VALUE OF LEUCOCYTE CELL POPULATION DATA FROM SYSMEX XN-1000 IN EARLY DETECTION OF ACUTE LEUKEMIA

Noha H Boshnak and Shams ElDoha G Zaiema

Clinical Pathology, Faculty of Medicine, Ain Shams University, Cairo, Egypt

Corresponding author:
Noha H Boshnak
Mobile: +20 122 293 2829
e.mail:
nhboshnak@hotmail.com

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ABSTRACT:

Background: *Among the more complex tests for the diagnostic workup of acute leukemia (AL), automated hematology cell counters provide leucocyte cell population data (CPD) parameters along with the basic complete blood count (CBC) that have the ability to recognize morphological changes in these cells.*

Aim of the work*: Assessment of the efficiency of CPD research parameters obtained by Sysmex XN-1000 auto-analyzer to predict the diagnosis of AL and its subclassification into acute myeloid leukemia (AML) and acute lymphoblastic leukemia (ALL).*

Patients and methods*: Cell population data (CPD) parameters from 103 newly diagnosed AL samples were processed on Sysmex XN-1000 auto-analyzer and compared with 101 age-matched controls (51 healthy and 50 reactive subjects).*

Results: *We found significant differences in many CPD neutrophilic, monocytic, and lymphocytic population together with parameters between AL patients and both healthy and reactive controls, particularly those related to the width of dispersion of the parameters related to neutrophil side scatter intensity, neutrophil forward scatter intensity, lymphocyte side scatter intensity, monocyte side scatter intensity and monocyte side fluorescence intensity. To differentiate AML from ALL, the most significant differences were found in the median values of monocyte side scatter and monocyte side fluorescence along with the neutrophil forward scatter area distribution width and neutrophil forward scatter.*

Conclusion: *The CPD parameters generated from Sysmex XN-1000 auto-analyzer during CBC analysis could be a useful tool for the prediction of AL and its lineage.*

Keywords: *CBC, Cell Population Data, Sysmex XN, Acute Leukemia*

INTRODUCTION:

Acute leukemia (AL) is a highly complex, heterogeneous and severe disorder in which a haemopoietic stem cell or an early progenitor cell undergoes malignant transformation. A comprehensive and integrated approach is required for a successful and reliable diagnosis of AL, which includes an initial assessment of the clinical history, a complete blood cell count (CBC), leukemic blast identification and enumeration in peripheral blood and bone marrow, morphological examination of dysplastic features, with further cyto-chemical, immunophenotypic, molecular and cytogenetic studies [1].

Early detection of AL patients, classification and risk stratification at diagnosis are crucial for proper management [2]. However, the major difficulties in earlier

detection of AL are the extended turnaround time along with the technical expertise required in reporting confirmatory tests, which are typically performed within regular working hours and are only attainable in restricted well-equipped laboratory setup, in addition to the financial limitations in a resource-poor setting, which are more noted in developing countries [3]. Therefore, an efficient, rapid, readily accessible and inexpensive, screening tool is needed for the preliminary workup of patients with AL, so that they can be timely referred for prompt treatment [4].

The latest generation of automated hematological analyzers incorporates technical advancements including many principles, for example, light scattering, electrical impedance, fluorescence flow cytometry, electrical conductivity radiofrequency, or cytochemistry [3]. Additionally, the autoanalyzer integrates innovative computer algorithms and modern hardware technologies to facilitate the gathering and generation of cell morphological data, known as cell population data (CPD)[5]. These parameters provide quantitative information on leukocytes' [neutrophils (NE), monocytes (MO) and lymphocytes (LY)] morphological and functional properties, that can be precisely assessed; thus, a more in-depth analysis of those cells, as well as their morphological alterations to various stimuli can provide useful data regarding the activation state and functional activity [6].

Sysmex XN-1000 auto-analyzer depends on the basis of fluorescence flow cytometry and cell light scatter. Flowing cells in light induce scattering at different angles as well as the emitted fluorescent light, all of which are detected and interpreted. to generate a 2D scatterplot[7]. Forward scattering light (FSC) (presented on Z axis) and side scattering light (SSC) (presented on X axis) values are related to the cell's size and internal complexity, respectively. Furthermore, the intensity of the side fluorescence light (SFL) (presented on Y axis) is related to the DNA/RNA content of the cell. The dispersion width (W) or the level of variability of the corresponding cell population is represented as 'WX,' 'WY,' and 'WZ,' respectively, along the distinct axis [3].

