

EVALUATION OF THE ABILITY OF THE DIFFERENTIAL COUNT ON TWO HEMATOLOGY ANALYZERS TO DETECT LEUKEMIAS, VERIFIED BY BONE MARROW AND PERIPHERAL BLOOD SMEARS



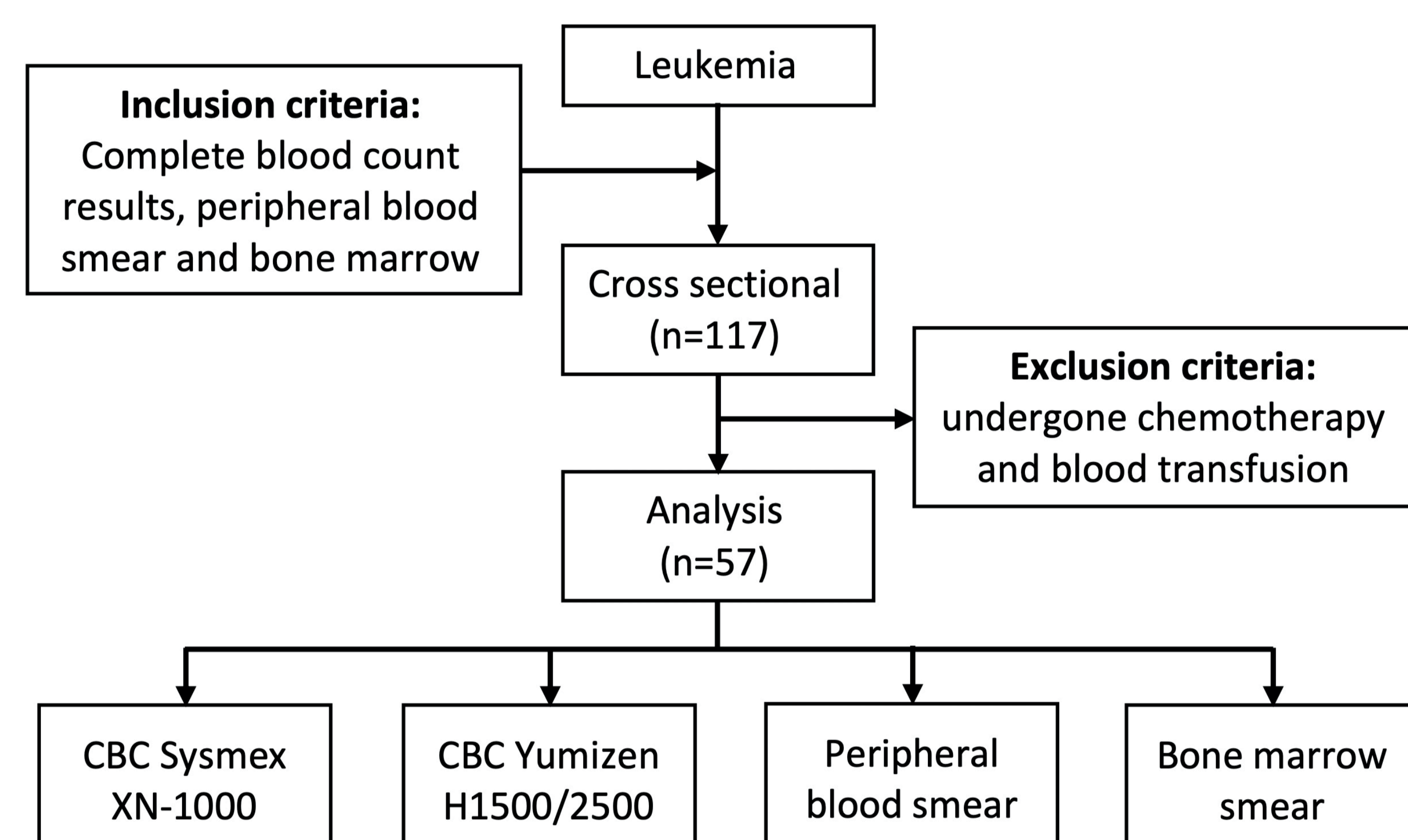
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Background The hematology analyzer allows the measurement of several hematological parameters useful in diagnostic and clinical patients. In leukemia, hematological parameters especially in the case of leukocyte differential count helps early diagnosis of leukemia.

