Atypical lymphocytes

Q Our menu for performing differentials on complete blood counts includes normal lymphs and reactive lymphs. Has the designation atypical lymphs been discontinued, only to be used in the past tense with students, or are there situations when it is useful to include this category in the count?

A The preferred term for lymphocytes that show morphologic features different from what we consider normal morphology is the term “variant lymphocyte.” This term has been incorporated in the reference method for leukocyte differential counting. As you indicate, a number of different adjectives have been used to show changes in the morphology of lymphocytes. One not mentioned is the term “Downey cells,” which was indicative of infectious mononucleosis.

The reference method seeks to avoid ascribing etiology to the abnormal lymphocytes, and the consensus was that these terms should be avoided and instead grouped into the “variant” group. Variant lymphocytes can be found in increased numbers in viral illnesses, as well as malignant lymphocytic diseases. “Abnormal” lymphocytes indicate too many malignant cells, while if the term “reactive” is used, there is an implication that there is a benign etiology for such cells.

Small numbers (up to 6%) of variant lymphocytes normally can be seen in adults, with somewhat higher numbers in children. Careful examination would be required in the face of significant clinical problems. Currently, there is continuing development of more sophisticated hematology analysis to perform so-called “extended differential counts.” These methods would differentiate the several types of lymphocytes noted above, as well as immature granulocytes, but methods for the calibration and standardization of the extended differentials are still under study. We hope such instrumentation will become more widely available within the near future.

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Clearing lipemic serum

Q Is it acceptable to clear lipemic serum in a high-speed centrifuge (13,000 rpm for 30 minutes seems to work well) in order to produce more accurate chemistry results? Some labs use ultracentrifuges for this purpose, but they require a large amount of serum and are not always reliable (the specimen is often lost). My manager will not make this a standard practice until I can cite a reference stating this is acceptable. Instrument references indicate lipemia interferences can be eliminated by clearing the serum, though they do not indicate how it is done.

A Along with hemolysis and icterus, lipemia is one of the most commonly encountered conditions that cause interference in clinical laboratory testing. Lipemia has been shown to affect the measurement of a wide range of analytes. Displacement of water in a sample may lead to pseudohyponatremia when electrolytes are measured by indirect methods. Unlike hemolysis or icterus, the interference caused by lipemia can be reduced by removal of the interfering lipid. Several methods have been proposed, such as ultracentrifugation, filtration, and solvent extraction. My only problem with your method is that excess heat may occur in an unrefrigerated centrifuge, which could affect the integrity of the cellular components and cause the release of potassium. A refrigerated sample and/or centrifuge would make the separation of chylomicrons from the sample easier but would not reduce the VLDL fraction.

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Low pH control

Q I am having a difficult time answering several questions on the CAP checklist for blood gases. At our hospital, it is not uncommon to have pHs in the 6.6 or 6.7 range. The blood-gas instrument has a measuring range of 6.3 to 8.0. I cannot find any kind of control material that can test that range. Most commercially prepared material does not go lower than 6.8. I can report <6.8, but doctors in the special-care nursery would not like it. In reporting less than or greater than, how does...
that affect calculated results based on those tests? Also, CAP checklist question BGL.29770 asks: “Do the control materials cover the analytical measurement range (AMR) of the analyzer?” No blood-gas control can cover the AMR.

The first issue concerns the reporting of blood-gas results that are in compliance with CAP question BGL.29770. This requirement asks: “Do the control materials cover the analytical measurement range of the analyzer?” Many laboratorians interpret this as a requirement for the use of quality-control material that spans the lower and upper analytical limits of measured blood-gas parameters that might be reported from patient specimens. For example, an instrument with an analytic measurement range of 15 mm to 600 mm Hg for pO₂ would require the use of quality-control material that spans these limits if patient pO₂ values, measured at these extreme limits, were to be reported.

Fortunately, this literal interpretation of BGL.29770 is not required for compliance with this CAP question. Discussion with a technical specialist at CAP (V. Emmons, MT[ASCP]), written communication, October 2002) concerning the interpretation of BGL.29770 indicates a more reasonable approach for complying with this requirement. According to CAP, control material containing a combination of high, low, and normal values should be assayed each day of testing. Minimum acceptable laboratory practice for analysis of quality-control material, in accordance with CAP question BGL.29760, requires that two levels of quality-control material be run for each eight hours of testing. It is not required that control values extend to the end points of the analytical-measurement range. Controls must span the analytical-measurement range in a reasonable way, with control values near important clinical-decision levels.

Recommended critical-decision levels for blood-gas parameters measured in arterial or capillary blood include lower and upper limits, respectively, of 7.20 and 7.60 for pH and 20 mm and 70 mm Hg for pCO₂. For pO₂, a lower limit of 45 mm Hg for pO₂ measured in arterial blood and a critical lower limit of 20 mm Hg for pO₂ measured in capillary blood has been recommended. Thus, compliance with BGL.29770 is readily achieved by the appropriate use of quality-control material in a manner similar to that employed in the evaluation of other laboratory parameters.

The second issue concerns the effect that reporting a value as less than some pre-defined cutoff limit has on calculated blood-gas parameters. Blood-gas instruments calculate or estimate parameters, including saturation, oxygen binding capacity, and p50, by incorporating measured parameters such as pH, pCO₂, and pO₂ into various calculations. Reporting pH, pCO₂, or pO₂ values as less than or greater than some threshold value should not affect the calculated parameter, since the instrument will use the actual measured value in the calculation. It should be stressed, however, that many of the calculated or estimated parameters reported as part of a blood-gas analysis assume that the values for the dissociation constant (pK) for carbonic acid, solubility coefficient (Σ) for CO₂, O₂ affinity of hemoglobin, and 2- and 3-DPG levels are those that are observed in normal, healthy patients. Unfortunately, these values can be altered significantly in patients with certain pathologic conditions. Ill patients and some children with abnormalities in measured pH, pCO₂, or pO₂, or who have significant abnormalities in these constant values, may have calculated blood-gas parameters that differ significantly from the actual value. Thus, extreme caution must be exercised in using parameters calculated from blood-gas analyzers in extremely ill patients and children.

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References