The existence of immature/abnormal white blood cells (WBCs) in peripheral blood alters the measurements of CPD parameters. The degree of change in CPD parameter values is related to the numbers, immaturity, or abnormalities of such a specific type of immature/abnormal WBCs[5].

It has been observed in studies that leukocyte CPD can be useful for screening of sepsis[8-12], myelodysplastic syndrome[13-17], and severe infections[18-21]. However, there are few studies that evaluate the CPD's effectiveness in AL detection

AIM OF THE WORK:

The purpose of this study was to evaluate the clinical usefulness of the leucocyte CPD parameters reported by Sysmex XN-1000 auto-analyzer as an early laboratory indicator of AL and its subclassification into ALL and AML.

PATIENTS AND METHOD:

A total of 204 samples were studied [103 newly-diagnosed Egyptian adult AL cases, 101 age-matched controls (51 healthy and 50 reactive individuals)]. The local ethical committee's guidelines were followed when conducting the study. All consecutive newly diagnosed adult cases of AL admitted to the Ain-Shams University Hospitals were reviewed. Relapsed acute leukemia patients, cases with antecedent chronic myeloid leukemia (in blastic crisis) or prior therapy and mixed phenotype AL were excluded.

Fifty-one healthy blood donors were involved in the group of healthy controls. These samples had no suspicious flags, and scatter plot patterns were within normal ranges. Furthermore, 50 individuals with fever and reactive peripheral blood WBC morphological characteristics linked with an infectious cause were included in the group of reactive controls. For both patients and controls, clinical and demographic data were collected.

The ultimate diagnosis and lineage determination of cases with ALs were reached by morphological assessment of peripheral blood and bone marrow accompanied with immunophenotypic analysis using Navios flow cytometer (Beckman Coulter, USA).

According to our laboratory's standard operating procedure, 2mL venous blood samples were obtained from the cases and the controls using K3 EDTA (tripotassium ethylenediaminetetraacetic acid) and processed on Sysmex XN-1000 auto-analyzer within two hours of collection. The analyzer was calibrated and maintained in accordance with the manufacturer's instruct-ions to ensure the proper performance.

Routine CBC data along with CPD parameters produced by the analyzer was retrieved, analyzed, and evaluated. The CPD parameters studied were NE-SSC, NE-SFL, NE-FSC, LY-X, LY-Y, LY-Z, MO-X, MO-Y, MO-Z, NE-WX, NE-WY, NE-WZ, LY-WX, LY-WY, LY-WZ, MO-WX, MO-WY, and MO-WZ.

We evaluated the distribution of CPD values between AL group and control groups, as well as across different subtypes of AL as follows: (1) AL cases versus control (healthy + reactive controls), (2) AL cases versus healthy control, (3) AL cases versus reactive control, (4) AML versus ALL.

Statistical analysis:

Data were gathered, coded, and put into IBM SPSS version 23 of the Statistical Package for Social Science. When the quantitative data were parametric, they were shown as means, standard deviations, and ranges; when they were non-parametric, they were shown as medians with interquartile ranges (IQR). Qualitative data were also shown as percentages and numbers. The groups were compared using the Chi-square test and/or Fisher exact test. The Independent t-test was used to compare two independent groups with quantitative data and parametric distribution, whereas the Mann-Whitney test was used for non-parametric distribution. The optimal cut off point was determined using the receiver operating characteristic curve (ROC) and its sensitivity, specificity, positive predictive value, negative predictive value, and area under the curve (AUC) were identified. The allowable margin of error was set at 5%, while the confidence interval was set at 95%. As a result, the P-value was considered significant at the level of 0.05.

RESULTS:

A total of 103 AL patients were involved in this study. Of these, 24 were diagnosed as ALL, 79 as AML [7: acute promyelocytic leukemia (APL), 72: non-APL (18: M4+M5)]. The mean age of AL patients was 35.8 years (range: 18-79 years) and the male/female ratio was 1.2. The mean age of the control group was 30.6 years (range: 20-70 years) and the male/female ratio was 1.3.

