

Verein für
Association pour le
Associazione per il



medizinische Qualitätskontrolle
contrôle de qualité médical
controllo di qualità medico

Report

Differential Blood Smear H3

MQ 2023-2

Acknowledgements

The Zybio Z3 analyzer was provided by the company Polymed, the ABX Microsemi CRP analyzer by the company Axonlab and the XP-300 analyzer by the Firma Sysmex. MQ employees conducted the measurements.

The findings of the XN-20 and ADVA 2120 devices and of the microscopic blood counts were generated by the Central Laboratory of Medical Diagnostic HAD of the University Hospital Zurich Hematology Clinic. The lab is ISO/IEC 17025 certified (STS 445). Prof. Dr. med. Stefan Balabanov is the responsible manager; Prof. MG Manz, M.D., the clinic director.

www.haematologie.usz.ch

For information regarding all analyses offered by the University Hospital of Zurich, see:

www.uzl.usz.ch

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1 Sample A

1.1 Sysmex XP300



Findings MQ 2023-2 H3A
17 year old man

WBC	+	24.0	$10^3/\mu\text{L}$	WBC 	
RBC	-	3.98	$10^6/\mu\text{L}$		
HGB	-	11.7	g/dL		
HCT	-	34.1	%		
MCV		85.7	fL		
MCH		29.4	pg		
MCHC		34.3	g/dL		
PLT		170	$10^3/\mu\text{L}$		
LYM%	-	2.0	%		RBC
MXD%	-	1.1	%		
NEUT%	+	96.9	%		
LYM#	-	0.5	$10^3/\mu\text{L}$		
MXD#	-	0.3	$10^3/\mu\text{L}$		
NEUT#	+	23.2	$10^3/\mu\text{L}$		PLT
RDW_SD		44.0	fL		
RDW_CV		13.3	%		
PDW		9.6	fL		
MPV		8.4	fL		
P_LCR	-	13.4	%		
PCT	-	0.14	%		

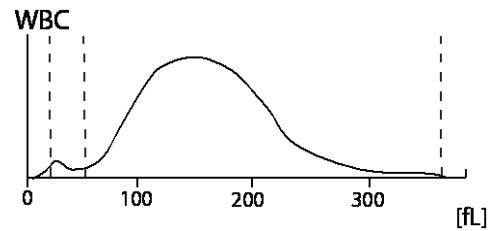
1.2 Zybio Z3 CRP



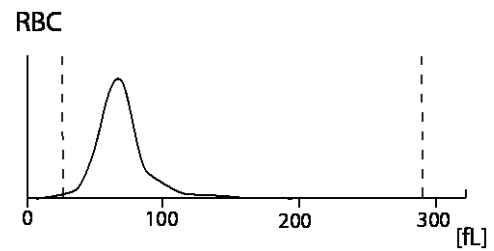
Findings MQ 2023-2 H3A

17 year old man

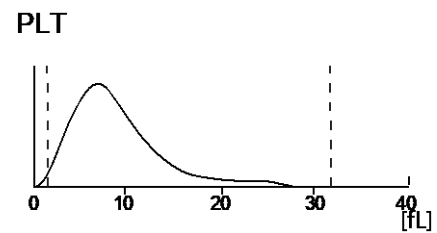
WBC	24.62	↑	10 ³ /μl	3.50-9.50
Lym#	1.21		10 ³ /μl	1.10-3.20
Mid#	1.50		10 ³ /μl	0.10-3.20
Gran#	21.91	↑	10 ³ /μl	1.80-6.30
LYM%	4.9	↓	%	20.0-50.0
Mid%	6.1		%	3.0-15.0
GRAN%	89.0	↑	%	40.0-75.0



RBC	4.01		10 ⁶ /μl	3.80-5.80
HGB	12.6		g/dl	11.5-17.5
HCT	32.9	↓	%	35.0-50.0
MCV	82.2		fL	82.0-100.0
MCH	31.4		pg	27.0-34.0
MCHC	38.2	↑	g/dl	31.6-35.4



RDW-CV	13.7		%	11.5-16.0
RDW-SD	37.8		fL	35.0-56.0
PLT	148		10 ³ /μl	125-350
MPV	8.3		fL	6.5-12.0
PDW	15.7		fL	9.0-17.0
PCT	0.123		%	0.108-0.282
P-LCC	20	↓	10 ³ /μl	30-90
P-LCR	13.2		%	11.0-45.0



