WBC DIFFERENTIALS: AUTO OR MANUAL
DOES IT REALLY MATTER?

The total white blood cell count (WBC) and the WBC differential count are frequently-used clinical tests. At VML, there are various ways to order a WBC and differential: test code CBC which contains an automated differential; test code CBC MAN which contains a CBC with manual differential and DIFFA which is an Automated Differential and Total WBC. All CBC have automated counts but the method of performing the differential varies.

The manual WBC differential, which most often includes red blood cell morphological characterization as well as platelet estimation and morphology, is a costly, time-consuming and inconsistent laboratory procedure. Hematology analyzers now have the capability to perform automated WBC differentials which has significantly improved the efficiency and proficiency of WBC differential performance.

The manual differential is a difficult and labor-intensive procedure, typically taking from two to ten minutes per smear to perform. It is considered, by accrediting bodies, to be a highly-complex lab procedure that requires a strong combination of experience and training in order to achieve an acceptable level of competency. Given that fact, VML employs technologists that possess a very strong background in hematology. The recommended protocol for performing the manual differential procedure is well defined in the literature, but the specific identification of individual white cells are made by the subjective interpretation of various cellular features by a technologist performing it. This identification is often influenced by how a cell appears relative to other cells found on the slide, or what is already known about the patient. Because disagreement on a cell's identification between evaluators is not uncommon, it is a struggle to maintain accuracy and improve the consistency of results. Also, the number of WBC examined when performing a manual differential is low (only 100 cells) in comparison to the number evaluated by an automated method (approximately 100% of the total WBC in the sample volume tested). For example, when a WBC is 10,000/uL, 10,000 WBC will be evaluated.

In the past decade or so, automated instruments have improved in both specificity and sensitivity in performing all parameters included in a typical CBC. Automated differentials are far superior to manual differentials in terms of accuracy, precision, turnaround time, economy, safety and clinical sensitivity in sorting out normal from abnormal samples. Even so, they fail to provide some of the information that the manual differential does like specific abnormalities in RBC morphology, categorization of some immature WBC and intra or extracellular parasites. Because of this, the manual differential still has good utility in the laboratory, as an adjunct to the automated differential. Abnormal conditions like the ones described are flagged by the instruments, prompting the technologist to replace the auto diff with a manual one.

At VML, we have two automated instruments in the hematology lab. The ADVIA 2120 Hematology System is a fully automated diagnostic instrument that uses cytochemical reactions to differentiate and count white blood cells, red blood cells, and platelets. It has the ability to report WBC by both percentage and absolute number. It also has a sophisticated flagging system which alerts technologists to any abnormal morphology, allowing them to manually review slides as required.
The magnitude and sources of variation in WBC differential combined with limitations including poor sensitivity and predictive value due to sampling and performers’ judgmental errors have provided sound basis for the routine use of automated differentials. Given this, **CBC with automated differential (code CBC)** is almost always the appropriate test to order. CBC with manual differential should be reserved for cases when known or suspected WBC abnormalities are thought to exist. With the superior nature of automated differentials and the complex flagging capabilities of today’s instruments, clinicians can rest assured that as cases which require a manual differential arise due to instrument flagging, the lab will replace the automated diff with a manual one as necessary and the lab computer system will correct any billing discrepancies that occur due to this change.

CBC may also be ordered without a differential, test code CBCND. It should be noted that Medicare compliance requires that clinicians indicate whether or not a differential is desired and the order of a CBC is implied to mean a CBC without a differential. It is also good to note that while a CBC may be ordered that does not include a differential, abnormal results from an automated instrument will trigger the technologist to either include a diff scan (DIFFS) or a full manual differential, depending on the abnormal flagging.

**Pathologist Slide Review**

As a requirement for CAP accreditation as well as good laboratory practice, VML has criteria which automatically trigger a slide review by a pathologist. As described above, the Advia 2120 alerts the technologist that abnormal morphologies or other conditions exist and the automated differential will be replaced with a manual one. Upon examining the slide, the technologist will note if any reviewable criteria are met. Criteria include certain immature granulocytes, blasts, high monocyte, eosinophil and lymphocyte counts, low or high platelet or WBC counts, certain RBC or WBC inclusions or the presence of blood parasites. Slides are sent to Keystone Medical Laboratories for review and a written report is generated. This report is referred to the ordering provider. VML keeps a database of pathology reviews and will not send the same slide for review should the patient have the same trigger on subsequent samples.

**PSA Reagent Recall Update**

Following our July Quality Assurance committee meeting, it was the recommendation that an additional letter be sent to all clients whose patients had a PSA screen or diagnostic test performed from May 1 until June 27, 2013. The intent was to alert clinicians to the possibility of positive trending impacting patient care in certain cases. VML is offering re-testing of patients who have frequent PSA tests, where a slight increase may prompt intervention. The period for repeating testing was extended until August 31, 2013. To date, there have been limited repeat tests performed and a review of the patient results for trending has shown that most patients were not influenced by the positive bias. Even so, if you have a patient whose testing you would like repeated, he may go to any Patient Service Center and have that done.