Scientific Comment

Blood film in the era of streaming cells[☆]

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The complete blood count (CBC) with leukocyte differential count (LDC) is a powerful tool to diagnose and monitor disease progression and therapy; it is one of the most ordered laboratory tests. Since Dr. Wallace H. Coulter introduced an automated cell counter in 1953,[1] the laborious and time-consuming eye-count method using a microscope and a hemocytometer has been replaced by automated analyzers with faster turnaround times, reduced burden on technologists and laboratory costs, and improved count accuracy and reproducibility.[2,3]

Modern machines incorporating flow cytometry, with or without cytochemical staining, maximize cell recognition and provide reliable LDC results in the majority of cases.[4] Although automated hematology analyzers vary in method, a significant overlap exists. A typical instrument discriminates a cell depending on its size, complexity or staining. If a cell does not fit a predetermined setting expected for neutrophils, lymphocytes, monocytes, eosinophils or basophils (e.g., immature leukocytes, plasma cells, fragmented red cells, platelet aggregates), it is not classified and triggers a flag. A warning flag is present in 10–30% of samples and should prompt the technologist to prepare and review a blood smear using a microscope or a digital imaging device.[5–7]

Blood smear examinations are routine in clinical laboratories to review flags but also crucial to analyze red and white cell morphology.[8] Poikilocytosis and cytoplasmic inclusions may provide ancillary clues for diagnosis; Sézary cells and prolymphocytes are only detected by morphology. The blood film is also essential to identify dysplastic changes. However, flags are not specific and false positive flags may reach 20% of flagged samples,[7] impacting on laboratory routine by adding unnecessary manual reviews that consume technologist time and resources. Conversely, false negative results (abnormal samples not flagged for review) may jeopardize patient care. Laboratories must, therefore, customize their own smear review rules to minimize false positive and false negative results.

The International Consensus Group for Hematology Review (ICGHR) published a set of 41 rules as criteria for reviewing CBCs of a heterogeneous population from 15 institutions, yielding a false positive rate of 19% and a false negative rate of 2.9%.[5] Comar et al. evaluated these same set of rules in a Brazilian university hospital setting, and found a false positive rate of 23% and a false negative rate of 6.7%, yielding a microscopy review rate of 46% and concluded that the ICGHR rules were not suitable or safe in their setting.[9]

In the current issue of the *Revista Brasileira de Hematologia e Hemoterapia*, Comar et al. propose new sets of arbitrarily and empirically designed criteria for blood smear review following

automated CBC.[10] A set with wide cut-off limits showed the best relationship between safety and efficacy. However, the proposed rules must be validated in other patient populations before extrapolated to other laboratories with similar patient profiles and instruments. More importantly, this work serves as a guide for clinical laboratories to individualize rules for slide review according to local characteristics.

Conflicts of interest

The author declares no conflicts of interest.

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