Differentiation between AL group and control groups:

Many routine CBC items showed a substantial difference in the AL group in comparison to healthy and reactive controls. As expected, the AL cases had anemia (mean hemoglobin: 8.61 ± 1.84 g/dL), thrombocytopenia [median platelet count: 63 (range: 24 – 118) $x10^9$ /L] with leukocytosis [median WBCs count: 21.83 (range: 6.6 – 56.25) × 10^9 /L]. The neutrophil percent (NE%) value was reduced in AL group [median NE%: 22 (range: 8.1 – 36.3)] as provided by the analyzer, while the

monocytes percent (MO%) [median MO%: 41 (range: 23 – 67)] and lymphocytes percent (LY%) [median LY%: 25 (range: 12.7 – 44)] were higher compared to control groups (healthy + reactive control).

Out of studied 18 CPD parameters, significantly different parameters ($P < 0.05$) between AL cases and controls (healthy + reactive) were 13. NE-SSC, NE-FSC, LY-X, MO-X, MO-Y, NE-WX, NE-WY, NE-WZ, LY-WY, LY-WZ, MO-WX, MO-WY, and MO-WZ.

Compared to healthy control, AL cases revealed significantly higher parameters, these were LY-X, MO-Y, NE-WX, NE-WY, NE-WZ, LY-WX, LY-WY, LY-WZ, MO-WX, MO-WY, and MO-WZ, while NE-SSC and NE-FSC were considerably lower ($P< 0.05$) (Table 1).

A substantial difference was also noted between AL cases and reactive control. LY-X, LY-Z, MO-Y, MO-Z, NE-WX, NE-WY, NE-WZ, LY-WZ, MO-WX, MO-WY, and MO-WZ were higher, while NE-SSC, NE-FSC and MO-X were significantly lower ($P< 0.05$) (Table 1).

The CPD parameters were used to establish the ROC curve to differentiate between AL cases and control (healthy + reactive). Based on the AUC, NE-WY, MO-WX, NE-WZ, NE-WX were the most effective parameters, with sensitivity and specificity extending between 74.76 – 81.55 % and 82.47 – 91.75 % respectively (Table 2) (Diagram 1).

Table 1: Comparison between acute leukemia cases and control groups regarding the CPD parameters

		Acute leukemia	Healthy control	*P*-value*	Reactive control	*P*-value**
		No. = 103	No. = 51		No. = 50	
NE-SSC	Median (IQR)	147.7 (121.7 – 153.3)	153.9 (151 – 156.9)	<0.001	157.2 (152.7 – 162)	
	Range	60.3 – 165.2	140.4 – 168.4		90.2 – 171	<0.001
NE-SFL	Median (IQR)	53.7 (47.4 – 62.4)	51.6 (49.5 – 53.8)	0.187	56.2 (53 – 62)	
	Range	30.5 – 153.3	46 – 86.2		47.2 – 72	0.055
NE-FSC	Median (IQR)	84.6 (71.2 – 92.3)	91.6 (87.6 – 94.2)	<0.001	89 (85.7 – 91.7)	
	Range	55.8 – 165.4	76.2 – 99.8		77.3 – 97.7	0.005
LY-X	Median (IQR)	84.6 (82.3 – 94.6)	83.6 (81.8 – 85.5)	0.011	82.65 (81.7 – 84.1)	
	Range	72.5 – 136	78 – 87		75.7 – 88	0.001
LY-Y	Median (IQR)	78.7 (71.3 – 83.9)	76.4 (73.3 – 80.9)	0.380	75.95 (70.3 – 80)	
	Range	51.8 – 169.6	44.2 – 90.6		30.1 – 91.3	0.099
LY-Z	Median (IQR)	60.6 (58.4 – 62.5)	62 (58.8 – 62.6)	0.096	59.25 (57.4 – 61.5)	
	Range	52.5 – 127	56.2 – 93.5		51.8 – 65.9	0.028
MO-X	Median (IQR)	121.5 (113.4 – 128.7)	123.5 (122 – 127.3)	0.092	127.4 (124.9 – 129)	
	Range	61.6 – 603	106.2 – 134.7		105.8 – 654	<0.001
MO-Y	Median (IQR)	132.8 (121.9 – 145.6)	120 (116.8 – 125.6)	<0.001	122.5 (118 – 129.2)	
	Range	87.8 – 1187	107.9 – 143.6		95 – 1008	<0.001
MO-Z	Median (IQR)	67.8 (64.8 – 70.8)	68.6 (64.9 – 70.1)	0.583	66.05 (63.6 – 68.7)	
	Range	51.9 – 525	54.3 – 79.3		57.1 – 72.8	0.024
NE-WX	Median (IQR)	432 (359 – 557)	308 (299 – 331)	<0.001	330.5 (317 – 343)	
	Range	73 – 1306	29.7 – 427		127.5 – 727	<0.001
NE-WY	Median (IQR)	1385 (754 – 1904)	615 (572 – 647)	<0.001	682.5 (645 – 750)	
	Range	151 – 4464	529 – 1068		135.1 – 1725	<0.001
NE-WZ	Median (IQR)	899 (742 – 1083)	674 (641 – 694)	<0.001	646 (618 – 716)	
	Range	91 – 2923	589 – 787		64.9 – 853	<0.001
LY-WX	Median (IQR)	530 (450 – 607)	470 (437 – 510)	0.004	512 (476 – 620)	
	Range	96 – 1521	393 – 596		293 – 1142	0.447
LY-WY	Median (IQR)	1041 (903 – 1180)	907 (859 – 958)	<0.001	1043.5 (958 – 1155)	
	Range	655 – 1426	98.7 – 1121		462 – 3371	0.649
LY-WZ	Median (IQR)	695 (613 – 780)	578 (524 – 616)	<0.001	568 (527 – 694)	
	Range	460 – 1357	5.7 – 714		462 – 1219	<0.001
MO-WX	Median (IQR)	347 (301 – 383)	258 (236 – 278)	<0.001	263.5 (248 – 287)	
	Range	200 – 2506	85 – 326		132 – 416	<0.001

