

Extra Credit Critical Thinking Questions (for any Anatomy &/or Physiology class)

Most of the following questions are designed to go a little beyond the specific knowledge you are actually accountable for in this class. You may have to search for additional information to answer some of them. There are textbooks in the library or a number of resources on the web that you can use to find answers to questions not discussed in your text. A few will require only a sentence or two, most will require some elaboration and explanation. On your answer sheet please include subject titles. Use the actual **number** given below for each question, you do not need to write out the question you are answering. The correct answer to each question is worth one point. Any points you receive from answering these questions will contribute toward your total EC points possible. Extra Credit answers are due on the test date covering those topics, they will not be accepted after that. Copying answers from a classmate will get both of you an "F" in the course.

The Human Body, an Orientation

3. Diabetes is a disorder in which the pancreas (an organ) fails to produce insulin (a chemical) that is normally made by the pancreas and released into circulation. List as many levels of organization as you can in which this disorder could be corrected.
10. One of the classic lines of evidence for evolution is vestigial organs. Darwin said it makes no sense that humans would have such structures were it not for the fact that we came from nonhuman ancestors in which they had a significant function. These structures are the reduced remnants of organs that apparently were more functional in our ancestors and now serve little or no purpose or have been converted to new functions in modern humans. Make a list of organs or structures considered vestigial in humans, list their former functions in our distant ancestors and their current function, if any, in modern humans.

Basic Chemistry & Biochemistry

3. Based on your own body weight, how much of each of the following elements do you have in your body IN GRAMS!!!
Oxygen
Carbon
Calcium
Sodium
Iodine
Iron
Show your work.
8. **Kartagener Syndrome** is a hereditary disease in which the protein dynein is missing from cilia and flagella. How do you think this would affect a man's ability to father a child? How might it affect his respiratory health? What other organs of the body might this disease affect and why?

Cells and Tissues

1. A "red-hot" bacterial infection of the intestinal tract irritates the intestinal cells and interferes with digestion. Such a condition is often accompanied by diarrhea, which causes loss of body water. On the basis of what you have learned about osmotic water flows, explain why diarrhea may occur.
3. Solutions A and B are separated by a selectively permeable membrane. Over time the fluid level inside A increases. Which solution initially had the higher concentration of solute? Which had the higher concentration of water? Explain.

Skin and Body Membranes

3. What does sunlight do to promote bone maintenance and growth?
8. What kind of substances could pass easily through the skin by diffusion? What kinds would have difficulty?

The Skeletal System

4. While working at an excavation, an archaeologist finds several small skull bones. She examines the frontal, parietal, and occipital bones and concludes that the skulls are those of children not yet 1 year old. How can she tell their ages from examining just these few bones?
6. When a person develops Paget's disease, for unknown reasons the collagen fibers in the bone matrix run randomly in all directions. In addition, there is a reduction in the amount of trabecular bone. What symptoms would you expect to observe and why?

The Muscular System

4. Frieda was involved in an automobile accident in which her car was "rear-ended", resulting in a whiplash injury. What neck muscles would be injured in this type of accident and why?
9. Many potent insecticides contain toxins, called organophosphates, that interfere with the action of the enzyme acetylcholinesterase. Ivan is using such an insecticide carelessly, without gloves or dust mask. He absorbs some of the chemical through his skin and inhales it as well. What symptoms would you expect to observe in Ivan as a result of his "self-poisoning".

The Nervous System

3. If neurons in the CNS lack centrioles and are unable to divide, how can a person develop brain cancer?
18. A 32-year old woman complains that she has been experiencing aching pains in the medial two fingers of both hands and that, during such episodes, the fingers become blanched and then blue. Her history is taken, and it is noted that she is a heavy smoker. The physician advises her that she must stop smoking and states that he will not prescribe any medication until she has discontinued smoking for a month. What is this woman's problem, and why was she told to stop smoking?

