest and destroy worn out \_\_\_\_\_ cells and any foreign particles present in the blood flowing through the liver.
49. Glucose is converted to \_\_\_\_\_ for storage within the liver.
50. The liver removes the nitrogenous portion from the amino acids not required for the formation of new protein; \_\_\_\_\_ is formed from this nitrogenous portion which is excreted in urine. Nucleic acids (genetic material) are broken down to form uric acid which is also excreted in the urine.
51. The liver inactivates the hormones insulin, glucagon, cortisol, aldosterone, thyroid, and \_\_\_\_\_ hormones.

**Note:** Dan Lukaczer, ND states “In premenopausal women, the ovaries produce the estrogen estradiol (E2), which converts into estrone (E1), both of which must eventually be broken down and excreted from the body. This breakdown occurs primarily in the liver, and the excreted metabolites flow out in the bile or urine. Estradiol and estrone undergo this breakdown through a process called hydroxylation, an enzymatic activity in which the parent estrogen is transformed by the addition of a hydroxyl (OH) group at specific positions on estrogen's molecular ring. **If these estrogens are metabolized into the 2-hydroxylated estrone and estradiol, they lose much of their cell proliferative and estrogenic activity and are termed "good" estrogen metabolites.** Studies show that when 2- hydroxylation increases, the body resists cancer, and that when 2-hydroxylation decreases, cancer risk increases”.

Douglas C. Hall, M.D., in the article *Vitamin E and Magnesium?*, states that “Low serum vitamin E is associated with elevated estrogen levels, and may negatively affect estrogen detoxification. Women with PMS have experienced improvements of their symptoms when given supplemental vitamin E. Magnesium promotes estrogen detoxification by promoting methylation and glucuronidation, key estrogen detoxification pathways. Ovarian hormones influence magnesium levels, triggering decreases at certain times during the menstrual cycle as well as altering the calcium to magnesium ratio. These cyclical changes can produce many of the well-known symptoms of PMS in women who are deficient in magnesium and/or calcium”.

**B Vitamins:** Folate and vitamins B6 and B12 function as important cofactors for enzymes involved in estrogen detoxification; thus, decreased levels of B vitamins can lead to increased levels of circulating estrogens.

52. The liver stores the substances: glycogen, fat-soluble vitamins A, D, E, K, iron, \_\_\_\_\_, and B12 (not a complete list).
53. Metabolism constitutes all the chemical reactions that occur in the body, using \_\_\_\_\_ to provide energy by chemical oxidation of nutrients, making new or replacement body substances.
54. Catabolism is the process of breaking down large molecules into smaller ones releasing chemical \_\_\_\_\_, which is stored as adenosine triphosphate (ATP), and heat.
55. Anabolism is the building up, or \_\_\_\_\_, of larger molecules from smaller ones and requires a source of energy, usually ATP.
56. Metabolic pathways are switched on and off by \_\_\_\_\_, providing control of metabolism and meeting individual requirements.
57. Carbohydrate in excess of that required to maintain the blood glucose level and glycogen stores in the tissues is converted to \_\_\_\_\_ and stored in the fat depots.
58. Proteins, in the form of amino acids, are potential fuel molecules that are used by the body only when other energy sources are low, e.g. starvation. To supply the amino acids for use as fuel, in extreme situations, the body breaks down \_\_\_\_\_, its main protein source.
59. Fats that have been digested and absorbed as fatty acids and glycerol into the lacteals are transported via the \_\_\_\_\_ and the thoracic duct to the bloodstream and so, by a circuitous route, to the liver (a lacteal is a lymphatic capillary that absorbs dietary fats in the villi of the small intestine).
60. When body tissues are deprived of glucose, as occurs in prolonged fasting, starvation, energy-restricted diets or during \_\_\_\_\_ exercise, the body uses alternative energy sources, mainly fat stores.
61. Chronic gingivitis is a \_\_\_\_\_ inflammatory condition that occurs in response to accumulation of bacterial plaque around the teeth. It causes bleeding gums and gradually destroys the tissues that support the teeth, which eventually loosen and may fall out.

**Note:** Our teeth and gums are a reflection of our health and they require the same minerals and vitamins as our bones. Bleeding gums, excess tartar, loose teeth, receding gums, infections, dying pulp, and cavities are primarily the result of inadequate nutrients. Periodontal disease symptoms include swollen gums, bright red or purplish gums, bleeding gums, gums that feel tender when touched, gums that pull away from your teeth (recede), new spaces developing between your teeth, pus between your teeth and gums, loose teeth, a change in the way your teeth fit together when you bite. These symptoms are also common in the stages of scurvy/deficiency of vitamin C.