1.3 Sysmex XN-20

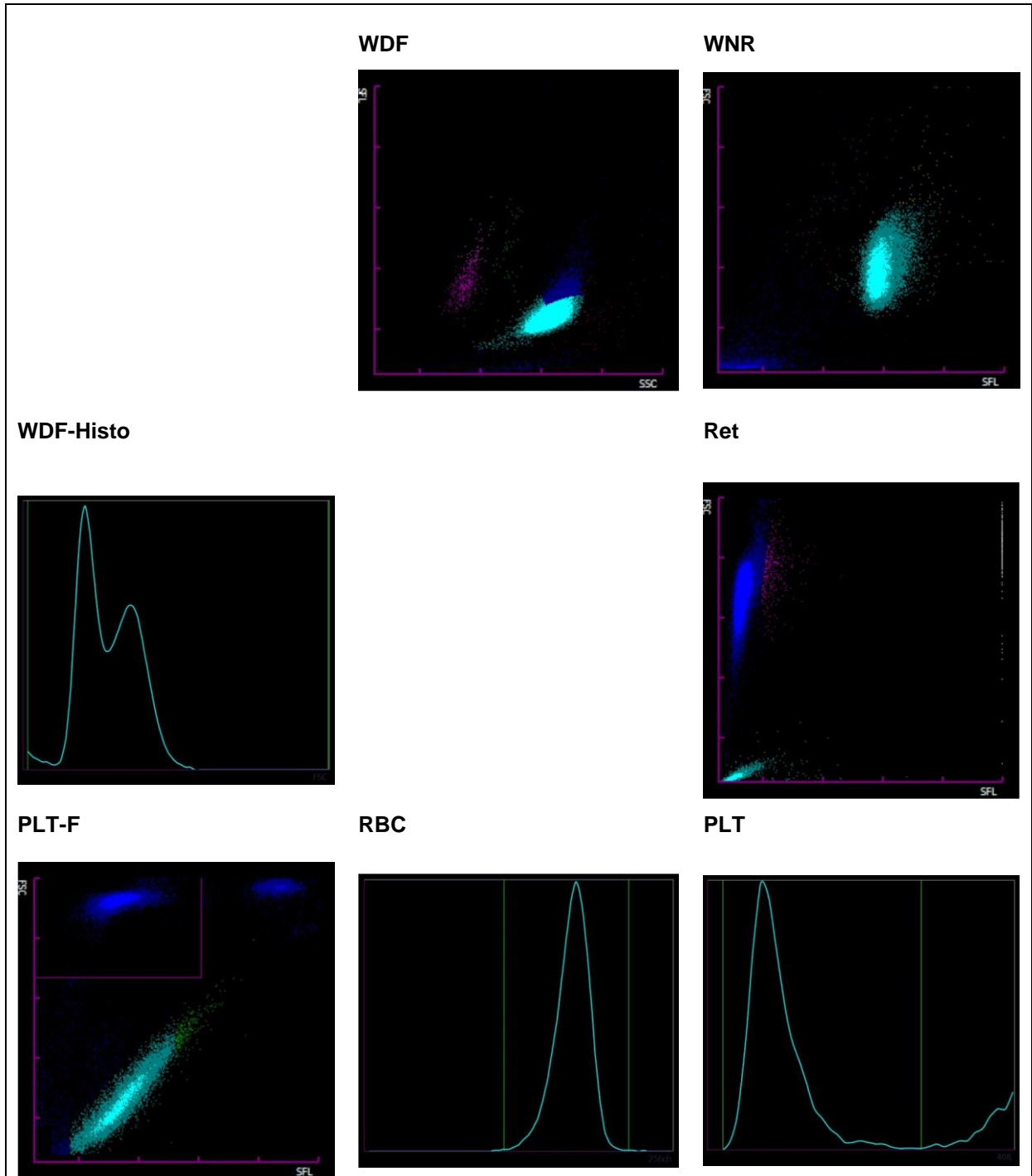


Findings MQ 2023-2 H3A

17 year old man

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	117	g/l	117-153
<u>Hematocrit</u>	0.324	l/l	0.35-0.46
Erythrocytes	3.92	T/l	3.9-5.2
MCV	82.7	fl	80-100
MCH	29.8	pg	26-34
MCHC	* 361	g/l	310-360
Mikrocytes	12.9	%	11.0-14.8
<u>Thrombocytes</u>	180	G/l	143-400
<u>Leucocytes</u>	* 24.29	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	* 21.74	G/l	1.40 – 8.00
Monocytes	* 0.05	G/l	0.16 – 0.95
Eosinophils	0.06	G/l	0.00 – 0.70
Basophils	0.05	G/l	0.00-0.15
Lymphocytes	* 0.38	G/l	1.50 - 4.00
IG abs.	* 2.01	G/l	0.00 – 0.03
IG %	* 8.3	%	0.0 – 0.05
NRBC abs.	0.06	G/l	
NRBC	0.2	/100 Lc	

Findings HAD MQ 2023-2 H3A



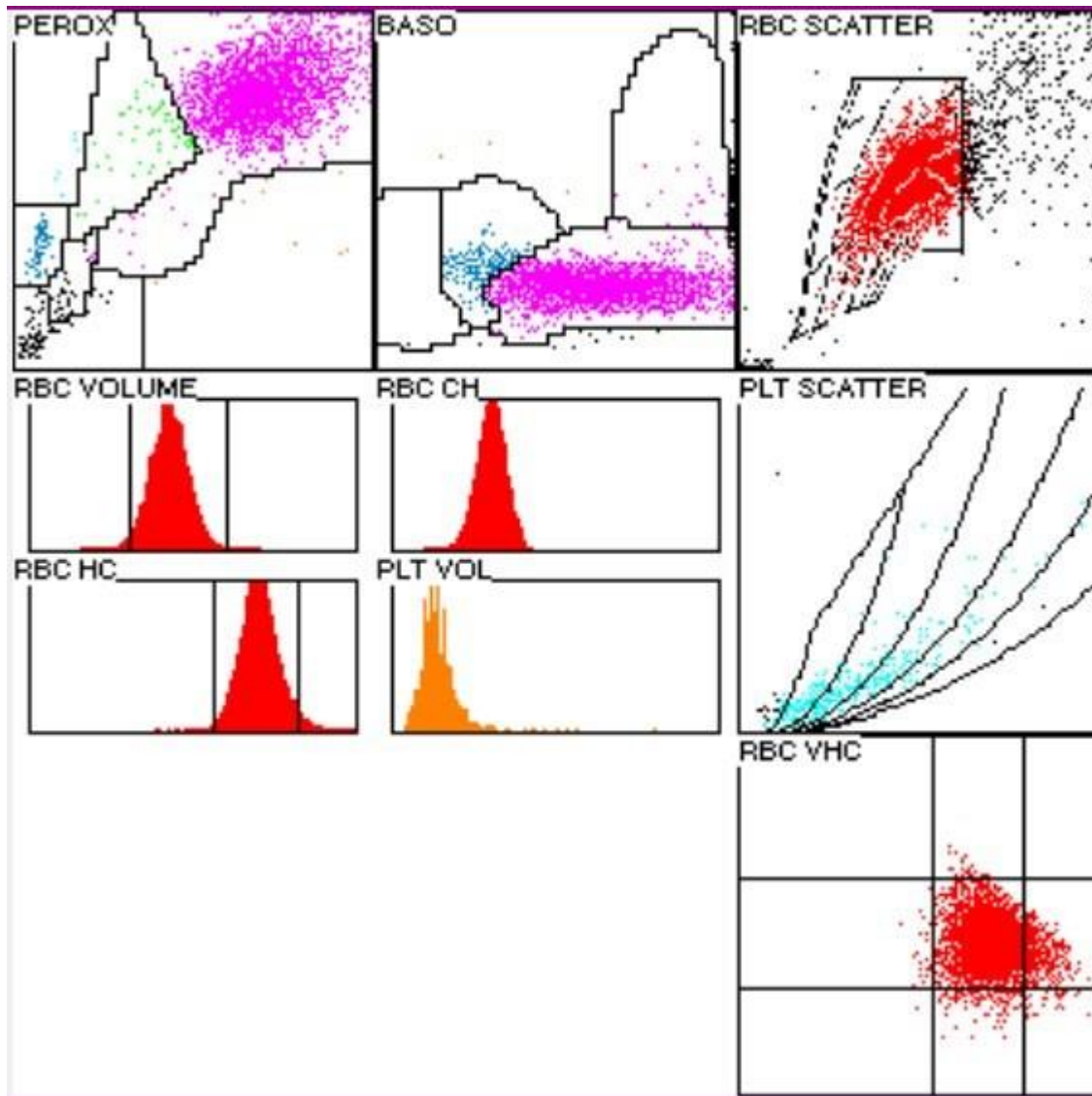
1.4 ADVIA 2120



Findings HAD MQ 2023-2 H3A

17 year old man

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	121	g/l	117-153
<u>Hematocrit</u>	0.356	l/l	0.35-0.46
Erythrocytes	4.17	T/l	3.9-5.2
MCV	85.3	fl	80-100
MCH	29.0	pg	26-34
MCHC	339	g/l	310-360
Mikrocytes	1.6	%	0-2.0
Macrocytes	0.3	%	0-2.0
Hypochromic Ec	0.5	%	0-2.0
Hyperchromic Ec	* 2.8	%	0-2.0
RDW	13.8	%	11.0-14.8
<u>Thrombocytes</u>	* 139	G/l	143-400
Vd. L-SHIFT	+	+	Keine (0)
<u>Leucocytes</u>	* 25.59	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	* 24.79	G/l	1.40-8.00
Monocytes	0.23	G/l	0.16-0.95
Eosinophils	0.04	G/l	0.00-0.70
Basophile	0.01	G/l	0.00-0.15
Lymphocytes	* 0.50	G/l	1.50-4.00
LUC	0.03	%	0.0-4.0



