Q&A column

Editor: Frederick L. Kiechle, MD, PhD

Submit your pathology-related question for reply by appropriate medical consultants. CAP TODAY will make every effort to answer all relevant questions. However, those questions that are not of general interest may not receive a reply. For your question to be considered, you must include your name and address; this information will be omitted if your question is published in CAP TODAY.

Q. How long do blood transfusions affect mean corpuscular volume values? A patient had a red blood cell count of 2.5 × 10^6/µL, hemoglobin level of 7.3 g/dL, hematocrit of 22.7 percent, MCV of 90.8 fL, mean corpuscular hemoglobin of 29.2 pg/cell, and a mean corpuscular hemoglobin concentration of 32.2 g/dL. Thirteen days after transfusion, the patient's values were an RBC of 3.61 × 10^6/µL, Hgb 10.7 g/dL, Hct 34.6 percent, MCV 95.8 fL, MCH 29.6 pg/cell, and MCHC 30.9 g/dL, and the analyzer flagged the Hgb as abnormal because the MCHC was low.

A.May 2023—Red blood cell transfusions can change RBC indices in a dose-dependent manner,[1,2] and the circulating transfused cells have a life span of 50 to 60 days.[3] The extent and persistence of these changes are related to the number of units transfused and patient health issues, including such factors as underlying medical conditions, type of anemia, and bone marrow response to treatment of anemia.

In the case presented in the question, the increase in MCV and decrease in MCHC could be explained by an increase in reticulocyte count.

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2. Ichikawa J, Koshino I, Komori M. Dose-dependent effect of stored-blood transfusions on recipient red blood cell indices, deformability and density. *Vox Sang*. 2019;114(2):174–177.
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Q. We perform a cell count and differential for bronchoalveolar lavages. I understand the importance

of a differential cell count, but is a cell count clinically significant when the bronchoalveolar volume is not standardized?

A.Bronchoalveolar lavage (BAL) is a relatively safe, well-tolerated procedure used to sample cellular and acellular components of the distal airways. Used in concert with assessments of clinical features and imaging characteristics, BAL results may help support or exclude certain entities on the diagnostic differential. BAL fluid is obtained by instilling a volume of saline into the distal airways and subsequently retrieving it using negative suction pressure. The volume of fluid instilled, amount of fluid retrieved, and time between instilling and retrieving the fluid differ among institutions.

Clinical practice guidelines pertaining to the BAL procedure have been published by various experts and professional societies, including the British Thoracic Society, European Respiratory Society, American Thoracic Society, and BAL Cooperative Group Steering Committee.[1] In general, guidelines recommend instilling 100 to 300 mL of saline into the distal bronchial tree and retrieving 20 to 30 percent of the instilled fluid using negative suction pressure.[2] More specific recommendations address the preferred wait time before retrieving the lavage fluid, as well as how many aliquots of saline to instill in the airways and at what frequency. Regardless of the recommendations and attempts to standardize the BAL procedure, the volume of recovered lavage fluid cannot be adequately controlled due to differences in the integrity of the parenchyma in the lungs. Thus, the volume of lavage fluid obtained for laboratory analysis varies greatly.

Measurements of two or more fluid components can be expressed as proportions relative to each other to overcome the problem of unknown dilution. This semiquantitative approach employs a ratio of cells to volume of fluid. Total nucleated cell (TNC) count is typically expressed as a component of the volume of fluid (e.g. cells $\times 10^6$/L, cells $\times 10^9$/L, or cells/µL). Therefore, the results of the TNC count are not influenced by the volume of instilled saline or recovered lavage fluid and can provide the clinician with useful data.[3]

TNC counts on body fluids may be performed by manual microscopy using a standard hemocytometer or by using an automated analyzer, typically via flow cytometry. Flow cytometry measures light patterns produced as particles pass single file through a laser light beam. The hemocytometer uses a counting chamber on a glass slide that has a uniform monolayer of cells from the undiluted BAL sample. The average number of cells counted are converted to number of cells per microliter of BAL fluid (cells/µL) according to the following formula: cells/µL = (No. of cells counted × dilution factor) / (No. of square mm counted × chamber depth), where 1 mm^3 is equivalent to 1 µL and the chamber depth is 0.1 mm.[4] The number of cells per microliter of BAL fluid is provided as the TNC count.

The clinical utility of BAL and BAL fluid analysis has been debated in the literature. Some reports indicate that the TNC count of BAL fluid can help distinguish healthy controls from patients with interstitial lung disease.[5] Others claim that the TNC count can aid in differentiating bacterial pneumonia from viral pneumonia when used in conjunction with neutrophil percentage and, thereby, be used to direct early appropriate treatment.[6] The TNC count has also been used to improve understanding of lung allograft dysfunction.[7]

The TNC count of BAL fluid is useful, even if used purely as an adjunct to results of other tests. Protocols for preparing the sample and counting cells, whether manually or by flow cytometry, enhance patient care.

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