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# Medical Laboratory NYMLT

ASCP NY Medical Laboratory Technician (NYMLT)

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## Question: 1

What is the most frequent symptom of parasitic disease?

- A. meningitis
- B. bloating
- C. anemia
- D. diarrhea

**Answer: D**

Explanation:

Diarrhea is the most common symptom of a parasitic infection. It typically manifests as frequent, loose, or watery stools, often accompanied by abdominal cramping. This symptom arises because many parasites, particularly those that infect the gastrointestinal tract, disrupt the normal function of the digestive system. The parasites interfere with nutrient absorption, cause inflammation of the intestinal lining, or directly damage the cells of the intestine.

While diarrhea is the most frequent symptom, the clinical presentation of parasitic diseases can vary significantly depending on the type of parasite involved. For example, protozoa like *Giardia lamblia* may cause mild to severe diarrhea and bloating, while helminths (worms) such as tapeworms might lead to anemia and weight loss due to nutrient depletion.

In addition to gastrointestinal symptoms, parasitic infections can also lead to systemic symptoms. These may include fever, chills, and general malaise, reflecting the body's immune response to the infection. In some severe cases, parasites can cause organ damage, leading to more specific symptoms such as jaundice (from liver involvement), coughing or difficulty breathing (from lung involvement), or neurological symptoms (from brain involvement).

Other possible symptoms, depending on the specific parasite and the organs affected, can include intestinal obstruction, ulcers, lesions, abscesses, bleeding, and anemia. These complications can arise from either the physical presence of the parasites themselves or the immune response they provoke. Understanding the wide range of potential symptoms is critical for accurate diagnosis and effective treatment. Medical professionals typically use a combination of clinical evaluation, laboratory tests, and sometimes imaging studies to diagnose parasitic infections and to determine the most appropriate treatment, which may include antiparasitic medications, supportive care, and sometimes surgical intervention.

## Question: 2

In crossmatching, if blood does not stick together when an anti-Rh serum is added to it, then the blood is what?

- A. Rh Positive.
- B. Rh Negative.

- C. Rh Neutral.
- D. Rh Positive and Negative.

**Answer: B**

Explanation:

Crossmatching is a crucial part of pre-transfusion testing that ensures compatibility between donor blood and the blood of the recipient. It helps to prevent adverse reactions during or after a blood transfusion. One of the key components of crossmatching is blood typing, which includes determining the Rh factor of the blood.

The Rh factor is a specific antigen present on the surface of red blood cells. People are classified as Rh positive if they have this antigen and Rh negative if they do not. During the crossmatching process, an anti-Rh serum, which contains antibodies against the Rh antigen, is mixed with a sample of the recipient's blood. The reaction of the blood to this serum is critical for determining the Rh status. If the blood cells agglutinate, or stick together, when the anti-Rh serum is added, it indicates that the Rh antigen is present on the cells, classifying the blood as Rh positive. Conversely, if there is no agglutination, this means the Rh antigen is absent, and the blood is classified as Rh negative. Thus, when the question states that the blood does not stick together upon the addition of anti-Rh serum, it means that the blood lacks the Rh antigen, and therefore, it is Rh negative. This information is vital for ensuring that the blood transfused is compatible with the recipient's blood type, particularly in avoiding Rh incompatibility, which can lead to serious complications such as hemolytic reactions.

### Question: 3

When performing a phlebotomy procedure on a patient which of the following should NOT be done?

- A. identify the patient by wrist or arm band
- B. choose a venipuncture site
- C. use tourniquet and leave on for at least two minutes
- D. use 20 – 21 gauge needles

**Answer: C**

Explanation:

When performing a phlebotomy procedure, several practices ensure the safety and efficacy of the blood draw. Among the common practices, identifying the patient by wrist or arm band, choosing a suitable venipuncture site, and using appropriately sized needles (such as 20 – 21 gauge) are all considered standard and appropriate. However, there are certain practices that should not be done to avoid compromising the patient's health and the accuracy of test results. One such practice is leaving the tourniquet on for an extended period.

Using a tourniquet during phlebotomy is a common technique to help the phlebotomist locate the veins by causing the veins to become more prominent as blood pools in the area. However, it is crucial that the tourniquet is not left on the patient's arm for more than one minute. The primary concern with extended tourniquet application (i.e., over one minute) is the risk of hemoconcentration and changes in blood flow dynamics. This prolonged restriction can lead to accumulation of certain blood components

in the vein segment below the tourniquet, potentially altering the concentrations of enzymes, proteins, lipids, and other substances.