1.5 Differential Blood Smear

Findings HAD MQ 2023-2 H3A

17 year old man

Analysis		Result	Unit	Reference value
Neutrophils total	*	25.08	G/l	1.40-8.00
Monocytes	*	0.00	G/l	0.16-0.95
Eosinophils		0.00	G/l	0.00-0.70
Basophils		0.00	G/l	0.00-0.15
Lymphocytes	*	0.51	G/l	1.50-4.00
Neutrophils total	*	98.0	%	40.0-74.0
Neutrophils Band		15.0	%	0.0-20.0
Neutrophils Segmented	*	83.0	%	30.0-50.0
Monocytes	*	0.0	%	3.4-9.0
Eosinophils		0.0	%	0.0-7.0
Basophils		0.0	%	0.0-1.5
Lymphocytes	*	2.0	%	19.0-48.0
Plasmacells		0.0	%	0-0.5
Blasts		0.0	%	0
Promyelocytes		0.0	%	0
Myelocytes		0.0	%	0
Metamyelocytes		0.0	%	0
Nucleated Red Cells		0.0	%	0

Commentary

Leukocytosis with absolute neutrophilia; neutrophil granulocytes with coarsened cytoplasmic granulation, fine basophilic streaks and many with cytoplasmic vacuoles. Normochromic, slightly anisocytic red blood count with few microcytes. Platelets morphologically unremarkable.

Dr.J.-D. Studt/ Dr. S. Balabanov

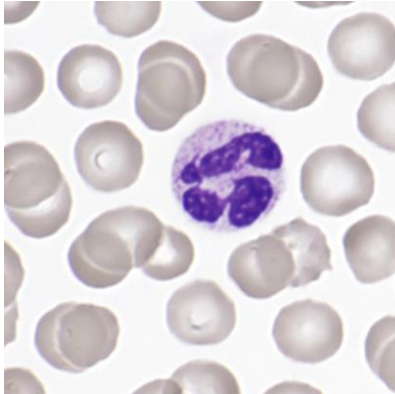


Abb 1. Neutrophile (Seg)

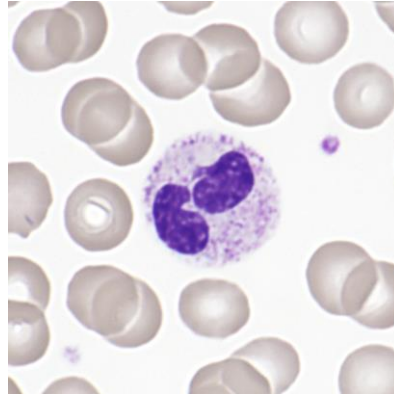


Abb 2. Neutrophile (Seg)

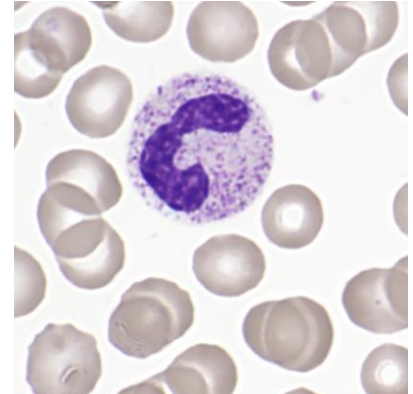


Abb 3. Neutrophile (Rod)

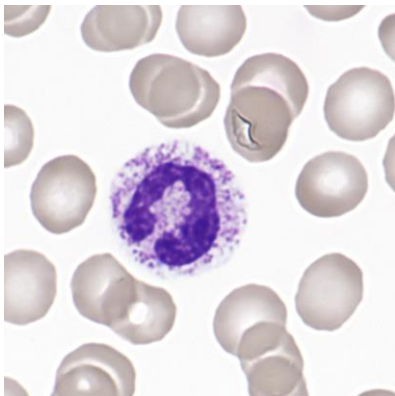


Abb 4. Neutrophile (Seg)

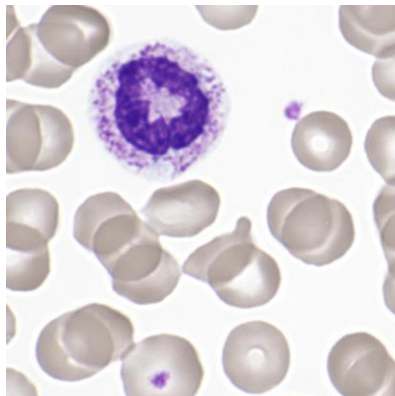


Abb 5. Neutrophile (Seg)

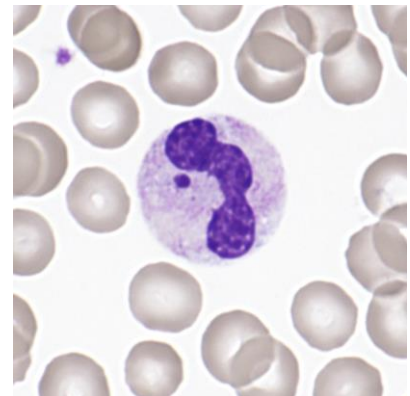


Abb 6. Neutrophile (Seg)