62. Crohn's disease is a chronic inflammatory condition of the alimentary tract. There is chronic patchy inflammation with \_\_\_\_\_ of the full thickness of the intestinal wall, causing partial obstruction of the lumen, sometimes described as skip lesions.

**Note:** The question we need to ask is; why are the bowels inflamed or irritated? Common causes include wheat, corn, milk, soy, Candida/fungus/mold, parasites, imbalance between harmful and beneficial bacteria, pesticides/chemicals, sugar, and lack of nutrients.

63. Malabsorption of nutrients and water from the intestines is not a disease in itself, but the result of \_\_\_\_\_ changes in one or more of the following: villi in the small intestine, digestion of food (enzymes), absorption or transport of nutrients from the small intestine (seems like a repeat since the villi are responsible for absorption and transport).

64. Hepatitis A was previously known as "infectious hepatitis" and affects mainly children, causing a mild illness. Antibodies develop and confer \_\_\_\_\_ immunity after recovery.

65. Hepatitis B is a virus that enters the blood and is spread by contaminated blood and blood products. The virus is also spread by body \_\_\_\_\_ and from infected mother to fetus.

**MayoClinic 2016** - "Most people infected with hepatitis B as adults recover fully, even if their signs and symptoms are severe."

**National Vaccine Information Center** - "As of March 2012, there was a total of 66,654 hepatitis B vaccine-related adverse events reported to the federal Vaccine Adverse Events Reporting System (VAERS), including reports of headache, irritability, extreme fatigue, brain inflammation, convulsions, rheumatoid arthritis, optic neuritis, multiple sclerosis, lupus, Guillain Barre Syndrome (GBS) and neuropathy."

**Note:** Most reactions never get reported to the VAERS because the doctors and/or parents don't understand that the vaccine could have been the issue. Hep B is given to babies immediately after birth so who can say if they were "born that way" or if it was the HepB shot. The infant also has no ability to communicate headaches or joint aches and extreme fatigue.

66. Hepatitis C is prevalent in IV drug users and the infection is very frequently asymptomatic as a \_\_\_\_\_ state occurs.
67. Gallstone predisposing factors include: changes in the composition of bile that affect \_\_\_\_\_ of its constituents.

**Note:** Phosphatidylcholine (PC) is considered to be the main cholesterol solubilizer in bile. It is needed to convert cholesterol to bile acids. Phosphatidylcholine is a fat molecule that contains the essential nutrient choline. Foods that contain choline and/or phosphatidylcholine are eggs, meat, fish, broccoli, almonds, walnuts, peanuts, cashews, Brussels sprouts, avocados, kidney beans and navy beans.

## Chapter 13

68. The urinary system plays a vital part in maintaining homeostasis of water and \_\_\_\_\_ concentrations within the body.
69. The main functions of the kidneys are: formation and secretion of urine, production and secretion of erythropoietin (the \_\_\_\_\_ that stimulates formation of red blood cells), and the production and secretion of renin, an important \_\_\_\_\_ in the control of blood pressure.
70. Hormone influence on kidney function: parathyroid hormone and calcitonin hormone from the thyroid gland regulate the reabsorption of calcium and \_\_\_\_\_ from the distal collecting tubules.
71. Antidiuretic hormone (ADH) is secreted by the posterior lobe of the pituitary gland... increasing water \_\_\_\_\_.
72. Aldosterone, secreted by the adrenal cortex, increases the reabsorption of sodium and water, and the \_\_\_\_\_ of potassium.

**Note:** High aldosterone levels can lead to low potassium levels. Low potassium levels often cause no symptoms but may lead to weakness, tingling, muscle spasms and cramps. High levels or chronic stress is a common cause of over active adrenal glands which increases aldosterone into the blood. Aldosterone also causes the excretion of magnesium into the urine.

73. Diabetic nephropathy is the result of diabetes causing \_\_\_\_\_ to large and small blood vessels throughout the body. Nephropathy = kidney disease.

74. Renal calculi (kidney stones) form in the kidneys and bladder when urinary constituents normally in solution are \_\_\_\_\_. The solutes involved are usually oxalate and phosphate salts. (orecipitate = a substance deposited in solid form from a solution)

**Note:** The following is from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). What is not listed is phosphoric acid (soda/pop) which depletes calcium and other minerals.

Calcium stones are caused by the combination of high urine calcium and alkaline urine, meaning the urine has a high pH. Uric acid stones form when the urine is persistently acidic. A diet rich in purines, substances found in animal protein, may increase uric acid in urine.