MO-WY	Median (IQR)	856 (664 – 1016)	689 (601 – 742)	<0.001	783.5 (688 – 815)	
	Range	164 – 1355	6.74 – 1117		42 – 1046	0.006
MO-WZ	Median (IQR)	735 (648 – 805)	636 (572 – 709)	<0.001	593 (550 – 646)	
	Range	440 – 959	68.9 – 826		409 – 819	<0.001

(*) *P* value when acute leukemia cases were compared to healthy control
(**) *P* value when acute leukemia cases were compared to reactive control

Table 2: Performance characteristics of significant CPD parameters in differentiating acute leukemia cases from controls

	Cut off point	AUC	Sensitivity%	Specificity%	PPV%	NPV%
NE-SSC	≤ 149.4	0.810	59.22	90.72	87.1	67.7
NE-FSC	≤ 82.9	0.665	47.57	95.88	92.5	63.3
LY-X	>87.5	0.562	21.36	97.94	91.7	54.0
MO-Y	>135.1	0.691	46.60	93.81	88.9	62.3
NE-WX	>351	0.820	79.61	89.69	89.1	80.6
NE-WY	>720	0.869	81.55	82.47	83.2	80.8
NE-WZ	>749	0.848	74.76	87.63	86.5	76.6
LY-WY	>1075	0.602	42.72	79.38	68.7	56.6
LY-WZ	>647	0.767	65.05	81.44	78.8	68.7
MO-WX	>296	0.868	76.70	91.75	90.8	78.8
MO-WY	>820	0.696	58.25	83.51	78.9	65.3
MO-WZ	>687	0.793	66.99	79.38	77.5	69.4

