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**MLS516 QUIZ**

**1.)**

STEPS TO TAKE TO ASCERTAIN THE SUITABILTY OF A NEW METHOD

Consideration of new test

* Preliminary considerations
* Cost per test
* Make versus buy decisions (why make a reagent when you can buy it and why buy it if you can make it?)
* Safety (Are the reagents safe?)
* Required technical input (Does the method require highly trained personnel and if yes, are such personnel available?)
* Turn around time
* Technical Considerations
* Accuracy (Nearness to the true value)
* Precision
* Specificity (Ability to say yes when it is yes and no when it is no/ stay true to a value)
* Sensitivity (Highly sensitive and able to pick little no matter how much is there)
* Recovery (How much analyte is recovered after each test. If a test has high recovery, the test can be used )

**2.)**

In the *analytical stage*, errors arise during the process of testing or experimentation. This could be due to the use of the wrong test reagents, the use of defective and non-calibrated equipment, the use of the wrong proportions of reagents, and general non-adherence to standard operating procedures (SOPs).

These errors can be minimized by ensuring that:

* All laboratory equipment are well maintained and calibrated.
* A proper inventory is in place, outlining all reagents and their validity to ensure no expired reagents are in use.
* The use of control for analytical run
* Passing the result of analytical run with other parameters
* Matching the result with provisional diagnosis

Errors can be introduced in the *post-analytical***stage** through incorrect calculations, recording, and interpretation of results.

To minimize these types of errors:

* Avoid manual calculations.
* Ensure that only well-trained personnel interpret and record results.

**3.)**

Coronavirus disease (COVID-19) is a highly infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This is a new illness which targets the respiratory system.

Spread of the disease is transmitted via respiratory droplets through coughing or sneezing, which is why as laboratory scientists, while testing suspected infected patients must be equipped with Personal Protective Equipment (PPE) which includes Hazmat suits, for entirety, if unavailable, the use of surgical face masks, latex gloves, laboratory coats should be employed

Some COVID-19 patients are asymptomatic, meaning they don’t have any symptoms despite testing positive for the disease. Mild symptoms occur in the majority of cases (~80%) and include a continuous cough and fever. More severe symptoms include shortness of breath, known as dyspnea, which can indicate pneumonia. A small proportion of critical cases (<5%) can result in respiratory failure, septic shock or multiple-organ failure.

It can result in renal failure, heart failure, lung (respiratory system) failure, venous thromboembolism, arrhythmias, shock

INVESTIGATION OF RENAL FAILURE

Serum Creatinine

Creatinine is a waste product that comes from the normal wear and tear on muscles of the body. Creatinine levels in the blood can vary depending on age, race and body size. A creatinine level of greater than 1.2 for women and greater than 1.4 for men may be an early sign that the kidneys are not working properly. As kidney disease progresses, the level of creatinine in the blood rises.

Glomerular Filtration Rate(GFR)

This test is a measure of how well the kidneys are removing wastes and excess fluid from the blood. It is calculated from the serum creatinine level using age and gender with adjustment for those of African American descent. Normal GFR can vary according to age (as you get older it can decrease). The normal value for GFR is 90 or above. A GFR below 60 is a sign that the kidneys are not working properly. Once the GFR decreases below 15, one is at high risk for needing treatment for kidney failure, such as dialysis or a kidney transplant.

Blood Urea Nitrogen (BUN)

Urea nitrogen comes from the breakdown of protein in the foods you eat. A normal BUN level is between 7 and 20. As kidney function decreases, the BUN level rises.

Urinalysis

Includes microscopic examination of a urine sample as well as a dipstick test. The dipstick is a chemically treated strip, which is dipped into a urine sample. The strip changes color in the presence of abnormalities such as excess amounts of protein, blood, pus, bacteria and sugar. A urinalysis can help to detect a variety of kidney and urinary tract disorders, including chronic kidney disease, diabetes, bladder infections and kidney stones.

Urine Protein

This may be done as part of a urinalysis or by a separate dipstick test. An excess amount of protein in the urine is called proteinuria. A positive dipstick test (1+ or greater) should be confirmed using a more specific dipstick test such as an albumin specific dipstick or a quantitative measurement such as an albumin-to-creatinine ratio.

Microalbuminuria

This is a more sensitive dipstick test which can detect a tiny amount of protein called albumin in the urine. People who have an increased risk of developing kidney disease, such as those with diabetes or high blood pressure, should have this test or an albumin-to-creatinine ratio if their standard dipstick test for proteinuria is negative.

Creatinine Clearance

Creatinine is a waste product that comes from the normal wear and tear on muscles of the body. Creatinine clearance test compares the creatinine in a 24-hour sample of urine to the creatinine level in your blood to show how much waste products the kidneys are filtering out each minute.

INVESTIGATION OF HEART FAILURE

**Cholesterol test**

A cholesterol test, also called a lipid panel or lipid profile, measures the fats in your blood. The measurements can show your risk of having a heart attack or other heart disease. The test typically includes measurements of:

Total cholesterol. This is the amount of your blood's cholesterol content. A high level can increase your risk of heart disease.