### **Dietary Changes to Help Prevent Kidney Stones**

Drinking enough fluids each day is the best way to help prevent most types of kidney stones. Health care providers recommend that a person drink 2 to 3 liters of fluid a day. People with cystine stones may need to drink even more. Though water is best, other fluids may also help prevent kidney stones, such as citrus drinks. Recommendations based on the specific type of kidney stone include the following:

- **Calcium Oxalate or Calcium Phosphate Stones**
  - reducing sodium
  - reducing animal protein, such as meat, eggs, and fish
  - getting enough calcium from food or taking calcium supplements with food
  
- **Uric Acid Stones**
  - reducing/limiting animal protein

## **Chapter 14**

75. The skin is the largest \_\_\_\_\_ in the body and there are two main layers the epidermis and the dermis.

76. The dermis is formed from connective tissue and the matrix contains \_\_\_\_\_ fibers interlaced with elastic fibers.

77. The structures in the dermis are blood and lymph vessels, \_\_\_\_\_ (somatic) nerve endings, sweat glands and ducts, hairs, arrector pili muscles and sebaceous glands.

78. The skin acts as a barrier against invasion by \_\_\_\_\_, chemicals, physical agents, and dehydration. The formation of vitamin D starts with 7-dehydrocholesterol, a lipid-based substance in the skin. Ultraviolet rays in sunlight convert it to vitamin D.

**Note:** "Vitamin D itself is biologically inactive, and it must be metabolized to its biologically active forms. After it is consumed in the diet or synthesized in the epidermis of skin, vitamin D enters the circulation and is transported to the liver. In the LIVER, vitamin D is hydroxylated to form 25-hydroxyvitamin D (calcidiol; 25-hydroxyvitamin D), the major circulating form of vitamin D. In the KIDNEY, the 25-hydroxyvitamin D3-1-hydroxylase enzyme catalyzes a second hydroxylation of 25-hydroxyvitamin D, resulting in the formation of 1,25-dihydroxyvitamin D (calcitriol, 1 $\alpha$ ,25-dihydroxyvitamin D), the most potent form of vitamin D. Most of the physiological effects of vitamin D in the body are related to the activity of 1,25-dihydroxyvitamin D." - Linus Pauling Institute 2016

79. The human papilloma virus (HPV) causes \_\_\_\_\_ or verrucas that are spread by direct contact.

80. Herpes viruses include herpes \_\_\_\_\_ virus (chickenpox and shingles), herpes simplex 1 (cold sores), herpes simplex 2 (genital herpes). Genital herpes cause genital warts that are spread by direct contact during sexual intercourse. Impetigo is a highly infectious condition commonly caused by *Staphylococcus aureus*.

81. Fungal infections of the skin include \_\_\_\_\_ and tinea pedis (athlete's foot).

**Note:** Tinea is a type of fungal infection of the hair, skin, or nails. Tinea is often called ringworm because it may look like tiny worms are under the skin (they're not!). Because the fungi that cause tinea (ringworm) live on different parts of the body, they are named for the part of the body they infect.

82. Dermatitis (eczema): Children, who may also suffer from hay fever or \_\_\_\_\_ are often affected.

"Sulfur baths, and other forms of sulfur applied to the skin, seem to help treat psoriasis, eczema, dandruff, folliculitis (infected hair follicles), warts, and pityriasis versicolor, a long-lasting skin disorder characterized by patches of skin that are a different color from the usual skin tone." - *University of Maryland Medical Center 2016*

## Chapter 15

83. Acute inflammation (short duration) has aspects that are hugely \_\_\_\_\_, promoting removal of the harmful agent and setting the scene for healing to follow.
84. Increased tissue fluid formation: Most of the excess tissue fluid drains away in the \_\_\_\_\_ vessels, and takes damaged tissue, dead and dying cells and toxins with it. The plasma proteins that escape into the tissues include \_\_\_\_\_, which combat infection, and fibrinogen, a clotting protein.
85. Phagocyte activity is promoted by the \_\_\_\_\_ temperatures (local and systemic) associated with inflammation. **Note:** A phagocyte is a type of immune cell within the body capable of engulfing and absorbing bacteria and other small cells and particles.
86. The increased temperature of inflamed tissues has the twin benefits of inhibiting the growth and division of \_\_\_\_\_, whilst promoting the activity of phagocytes. **Note:** Using drugs like Tylenol to lower a fever interferes with the body's ability to fight infection.
87. A population of lymphocytes, called \_\_\_\_\_(NK) cells, constantly patrol the body searching for abnormal cells. Cells that have been infected with a virus, or \_\_\_\_\_ cells that might become malignant, frequently display unusual markers on their cell membranes, which are recognized by NK cells.