Hemoconcentration resulting from extended tourniquet application can significantly affect laboratory results. For example, levels of cellular components (like red blood cells, white blood cells, and platelets) and plasma proteins may appear falsely elevated, leading to misinterpretation of the patient's health status. This can result in incorrect diagnoses or unnecessary further testing. Additionally, prolonged tourniquet application can cause patient discomfort or even tissue damage in more severe cases. Therefore, when the question asks which of the following should NOT be done during a phlebotomy procedure, the correct answer is: "use tourniquet and leave on for at least two minutes." Proper phlebotomy technique mandates that the tourniquet should be released as soon as venous blood flow is established and certainly no longer than one minute after its application to avoid any adverse effects on the patient or the validity of the blood test results.

### Question: 4

Which of the following diseases is characterized by infiltration of lymphocytes and plasma cells into the liver?

- A. primary biliary cirrhosis
- B. autoimmune chronic hepatitis (AI-CAH)
- C. Graves disease
- D. Hashimoto's disease

**Answer: B**

Explanation:

Autoimmune chronic hepatitis (AI-CAH) is a progressive inflammatory liver disease marked by the infiltration of lymphocytes and plasma cells into the liver. This infiltration leads to liver damage and, over time, can cause severe liver dysfunction and cirrhosis.

In autoimmune chronic hepatitis, the body's immune system attacks liver cells, believing them to be harmful invaders. This autoimmune response is primarily mediated by T cells, a type of white blood cell that normally helps protect the body against infections and cancers. In AI-CAH, however, these T cells attack the liver cells, causing inflammation and damage.

The disease is characterized by several immunological markers, including the presence of autoantibodies such as antinuclear antibodies (ANA) and smooth muscle antibodies (SMA). The diagnosis of AI-CAH often involves detecting these antibodies in the blood, along with elevated liver enzyme levels, which indicate liver inflammation.

Histologically, the liver of a person with AI-CAH shows a characteristic pattern of inflammation, primarily around the liver's portal areas. These areas contain infiltrates made up predominantly of lymphocytes and plasma cells. Over time, if untreated, this persistent inflammation leads to the destruction of the liver architecture, progressing to fibrosis and eventually cirrhosis.

Treatment of AI-CAH typically involves immunosuppressive medications to reduce liver inflammation and slow the progression of the disease. Corticosteroids, such as prednisone, are commonly used, often in combination with other immunosuppressants like azathioprine. The goal of treatment is to induce remission and prevent long-term complications, including liver failure and the need for liver transplantation.

In contrast, other conditions listed, such as primary biliary cirrhosis, Graves' disease, and Hashimoto's disease, involve different mechanisms and areas of autoimmune attack. Primary biliary cirrhosis primarily affects the bile ducts within the liver, while Graves' disease and Hashimoto's disease target the thyroid gland, manifesting in different symptoms and requiring distinct treatments from AI-CAH.

### Question: 5

The process of multiple progressive dilutions ranging from more-concentrated solutions to less-concentrated solutions is called:

- A. simple dilution
- B. complex dilution
- C. serial dilution
- D. hydrating dilution

**Answer: C**

Explanation:

The correct answer to the question is "serial dilution." Serial dilution is a method commonly used in laboratories to create a series of solutions with decreasing concentrations from a more concentrated starting solution. This process involves diluting a fixed amount of the original solution stepwise into a new diluent multiple times. Each step typically involves taking a measured volume of the solution from the previous dilution and mixing it with a fresh portion of solvent, maintaining a consistent dilution factor at each step.

Serial dilutions are particularly valuable in scientific experiments where precise and small concentrations of a solution are required. This method ensures that the dilution is manageable and accurate, especially when working with very potent substances where even tiny variations in concentration can significantly impact the results.

One common application of serial dilutions is in microbiology, where they are used to estimate the concentration of microorganisms, such as bacteria or viruses, in a sample. By diluting the sample and then culturing it on a growth medium, scientists can count the number of colonies that form, which reflects the original concentration of microbes in the sample.

Another important use of serial dilutions is in the field of chemistry for reaction rate studies. By preparing solutions of different concentrations through serial dilution, researchers can study how changes in reactant concentration affect the rate of a chemical reaction. This is crucial for understanding reaction kinetics and mechanisms.

Serial dilutions are also essential in pharmaceutical applications, particularly in drug development and testing. They allow for the preparation of drug solutions at various concentration levels to study dose-response relationships and therapeutic thresholds.

In summary, serial dilution is a fundamental technique in various scientific disciplines that involves progressively diluting a substance to achieve a range of concentrations. This method is critical for experiments requiring precise concentration measurements and is helpful when the volume of the original solution or the diluent is limited.

### Question: 6

Which of the following would NOT be part of the color and clarity procedure for examining urine?