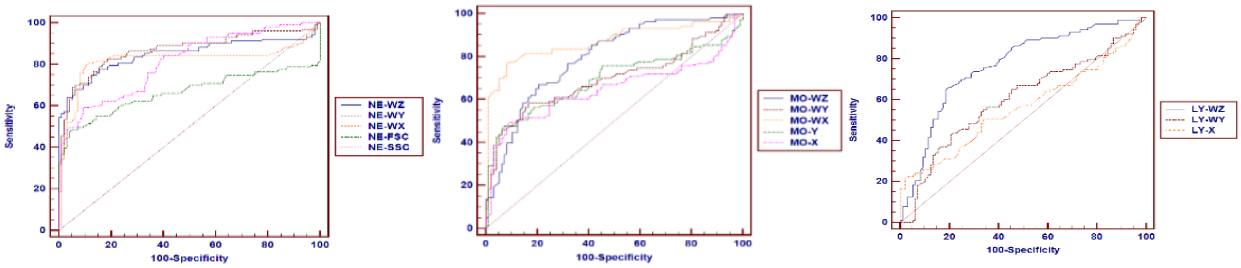

Diagram 1: Receiver operating characteristic (ROC) curve for the diagnostic accuracy of NE-SSC, NE-FSC, NE-WX, NE-WY, NE-WZ, MO-X, MO-Y, MO-WX, MO-WY, MO-WZ, LY-X, LY-WY and LY-WZ in differentiation of AL cases from controls.

Differentiation between AML and ALL:

No statistically significant difference was found between AML and ALL cases as regard the routine CBC parameters except for the monocyte percent count which was higher in AML (*P*<0.001) and lymphocyte percent count which was higher in ALL (*P*<0.001).

As shown in Table 3 upon comparing AML and ALL groups regarding the CPD parameters, ALL cases revealed significantly lower MO-X, MO-Y, NE-WX, NE-WZ, MO-WY and significantly higher NE-FSC. The parameter with maximum area under curve was MO-X with value of 0.902, followed by MO-Y> NE-WZ> NE-FSC. At cutoff value of ≤ 115.9, the parameter, MO-X was capable to delineate ALL patients with 83.33% sensitivity and 82.28% specificity (Table 4) (Diagram 2).

Table 3: Comparison between AML and ALL groups regarding the CPD parameters

		AML group	ALL group	P-value
		No. = 79	No. = 24	
NE-SSC	Median (IQR)	146.8 (124 – 153.2)	149.7 (100.4 – 155.5)	0.119
	Range	60.3 – 160.7	79.7 – 165.2	
NE-SFL	Median (IQR)	53.5 (44.5 – 71.4)	54.7 (50.2 – 58.55)	0.740
	Range	30.5 – 153.3	37.9 – 67.9	
NE-FSC	Median (IQR)	78.3 (69.1 – 90.4)	90 (85.65 – 121.55)	<0.001
	Range	55.8 – 160.9	68.7 – 165.4	
LY-X	Median (IQR)	84.6 (81.5 – 98)	84.95 (82.85 – 90.2)	0.818
	Range	72.5 – 136	80.7 – 97.4	
LY-Y	Median (IQR)	78.7 (71.3 – 88.2)	78.65 (73.6 – 81.45)	0.731
	Range	51.8 – 169.6	55.3 – 95	
LY-Z	Median (IQR)	60.6 (58.9 – 62.5)	60.5 (57.6 – 62.45)	0.468
	Range	52.5 – 127	53.1 – 67	
MO-X	Median (IQR)	124.8 (119.4 – 131.6)	109.25 (106.3 – 114.95)	<0.001
	Range	61.6 – 603	105 – 121.7	
MO-Y	Median (IQR)	139 (123.9 – 151.7)	116.9 (110.95 – 130.3)	<0.001
	Range	87.8 – 1187	89 – 145.6	
MO-Z	Median (IQR)	67.5 (64.8 – 71)	68 (64.05 – 69.8)	0.585
	Range	59.1 – 525	51.9 – 75	
NE-WX	Median (IQR)	480 (355 – 576)	373 (363.5 – 433)	0.028
	Range	73 – 1306	266 – 590	
NE-WY	Median (IQR)	1532 (754 – 2167)	1124 (746.5 – 1581.5)	0.090
	Range	151 – 4464	617 – 3010	
NE-WZ	Median (IQR)	982 (796 – 1113)	750 (693.5 – 821)	<0.001
	Range	91 – 2923	513 – 1011	
LY-WX	Median (IQR)	524 (442 – 629)	530 (471.5 – 554.5)	0.676
	Range	96 – 1521	306 – 773	
LY-WY	Median (IQR)	1029 (893 – 1168)	1083 (969 – 1206)	0.197
	Range	655 – 1402	692 – 1426	
LY-WZ	Median (IQR)	703 (623 – 799)	673.5 (604.5 – 736.5)	0.152
	Range	496 – 1357	460 – 983	
MO-WX	Median (IQR)	360 (305 – 392)	333.5 (293 – 363)	0.077
	Range	200 – 2506	256 – 399	
MO-WY	Median (IQR)	885 (725 – 1027)	772.5 (592 – 857)	0.022
	Range	504 – 1355	164 – 1336	
MO-WZ	Median (IQR)	745 (669 – 803)	659 (602 – 810.5)	0.051
	Range	532 – 959	440 – 927	