**Note: T-cell is also called T-lymphocyte, B-cell is also called B-lymphocyte**

88. Lymphocytes make up 20-30% of circulating white blood cells but at any one time most of them are found in lymphatic and other tissues rather than in the bloodstream. T-cells and B-cells are responsible for immunity (specific defense) and are produced in the \_\_\_\_\_.
89. T-lymphocytes (T-cells) are processed by (matured in) the \_\_\_\_\_ gland. It is important to recognize that a mature T-lymphocyte has been programmed to recognize only one type of antigen. T-lymphocytes provide cell-mediated immunity.

**Note:** An antigen is any substance that causes your immune system to specifically produce antibodies or T-cells. An antigen may be a foreign substance from the environment, such as chemicals, bacteria, viruses, or pollen. An antigen may also be formed inside the body, as with bacterial toxins or tissue cells. The antibody or T-cell recognizes a small, unique part of the foreign target and the piece is called an antigen.

- B-lymphocytes mature in bone marrow and make antibodies to help fight infection.
- T-lymphocytes mature in the thymus and help B-lymphocytes make the antibodies that help fight infection.
- Natural killer cells attack cancer cells, viruses and cells showing stress from bacteria and toxins.

90. B-lymphocytes are both produced and processed in the bone marrow. They produce \_\_\_\_\_ (immunoglobulins), which are proteins designed to bind to, and destroy, an antigen. B-lymphocytes provide antibody-mediated immunity.

91. Suppressor T-cell act as “brakes”, turning off activated T and B-lymphocytes. This limits the \_\_\_\_\_ and potentially damaging effects of the immune response.

92. Memory B-cells: The fact that the body does not normally develop immunity to its own cells is due to the fine balance that exists between the immune reaction and its suppression. Autoimmune diseases are due to \_\_\_\_\_ of this balance.

**Note:** “Autoimmunity occurs when the immune system recognizes and attacks host tissue. In addition to genetic factors, environmental triggers (in particular viruses, bacteria and other infectious pathogens) are thought to play a major role in the development of autoimmune diseases.” - *Clin Exp Immunol*. 2009 Jan; 155(1): 1–15. *The role of infections in autoimmune disease*, A M Ercolini and S D Miller

## Chapter 16

93. Bone cells that are responsible for bone formation are called \_\_\_\_\_, they later mature into osteocytes. Osteoblast cells secrete both the organic and inorganic components of bone. Osteoclast are involved in resorption of bone to maintain the optimum shape.

**Note:** Bone development occurs in three general phases that coincide with age: growth, modeling or consolidation, and remodeling. The remodeling phase predominates during adulthood, with bone resorption and formation activities constantly occurring in linked succession (resorption refers to the breakdown of bone by osteoclasts, resulting in the release of calcium and phosphate (bone mineral) into the blood).

**Note:** The process of bone formation requires an adequate and constant supply of nutrients. Nutrients that are known to directly and indirectly effect bone structure are: Vitamins A, C, D, K, B6, B12, folic acid, and the minerals phosphorus, calcium, potassium, magnesium, fluoride (naturally occurring non-toxic fluoride in food), sodium, manganese, copper, boron, iron, and zinc. A daily supply of dietary protein is required for bone maintenance.

**Note:** “Data indicate that various protein sources may exhibit different effects on bone metabolism. Some, but not all, studies have found that meat as a protein source is associated with higher serum levels of IGF-1, which is in turn associated with increased bone mineralization and fewer fractures. Soy foods have been linked with lower levels of IGF-1.” -(American Society for Clinical Nutrition, 2015)

94. Joints allow \_\_\_\_\_ and movement of the skeleton and allow attachment between bones. There are three types of joints: fibrous, cartilaginous, synovial.
95. \_\_\_\_\_ joints allow a limited amount of movement and stabilizes the alignment of the bones.
96. Cartilaginous joints are formed by a pad of fibrocartilage, a tough material that acts as a \_\_\_\_\_ absorber.
97. Synovial joints are characterized by the presence of a \_\_\_\_\_ or capsule between the articulating bones.
98. Synovial fluid nourishes the structures within the joint cavity, contains phagocytes, acts as a \_\_\_\_\_, maintains joint stability, and prevents the ends of bones from being separated.

