

Verein für
Association pour le
Associazione per il



medizinische Qualitätskontrolle
contrôle de qualité médical
controllo di qualità medico

Report

Differential Blood Smear H3

MQ 2022-4

Acknowledgements

The Mythic 18 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 XE-5000 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). Dr. J-D. Studt 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 ABX Microsemi CRP



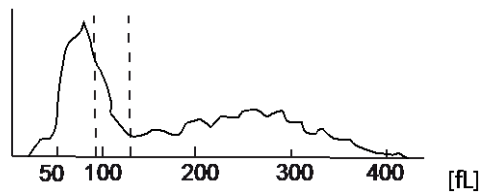
Findings MQ 2022-4 H3A

85 year old man

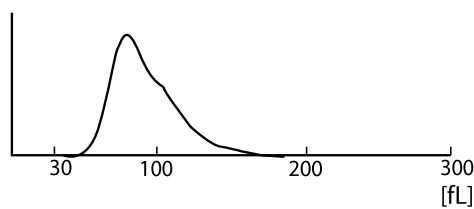
WBC :	3.6	$10^3/\mu\text{L}$	MCV :	96.4	μm^3
RBC :	3.19	L $10^6/\mu\text{L}$	MCH :	34.0	H pg
HGB :	10.8	L g/dL	MCHC:	34.0	g/dL
HCT :	30.7	L %	RDW :	13.8	%
PLT :	181	$10^3/\mu\text{L}$	MPV :	6.8	μm^3
PCT :	0.122	%	PDW :	12.7	%

DIFF:					
%LYM:	31.2	%	#LYM:	1.1	L $10^3/\mu\text{L}$
%MON:	13.5	H %	#MON:	0.5	$10^3/\mu\text{L}$
%GRA:	55.3	%	#GRA:	2.0	$10^3/\mu\text{L}$

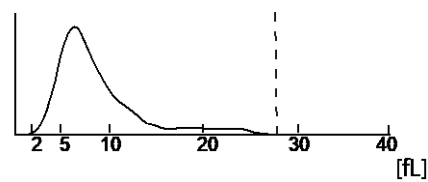
WBC



RBC



PLT



1.2 Sysmex XP300



Findings MQ 2022-4 H3A
85 year old man

WBC	-	3.7	10 ³ /μL	
RBC	-	3.26	10 ⁶ /μL	
HGB	-	10.7	g/dL	
HCT	-	30.8	%	
MCV	-	94.5	fL	
MCH	-	32.8	pg	
MCHC	-	34.7	g/dL	
PLT	-	173	10 ³ /μL	
LYM%	+	44.8	%	
MXD%	+	28.2	%	
NEUT%	-	27.0	%	
LYM#	-	1.7	10 ³ /μL	
MXD#	-	1	10 ³ /μL	
NEUT#	-	1	10 ³ /μL	
RDW_SD	+	51.2	fL	
RDW_CV	-	14.2	%	
PDW	-	9.8	fL	
MPV	-	8.2	fL	
P_LCR	-	14.2	%	
PCT	-	0.14	%	

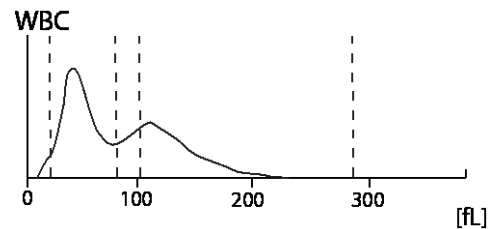
1.3 Zybio Z3 CRP



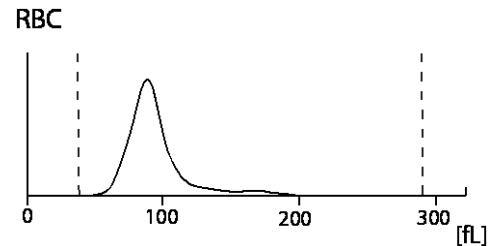
Findings MQ 2022-4 H3A

85 year old man

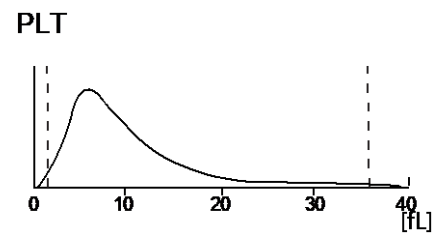
WBC	3.46	↓	10 ³ /μl	3.50-9.50
Lym#	1.77		10 ³ /μl	1.10-3.20
Mid#	0.20		10 ³ /μl	0.10-3.20
Gran#	1.49	↓	10 ³ /μl	1.80-6.30
LYM%	51.2	↑	%	20.0-50.0
Mid%	5.8		%	3.0-15.0
GRAN%	43.0		%	40.0-75.0



