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Haematology and Transfusion

West Herts Teaching Hospitals NHS Trust operating
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Survey 2304DF: Blood Film Manual Differential Leucocyte Count
4th December 2023

Participant Reference Number:
Non participation score:

General Information
Participants were asked to perform a manual differential leucocyte count on specimen 2308BF1 from the Blood Films for Morphology Survey 2308BF which had an automated WBC of 116.1 x 10^9/L. Both the percent and absolute differential cell counts were requested and if applicable, the absolute white blood cell counts to be corrected for the presence of NRBC.

Specimens distributed
Films were distributed to 564 participants registered for the programme. 529 (93.8%) returned results for the 2304DF survey of which 499 (94%) were included in the analysis below. Highly improbable results were excluded from the analysis. 6 (1.2%) participants reported the film as unsatisfactory.

Data analysis
Table 1 summarises the data for the percent cell count; table 2 summarises the data for NRBCs and corrected total white cell counts, and table 3, the absolute cell count.
Tables 4 to 5 give the results of Digital Imaging analysis (eg. Cellavision). Table 4 shows the results reported by the analyser before user review and Table 5 the results after review; percent cell count only.

'N' = number of laboratories reporting this cell type and '~' = CV% cannot be calculated.

Table 1: Percent cell count (%)

Cell Type	N	Median	Est SD	CV%	Reported range		Outliers excluded*		Your Result
					Min	Max	Min	Max	
Neutrophils (inc. Bands)	499	9.0	7.4	82.4	0.0	97.0	0.0	23.8	10.7
Lymphocytes	465	1.0	1.1	111.2	0.0	82.0	0.0	3.2	0.5
Monocytes	464	1.0	0.7	74.1	0.0	81.0	0.0	2.5	0.5
Eosinophils	494	88.0	7.4	8.4	1.0	99.0	73.2	102.8	88.3
Basophils	288	0.0	0.0	~	0.0	9.0	0.0	0.0	
Metamyelocytes	217	0.0	0.0	~	0.0	10.0	0.0	0.0	
Myelocytes	214	0.0	0.0	~	0.0	6.0	0.0	0.0	
Promyelocytes	191	0.0	0.0	~	0.0	2.0	0.0	0.0	
Blast cells	196	0.0	0.0	~	0.0	58.0	0.0	0.0	
Smear cells	185	0.0	0.0	~	0.0	1.0	0.0	0.0	
Neoplastic cells	176	0.0	0.0	~	0.0	1.0	0.0	0.0	

*(Median +/- 2 x ESD) approximates to 95% of results

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Table 2: Nucleated red cell and corrected white cell counts

Parameter	N	Median	Est SD	CV%	Reported range		Outliers excluded*		Your Result
					Min	Max	Min	Max	
NRBC (/100WBC)	485	4.0	2.2	55.6	0.0	20.0	0.0	8.4	1.0
Corrected WBC (10^9/L)	474	111.6	2.4	2.1	85.9	116.1	106.8	116.4	114.9

Table 3: Absolute cell count (10^9/L)

Cell Type	N	Median	Est SD	CV%	Reported range		Outliers excluded*		Your Result
					Min	Max	Min	Max	
Neutrophils (inc. Bands)	481	10.0	8.2	81.5	0.0	112.6	0.0	26.3	12.2
Lymphocytes	444	1.1	1.1	102.8	0.0	93.3	0.0	3.4	0.6
Monocytes	447	1.2	0.9	74.1	0.0	107.1	0.0	3.0	0.6
Eosinophils	473	98.7	9.7	9.9	1.1	114.9	79.2	118.2	101.5
Basophils	254	0.0	0.0	~	0.0	10.1	0.0	0.0	
Metamyelocytes	185	0.0	0.4	~	0.0	104.1	0.0	0.7	
Myelocytes	181	0.0	0.0	~	0.0	6.6	0.0	0.0	
Promyelocytes	161	0.0	0.0	~	0.0	1.1	0.0	0.0	
Blast cells	167	0.0	0.0	~	0.0	49.9	0.0	0.0	
Smear cells	158	0.0	0.0	~	0.0	1.1	0.0	0.0	
Neoplastic cells	148	0.0	0.0	~	0.0	1.2	0.0	0.0	

Expert comment (*Professor Barbara Bain)*

The improbable manual count results, even when extreme outliers are excluded, suggests that there are many inaccurate differential counts. The neutrophil count was certainly not zero. In a film with many degranulated eosinophils, very careful examination of cytological features is needed to identify these cells.

The digital imaging results are instructive. The digital imaging system has identified some of the abnormal eosinophils as monocytes and some as neutrophils, errors which have been corrected in the post-verification counts. However there has again been a failure to identify *any* neutrophils in some of the post-verification counts.

For further comments on the film please see the report for the associated blood film morphology exercise 2308BF1.

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Digital Imaging results: pre-verification

Table 4: Percent cell count (%)

Cell Type	N	Median	Est SD	CV%	Reported range		Outliers excluded*		Your Result
					Min	Max	Min	Max	
Neutrophils (inc. Bands)	25	46.0	14.8	32.2	10.2	68.0	16.3	75.7	
Lymphocytes	23	1.0	1.3	129.7	0.0	8.0	0.0	3.6	
Monocytes	25	6.0	4.4	74.1	0.0	24.0	0.0	14.9	
Eosinophils	25	33.0	9.3	28.3	9.0	89.1	14.3	51.7	
Basophils	23	1.0	1.7	166.8	0.0	11.0	0.0	4.3	
Metamyelocytes	22	1.0	1.4	146.3	0.0	3.0	0.0	3.7	
Myelocytes	22	1.0	1.4	144.6	0.0	6.0	0.0	3.9	
Promyelocytes	21	0.5	0.7	148.3	0.0	4.0	0.0	2.0	
Blast cells	16	0.0	0.0	~	0.0	1.0	0.0	0.0	
Smear cells	12	0.0	0.0	~	0.0	14.0	0.0	0.0	
Neoplastic cells	14	0.0	5.6	~	0.0	17.5	0.0	11.1	

Digital Imaging results: post- verification

Table 5: Percent cell count (%)

Cell Type	N	Median	Est SD	CV%	Reported range		Outliers excluded*		Your Result
					Min	Max	Min	Max	
Neutrophils (inc. Bands)	22	9.9	5.0	50.4	1.5	83.7	0.0	19.9	
Lymphocytes	19	0.9	0.7	82.4	0.0	3.7	0.0	2.4	
Monocytes	20	1.0	1.2	118.6	0.0	3.3	0.0	3.4	
Eosinophils	22	89.5	5.6	6.3	10.6	95.6	78.2	100.7	
Basophils	17	0.0	0.0	~	0.0	1.0	0.0	0.0	
Metamyelocytes	16	0.0	0.7	~	0.0	3.0	0.0	1.5	
Myelocytes	16	0.0	0.0	~	0.0	1.0	0.0	0.0	
Promyelocytes	14	0.0	0.0	~	0.0	1.0	0.0	0.0	
Blast cells	15	0.0	0.0	~	0.0	1.0	0.0	0.0	
Smear cells	13	0.0	0.0	~	0.0	11.0	0.0	0.0	
Neoplastic cells	11	0.0	0.0	~	0.0	0.0	0.0	0.0	