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Letter to the Editor

Why and how validate criteria by manual smear review to improve laboratory productivity?



Dear Editor,

I read the article “Are the review criteria for automated complete blood counts of the International Society of Laboratory Hematology suitable for all hematology laboratories?”, published in RBHH 2014;36(2);219–225,¹ and I would like to make some comments about it.

The purpose of the study is remarkable and it is known that each Laboratory has to define their own criteria for reviewing blood smears. Several studies have reported different experiences when manual methods were replaced by automated hematology systems, all of which described improvements in quality and precision, in addition to faster reportable results.^{2–4} Comar et al. applied the review criteria of the International Society for Laboratory Hematology in their study with some adaptations according to local requirements. A total of 1977 whole blood samples were analyzed on two pieces of equipment and 100 leukocytes were counted by a single observer. Among other results, the authors reported high rates of microscopy reviews and an unacceptable percentage of false negative results (>5%).

Some considerations should be mentioned about this evaluation. First, and most important in my view, is related to microscopic analysis. According to the National Committee for Clinical Laboratory Standards (NCCLS) document ‘Reference Leukocyte (WBC) Differential Count, H20-A2’⁵ some rules must be followed in order to obtain a reliable analysis, such as: (i) three blood films from each specimen should be prepared (two are used for the procedure and the third is kept as a spare); (ii) a larger number of blood films must be prepared for leukopenic samples; (iii) 200 WBC should be counted on each slide; and (iv) at least two examiners must be able to classify all normal and abnormal cells. These recommendations were not followed in the study, which may explain, according to the authors, “the inadequate performance of both pieces of equipment”. Other studies, using the NCCLS Document as an evaluation protocol, showed different results. Rusicka et al.⁶ tested the efficiency of flagging using the XE-2100 device and showed that the rate of false negative results of the immature granulocyte category was only 1% and the efficiency rate of

myeloid precursor cell detection was 84%. Regarding the false negative results for blasts, the rate was 1% (5 samples), all of them showing leukocyte counts $<2.5 \times 10^9/L$, and four of them were flagged by the atypical lymph flag or IG flag. This means that, although the blast cell was not detected, the blood cell smear should be examined due to additional flags. Another study was published by Stamminger et al.⁷ where 800 cells were analyzed per sample. The authors considered the Left Shift to be positive if band cells were $>0.9 \times 10^9/L$ or 6% and/or a neutrophil proportion $>80\%$. The efficiency of the Left Shift flag was 0.86 (sensitivity 0.53 and specificity 0.92). When the combination Left Shift plus neutrophilia was applied, there was a significant increase in the efficiency (0.92), sensitivity (0.83) and specificity (0.92). Considering the variations in morphological definition of the band cell, the count of this cell in the routine laboratory is apparently unreliable.

In summary, the progress of hematology automation and the achieved good levels of precision and the accuracy in cell counting are incontestable. The examination and identification of thousands of cells in each sample, the improvement in technologies and the incorporation of new parameters provide reliable and applicable information for diagnosis in several clinical conditions. Automation will most likely never totally replace the microscopic review of blood cells. The examination of red cell morphology is crucial for the diagnosis of anemia, and automation does not provide all the information that is potentially important to the physician.⁸ The purpose of automation is to provide faster reportable results, to reduce the technologist hands-on time, in addition to providing high quality and precision. Each laboratory must define the best criteria to achieve their performance goals. Several tools and guidelines are available to analyze the performance of equipment, and to define the best rules for specific needs.

Conflicts of interest

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