RBC	3.25	↓	10 ⁶ /μl	3.80-5.80
HGB	11.1	↓	g/dl	11.5-17.5
HCT	29.5	↓	%	35.0-50.0
MCV	90.7		fL	82.0-100.0
MCH	34.2	↑	pg	27.0-34.0
MCHC	37.7	↑	g/dl	31.6-35.4



RDW-CV	13.8		%	11.5-16.0
RDW-SD	42.2		fL	35.0-56.0
PLT	169		10 ³ /μl	125-350
MPV	8.3		fL	6.5-12.0
PDW	16.4		fL	9.0-17.0
PCT	0.141		%	0.108-0.282
P-LCC	26	↓	10 ³ /μl	30-90
P-LCR	15.6		%	11.0-45.0



1.4 Sysmex XN-20

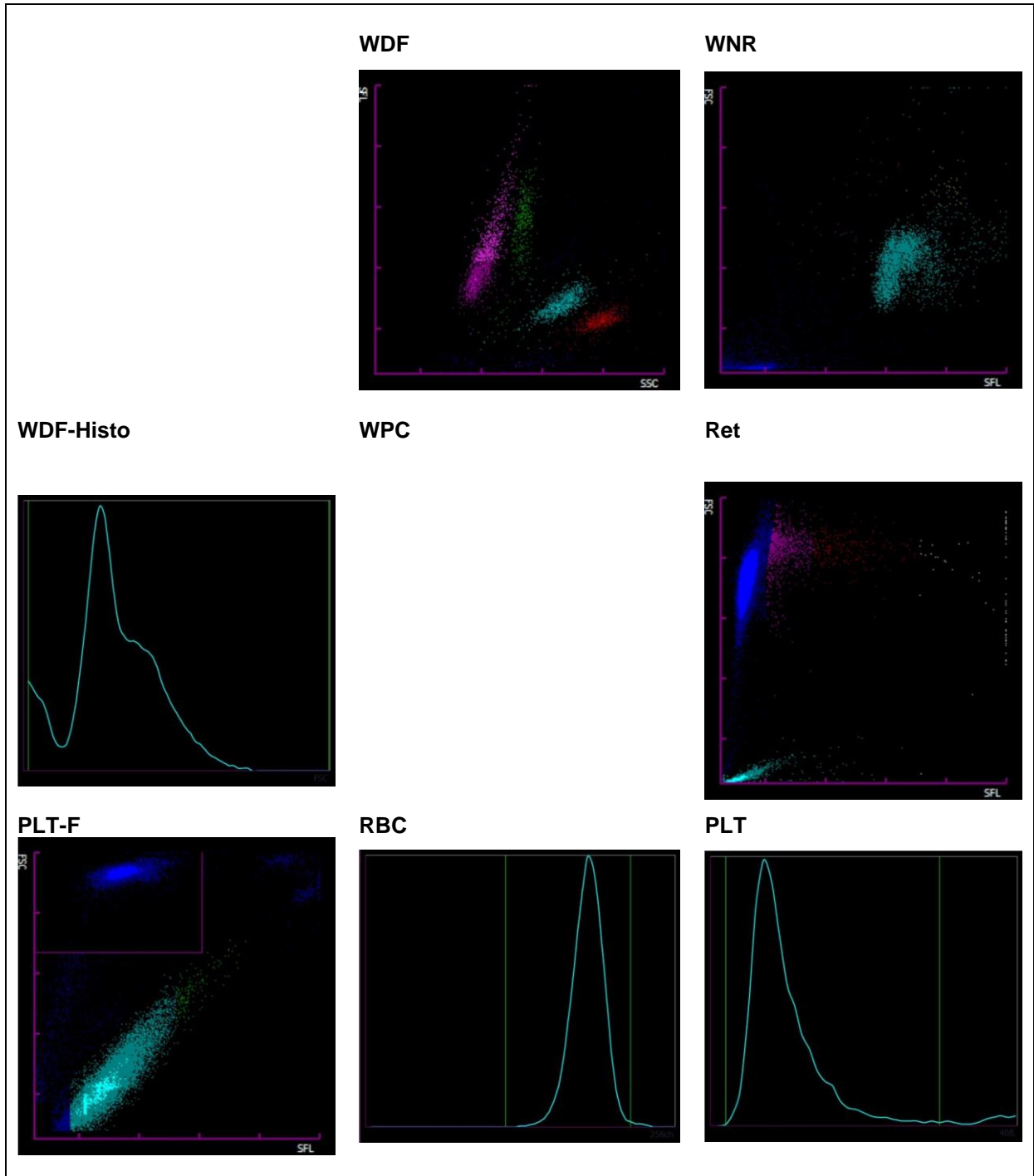


Findings MQ 2022-4 H3A

85 year old man

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	107	g/l	117-153
<u>Hematocrit</u>	0.298	l/l	0.35-0.46
Erythrocytes	3.31	T/l	3.9-5.2
MCV	90.0	fl	80-100
MCH	32.3	pg	26-34
MCHC	359	g/l	310-360
Mikrocytes	13.5	%	11.0-14.8
<u>Thrombocytes</u>	163	G/l	143-400
<u>Leucocytes</u>	3.55	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	* 0.94	G/l	1.40 – 8.00
Monocytes	0.37	G/l	0.16 – 0.95
Eosinophils	0.59	G/l	0.00 – 0.70
Basophils	0.05	G/l	0.00-0.15
Lymphocytes	1.57	G/l	1.50 - 4.00
IG abs.	0.03	G/l	0.00 – 0.03
IG %	* 0.8	%	0.0 – 0.05
NRBC abs.	0.04	G/l	
NRBC	0.1	/100 Lc	

