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QUESTION 1

The primary seat of tubercular infection is generally in the upper part of the lung. The invading organisms settle on the surface here and cause a multiplication of the cells and an inflammatory exudate in a small area. With the continuous growth of the bacilli in the localized region, adjoining areas of the lung become affected, and there is further extension into the immediate vicinity by means of the lymphatics. Small nodules form and then coalesce to create a larger area. The body primarily defends itself with the formation of dense masses of cicatricial tissue, which function to wall off the affected area. This results in unfavorable growth conditions for the bacilli. This mode of defense, combined with the production of substances antagonistic to the toxins produced by the bacilli, is so efficacious that in the great majority of cases no further extension of the process takes place. In certain cases, however, the growth of the bacilli in the focus area is unchecked, then the surrounding tissue is killed and converted into a soft semi-fluid material; further extension then takes place. All parts of the enormous surface of the lungs are connected by a system of air tubes or bronchi, and as a result, the bacilli have favorable opportunity for distribution. This opportunity is facilitated by sudden movements of the air currents in the lung produced by coughing. The body's defense; however, can still keep pace with the attack, and even in an advanced stage, the infection can sometimes be permanently checked; in other cases, the check is temporary, the process of softening continues, and large cavities are produced by the destruction of the tissue. On the inner surface of these cavities there may be a rapid growth of bacilli. From the lungs, the bacilli are carried by the lymphatics to the lymph nodes at the root of the lungs, in which a similar process takes place; this, on the whole, is favorable, because further extension by this route is for a time blocked. The extension across surfaces continues and the abundant sputum, which is formed in the lungs and contains large numbers of bacilli, becomes the vehicle of transportation. The windpipe and larynx may become infected, as the back parts of each are more closely in contact with the sputum and are the parts most generally infected. A large part of the sputum is swallowed and infection of the intestine takes place with the lesions taking the form of large ulcers. From the intestinal ulcers there is further extension by means of the lymphatics to the large lymph nodes in the back of the abdominal cavity.

Which description best characterizes the tone of this passage?

- A. Subjective and biased
- B. Objective and unbiased
- C. Scientific and caring
- D. Clinical and respectful

Correct Answer: B

The author treats the subject in a matter-of-fact and scientific manner absent of both opinion and emotion. The absence of an emotional response eliminates answer choices [Subjective and biased] and [Scientific and caring], and while the treatment of the subject can be described as clinical, describing it as respectful is awkward.

QUESTION 2

When blood flow to human tissue is interrupted, the lack of sufficient blood supply is called ischemia. If ischemia is not restored quickly, the affected tissue may undergo a process called infarction, which involves a series of chemical changes that damage the tissue. The lack of blood supply results in lack of oxygen, and thus lactic acidosis. Mitochondrial dysfunction results. Microscopic examination and chemical analysis of ischemic cells reveal membrane degeneration, excessive calcium (Ca⁺) inside the cell, and free radical formation, accompanied by a reactive inflammation and free fatty acid formation. A research experiment is designed to evaluate the response of infarcted tissue to intra-arterial administration of an antioxidant. Preliminary results demonstrate that follow-up evaluation of tissue exposed to intra-arterial antioxidant injection resulted, on average, in a smaller area of infarcted tissue after seven days when compared to controls without exposure to the antioxidant. It was noted that 70% of the patients who demonstrated smaller areas of infarction also had a notable decrease in edema of the ischemic tissue lasting about 6 to 10 hours after

injection.

How could lactic acid production and free fatty acid formation contribute to organelle dysfunction?

- A. The acidity of these molecular products, when uncorrected, alters the cell's pH beyond that which the cell can compensate for. Organelles, containing proteins, denature as a result.
- B. Lactic acid production and free fatty acid formation function like free radicals, altering the structure of the molecular components of the organelles.
- C. Lactic acids and free fatty acids crowd the organelles within the cells, preventing them from communicating with each other in the cytoplasm.
- D. Lactic acids and free fatty acids are hydrophobic and thus can enter the membranes of the organelles, disrupting their function.

Correct Answer: A

In small quantities, lactic acids and free fatty acids are tolerable due to the cell's ability to buffer mild pH changes. However, in an ischemic setting, the cell cannot correct the pH changes, and thus the proteins that form the structural and functional components of the organelles begin to denature. Lactic acids and free fatty acids are acidic, meaning that they contribute hydrogen atoms to the environment, whereas free radicals are deficient in electrons. Although the volume of acidic molecules within the cell is not beneficial for the organelles, their pH is their most harmful characteristic and thus the most immediately damaging consequence. Free fatty acids are hydrophobic and thus may be able to pass through organelle membranes, but they cause organelle dysfunction from outside the organelle in the cytoplasm as well.