## Chapter 17

Almost every cell in the body contains the DNA (blue prints) so it may produce a new, exact copy of itself (replication). Some cells constantly divide, like those in your hair and fingernails and bone marrow cells. Other cells go through several rounds of cell division and stop (including specialized cells, like those in your brain, muscle, and heart). Finally, some cells stop dividing, but can be induced to divide to repair injury (liver). In cells that do not constantly divide, the cues for DNA replication/cell division come in the form of chemicals. These chemicals can come from other parts of the body (hormones) or from the environment. - Craig Freudenrich, Ph.D.

“There are two kinds of cell division: mitosis and meiosis. Mitosis is essentially a duplication process: It produces two genetically identical "daughter" cells from a single "parent" cell. You grew from a single embryonic cell to the person you are now through mitosis. Even after you are grown, mitosis replaces cells lost through everyday wear and tear. The constant replenishment of your skin cells, for example, occurs through mitosis. Mitosis takes place in cells in all parts of your body, keeping your tissues and organs in good working order. Meiosis, on the other hand, is quite different. It shuffles the genetic deck, generating daughter cells that are distinct from one another and from the original parent cell. Although virtually all of your cells can undergo mitosis, only a few special cells are capable of meiosis: those that will become eggs in females and sperm in males. So, basically, mitosis is for growth and maintenance, while meiosis is for sexual reproduction.

Mitosis creates cells and apoptosis kills them. Although these processes oppose one another, they often work together to keep us healthy. For example, our skin and hair cells are renewed via a continuous cycle of apoptosis and mitosis. So are the cells lining our intestines. Because new cells replace old, worn-out ones, our tissues remain healthy.” (<http://publications.nigms.nih.gov/insidethecell/chapter5.html>)

99. Mutation means an \_\_\_\_\_ alteration in the normal genetic make-up of a cell (the blue print has been changed). Some mutations are by chance (mistake in copying or reading the DNA) and some are caused by external factors such as X-rays, ultraviolet light or exposure to certain chemicals.

## Chapter 18

100. *Chlamydia trachomatis* causes inflammation of the female cervix. Infection may ascend through the reproductive tract and cause pelvic inflammatory disease. The same organism causes trachoma, an eye infection that is the primary cause of \_\_\_\_\_ worldwide.

101. \_\_\_\_\_ vaginalis is a protozoa that causes acute vulvovaginitis with irritating, offensive discharge.

102. The yeast *Candida albicans* is frequently a commensal in the normal vagina and causes no problems. It is normally prevented from flourishing by vaginal \_\_\_\_\_, but in certain circumstances it proliferates, causing candidiasis (thrush). It is actually a yeast- like fungus.

“The cells that normally keep candida in check-the NK and puffer cells, which can kill a yeast cell in 1/100th of a second, are overwhelmed, and the candida then takes over. It proliferates in the gut, penetrates the intestinal wall and is carried by the circulatory system throughout the body. **At this point, the candida becomes systemic: it infects organ and muscle tissues and compromises the entire immune system.** Once the immune

system is compromised, it may no longer be able to sufficiently repel invaders. This can result in **allergies to chemicals, pollens and foods**. Also, it is believed that **toxins from candida cells and protein molecules develop an antigen/antibody reaction, which can cause even more allergic reactions**. Interestingly, immune deficiencies can be either caused by candida as well as result in candida.” Rick Wagner, C.N., M.S.

“Candida albicans is one of the most important opportunistic pathogenic fungi. Weakening of the defense mechanisms of the host, and the ability of the microorganism to adapt to the environment prevailing in the host tissues, turn the fungus from a rather harmless saprophyte into an **aggressive pathogen**. The disease, candidiasis, ranges from light superficial infections to deep processes that endanger the life of the patient. In the establishment of the pathogenic process, the cell wall of C. albicans (as in other pathogenic fungi) plays an important role. It is the outer structure that protects the fungus from the host defense mechanisms and initiates the direct contact with the host cells by adhering to their surface. The wall also contains important antigens and other compounds that affect the homeostatic equilibrium of the host in favor of the parasite...” - <http://www.ncbi.nlm.nih.gov/pubmed/16423067>

103. Endometriosis is the growth of endometrial tissue \_\_\_\_\_ the uterus, usually in the ovaries, uterine tubes and other pelvic structures. The ectopic tissue, like the uterine endometrium, responds to fluctuations in sex hormone levels during the menstrual cycle.....

**Note:** Progestins are a group of drugs (synthetic hormones) that behave like the female hormone progesterone. They have been used since the mid 1950s to treat the symptoms of endometriosis. Synthetic progesterone (progestins) increases breast cancer risk. The use of natural progesterone does not increase breast cancer risk.

**END OF TEST (PART THREE)**