Findings HAD MQ 2022-4 H3A



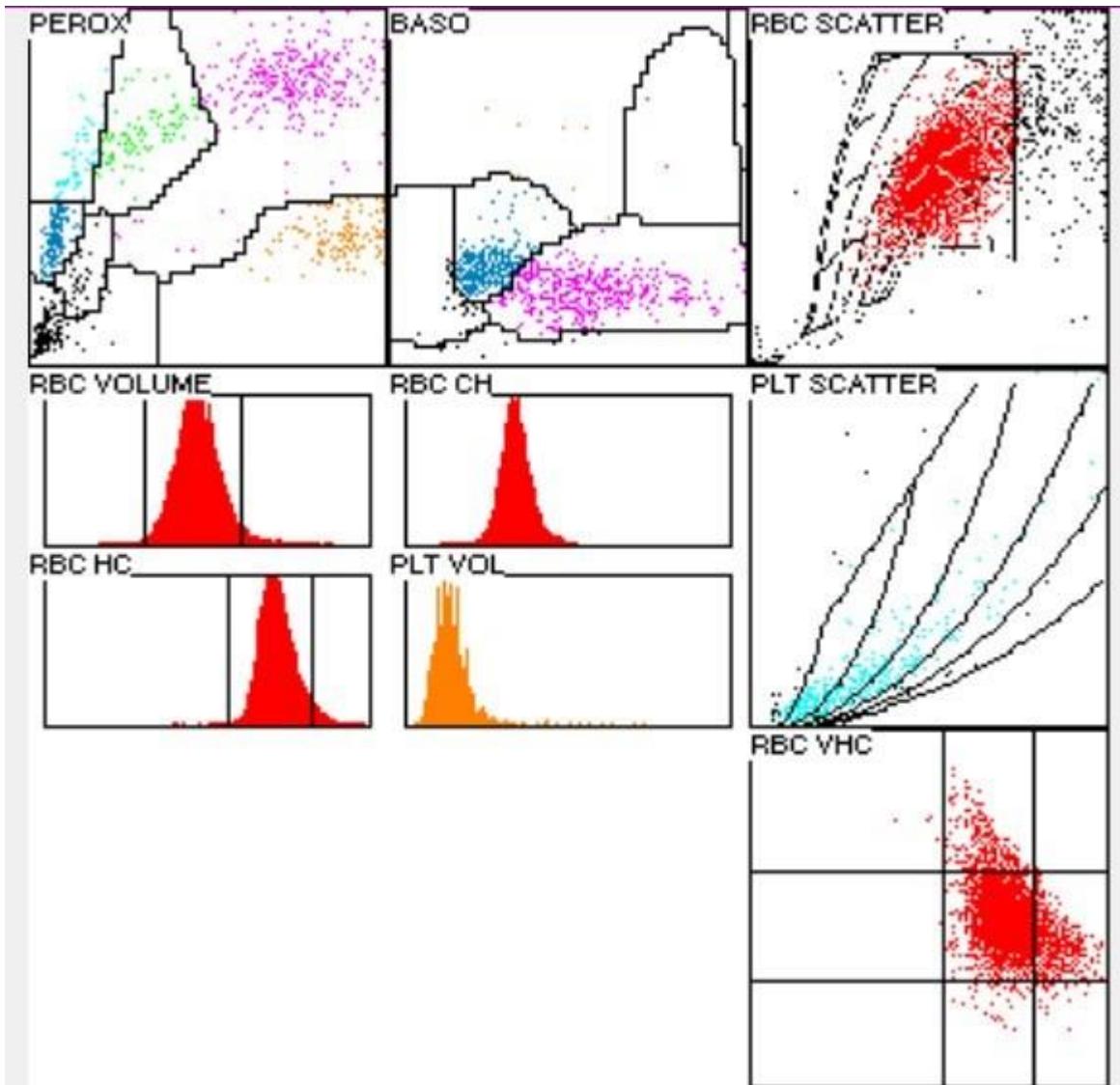
1.5 ADVIA 2120



Findings HAD MQ 2022-4 H3A

85 year old man

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	108	g/l	117-153
<u>Hematocrit</u>	0.314	l/l	0.35-0.46
Erythrocytes	3.32	T/l	3.9-5.2
MCV	94.4	fl	80-100
MCH	32.5	pg	26-34
MCHC	344	g/l	310-360
Mikrocytes	0.6	%	0-2.0
Macrocytes	* 3.9	%	0-2.0
Hypochromic Ec	0.2	%	0-2.0
Hyperchromic Ec	* 4.4	%	0-2.0
RDW	* 15.7	%	11.0-14.8
<u>Thrombocytes</u>	169	G/l	143-400
Vd. L-SHIFT	0	+	Keine (0)
<u>Leucocytes</u>	3.92	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	* 1.31	G/l	1.40-8.00
Monocytes	8.1	G/l	0.16-0.95
Eosinophils	* 13.1	G/l	0.00-0.70
Basophile	0.9	G/l	0.00-0.15
Lymphocytes	36.4	G/l	1.50-4.00
LUC	* 8.2	%	0.0-4.0



1.6 Differential Blood Smear

Findings HAD MQ 2022-4 H3A

85 year old man

Analysis		Result	Unit	Reference value
Neutrophils total	*	1.00	G/l	1.40-8.00
Monocytes	*	0.14	G/l	0.16-0.95
Eosinophils	*	0.73	G/l	0.00-0.70