QUESTION 3

Which of the following nitrogen bases is present in RNA but absent in DNA?

- A. Cytosine
- B. Uracil
- C. Guanine
- D. Adenine

Correct Answer: B

RNA consists of ribose pentose sugar. Unlike DNA, it consists of only one polynucleotide chain. It also contains two purine and pyrimidine bases. Uracil (U) is the nitrogen base which is present in RNA but absent in DNA. Thus, RNA contains Adenine (A) and Guanine (G) as purine bases, and Cytosine (C) and Uracil (U) as pyrimidine bases.

QUESTION 4

PLASTICS

Plastics have long been considered one of the great conveniences of the modern era, but evidence is mounting to indicate that these conveniences have come at an incredible cost. The chief benefit of plastics is their durability, but this benefit turns out to be the same reason plastic has become a significant problem: It takes 200 to 400 years to decompose. All of this plastic has accumulated into a catastrophic mess and has also caused disease in humans.

Between Hawaii and Japan, a giant mass of plastic twice the size of Texas slowly swirls with the currents of the Pacific Ocean. This area has come to be known as the Great Pacific Garbage Patch, and its effects on the ecology of the ocean are unimaginable. According to United Nations researchers, a hundred thousand sea mammals and a million seabirds die each year. They are found with cigarette lighters, syringes, and other plastics that they mistake for food in their stomachs.

Evidence also indicates that the plastic receptacles that people store their food in poses health risks. For instance, phthalates have been shown to have detrimental effects on the reproductive system, yet they are found in many plastic products including baby bottles and water bottles. They have also been linked to various forms of cancer. Additionally, a chemical called bisphenol A that is found in many plastics can mimic the effects of the hormone estrogen, which can also affect the reproductive system.

Which of the following statements can be inferred from paragraph two?

- A. No one has determined why sea mammals and seabirds are dying at an alarming rate.
- B. The Great Pacific Garbage Patch is not a significant threat to humans.
- C. The Great Pacific Garbage Patch is too large to be cleaned up by one country.
- D. Ocean currents carry the plastic to the middle of the ocean.

Correct Answer: D

QUESTION 5

Since 1997, the American Heart Association (AHA) has attempted to increase awareness about cardiovascular disease (CVD) among women. Fortunately, great progress has been made to educate individuals about CVD and its consequences. According to the AHA's 2011 Guidelines for Prevention of Cardiovascular Disease in Women, the misconception that CVD is a "man's disease" has been somewhat disproved, as awareness among the general public increased from 30% in 1997 to 54% in 2009. Unfortunately, CVD continues to be the leading cause of death in the United States for both men and women. Since 1984, the number of deaths related to CVD in women exceeded those in men. In the United States, CVD death rates among women aged 35 to 54 years appear to be increasing by 1% annually, which is most likely attributable to the escalating obesity epidemic. According to the AHA, even though CVD is the number 1 cause of death among women, only 13% of women perceive CVD as a health threat. CVD is responsible for more deaths among women than the next 3 leading causes of death combined, including all forms of cancer. Due to the ongoing prevalence of CVD, increasing awareness and understanding of CVD, especially among the female population, is still a top priority for many health care professionals. As one of the most accessible health care professionals, pharmacists are in a pivotal position to educate and inform their patients of the risks associated with CVD, possible drug therapies, and preventive measures. The AHA has set a goal for 2020 to improve cardiovascular health in all Americans by 20%, while reducing deaths from CVD and stroke by 20%. According to the American Heart Association, in the United States a woman dies of some form of CVD every minute and more than 1 in 3 females have some form of CVD. Studies have demonstrated that gender differences may play an important role in the diagnosis, treatment, and prevention of CVD. Unfortunately, many women may not always recognize the warning signs and symptoms of a heart attack because they sometimes appear more subtle when compared with those typically experienced by men. Results from a study of 515 women who had heart attacks report that 43% did not experience any type of chest pain or pressure during the heart attack. Although the classic symptoms include chest pain, tingling in the left arm, sweating, and shortness of breath, women may also experience some "atypical" symptoms, such as extreme fatigue, nausea, dizziness, indigestion, vomiting, and pain in the neck or back. By learning and recognizing the warning signs, women can take a proactive approach to their cardiovascular health and get treatment earlier to prevent further complications.

In context, the word "pivotal" in paragraph 3 most nearly means

- A. determining

B. crucial

C. important

D. central

Correct Answer: D

The author describes pharmacists as being in a pivotal position to educate and inform patients of the risks associated with CVD due to their accessibility. While pharmacists are certainly important in transmitting this information, because of their accessibility, they are crucial, or central, to raising awareness of CVD.

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