Methods A cross sectional study in 57 subjects. Measurement of differential count using two hematology analyzers Yumizen H1500/2500 and Sysmex XN1000. The statistical tests were Mann-Whitney and Spearman's test. The test results are significant if the p-value < 0.001.

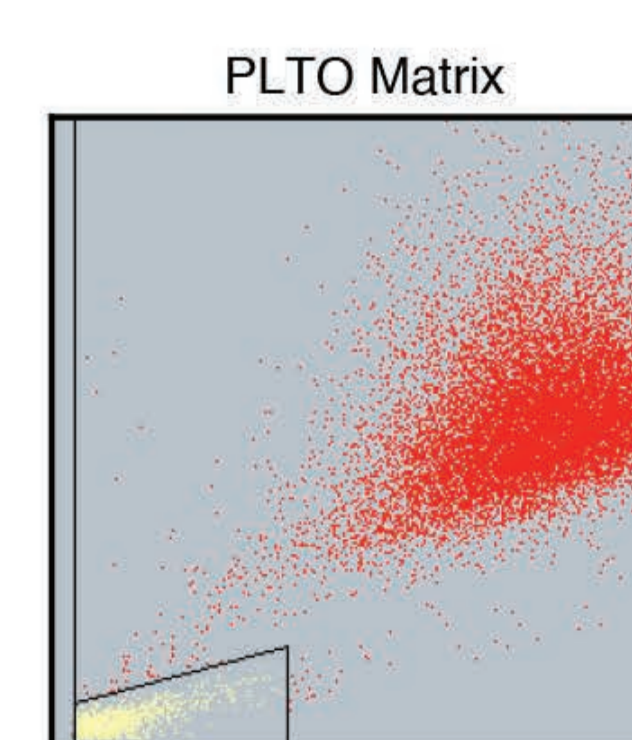
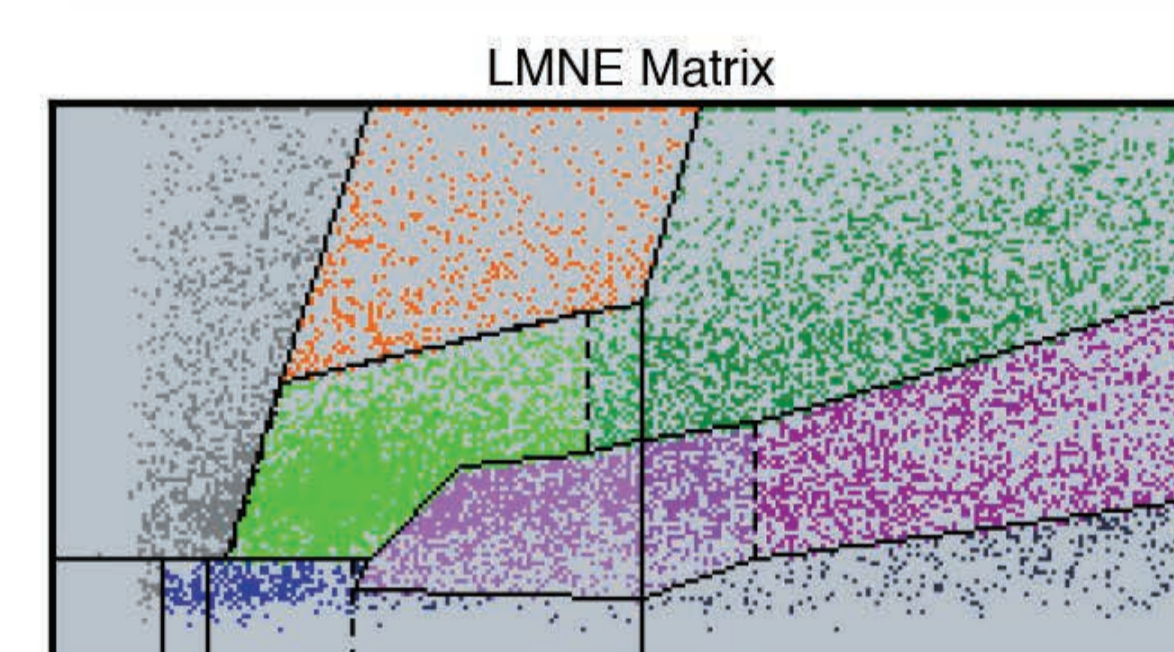
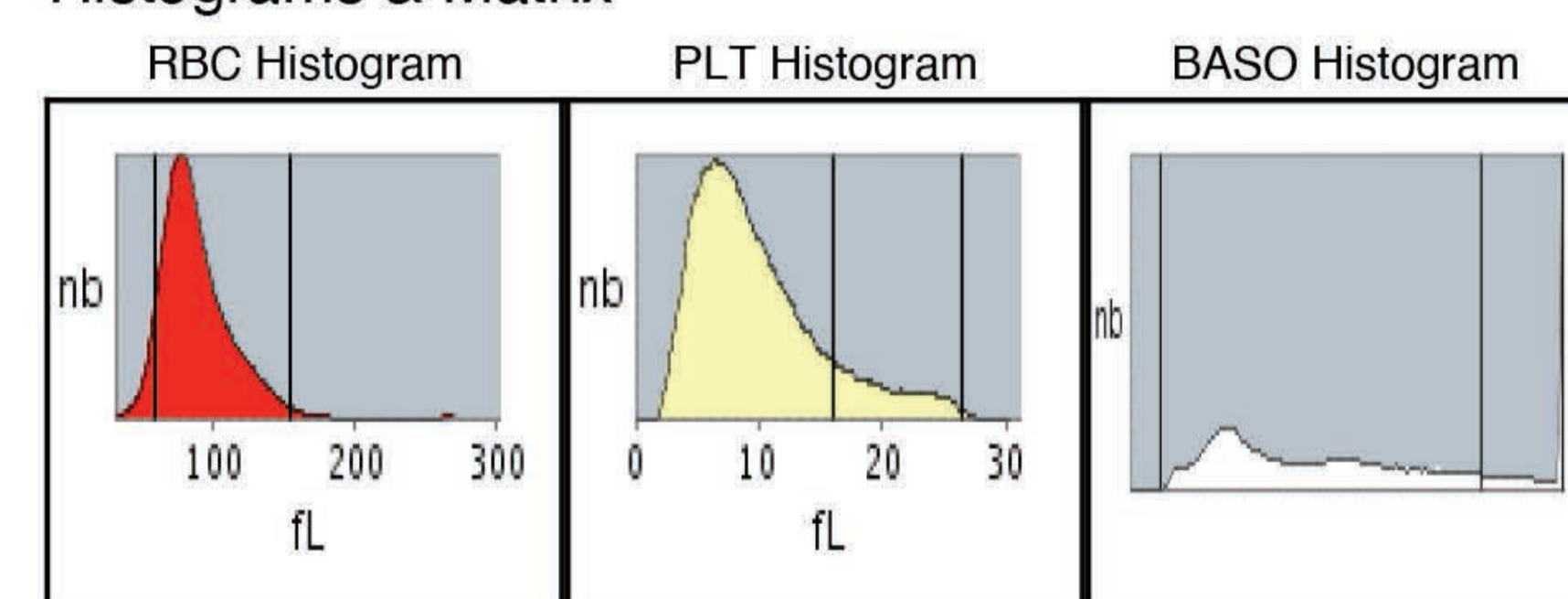
Results 57 patients consisted of 15 AML, 12 ALL, 14 CML, 9 MDS, and 7 other diagnosis. There was significant relationship between the leukocyte differential count parameter with the morphology of peripheral blood smear and bone marrow aspiration (p<0,001). The correlation between leukocyte differential counts parameters of two hematology analyzers using Spearman's correlation has a significant positive correlation with moderate to very strong (p<0,001). The parameters of leukocytes, lymphocytes, and eosinophils were very strong correlation (r = 0,990, 0,892 and 0,717), monocytes and neutrophils were a strong correlation (r = 0,706 and 0,782) and basophils were moderate correlation (r = 0,376).