Basophils		0.04	G/l	0.00-0.15
Lymphocytes		2.02	G/l	1.50-4.00
Neutrophils total	*	25.2	%	40.0-74.0
Neutrophils Band		7.5	%	0.0-20.0
Neutrophils Segmented	*	18.0	%	30.0-50.0
Monocytes		3.5	%	3.4-9.0
Eosinophils	*	18.5	%	0.0-7.0
Basophils		1.0	%	0.0-1.5
Lymphocytes	*	51.5	%	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

Anaemia; Slightly hypochromic, slightly anisocytic red blood count with few macrocytes. Slight polychromasia. Lymphocytes atypical, presumably clearly reactively altered. Neutrophil granulocytes with slightly coarsened cytoplasmic granulation, few with fine basophilic streaks. Platelets morphologically inconspicuous.

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

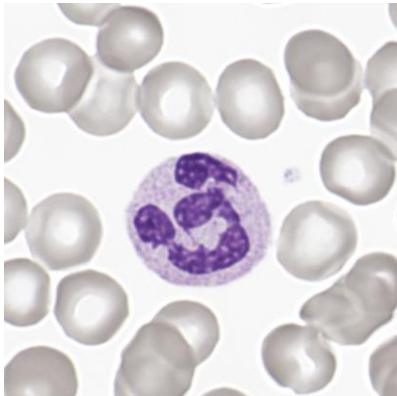


Abb 1. Neutrophile (Seg)

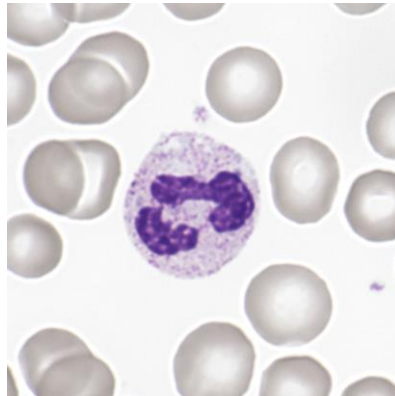


Abb 2. Neutrophile (Hyperseg)

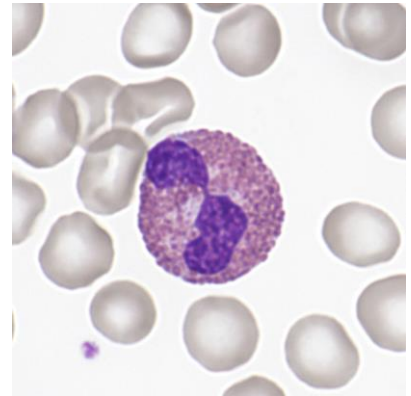


Abb 3. Neutrophile (Rod)

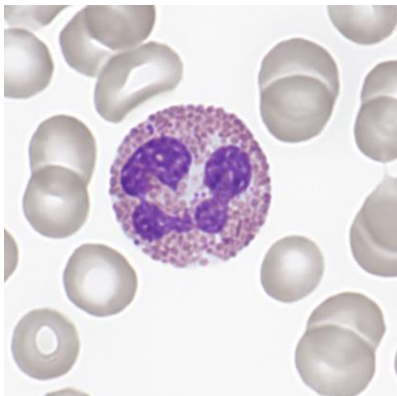


Abb 4. Neutrophile (Seg)

