SDRL Laboratory

TOXICOLOGY TIMES

SDRL Laboratory

(800) 677-7995

www.sdrl.com

A FREE Monthly Newsletter for Substance Abuse and Opioid Treatment Programs from San Diego Reference Laboratory

Volume 4, Issue 11

November, 2014

CBC Meaning and Interpretation (Part 1)

Dr. Joseph E. Graas, Scientific Director
Dr. Edward Moore, Medical Director

Description and Collection:

The CBC is conducted as a routine check-up at the time of a patient physical or when indicated by the attending physician. Ordering of a CBC must be done by the patient's Doctor and his name should be noted on the laboratory request form. The laboratory request form must be clearly filled out as well as the collection tube such that no confusion occurs between the sample tube (purple top vacutainer) and the companion paperwork. The collection of the sample is a very important step in the process. Normal precautions are used for the protection of the phlebotomist when collecting the sample. Whole blood does contain viable pathogens and gloves, lab jacket and, in some cases, eye protection is required. The sample is collected into a vacutainer that has a purple top on it. This color code indicates the presence of EDTA, which binds calcium and prevents the clotting of the specimen. Immediately after collection and removal of the needle the sample must be thoroughly mixed by inversion many times to insure that the anticoagulant is mixed and micro clots do not form. The sample must then be placed in the refrigerator and sent to the laboratory with in 24 hours. Any delay will affect the quality of the results. The laboratory personnel will do the testing requested and issue the report with the results and report back to the Clinic or Doctor as to their findings.

Methodology:

CBC stands for Complete Blood Count, and is usually done with an instrument that automates the counting of the red cells, white cells, and platelets and then calculates the indices for the red cell and gives a pretty good estimation of white cell distributions. All of these tests can be done manually, which is still the reference method. However, with the availability of automated instrumentation these analyses are performed in a highly efficient, accurate, and reliable fashion. When blood is withdrawn from the human body, it is a red fluid that contains a complex mixture of plasma proteins, lipids and electrolytes, among other compounds and formed elements. The formed elements in the blood are the red cells, white cells and platelets which can be separated by gravity when left standing on a laboratory bench. The three classes of these cellular elements are measured by sorting by size, and the instrument reports the number of each of these cells in a specified volume. This, when compared to normal values, give the clinician diagnostic indicators and a clue as to the problem the patient is experiencing. The red cells are formed in the bone marrow and then are released into the vascular system. These red cells are primarily filled with hemoglobin and do not have a nucleus. Under a microscope the red cells appear as a donut with a definite round shape with a somewhat clear center. Any deviation from this shape is diagnostic and indicates an abnormal condition. The red cells are primarily responsible for carrying the hemoglobin that combines with oxygen from the lungs. The oxygen saturated hemoglobin is delivered to the body tissues via the arteries, arterioles, and capillaries. The release of the oxygen allows the hemoglobin to pick up carbon dioxide and return to the lungs via the venous system. The carbon dioxide is released in the lungs, and the hemoglobin repeats the cycle.

Several calculations are made at the time the instrument is counting the red cells. These calculations are called indices and indicate the size of the cell and the cell volume and from this is calculated the hematocrit, which is volume of the red cells as a percent of the total volume of vascular fluid. When the cells are removed from the sample the remaining fluid is the plasma, which is the fluid that carries the proteins and nutrients with the formed elements removed (i.e. red cells, white cells and platelets). The white cells are involved in the immune system and clotting process in the body. They can be fractionated into several different kinds of cells as granulocytes, lymphocytes, and monocytes etc. The third formed element is the platelets which are principally responsible for homeostasis (stopping bleeding). The platelets are irregular in shape and are much smaller than the other two and are also involved in delivering active components to injured tissue. The three classes of formed elements are significant as to shape, size, and total number of each. The laboratory report organizes all of the data and presents the values and reference ranges for each component.

Part 2 of this article will appear in the December issue of Toxicology Times

??? Did You Know ???

A Specimen Validity Test can be performed on a specimen in the laboratory or in the clinic if it doesn't appear to be urine? Urine has characteristics that differentiate it from other liquids (i.e. water, soda, soap, etc). Common characteristics that are used are Creatinine, Specific Gravity, color, oxidizing agents, pH, etc. If a sample does not follow normal ranges, it can be considered either Adulterated (something added to the urine) or Substituted (another type of substance/liquid with little to no urine). A specimen validity test can be performed at the laboratory or the clinic by a dip strip and is an easy way to determine the validity of the sample quickly.

Question of the Month

Question: What is serum methadone testing?
Answer: Methadone, administered daily at a steady dose, should be present in blood at levels sufficient to maintain "normalcy" over a 24-hour period. That is, the patient should not feel drugged or "high", nor have withdrawal symptoms (abstinence syndrome) during that time. The assumption in opiate treatment facilities is that the patient is taking their total dose; however, the patient could share or skip a dose. Measuring levels of methadone in the blood – in terms of nanograms per milliliter (ng/mL) – is helpful in determining how much of the medication is circulating in the patient's system. The measurements provide baseline serum methadone values that correspond to the patient's dose.