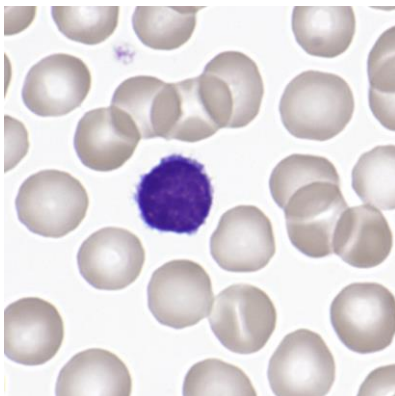


Abb 7. Lymphocyte

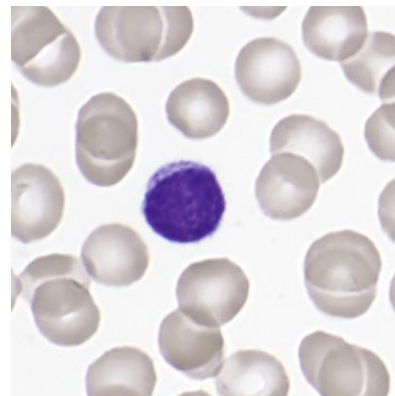


Abb 8. Lymphocyte

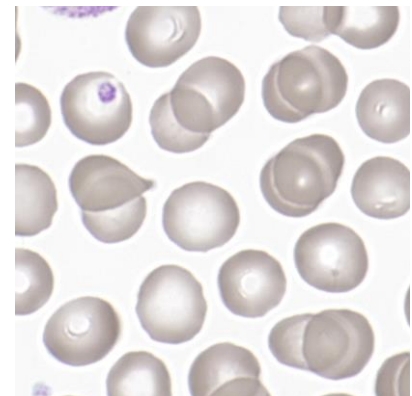


Abb 9. Erythrocytes

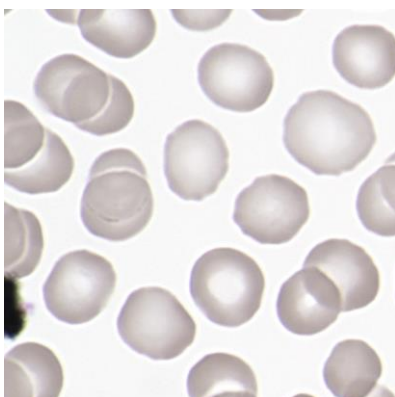


Abb 10. Erythrocytes

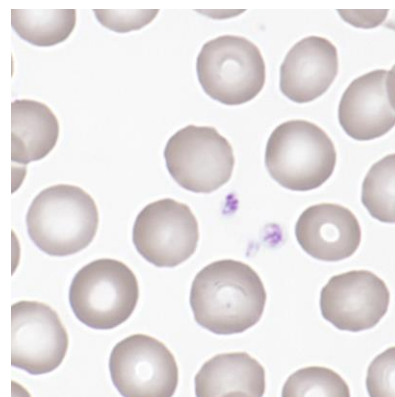


Abb 11. Platelets

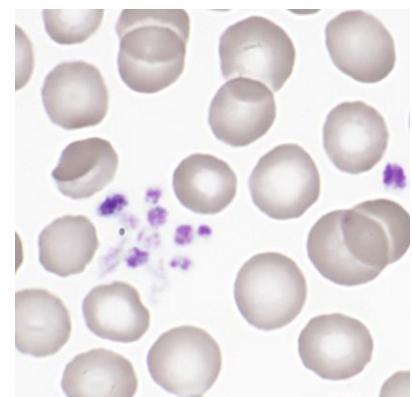


Abb 12. Platelets

1.6 Summary of participant results

Leukocyte Differenzial H3-A

	0	1-4	5-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	>79
<i>Neutrophils Band</i>		10	26	80*	39	15	4	3		1	
<i>Neutrophils Segmented.</i>			1				5	7	17	51	97*
<i>Eosinophils</i>	147*	28	2		1						
<i>Basophile</i>	166*	12									
<i>Monocytes</i>	134*	44									
<i>Lymphocytes</i>	4	154*	15	5							
<i>Plasmacells</i>	177*	1									
<i>Blasts</i>	178*										
<i>Promyelocytes</i>	178*										
<i>Myelocytes</i>	178*										
<i>Metamyelozyten</i>	171*	7									
<i>Erythrocytes Nucleated</i>	177*	1									
<i>Unknown</i>	177*	1									
<i>Smudge cells</i>	171*	6		1							

Evaluation H3-A

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	48	14	4	<i>Hypochromic Ec</i>	36	8	2
<i>Pelger-Hüet Anomaly</i>	1	1		<i>Polychromatic Ec</i>	9	1	
<i>Coarse Granulation</i>	53*	80	16	<i>Anisocytes</i>	87*	5	
<i>Basophilic Stripling</i>	59*	2		<i>Mikrocytes</i>	53*	6	1
<i>Vacuoles</i>	59*	12	1	<i>Makrocytes</i>	14		1
<i>Reaktive Lymphocytes</i>	1	1		<i>Megalocytes</i>		1	
<i>Atypical Lymphocytes</i>				<i>Poikilocytosis</i>	25	3	
<i>Others</i>				<i>Ovalocytes</i>	22		
				<i>Target Cells</i>	6		
				<i>Akanthocytes</i>	12	1	
<i>Anisocytosis</i>	35	4	1	<i>Echinocytes</i>	22	3	1
<i>Megakaryocyte Nucleaus</i>	2			<i>Sickle Cells</i>			
<i>Granulation</i>	10	4		<i>Fragmentocytes</i>	3		
<i>Others</i>				<i>Spherocytes</i>	2		
				<i>Stomatocytes</i>	3		
				<i>Basophilic Stripling</i>	5		
				<i>Howell-Jolly Bodies</i>	6		
				<i>Pappenheim Bodies</i>	1	1	
				<i>Others</i>	1		

The blood count was from a patient with absolute neutrophilia.

1.7 Qualab Codes

Summary of the participant codes
(Bold printed: expected codes)

Code	Text	Number
4	Neutrophils, Toxic Changes	112
31	Pathologic findings	91
2	Neutrophils, left shift	62
30	Pathologic findings, refer to expert	60
1	Neutrophils, hypersegmentation of nucleus	54
12	Microcytes	29
14	Hypochromic Erythrocytes	25
27	Erythrocytes, other	20
29	Normal findings	16
16	Poikilocytosis	14
11	Thrombocytes, others	13
10	Thrombocyte aggregates	8
17	Elliptocytes/Ovalocytes	8
22	Rouleaux	6
15	Polychromatophilic Red Cells	4
24	Howell-Jolly bodies	4
25	Basophilic strippling	4
8	Leucocytes other:	3
19	Targetcells	3
3	Pelger Hüet Anomaly	2
9	Macrothrombocytes	2
13	Macrocytes	2
18	Stomatocytes	2
26	Teardrops	2
5	Atypical lymphocytes, probably reactive	1
20	Fragmentocytes	1
21	Spherocytes	1
99	Total	171