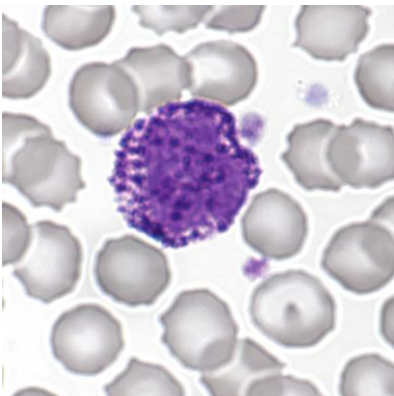


Abb 5. Monocyte

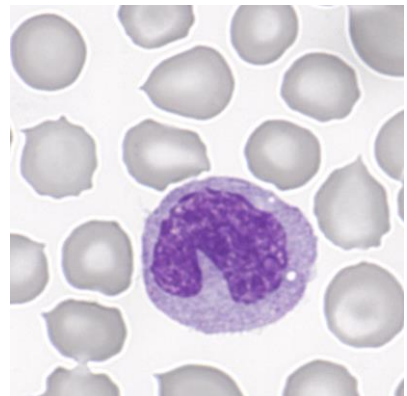


Abb 6. Monocyte

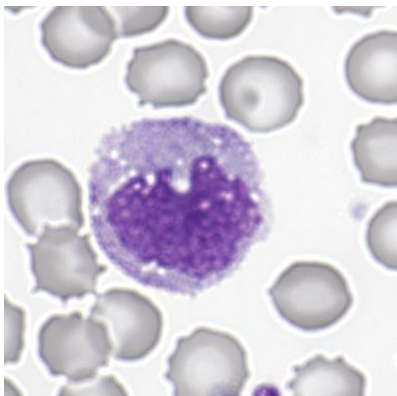


Abb 7. Lymphocyte

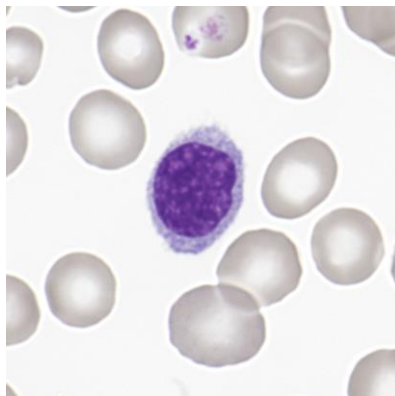


Abb 8. Lymphocyte

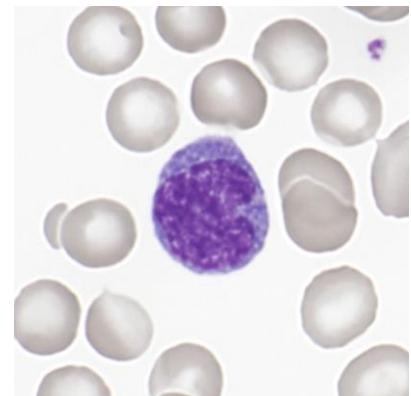


Abb 9. Lymphocyte

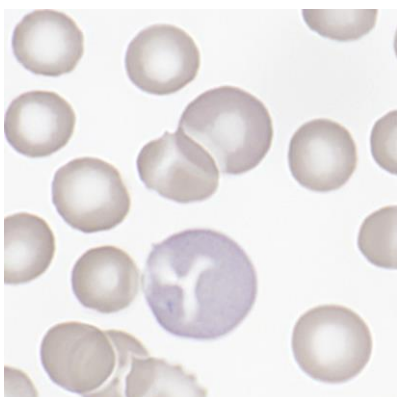


Abb 10. Platelets

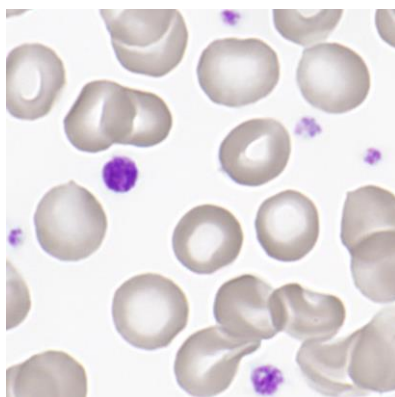


Abb 11. Platelets

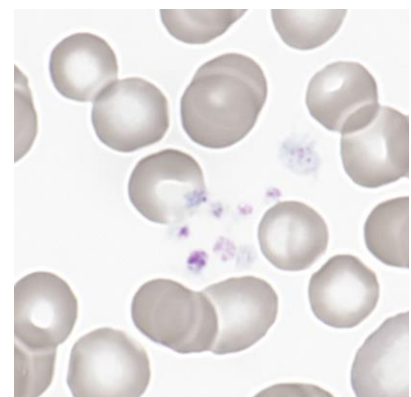


Abb 12. Platelets

1.7 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>	3	45	80*	54	4						
<i>Neutrophils Segmented.</i>				34*	109	42	1				
<i>Eosinophils</i>	1	6	17	153*	8	1					
<i>Basophile</i>	117	69*									
<i>Monocytes</i>	12	70*	81	19	2	0	2				
<i>Lymphocytes</i>		1	1	1	3	19	109	48*	4		
<i>Plasmacells</i>	176*	7	2				1				
<i>Blasts</i>	183*	2				1					
<i>Promyelocytes</i>	183*	2	1								
<i>Myelocytes</i>	182*	3	1								
<i>Metamyelozyten</i>	179*	6	1								
<i>Erythrocytes Nucleated</i>	180*	6	0								
<i>Unknown</i>	179*	6	0	1							
<i>Smudge cells</i>	173*	9	3	1							

Evaluation H3-A

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	13	2		<i>Hypochromic Ec</i>	50	19	2
<i>Pelger-Huet Anomaly</i>				<i>Polychromatic Ec</i>	83	13	
<i>Coarse Granulation</i>	45	10	2	<i>Anisocytes</i>	70	74	8
<i>Basophilic Stripping</i>	18	1		<i>Mikrocytes</i>	63	19	1
<i>Vacuoles</i>	17	6		<i>Makrocytes</i>	59	20	2
<i>Reaktive Lymphocytes</i>	51	36	6	<i>Megalocytes</i>	17		1
<i>Atypical Lymphocytes</i>	12	20	1	<i>Poikilocytosis</i>	39	8	
<i>Others</i>	4	5		<i>Ovalocytes</i>	27		
				<i>Target Cells</i>	7		
				<i>Akanthocytes</i>	4		
<i>Anisocytosis</i>	71	7		<i>Echinocytes</i>	6	2	