Table 4: Performance characteristics of NE-FSC, MO-X, MO-Y, NE-WX, NE-WZ, and MO-WY in differentiating ALL from AML cases

	Cut off point	AUC	Sensitivity%	Specificity%	PPV%	NPV%
NE-FSC	>85.1	0.743	83.33	64.56	41.7	92.7
MO-X	≤ 115.9	0.902	83.33	82.28	58.8	94.2
MO-Y	≤ 133	0.791	87.50	58.23	38.9	93.9
NE-WX	≤ 507	0.649	95.83	45.57	34.8	97.3
NE-WZ	≤ 888	0.772	91.67	64.56	44.0	96.2
MO-WY	≤ 858	0.654	79.17	55.70	35.2	89.8

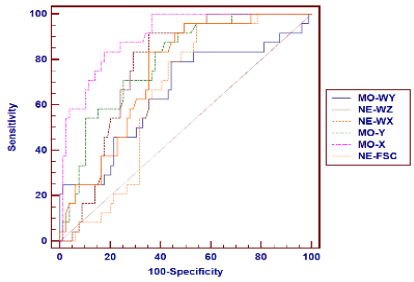

Diagram 2: Receiver operating characteristic (ROC) curve for the diagnostic accuracy of MO-WY, NE-WZ, NE-WX, MO-Y, MO-X and NE-FSC in differentiating ALL from AML cases.

DISCUSSION:

A rapid and effective screening method is required for the first workup of AL in order to facilitate prompt treatment. The present study assessed the clinical utility of the leucocytes CPD parameters reported by Sysmex XN-1000 auto-analyzer aiming for early detection of AL patients and sub-classification into AML or ALL.

Comparing AL cases to both healthy and reactive controls, we found considerable differences in many CPD parameters especially those related to width of dispersion (WX, WY, and WZ) of the neutrophilic, monocytic and lymphocytic population. Similar to our findings, Haider et al. [7] who studied neutrophilic CPD parameters reported that NE-WX, NE-WY, and NE-WZ levels were higher in AL cases compared to healthy control, while NE-SSC and NE-FSC levels were lower or within normal limits. In contrast to their study [7], we didn't find significant difference between AL cases and healthy control as regard the NE-SFL which was higher in their AL cases. In another study [3], it was found that the neutrophilic and monocytic widths of distribution were considerably higher, as well as lymphocytic side scatter (LY-X), and forward scatter (LY-Z) in AML patients than healthy controls.

In the current study, the best parameters that discriminate between AML and ALL were MO-X, MO-Y, NE-WZ, NE-FSC (P<0.001). Similar to our observation regarding NE-WZ, Haider et al. [7] reported that NE-WZ had high efficiency, to distinguish AML from ALL patients and control groups in addition to NE-WX, NE-WY. While Mishra et al, [3] found that NE-WY, LY-X, NE-WX, and MO-WY attained 85–90% sensitivity and 80–83% specificity in discriminating AML from ALL.

Acute leukemia, particularly AML, is characterized by abnormal neutrophil maturation on both sides: cytoplasmic [including defect in primary and/or secondary granule, presence of Auer rods]) and nuclear (such as abnormal nuclear segmentations)] [7], in the SFL vs SSC scattergram of the XN-1000 auto-analyzer, myeloid blasts show tendency to occupy the region above the mature lymphocytic, monocytic, and neutrophilic population due to their granular nature, greater nucleic acid concentration, and larger size [3]. The majority of immature cells in AML and ALL, were counted close to the neutrophils' region, which shifts and, in particular, increases the diameter of the neutrophil's scattering area. As a result, in AML patients, this region would be a mix of immature AML cells and neutrophils, resulting in elevated NE-WX, NE-WY, and NE-WZ values [7].

