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Evaluation of the new CellaVision Bone Marrow aspirate application for morphological examination and classification of bone marrow cells

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Introduction

For many years, our laboratory has used the CellaVision Peripheral Blood Application for the morphological examination of peripheral blood cells based on automated microscopy, image analysis, and artificial intelligence (AI).

Methods

CellaVision has recently introduced the CellaVision Bone Marrow Aspirate (BMA) Application, which runs on the CellaVision DC-1 instrument using a 100× objective.

The system consists of the CellaVision BMA Analyzer Software, which automatically locates and preclassifies bone marrow aspirate cells using advanced AI-driven technology, and the CellaVision BMA Review Software, which allows users to review cell images and verify preclassification results **(Figure 1)**.

We evaluated the CellaVision BMA Review software version 1.0. An expert morphologist verified the preclassification proposed by CellaVision, and then its performance was compared with the conventional morphological examination of 500 cells using optical microscopy. Between September and December 2025, a total of 158 bone marrow aspirate samples were analyzed.

Method comparison was performed using Passing–Bablok regression analysis, and agreement between methods was assessed using Bland–Altman analysis.

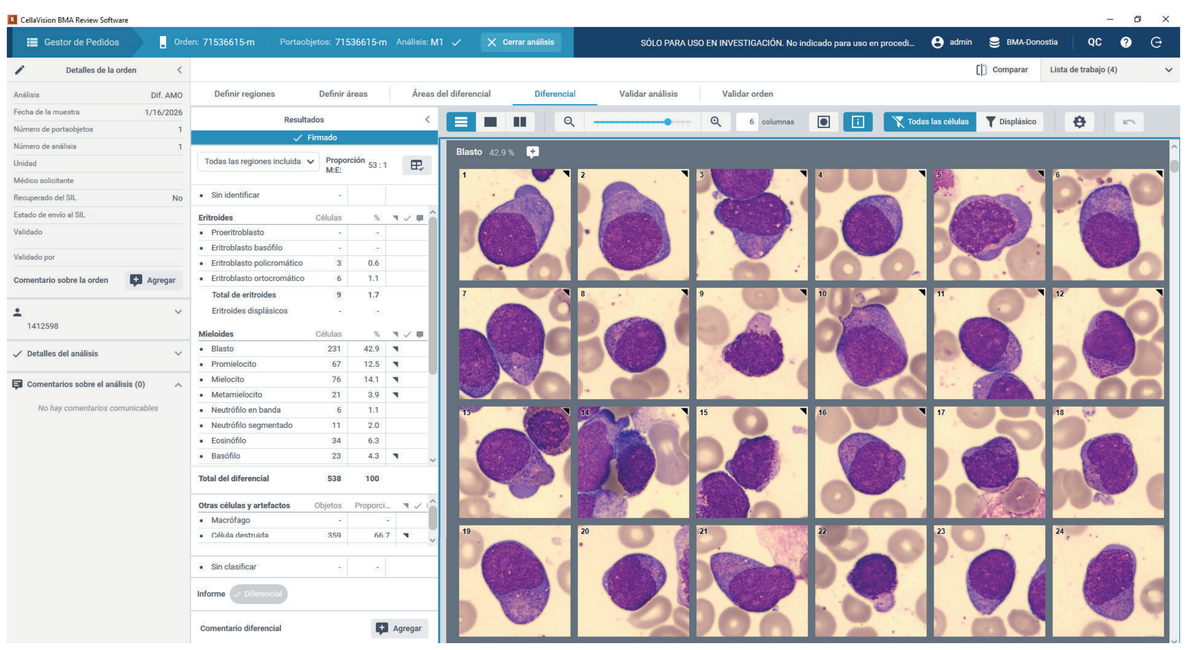

Figure 1. Screenshot from the CellaVision BMA Analyzer showing blast cell images on the right and the differential count of 538 cells on the left. Monocyte, lymphocyte, and plasma cell counts are not visible in this image.

Results

The study included 95 men (60.1%) and 63 women (39.9%), with a mean age of 59 years (range: 1–89). Diagnoses comprised 12 myeloproliferative neoplasms (MPN), 10 myelodysplastic/myeloproliferative neoplasms (MDS/MPN), 21 myelodysplastic syndromes (MDS), 38 acute myeloid leukemias (AML), 21 acute lymphoblastic leukemias (ALL), 2 acute leukemias of ambiguous lineage, 12 lymphomas, 27 multiple myelomas or monoclonal gammopathies, and 15 non-neoplastic conditions. Regarding disease status, 56 samples (35.4%) were obtained at diagnosis, 95 (60.2%) during follow-up, and 7 (4.4%) during disease progression or relapse.