<i>Megakaryocyte Nucleaus</i>	3	1		<i>Sickle Cells</i>	1		
<i>Granulation</i>	9	1		<i>Fragmentocytes</i>	15	1	
<i>Others</i>	1			<i>Spherocytes</i>	3	2	
				<i>Stomatocytes</i>	18	5	
				<i>Basophilic Stripping</i>	55		
				<i>Howell-Jolly Bodies</i>	3	1	
				<i>Pappenheim Bodies</i>	3	1	
				<i>Others</i>	2	1	

The blood was from a man with anaemia and eosinophilia.

1.8 Qualab Codes

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

Code	Text	Number
30	Pathologic findings, refer to expert	107
5	Atypical lymphocytes, probably reactive	73
31	Pathologic findings	60
13	Macrocytes	53
15	Polychromatophilic Red Cells	45
8	Leucocytes other:	39
14	Hypochromic Erythrocytes	39
6	Atypical lymphocytes, probably neoplastic	37
12	Microcytes	37
4	Neutrophils, Toxic Changes	27
25	Basophilic strippling	25
16	Poikilocytosis	19
27	Erythrocytes, other	18
9	Macrothrombocytes	13
29	Normal findings	11
18	Stomatocytes	10
20	Fragmentocytes	8
1	Neutrophils, hypersegmentation of nucleus	7
11	Thrombocytes, others	6
2	Neutrophils, left shift	5
22	Rouleaux	4
24	Howell-Jolly bodies	4
19	Targetcells	3
21	Spherocytes	3
3	Pelger Huet Anomaly	1
17	Elliptocytes/Ovalocytes	1
23	Erythrocytes agglutination	1
99		186
		107

2 Sample B

2.1 ABX Microsemi CRP



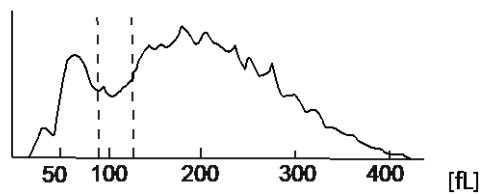
Findings MQ 2022-4 H3B

60 year old woman

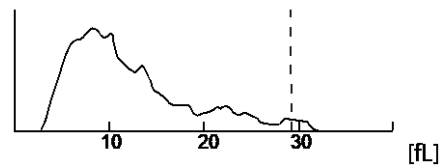
WBC :	6.1	$10^3/\mu\text{L}$	MCV :	89.5	μm^3
RBC :	2.11	L $10^6/\mu\text{L}$	MCH :	31.1	pg
HGB :	6.6	L g/dL	MCHC:	34.7	g/dL
HCT :	18.9	L %	RDW :	15.0	%
PLT :	61	L $10^3/\mu\text{L}$	MPV :	8.9	μm^3
PCT :	0.054	H %	PDW :	0.054	L %

%LYM:	15.3	L %	#LYM:	0.9	L $10^3/\mu\text{L}$
%MON:	9.0	%	#MON:	0.5	$10^3/\mu\text{L}$
%GRA:	75.7	%	#GRA:	4.7	$10^3/\mu\text{L}$