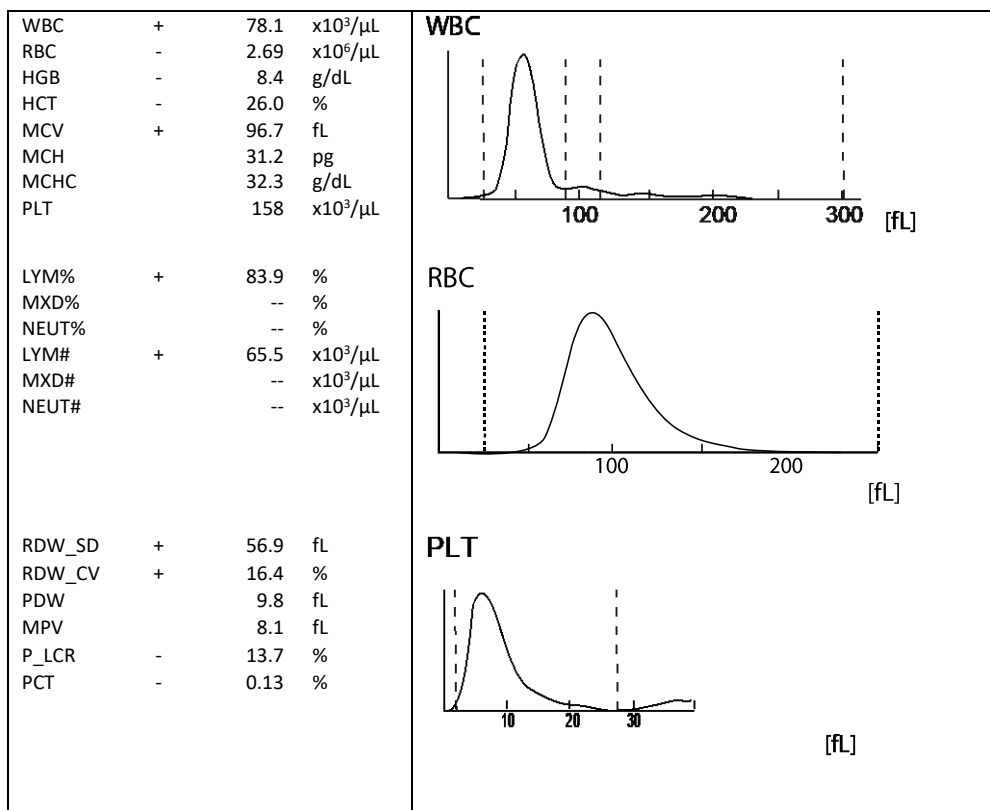
2 Sample B

2.1 Sysmex XP300



Findings MQ 2023-2 H3B

81 year old man



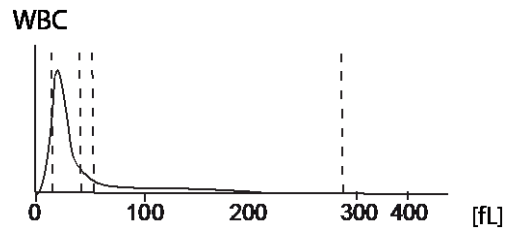
2.2 Zybio Z3 CRP



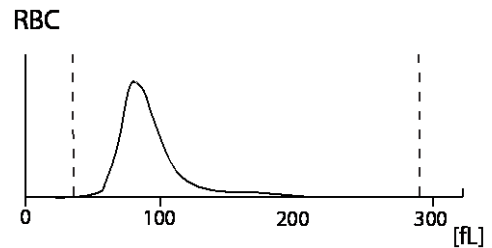
Findings HAD MQ 2023-2 H3B

81 year old man

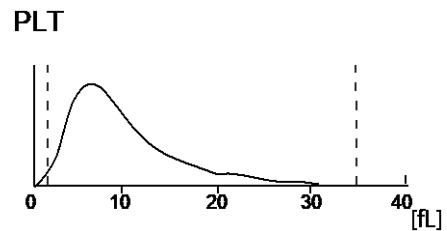
WBC	71.22	↑	10 ³ /μl	3.50-9.50
Lym#	58.12	↑	10 ³ /μl	1.10-3.20
Mid#	1.92	↑	10 ³ /μl	0.10-3.20
Gran#	11.18	↑	10 ³ /μl	1.80-6.30
LYM%	81.6	↑	%	20.0-50.0
Mid%	2.7	↓	%	3.0-15.0
GRA%	15.7	↓	%	40.0-75.0



RBC	2.75	↓	10 ⁶ /μl	3.80-5.80
HGB	8.9	↓	g/dl	11.5-17.5
HCT	25.3	↓	%	35.0-50.0
MCV	92.2		fl	82.0-100.0
MCH	32.4		pg	27.0-34.0
MCHC	35.2		g/dl	31.6-35.4



RDW-CV	17.0	↑	%	11.5-16.0
RDW-SD	51.7		fL	35.0-56.0
PLT	147		10 ³ /μl	125-350
MPV	8.6		fl	6.5-12.0
PDW	16.7		fL	9.0-17.0
PCT	0.126		%	0.108-0.282
P-LCC	26	↓	10 ³ /μl	30-90
P-LCR	17.7		%	11.0-45.0



2.3 Sysmex XN-20

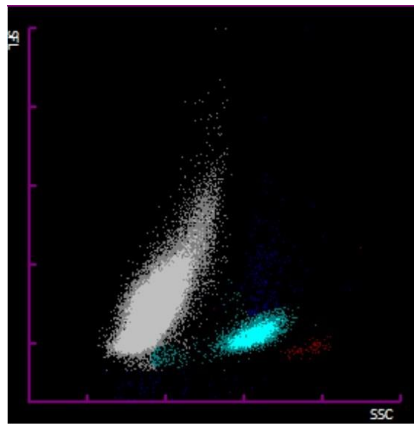


Findings HAD MQ 2023-2 H3B 81 year old man

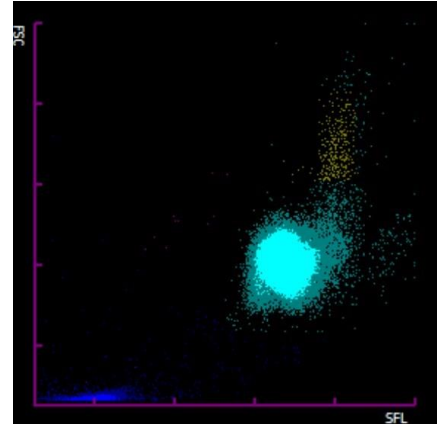
Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	80	g/l	117-153
Hematocrit	0.254	l/l	0.35-0.46
Erythrocytes	2.69	T/l	3.9-5.2
MCV	94.4	fl	80-100
MCH	29.7	pg	26-34
MCHC	315	g/l	310-360
Thrombocytes	* 136	G/l	143-400
Leucocytes	89.14	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	4.47	G/l	1.40-8.00
Monocytes	* 7.44	G/l	0.16-0.95
Eosinophils	0.08	G/l	0.00-0.70
Basophils	* 0.33	G/l	0.00-0.15
Lymphocytes	* 76.64	G/l	1.50-4.00
IG abs.	* 0.18	G/l	0.00-0.03
IG %	0.2	%	0.0-0.5
NRBC abs.	0.02	G/l	
NRBC	0.0	/100 Lc	