Ideally, your total cholesterol should be below 200 milligrams per deciliter (mg/dL) or 5.2 millimoles per liter (mmol/L).

Low-density lipoprotein (LDL) cholesterol. This is sometimes called the "bad" cholesterol. Too much LDL cholesterol in your blood causes plaque to buildup in your arteries, which reduces blood flow. These plaque deposits sometimes rupture and lead to major heart and blood vessel problems.

Your LDL cholesterol level should be less than 130 mg/dL (3.4 mmol/L). Desirable levels are under 100 mg/dL (2.6 mmol/L), especially if you have diabetes or a history of heart attack, a heart stent, heart bypass surgery, or other heart or vascular condition. In people with the highest risk of heart attacks, the recommended LDL level is below 70 mg/dL (1.8 mmol/L).

High-density lipoprotein (HDL) cholesterol. This is sometimes called the "good" cholesterol because it helps carry away LDL ("bad") cholesterol, keeping arteries open and your blood flowing more freely.

If you're a man, your HDL cholesterol level should be over 40 mg/dL (1.0 mmol/L). Women should aim for an HDL over 50 mg/dL (1.3 mmol/L).

Triglycerides. Triglycerides are another type of fat in the blood. High triglyceride levels usually mean you regularly eat more calories than you burn. High levels can increase your risk of heart disease.

Your triglyceride level should be less than 150 mg/dL (1.7 mmol/L).

Non-HDL cholesterol. Non-high density lipoprotein cholesterol (non-HDL-C) is the difference between total cholesterol and HDL cholesterol. Non-HDL-C includes cholesterol in lipoprotein particles that are involved in hardening of the arteries. Non-HDL-C fraction may be a better marker of risk than total cholesterol or LDL cholesterol.

**High-sensitivity C-reactive protein**

C-reactive protein (CRP) is a protein your liver makes as part of your body's response to injury or infection, which causes swelling inside the body (inflammation).

Inflammation plays a major role in the process of atherosclerosis. High-sensitivity CRP (hs-CRP) tests help determine your risk of heart disease before you have symptoms. Higher hs-CRP levels are associated with a higher risk of heart attack, stroke and cardiovascular disease.

Because CRP levels can be temporarily increased by many situations such as a cold or going for a long run, the test should be done twice, two weeks apart. An hs-CRP level above 2.0 milligrams per liter (mg/L) indicates a higher risk of heart disease.

Combining your hs-CRP test and other blood test results with your heart disease risk factors gives your doctor a picture of your overall heart health. Your doctor will determine if you may benefit from having your hs-CRP measured to better estimate your risk of heart attacks or stroke.

Cholesterol-lowering statin medications may reduce CRP levels and decrease your heart disease risk.

**Lipoprotein (a)**

Lipoprotein (a), or Lp(a), is a type of LDL cholesterol. Your Lp(a) level is determined by your genes and isn't generally affected by lifestyle.

High levels of Lp(a) may be a sign of increased risk of heart disease, though it's not clear how much risk. Your doctor might order an Lp(a) test if you already have atherosclerosis or heart disease but appear to have otherwise normal cholesterol levels or if you have a family history of early-onset heart disease, sudden death or stroke.

Drugs are in development to lower Lp(a), but it isn't yet clear what effect lowering Lp(a) will have on heart disease risk.

Plasma ceramides

This test measures the levels of ceramides in the blood. Ceramides are produced by all cells and play a significant role in the growth, function and ultimately death of many types of tissue. Ceramides are transported through the blood by lipoproteins and are associated with atherosclerosis.

Three specific ceramides have been linked to plaque buildup in the arteries and insulin resistance, which can lead to type 2 diabetes. High levels of these ceramides in the blood are a sign of a higher risk of cardiovascular disease within one to five years.

**Natriuretic peptides**

Brain natriuretic peptide, also called B-type natriuretic peptide (BNP), is a protein that your heart and blood vessels make. BNP helps your body eliminate fluids, relaxes blood vessels and moves sodium into your urine.

When your heart is damaged, your body secretes high levels of BNP into your bloodstream to try to ease the strain on your heart. One of the most important uses of BNP is to try to determine whether shortness of breath is due to heart failure.

Normal BNP levels vary according to age and gender and whether you are overweight. For people who have heart failure, establishing a baseline BNP can be helpful and future tests can be used to help measure how well treatment works.

A variation of BNP called N-terminal BNP is also useful for diagnosing heart failure and for evaluating the risk of a heart attack and other problems in those with existing heart disease.

A high level of BNP alone isn't enough to diagnose a heart problem. Your doctor will also consider your risk factors and other blood test results.

**Troponin T**

Troponin T is a protein found in heart muscle. Measuring troponin T using a high-sensitivity troponin T test helps doctors diagnose a heart attack and determine your risk of heart disease. An increased level of troponin T has been linked with a higher risk of heart disease in people who have no symptoms.