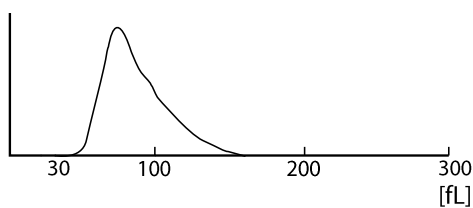
WBC



PLT



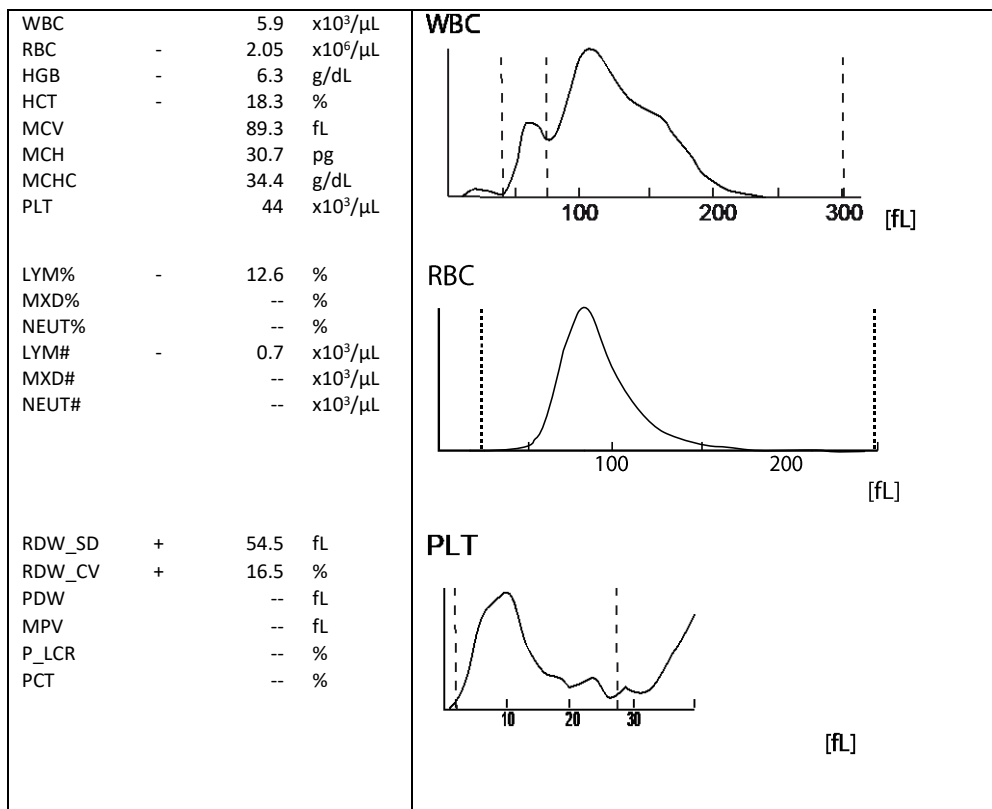
RBC



2.2 Sysmex XP300



Findings MQ 2022-4 H3B 60 year old woman



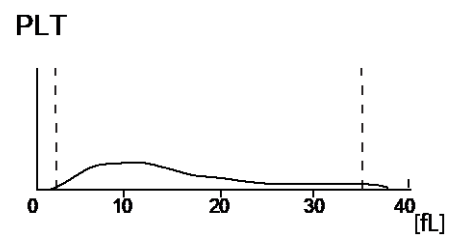
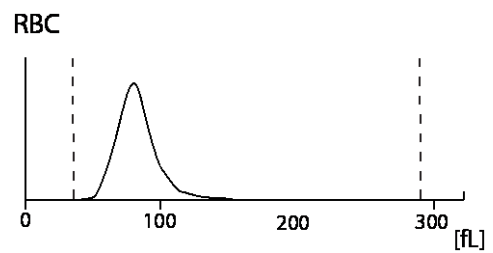
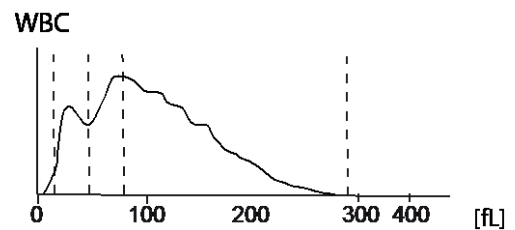
2.3 Zybio Z3 CRP