Findings HAD MQ 2023-2 H3B

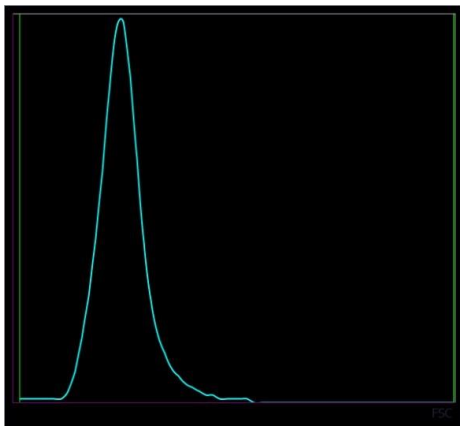
WDF



WNR



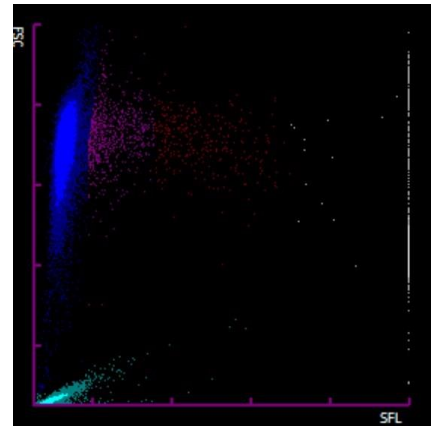
WBC-Histo



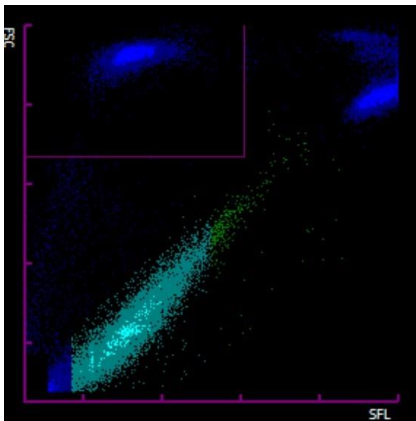
WPC



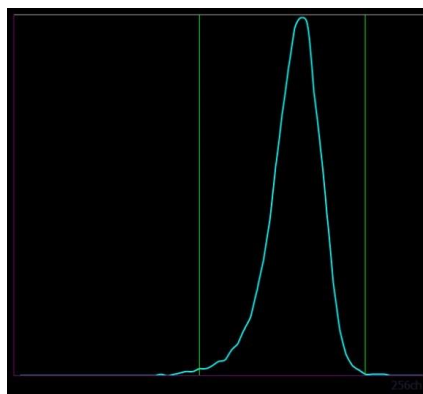
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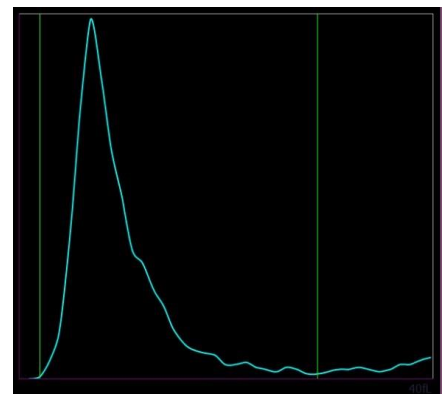
PLT-F



RBC



PLT



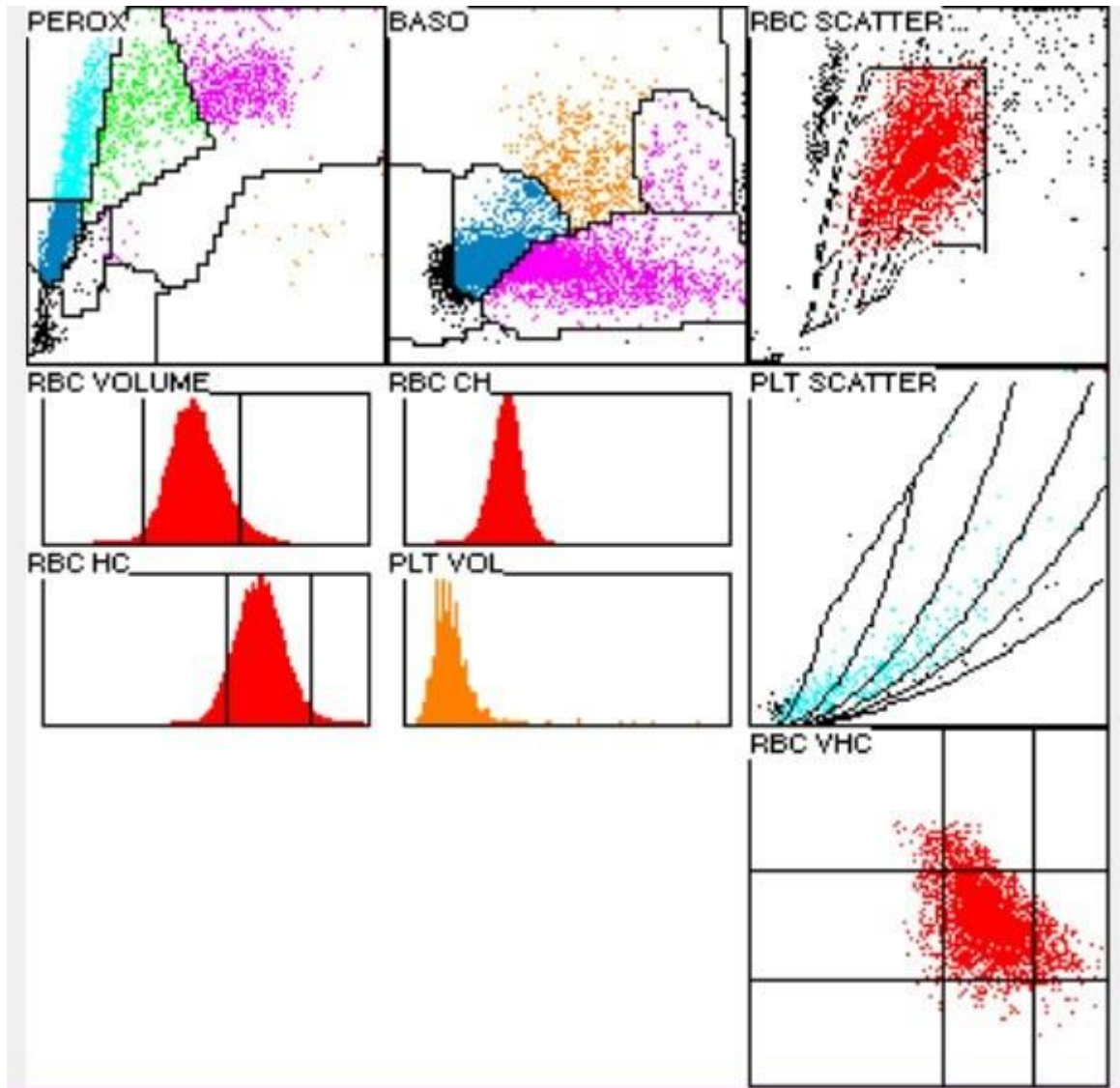
2.4 ADVIA 2120



Findings HAD MQ 2023-2 H3B

81 year old man

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	83	g/l	117-153
Hematocrit	0.259	l/l	0.35-0.46
Erythrocytes	2.76	T/l	3.9-5.2
MCV	93.9	fl	80-100
MCH	30.0	pg	26-34
MCHC	319	g/l	310-360
Mikrocytes	1.0	%	0-2.0
Makrocytes	* 5.0	%	0-2.0
Hypochromic Ec	* 7.0	%	0-2.0
Hyerchromic Ec	1.9	%	0-2.0
RDW	* 17.0	%	11.0-0-14.8
Thrombocytes	* 127	G/l	143-400
Leukocytes	* 84.26	G/l	3.0-9.6
Leucocytes Differentiation			
Neutrophils	4.34	G/l	1.40-8.00
Monocytes	* 2.32	G/l	0.16-0.95
Eosinophils	0.09	G/l	0.00-0.70
Basophils	* 2.29	G/l	0.00-0.15
Lymphocytes	* 65.91	G/l	1.50-4.00
LUC	* 11.0	%	0.0-4.0



