Differentiation of Leukocytes Based on a New Digital Cell Morphology Analyzer Mindray MC-80

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INTRODUCTION

- Morphological assessment of peripheral blood cells is essential for hematological disease diagnosis.
- The conventional manual microscopic examination is labor-intensive and requires professionally trained personnel. Therefore, the demand for digital morphology analyzers has increased over the past decades.
- The Mindray MC-80 is a new automated digital cell morphology analyzer that has been launched to the market recently.
- We investigated the WBC differentiation performance of Mindray MC-80 by comparing the results with Cellavision DI-60 and manual WBC counting.

METHOD

Blood Samples And Blood Smears

- 177 abnormal peripheral blood samples 'flagged' for microscopic review by automated hematology analyzers were randomly selected
- The blood smear slides were created and stained with the automated slide maker Mindray SC-120

WBC Pre-classification and Verification by Mindray MC-80 and Cellavision DI-60

- WBCs were pre-classified by the Mindray MC-80 and Cellavision DI-60 cell morphology analyzers and then verified and reclassified by a trained morphology expert.

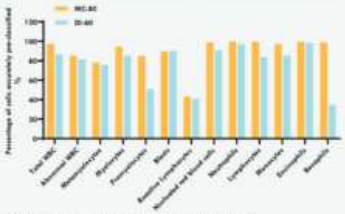
Manual Differentiation

- Two trained and experienced morphology experts then performed the manual microscopic differentiation according to the CLSI H20-A2 guidelines.

CONCLUSION

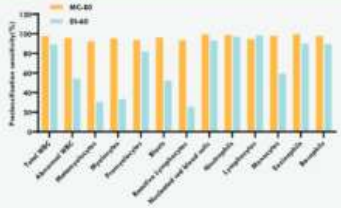
- The Mindray MC-80 shows significant advantages in pre-classification and post-classification of normal and abnormal WBCs compared with DI-60 on both detection accuracy and sensitivity.
- The Mindray MC-80 is an accurate and reliable digital cell morphology analyzer and offers another option for hematology laboratories.

① MC-80 Showed Better Pre-classification Accuracies on Both Normal and Abnormal WBCs



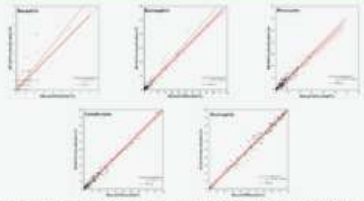
- The Mindray MC-80 accurately pre-classified 97.17% total WBCs
- For the five types of normal WBCs, MC-80 correctly pre-classified over 98% of cells except for monocytes (96.95%).
- MC-80 also showed high pre-classification accuracies on abnormal WBCs (85.22%) and nucleated red blood cells (98.7%).
- Mindray MC-80 showed higher pre-classification accuracies than Cellavision DI-60 for the cells tested in this study

② MC-80 Showed Better Pre-classification Sensitivities on Both Normal and Abnormal WBCs



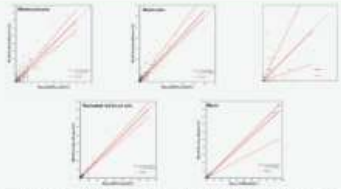
- The sensitivities of MC-80 to detect normal WBC were above 94%, reaching 99.76% for neutrophils.
- The sensitivities of MC-80 to detect abnormal WBC were higher than 90% (metamyelocytes: 92.18%, myelocytes: 95.26%, promyelocytes: 93.66%, reactive lymphocytes: 93.24%, and blasts: 96.05%) and the sensitivity to detect nucleated red blood cells was 99.41%.
- MC-80 showed higher pre-classification sensitivities than DI-60 on all cell types tested in this study.

③ The Post-classification Performance of MC-80 on Normal WBCs



- The WBC post-classification performance was evaluated by Passing and Bablok regression analysis between the post-classification and the manual differential counting results.
- For the five types of normal WBCs, the post-classification results correlated very well with manual microscopy review (neutrophils: r = 0.9873, lymphocytes: r = 0.9896, monocytes: r = 0.9501, eosinophils: r = 0.9765) except for basophils (r = 0.85), because of the low basophils counts in the blood samples

④ The Post-classification Performance of MC-80 on Abnormal WBCs



- For abnormal WBCs, the post-classification results correlated well with the manual differential results, indicating a high post-classification performance of MC-80 on abnormal cells.
- For immature granulocytes, post-classification of metamyelocytes and myelocytes were better than promyelocytes (metamyelocytes: r = 0.9050; myelocytes: r = 0.8994; promyelocytes: r = 0.6865) because of the low appearance of promyelocytes in blood samples.
- The correlation coefficients were excellent for blast cells (r = 0.9988) and nucleated RBCs (r = 0.9903)