Passing–Bablok regression analysis demonstrated comparability between the two methods for erythroblasts, granulocytic cells, blasts, eosinophils, basophils, monocytes, lymphocytes, and plasma cells **(Table 1 and Figure 2)**. A slight systematic difference was observed for blasts, while a slight proportional difference was noted for lymphocytes. Linearity between methods was observed for all cell types except basophils and plasma cells.

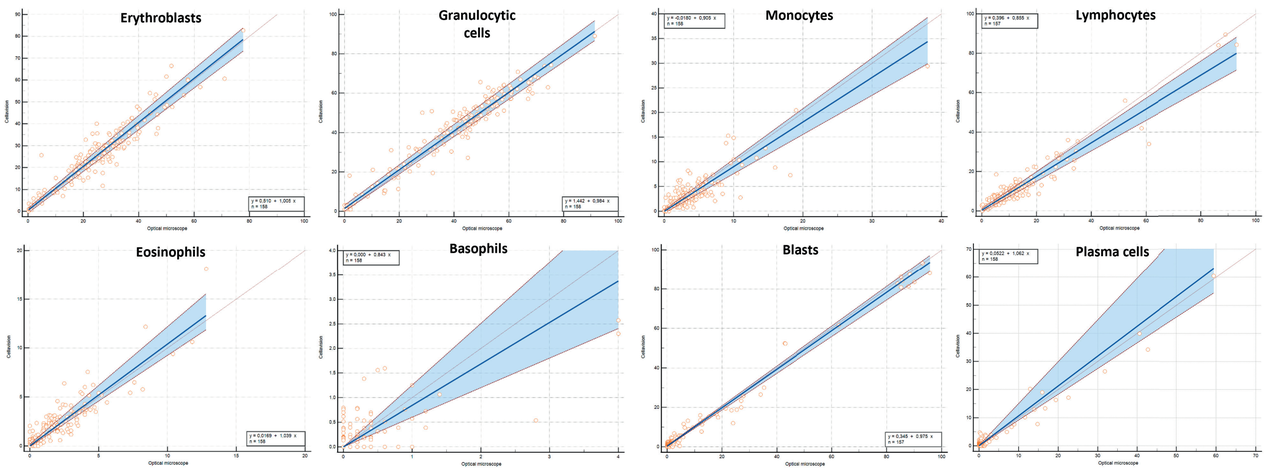

Figure 2. Passing–Bablok regression analysis comparing optical microscopy with the CellaVision BMA application. Results are expressed as percentages. Solid line: regression line; dashed lines: 95% confidence intervals (CI).

	Intercept (95 % CI)	Slope coefficient (95 % CI)	Test for linearity
Erythroblasts	0,513 (-0,75 to 1,37)	1,0046 (-0,95 to 1,06)	p=0,91
Granulocytic cells	1,4423 (0,02 to 3,09)	0,9838 (-0,94 to 1,02)	p=0,54
Blasts	0,3447 (0,13 to 0,57)	0,9751 (0,92 to 1,01)	p=0,53
Eosinophils	0,01689 (-0,06 to 0,19)	1,0391 (-0,93 to 1,19)	p=0,42
Basophils	0,0000 (-0,00 to 0,00)	0,8432 (060 to 1,25)	p=0,03
Monocytes	-0,0179 (-0,34 to 0,24)	0,9050 (0,79 to 1,02)	p=0,80
Lymphocytes	0,3960 (-0,39 to 1,18)	0,8554 (0,77 to 0,93)	p=0,80
Plasma cells	0,05215 (0,00 to 0,16)	1,0615 (0,91 to 1,48)	p=0,01

(CI) Confidence Interval

Table 1. Passing–Bablok regression analysis comparing bone marrow aspirate cells morphological examination by optical microscopic and by Cellavision BMA Application.

Bland–Altman analysis showed good agreement between the CellaVision BMA Application and optical microscopy, with no relevant systematic bias or random error **(Table 2)**.

	Mean	Limits of agreement (-1.96 SD to +1.96 SD)
Erythroblasts	0,7	(-9,2 to 10,6)
Granulocytic cells	1,2	(-9,4 to 11,8)
Blasts	0,0	(-4,9 to 5,0)
Eosinophils	0,2	(-1,8 to 2,3)
Basophils	-0,04	(-0,83 to 0,76)
Monocytes	-0,4	(-4,8 to 4,0)
Lymphocytes	1,4	(-6,9 to 9,7)
Plasma cells	0,1	(-3,0 to 3,1)

Table 2. Bland-Altman analysis of agreement between the two methods.

CONCLUSIONS

The CellaVision BMA application provides a reliable tool to automate and simplify the morphological examination of bone marrow aspirate cells. Our results demonstrate that its performance is comparable to the current gold standard of conventional optical microscopy. Nevertheless, review by an expert morphologist is essential.