2.5 Differential Blood Smear

Findings HAD MQ 2023-2 H3B

81 year old man

Analysis	Result	Unit	Reference value
Leucocytes Differentiation			
Neutrophils total	7.58	G/l	1.40-8.00
Monocytes	0.42	G/l	0.16-0.95
Eosinophils	0.00	G/l	0.00-0.70
Basophils	0.00	G/l	0.00-0.15
Lymphocytes	* 76.26	G/l	1.50-4.00
Neutrophils total	0.0	%	40.0-74.0
Neutrophils Band	* 9.0	%	0.0-20.0
Neutrophils Segmented	0.0	%	30.0-50.0
Monocytes	* 9.0	%	3.4-9.0
Eosinophils	* 0.5	%	0.0-7.0
Basophils	0.0	%	0.0-1.5
Lymphocytes	0.0	%	19.0-48.0
Plasmacells	* 90.5	%	0-0.5
Blasts	0.0	%	0
Promyelocytes	0.0	%	0
Myelocytes	0.0	%	0
Metamyelocytes	0.0	%	0
Others/ damaged cells	0.0	%	0

Commentary

Leukocytosis with absolute lymphocytosis of 76.26 G/l; medium-sized, atypical presumably neoplastic lymphocytes with large, partly folded nucleus, partly with deep nuclear incision, irregular nuclear chromatin and an indicated nucleolus. The narrow cytoplasmic rim is light basophilic. 1/10 of the lymphocytes are lesioned/nuclear shadows, these were differentiated in an integrated manner.

Neutrophil granulocytes with fine cytoplasmic granulation and few with fine basophilic streaks. Anaemia; slightly hypochromic, markedly anisocytic red blood count with many macrocytes and few microcytes. Slight polychromasia. Slight poikilocytosis with few ovalocytes, acanthocytes as well as individual tear drop shapes detectable in the transillumination. Slight money roll formation. Few erythrocytes with Howell-Jolly bodies detectable. Slight thrombocytopenia; slight anisocytosis of the hypogranulated thrombocytes.
Dr.J.-D. Studt/ Prof. Dr. S. Balabanov

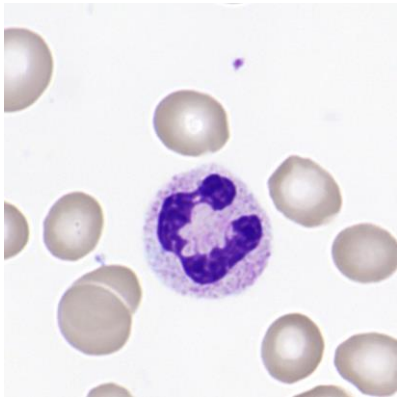


Abb 1. Neutrophil (Seg)

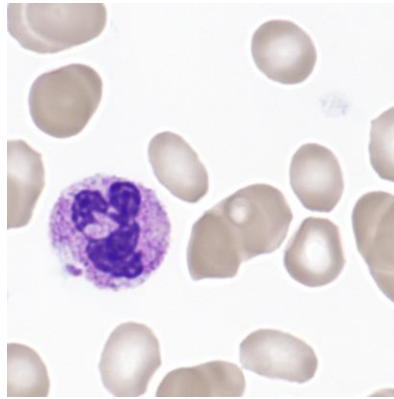


Abb 2. Neutrophil (Seg)