- A. Use a well-mixed specimen.
- B. View through a clear container.
- C. Maintain adequate room lighting.
- D. View against a dark background.

**Answer: D**

Explanation:

When examining the color and clarity of urine as part of a urinalysis, specific procedures must be followed to ensure accuracy and precision in the results. One of the essential steps in this process is the background against which the urine sample is viewed. It is recommended that urine samples be viewed against a white background. This practice helps in accurately assessing the true color of the urine and detecting any turbidity or particles present in the sample. A white background provides a neutral and consistent contrast that highlights the appearance and color without any distortion.

Viewing urine against a dark background, however, is not recommended. This method can lead to misinterpretations of the sample's color and clarity. A dark background may mask certain colors and subtle changes in the transparency of the urine. Such an environment can make it challenging to detect slight differences in the hue, which can be crucial for diagnosing various conditions. For example, pale or clear urine might look darker against a dark surface, and similarly, any sediment or cloudiness could be less noticeable, potentially leading to an inaccurate clinical assessment.

Furthermore, other factors that should be considered during the color and clarity evaluation include using a well-mixed specimen to ensure that any components are evenly distributed throughout the sample. Also, viewing the sample through a clear container is crucial as any coloration or opacity in the container itself could alter the appearance of the urine. Lastly, maintaining adequate room lighting is essential as poor lighting can affect the visibility of the urine's true color and clarity.

In summary, for an accurate evaluation of urine's color and clarity, it is imperative to view the sample against a white background. This practice, along with ensuring proper mixing, clear containers, and good lighting, forms the basis of a precise and reliable urinalysis. Viewing against a dark background is not advisable as it can lead to potential misinterpretation of the urine's characteristics, thereby affecting the overall diagnostic process.

### Question: 7

Of the following, which is NOT a specie of *Mycobacterium nonchromogenicum/terrae* clade?

- A. *M. gastri*.
- B. *M. terrae*.
- C. *M. triviale*.
- D. *M. hiberniae*.

**Answer: A**

Explanation:

The question asks which listed species is not part of the *Mycobacterium nonchromogenicum/terrae* clade. To answer this, it is essential to understand the classification of *Mycobacterium* species based on their genetic and phenotypic characteristics. The *Mycobacterium* genus includes various species known to cause diseases in humans and animals, and they are grouped into clades or complexes based on similarities.

The *Mycobacterium nonchromogenicum/terrae* clade is known for species that typically do not produce pigments when cultured in the laboratory (hence "nonchromogenic"). This clade includes several species such as *Mycobacterium nonchromogenicum* and *Mycobacterium terrae*, which are often isolated from environmental sources like soil and water.

In contrast, *Mycobacterium kansasii*, which belongs to a different clade, is a distinct species known for causing pulmonary diseases similar to tuberculosis and can produce a yellow pigment when cultured in the presence of light. The species *M. gastri*, mentioned in the question, is a part of the *Mycobacterium kansasii* clade.

Therefore, *M. gastri*, being a species in the *Mycobacterium kansasii* clade, is not a part of the *Mycobacterium nonchromogenicum/terrae* clade. The other species listed - *M. nonchromogenicum*, *M. terrae*, *M. triviale*, and *M. hiberniae* - are correctly grouped under the *Mycobacterium nonchromogenicum/terrae* clade. Thus, *M. gastri* is the correct answer as it is not a species of the *Mycobacterium nonchromogenicum/terrae* clade.

### Question: 8

Which of the following is NOT a general characteristic of erythrocytes?

- A. They transport oxygen.
- B. Loss of nucleus is required for function.
- C. There is only one cell line population.
- D. They have a 30 day life span.

**Answer: D**

Explanation:

The question asks to identify which statement is NOT a general characteristic of erythrocytes.

Erythrocytes, or red blood cells, have several key features essential to their function in the human body.

The correct answer to the question is "They have a 30 day life span." This statement is incorrect as erythrocytes typically have a lifespan of about 120 days, not 30 days.

Understanding the lifespan of erythrocytes is important because it impacts how often the body needs to produce new red blood cells to replace the old ones and maintain adequate oxygen transport. The bone marrow constantly produces new erythrocytes to replace those that are aged or damaged. This cycle is vital for maintaining healthy levels of red blood cells and, by extension, for the effective transport of oxygen to various parts of the body.

Other statements listed as options in the question reflect true characteristics of erythrocytes. For example, erythrocytes are primarily responsible for the transport of oxygen, which they achieve by carrying hemoglobin. Hemoglobin binds oxygen in the lungs and releases it in other tissues, a critical function for cellular respiration and energy production. Additionally, erythrocytes are unique in that they do not have a nucleus when mature. This adaptation allows more room for hemoglobin, thereby increasing the cell's capacity to transport oxygen.

