NEW PARAMETERS REPORTED WITH CBC RESULTS  
EFFECTIVE JANUARY 1, 2016

The laboratory recently introduced new automated hematology analyzers (Sysmex XN3000). Because of technological improvements, these instruments are now able to accurately categorize immature granulocytes and immature reticulocytes. Several new values - called Advanced Clinical Parameters (ACPs) by Sysmex - will be available as part of a routine CBC. These parameters will automatically be resulted anytime a CBC is performed at no additional cost. Clinicians are advised to review the literature in their individual disciplines to determine which, if any, of these ACPs may provide useful additional information. This memo highlights basic information about these parameters and how they will be used by the laboratory.

IMMATURE GRANULOCYTES (IG)

IG will appear on your CBC report just below BASO (basophils) and will be available as both an absolute concentration (in cells x 10^3/mL) and as a percentage of total WBC (i.e. not as a percentage of granulocytes). In the past, analyzers could flag a "left shift" but were unable to separate the immature forms (i.e. bands vs. metas vs. myelos vs. promyelos). The "left shift" flag will still flag all immature granulocytes (including bands) while the new IG parameter will enumerate metamyelocytes, myelocytes, and promyelocytes, but not bands. IG therefore reflects the degree of a granulocytic left shift beyond bands.

All of our usual CBC criteria for making a slide and resulting a formal manual WBC differential will be retained. In addition, a manual differential will be resulted anytime IG% is greater than 5%.

IMMATURE RETICULOCYTE FRACTION (IRF)

IRF will appear in the reticulocyte section of the CBC report just below RET. IRF is a calculated ratio of newly released reticulocytes to total reticulocytes. IRF is therefore a very sensitive measure of marrow erythropoietic activity. For most practical purposes, evaluation of the combination of IRF along with reticulocyte count (RET) may be used to refine the etiology of anemia in a particular patient. Some examples: low RET + low IRF would suggest aplastic anemia or renal failure; high RET + high IRF would suggest hemolytic anemia or blood loss; low/normal RET + high IRF would suggest iron, folate, or B-12 deficiency; low/normal RET + normal IRF would suggest anemia of chronic disease. The appropriate assays could then be performed to investigate these possibilities, if clinically indicated. Because the IRF is very sensitive to early reticulocytes, it has utility when used on its own in evaluating patients after bone marrow transplantation (to indicate early engraftment) and in patients treated with EPO (to measure response to EPO therapy).

Questions: contact Craig Krentz, Laboratory Director  
Telephone: 888-522-7962  
Email: Craig.Krentz@rwhs.org
Red cell inclusions (e.g. Howell-Jolly bodies, Pappenheimer bodies, basophilic stippling) may cause interference with this parameter. This will not be a major concern as red cell inclusions are only rarely seen in clinical practice. Nevertheless, if any red cell flags are present on the CBC, a slide will be made and the red cells evaluated using the same criteria as we have always used. If any red cell inclusions are present, an appropriate comment will be included with the CBC results to note that the IRF value may not be accurate. If no such comment appears, the clinician may conclude that no inclusions are present based on Medical Technologist smear review.

**RETICULOCYTE HEMOGLOBIN EQUIVALENT (Ret-He)**

Ret-He will appear in the reticulocyte section of the CBC report just below IRF. Ret-He is a measure of iron availability in the bone marrow and may serve as a screen for iron deficiency (with or without anemia) above and beyond traditional biochemical tests (e.g. iron, ferritin, TIBC, %Sat). Some of the more common clinical conditions for which Ret-He may be a useful additional measurement include screening of infants for iron deficiency, evaluation of iron deficiency in ESRD/chronic dialysis patients, and in patients with other chronic diseases associated with inflammation in which traditional biochemical tests may be misleading.

As you review the literature to determine the clinical utility of this parameter in a particular patient population, Ret-He should be thought of as essentially equivalent to CHr (Reticulocyte Hemoglobin Content). Ret-He is a Sysmex instrument parameter and CHr is a Siemens instrument parameter (for those of you who may have experience with Siemens/Bayer hematology instruments). While not identical, these parameters essentially measure the same thing in reticulocytes (Clin Lab Haem 2006 28 303-8).

Red cell inclusions (e.g. Howell-Jolly bodies, Pappenheimer bodies, basophilic stippling) may cause interference with this parameter. This will not be a major concern as red cell inclusions are only rarely seen in clinical practice. Nevertheless, if any red cell flags are present on the CBC, a slide will be made and the red cells evaluated using the same criteria as we have always used. If any red cell inclusions are present, an appropriate comment will be included with the CBC results to note that the Ret-He value may not be accurate. If no such comment appears, the clinician may conclude that no inclusions are present based on Medical Technologist smear review.

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