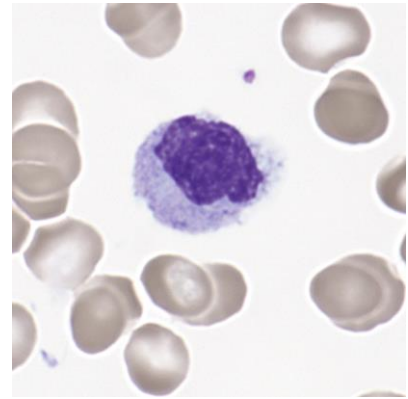


Abb 3. Monocyte

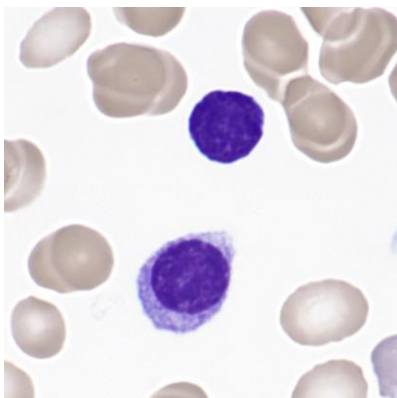


Abb 4. Lymphocyte

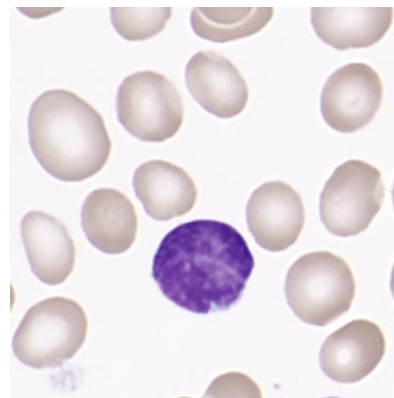


Abb 5. Lymphocyte

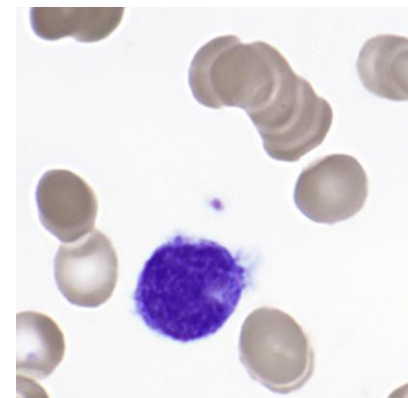


Abb 6. Lymphocyte

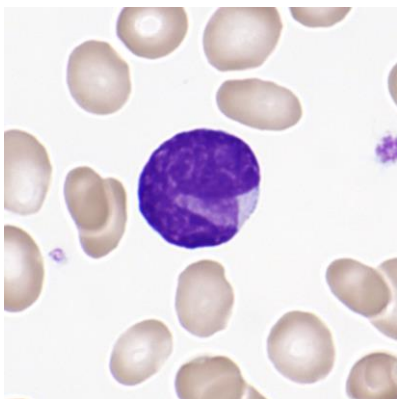


Abb 7. Lymphocyte

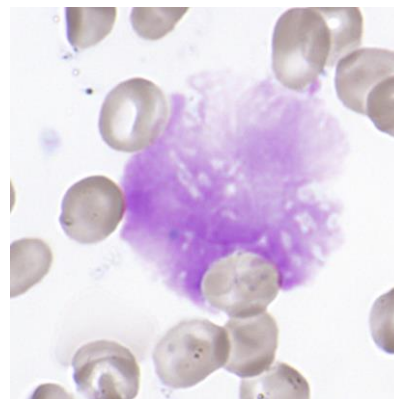


Abb 8. Smudge cell

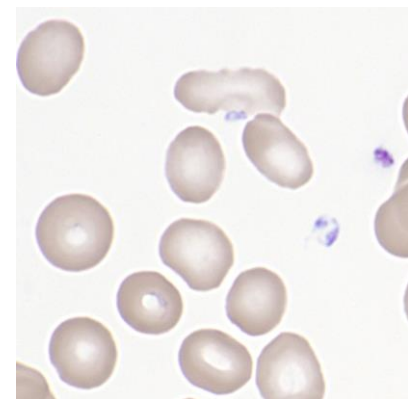


Abb 9. Ec, Ovalocytes

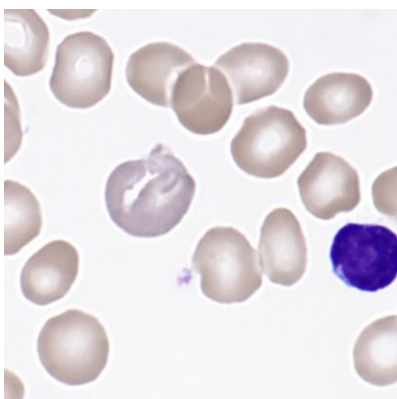


Abb 10. Ec, Polychromasia

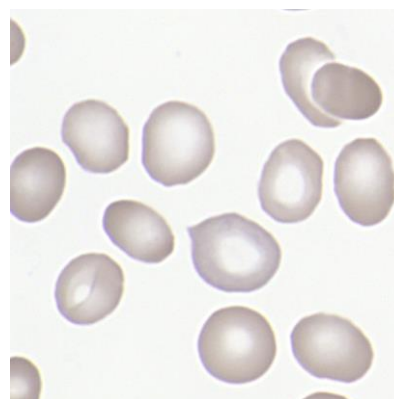


Abb 11. Ec, Anisozytose

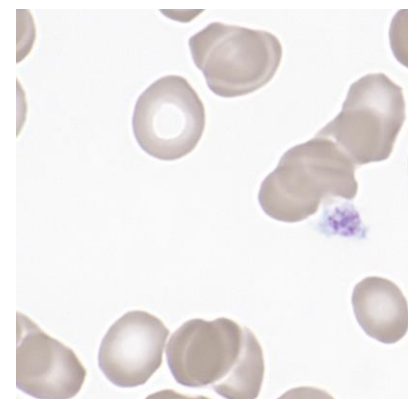


Abb 12. Platelets

2.6 Summary of participant results

Leukocyte Differential H3-B

	<1	1-4	5-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	>79
<i>Neutrophils Band</i>	97*	76	4	2							
<i>Neutrophils Segmented.</i>	4	48	113*	12			1			1	
<i>Eosinophils</i>	152*	27									
<i>Basophile</i>	167*	12									
<i>Monocytes</i>	54*	119	2	4							
<i>Lymphocytes</i>	2	5	3	6		4	2	3	6	31	117*
<i>Plasmacells</i>	174*	1	2			1		1			
<i>Blasts</i>	136*	12	7	4	3	2	3	1	2	2	7
<i>Promyelocytes</i>	175*	3	1								
<i>Myelocytes</i>	173*	4	1		1						
<i>Metamyelozyten</i>	174*	5									
<i>Erythrocytes Nucleated</i>	178*	1									
<i>Unknown</i>	171*	2	1	1				1	1	1	1
<i>Smudge cells</i>	75*	15	32	55	2						

Evaluation H3-B

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	7	2		<i>Hypochromic Ec</i>	46*	20	6
<i>Pelger-Hüet Anomaly</i>	1			<i>Polychromatic Ec</i>	79*	10	
<i>Coarse Granulation</i>	8	3		<i>Anisocytes</i>	62	73	8
<i>Basophilic Stripling</i>	3			<i>Mikrocytes</i>	60*	19	1
<i>Vacuoles</i>	8			<i>Makrocytes</i>	49*	8	
<i>Atypical Lymph, reactive</i>	7	6	4	<i>Megalocytes</i>	4	1	
<i>Atypical Lymph, neoplastic</i>	6	17	61*	<i>Poikilocytosis</i>	69*	11	1
<i>Others</i>	4	4	9	<i>Ovalocytes</i>	76*	27	2
				<i>Target Cells</i>	1		
				<i>Akanthocytes</i>	7	1	
<i>Anisocytosis</i>	32	4		<i>Echinocytes</i>	13	2	2
<i>Megakaryocyte Nucleaus</i>	2	0		<i>Sickle Cells</i>			
<i>Granulation</i>	13	1		<i>Fragmentocytes</i>	7	1	
<i>Others</i>				<i>Spherocytes</i>	6		
				<i>Stomatocytes</i>	2	1	
				<i>Basophilic Stripling</i>	3	0	
				<i>Howell-Jolly Bodies</i>	4	1	
				<i>Pappenheim Bodies</i>	1		
				<i>Others</i>	1		1

The blood came from a man with mantle cell lymphoma.

2.7 Qualab Codes

Summary of the participant codes
(Bold printed: expected codes)

Code	Text	Number
30	Pathologic findings, refer to expert	122
6	Atypical lymphocytes, probably neoplastic	102
17	Elliptocytes/Ovalocytes	59
31	Pathologic findings	51
15	Polychromatophilic Red Cells	49
16	Poikilocytosis	39
14	Hypochromic Erythrocytes	33
12	Microcytes	30
8	Leucocytes other:	24
13	Macrocytes	22
27	Erythrocytes, other	15
5	Atypical lymphocytes, probably reactive	14
11	Thrombocytes, others	8
1	Neutrophils, hypersegmentation of nucleus	5
22	Rouleaux	5
20	Fragmentocytes	4
9	Macrothrombocytes	3
24	Howell-Jolly bodies	3
4	Neutrophils, Toxic Changes	2
10	Thrombocyte aggregates	1
21	Spherocytes	1
25	Basophilic strippling	1
99	Total	171