Special Senses

2. Janie is referred to the eye clinic by her teacher, who suspects a need for glasses. Examination demonstrates that Janie is myopic. Will she need concave or convex lenses? Explain.
4. Sally, a 9-year-old girl, told the clinic physician that her "ear lump hurt" and she kept "getting dizzy and falling down." As she told her story, she pointed to her mastoid process. An otoscopic examination of the external auditory canal revealed a red, swollen eardrum, and her throat was inflamed. Her condition was described as mastoiditis with secondary labyrinthitis (inflammation of

the labyrinth). Describe the most likely route of infection and the infected structures in Sally's case. Also, explain the cause of her dizziness and falling.

The Endocrine System

22. In some cultures eunuchs were responsible for guarding harems (the collective wives of one male). Eunuchs were males who, as boys, were castrated, (i.e., the testes, were removed). Since testosterone is responsible for the sex drive in males, the reason for castration is obvious. As a side effect of this procedure, the eunuchs grew to greater than normal heights. Can you explain why this happened?
24. A 12 year old female has an adrenal tumor that produces large amounts of estrogen. If untreated, what effect would this have on her growth for the next 6 months? On her height when she is 18?

The Circulatory System

10. Heart rate and cardiac output were measured in a group of nonathletic students. After two months of aerobic exercise training their measurements were repeated. It was found that heart rate had decreased, but cardiac output remained the same for many activities. Explain these findings.
11. Explain why atrial fibrillation will not cause death (at least not immediately) but ventricular fibrillation will.

Blood & Hematology

4. According to the old saying, "Good food makes good blood." Name three substances in the diet that are **essential** for "good blood." What blood disorders develop if these substances are absent from the diet?
6. Explain, specifically, how liver dysfunction can cause bleeding disorders.

The Lymphatic System

1. Compare and contrast the structure of a lymphatic capillary with that of a blood capillary. Explain how their structural differences are related to their functional differences.
3. Explain the symptoms that might arise if lymphatic vessels in the legs become blocked. What might cause such a condition?

Body Defenses

4. Antihistamines block the effect of a chemical called histamine, that is released during the inflammatory response. After studying the specific effects of histamine, describe the effects that an antihistamine would have on the inflammatory response, and whether these effects would be beneficial or not.
8. Suppose a new virus emerged that selectively destroyed memory T cells and memory B cells. What would be the pathological effects of such a virus?

The Respiratory System

10. In what ways do the structure and function of the pleurae resemble the structure and function of the pericardium?
12. In a certain criminal investigation, the pathologist performing an autopsy on an infant removes the lungs, places them in a pail of water and concludes that the infant was live-born. What do you think the pathologist saw that led to this conclusion? What contrasting observation would suggest that an infant had been stillborn?

The Digestive System

3. Why, specifically, does a vegetarian usually have to be more careful about his/her diet than a person who eats meat?
5. Sometimes a gallstone can move to the pancreatic duct and block or impair the flow of pancreatic juices, thus causing pancreatitis. What symptoms would you expect to see if this occurred?

Nutrition, Metabolism, and Body Temperature Regulation

3. What is meant by "body energy balance" and what happens if the balance is not precise?
4. Explain how the following factors affect metabolic rate: thyroxine levels, eating, body surface area, muscular exercise, emotional stress, starvation

The Urinary System

2. In some patients with diabetes mellitus not enough insulin is produced, consequently, blood glucose levels increase. If blood glucose levels rise high enough, the kidneys are unable to reabsorb all the glucose that filters out and glucose "spills over" into the urine. What effect would this have on urine concentration and volume? How would the body attempt to adjust to this?
1. Explain how emphysema and congestive heart failure can lead to acid-base imbalances.

The Reproductive System

4. A new mother tells you that when she nurses her baby, she feels as if she is having menstrual cramps. How would you explain this phenomenon?
5. Women bodybuilders and women with eating disorders such as anorexia nervosa commonly experience amenorrhea. What does this fact suggest about the relation between body fat and menstruation? What might be the benefit of amenorrhea under such circumstances?

Human Development

1. *Oligohydramnios* is an abnormally low volume of amniotic fluid. Renal agenesis is a failure of the fetal kidneys to develop. Which of these do you think is most likely to cause the other? Explain why. What could be some consequences of oligohydramnios to fetal development?

2. Martha is showing a sonogram of her unborn baby to her coworkers. Her friend Betty tells her she shouldn't have sonograms made because X-rays can cause birth defects. Is Betty's concern justified? Explain.