The Coulter LH 780 automated analyzer that provide CPD parameters based on VCS (volume, conductivity, and scatter) technology was used in a study [4] to evaluate 100 new AML cases, and the

results were compared to 100 healthy controls. The most important parameters to filter out their AML cases were neutrophilic volume, lymphocytic side scatter and conductivity, together with dispersion width.

Yang et al. [22] evaluated the utility of CPD parameters on Coulter DxH800 analyzer to diagnose acute leukemia lineages. In their study, 100% sensitivity and specificity were found in successfully identifying APL patients using a model of 21 parameters, whereas for ALL, the sensitivity was 91.5% and specificity was 96.8%.

The CPD parameters from 31 AML cases [10 APL and 21 non-APL-AML] were examined in another study [23] using the Sysmex XN 3000 auto-analyzer. When compared to AML patients, APL cases exhibited considerably lower NE-Y, LY-WY, MO-WX, and MO-WY values in their study. On the other hand, Mishra et al. [3] and Haider et al. [24] revealed that APL cases had considerably greater NE-Y than AML participants which was explained by increased DNA/RNA content in the promyelocyte cell as a result of maturation arrest at this stage leading to increased side fluorescence.

In conclusion, CPD parameters were studied to evaluate their utility in detecting AL cases and its lineages, in the light of the results of our study, it was found that CPD data would offer valuable information for screening AL patients and differentiating AML from ALL cases.

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Conflicts of interest:

The authors declare that they have no conflict of interest.

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أهمية البيانات الخاصة بكرات الدم البيضاء الصادرة من جهاز **Sysmex XN-1000** في الكشف المبكر عن سرطان الدم الحاد

نهى حسين بشناق و شمس الضحي جلال زعيمه

قسم الباثولوجيا الإكلينيكية - كلية الطب - جامعة عين شمس

الخلفية العلميه: من بين الاختبارات الأكثر تعقيدًا للعمل التشخيصي لسرطان الدم الحاد (AL) ، توفراجهزه عد خلايا الدم الآلية البيانات الخاصة بكرات الدم البيضاء (CPD) جنبًا إلى جنب مع تعداد الدم الكامل الأساسي (CBC) التي لديها القدرة على التعرف على التغيرات الشكلية في هذه الخلايا .

الهدف من هذه الدراسة: تقييم كفاءة هذه البيانات البحثية التي تم الحصول عليها بواسطة جهاز Sysmex XN-1000 للتنبؤ بتشخيص AL وتصنيفه الفرعي إلى سرطان الدم النخاعي الحاد (AML) وسرطان الدم الليمفاوي الحاد (ALL).

المرضي وطريقة البحث: تم تحليل البيانات الخاصة بكرات الدم البيضاء (CPD) من ١٠٣ عينة AL تم تشخيصها حديثًا بواسطة محلل Sysmex XN-1000 ومقارنتها مع ١٠١ عنصر تحكم مطابق للعمر (٥١ شخصًا صحيًا و ٥٠ موضوعًا تفاعليًا).

النتائج: وجدنا فروقًا ذات دلالة إحصائية في العديد من بيانات CPD بين مرضى AL وكل من الضوابط الصحية والمتفاعلة ، لا سيما تلك المتعلقة بعرض تشتت خلايا العدلات ، و خلايا الوحيدات والخلايا اللمفاويه جنبًا إلى جنب مع البيانات المتعلقة بكثافة التشتت الجانبي لخلايا العدلات و كثافة التشتت الامامي لخلايا العدلات ، وكثافة التشتت الجانبي للخلايا اللمفاويه ، وكثافة التشتت الجانبي لخلايا الوحيدات وشدة الضوء الفلوري الجانبي لخلايا الوحيدات. للتمييز بين AML عن ALL ، تم العثور على أهم الاختلافات في قيم كثافة التشتت الجانبي لخلايا الوحيدات وشدة الضوء الفلوري الجانبي لخلايا الوحيدات جنبًا إلى جنب مع عرض توزيع منطقة التشتت الامامي لخلايا العدلات.

الخلاصة: يمكن أن تكون بيانات CPD الصادرة من جهاز Sysmex XN-1000 أثناء تحليل CBC أداة مفيدة للتنبؤ بـ AL ونوعيها.