As for the statement about there being only one cell line population, it likely refers to the uniformity in the type of cells erythrocytes are, all primarily tasked with oxygen transport, though the phrasing could be clearer. In summary, the correct answer, "They have a 30 day life span," is not a characteristic of erythrocytes, as their actual lifespan is approximately four times longer, around 120 days.

### Question: 9

All of the following statements are true in regard to primary hemostasis except:

- A. It starts when platelets come in contact with exposed collagen, microfilaments and the basement membrane of endothelial tissue.
- B. Small blood vessels constrict allowing platelets to adhere to exposed tissue causing ADP/ATP and thromboxan A2 to be released
- C. It results in the formation of a fibrin clot in association with the intrinsic and extrinsic coagulation pathways.
- D. Platelets begin to aggregate, which causes the release of ADP, ATP and serotonin.

**Answer: C**

Explanation:

Hemostasis is the process by which the body stops bleeding at the site of an injury and involves a series of steps that can be divided into primary hemostasis and secondary hemostasis. Each of these phases plays a critical role in the overall process of clot formation and stabilization.

Primary hemostasis begins immediately after an injury to the blood vessel. When the endothelial lining of a blood vessel is damaged, the underlying collagen and other subendothelial elements are exposed. This exposure is critical in initiating primary hemostasis. Platelets in the blood stream recognize and bind to these exposed surfaces, particularly to collagen, via specific receptors on their surface such as the glycoprotein Ib-IX-V complex that binds to von Willebrand factor which is adhered to the collagen. Following the initial adhesion, platelets become activated and undergo a change in shape, which increases their surface area and facilitates further recruitment of additional platelets. During this activation, platelets release the contents of their granules, which include adenosine diphosphate (ADP), thromboxane A2, and serotonin. These substances are potent mediators that enhance further platelet aggregation and activation. This accumulation and activation of platelets form what is referred to as the platelet plug, essentially a mass of platelets that temporarily seals the site of injury.

Secondary hemostasis involves the formation of a fibrin clot through the coagulation cascade, which is a series of enzymatic reactions involving coagulation factors. This cascade is traditionally divided into two pathways: intrinsic and extrinsic, which converge on a common pathway leading to the transformation of fibrinogen to fibrin by the enzyme thrombin. Fibrin strands then interlace with the platelet plug, stabilizing and consolidating it into a more durable clot that remains in place until the vessel wall is repaired.

In the context of the question posed, the statement, "It results in the formation of a fibrin clot in association with the intrinsic and extrinsic coagulation pathways," does not accurately describe primary hemostasis but instead refers to secondary hemostasis. Primary hemostasis is concerned chiefly with the formation of the initial platelet plug, not the fibrin clot which is the hallmark of the secondary phase of hemostasis. Thus, the correct answer points out that the formation of a fibrin clot is outside the scope of primary hemostasis and pertains instead to secondary hemostasis.



## Question: 10

Which of these is the wavelength range for Ultraviolet B?

- A. 400 - 315 nm.
- B. 315 - 280 nm.
- C. 280 - 100 nm.
- D. 100 - 40 nm.

**Answer: B**

Explanation:

Ultraviolet (UV) radiation is a form of electromagnetic radiation that comes from the sun and man-made sources like tanning beds and welding torches. UV radiation is generally divided into three categories based on its wavelength: Ultraviolet A (UVA), Ultraviolet B (UVB), and Ultraviolet C (UVC).

Each category of UV radiation has a specific range of wavelengths. Ultraviolet A (UVA) encompasses wavelengths from 400 to 315 nanometers (nm). This type of UV radiation is less energetic but penetrates deeper into the skin, potentially causing skin aging and long-term skin damage.

Ultraviolet B (UVB), which is the focus of the original question, covers the wavelength range from 315 nm to 280 nm. UVB is more energetic than UVA and is primarily responsible for causing sunburn. It plays a key role in the development of skin cancer and contributes to photoaging of the skin. UVB radiation is also important for the synthesis of vitamin D in the skin.

The shortest wavelengths are categorized as Ultraviolet C (UVC), ranging from 280 nm to about 100 nm. UVC is the most energetic and potentially harmful type of UV radiation. However, it is mostly absorbed by the Earth's atmosphere and does not reach the ground in significant amounts, which naturally protects life forms from its potentially damaging effects.

In summary, the wavelength range for Ultraviolet B (UVB) is correctly identified as 315 - 280 nm. This knowledge is crucial for understanding both the beneficial effects of UVB, such as vitamin D synthesis, and its harmful impacts, such as increased risk of skin cancer and sunburn.



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