Results

Instrument Yumizen H2500			
WBC	305.90	D	10 ³ /mm ³ 3.50 - 10.00
TNC	307.12		10 ³ /mm ³ 3.50 - 10.00
Instrument Yumizen H2500			
RBC	2.75		10 ⁶ /mm ³ 4.20 - 6.00
HGB	8.6		g/dL 13.0 - 17.0
HCT	24.4		% 40.0 - 54.0
MCV	88.8		fL 80.0 - 100.0
MCH	31.4		pg 27.0 - 34.0
MCHC	35.4		g/dL 32.0 - 35.0
RDW-CV	17.0		% 12.0 - 18.0
RDW-SD	51.0		fL 37.0 - 56.0
MIC%	6.8		% 0.0 - 20.0
MAC%	3.3		% 2.0 - 10.0
Instrument Yumizen H2500			
PLT	182		10 ³ /mm ³ 150 - 400
PLTO	190		10 ³ /mm ³ 150 - 400
MPV	10.0		fL 7.4 - 12.0
PCT	0.182		% 0.150 - 0.400
PDW	18.3		fL 11.0 - 20.0
Instrument Yumizen H2500			
NEU%	22.7		% 40.0 - 75.0
LYM%	1.4		% 15.0 - 45.0
MON%	6.4		% 4.0 - 13.0
EOS%	4.5		% 0.5 - 7.0
BAS%	8.3		% 0.0 - 2.0
ALY%	0.2		% 0.0 - 2.5
LIC%	56.7		% 0.0 - 3.0
IML%	4.6		% 0.0 - 0.2
IMM%	23.0		% 0.0 - 0.5
IMG%	29.1		% 0.0 - 2.0
NRBC%	0.4		% 0.0 - 2.0
NEU#	69.49		10 ³ /mm ³ 1.50 - 7.00
LYM#	4.39		10 ³ /mm ³ 1.00 - 4.00
MON#	19.54		10 ³ /mm ³ 0.20 - 0.80
EOS#	13.89		10 ³ /mm ³ 0.00 - 0.50
BAS#	25.25		10 ³ /mm ³ 0.00 - 0.20
ALY#	0.69		10 ³ /mm ³ 0.00 - 0.20
LIC#	173.34		10 ³ /mm ³ 0.00 - 0.20
IML#	14.18		10 ³ /mm ³ 0.00 - 0.05
IMM#	70.23		10 ³ /mm ³ 0.00 - 0.10
IMG#	88.93		10 ³ /mm ³ 0.00 - 999.90
NRBC#	1.22		10 ³ /mm ³ 0.00 - 0.15

Histograms & Matrix



Comments:
 Sep. Neutro/Eosino
 Left Neutro.
 Right Mono.
 WBC out of linearity
 WBC abnormal DIFF

Sep. Mono/Neutro
 Right Neutro.
 WBC instability (DIFF)
 WBC noise (DIFF)

Table 1. Correlation between Leukocytes and differential count of Yumizen H1500/2500 and Sysmex XN-1000 tools

Parameters (n=57)	Correlation coefficient (R)*	p-value
WBC	0,990	0,000
Lymph	0,892	0,000
Mono	0,717	0,000
Neut	0,706	0,000
Eos	0,782	0,000
Baso	0,376	0,000

*Spearman's Correlation Test

Table 2. Comparison between Leukocytes and differential count of Yumizen H1500/2500 with peripheral blood smear and bone marrow

Parameters	Yumizen H1500/2500 (n=57)				p-value
	Acute		Chronic		
	Mean	SD	Mean	SD	
WBC	64,09	96,33	223,59	118,28	<0,001
NEUT	42,00	22,24	11,58	19,79	<0,001
LYMPH	21,93	21,49	6,83	6,33	0,001
MONO	19,23	12,86	6,83	6,33	0,001
EOS	0,97	1,76	2,78	1,52	<0,001
BASO	2,96	4,80	10,75	8,60	0,013

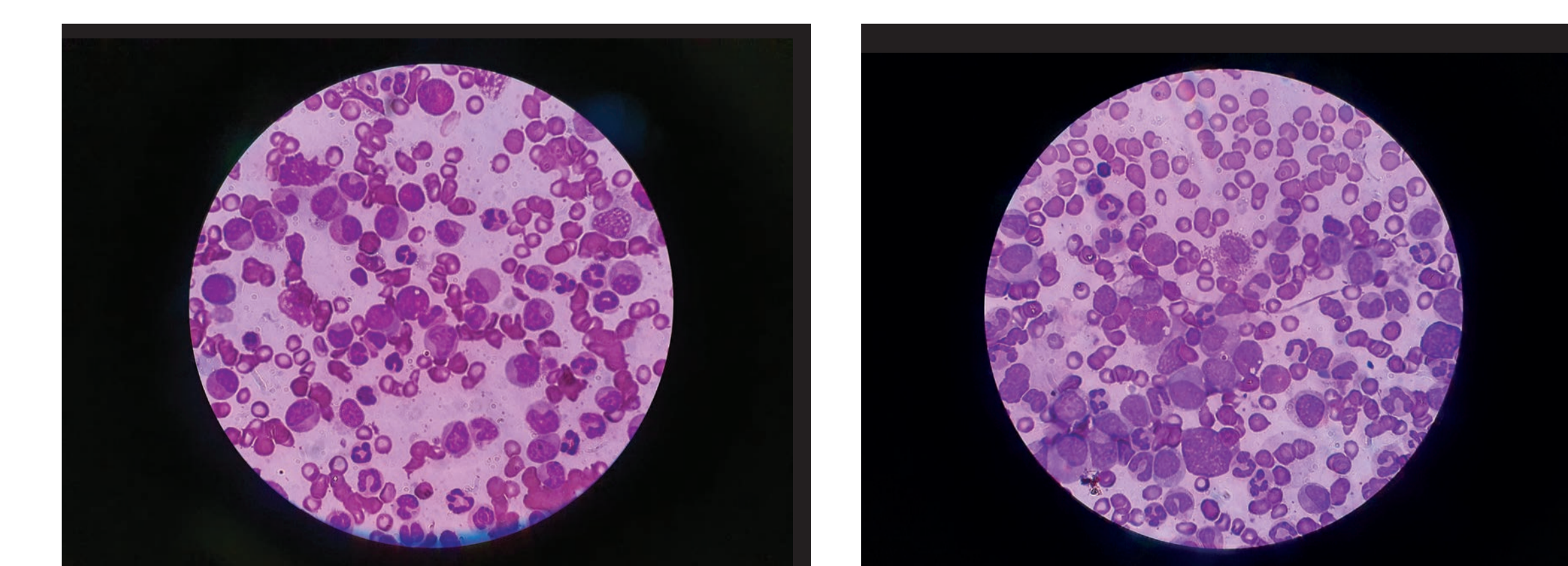
*Mann-Whitney test

Table 3. Comparison between Leukocytes and differential count of Sysmex XN-1000 with peripheral blood smear and bone marrow

Parameters	Sysmex XN-1000 (n=57)				p-value
	Acute		Chronic		
	Mean	SD	Mean	SD	
WBC	72,39	116,08	248,31	163,98	<0,001
NEUT	27,24	23,91	72,18	24,28	<0,001
LYMPH	41,63	22,92	10,30	20,43	<0,001
MONO	29,69	20,70	9,35	9,92	0,001
EOS	1,26	2,69	2,82	2,81	0,009
BASO	0,55	1,01	5,02	5,05	<0,001

*Mann-Whitney test

b. Blood smear patient with CML
 c. Bone marrow smear patient with CML



Discussion

The results of the leukocyte differential count showed the same cell types found in the morphology of the peripheral blood smear and bone marrow aspiration. The correlation between the two hematology analyzers showed that the results of the differential count were either increasing or decreasing even though the methods of the two hematology analyzers were different.

Conclusion

There was no difference in the leukocyte differential count parameters between both hematology analysers and had a significant positive correlation with the morphology of the peripheral blood smear and bone marrow aspiration.