Findings MQ 2022-4 H3B

60 year old woman

WBC	5.77		10 ³ /μl	3.50-9.50
Lym#	0.92	↓	10 ³ /μl	1.10-3.20
Mid#	0.72		10 ³ /μl	0.10-3.20
Gran#	4.13		10 ³ /μl	1.80-6.30
LYM%	15.9	↓	%	20.0-50.0
Mid%	12.4		%	3.0-15.0
GRA%	71.7		%	40.0-75.0
RBC	2.02	↓	10 ⁶ /μl	3.80-5.80
HGB	6.4	↓	g/dl	11.5-17.5
HCT	17.0	↓	%	35.0-50.0
MCV	84.2		fl	82.0-100.0
MCH	31.9		pg	27.0-34.0
MCHC	37.9	↑	g/dl	31.6-35.4
RDW-CV	15.3		%	11.5-16.0
RDW-SD	43.5		fL	35.0-56.0
PLT	49	↓	10 ³ /μl	125-350
MPV	11.9		fl	6.5-12.0
PDW	15.8		fl	9.0-17.0
PCT	0.059	↓	%	0.108-0.282
P-LCC	19	↓	10 ³ /μl	30-90
P-LCR	37.7		%	11.0-45.0



2.4 Sysmex XN-20

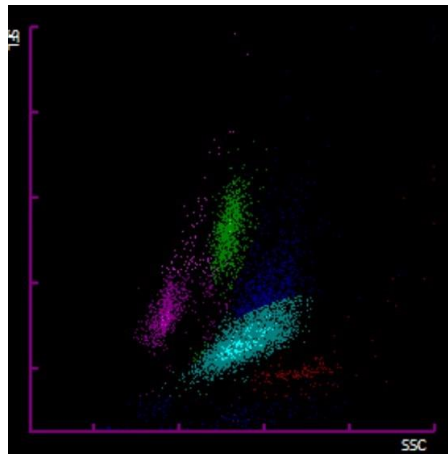


Findings HAD MQ 2022-4 H3B 60 year old woman

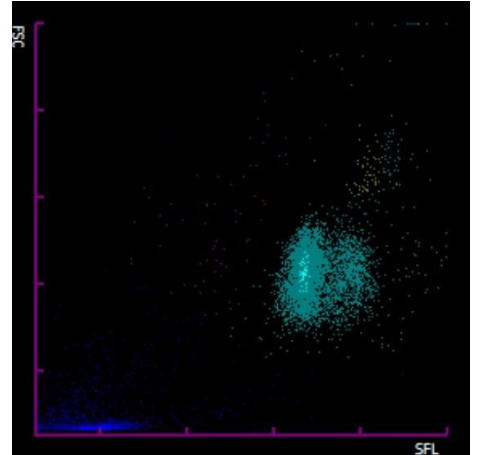
Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	64	g/l	117-153
Hematocrit	0.179	l/l	0.35-0.46
Erythrocytes	2.10	T/l	3.9-5.2
MCV	85.2	fl	80-100
MCH	30.5	pg	26-34
MCHC	358	g/l	310-360
Thrombocytes	* 45	G/l	143-400
Leucocytes	5.99	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	3.23	G/l	1.40-8.00
Monocytes	* 1.01	G/l	0.16-0.95
Eosinophils	0.17	G/l	0.00-0.70
Basophils	0.06	G/l	0.00-0.15
Lymphocytes	* 0.88	G/l	1.50-4.00
IG abs.	* 0.64	G/l	0.00-0.03
IG %	* 10.7	%	0.0-0.5
NRBC abs.	0.07	G/l	
NRBC	1.2	/100 Lc	

Findings HAD MQ 2022-4 H3B

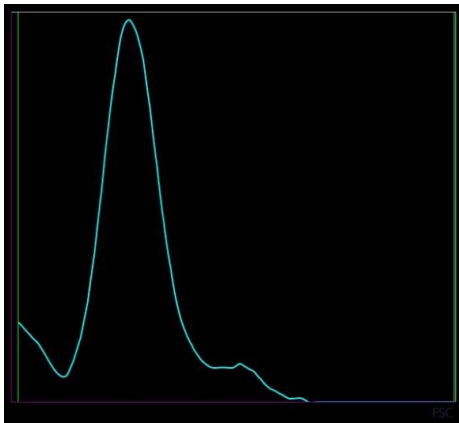
WDF



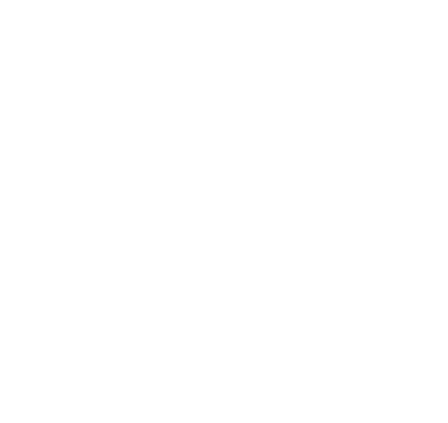
WNR



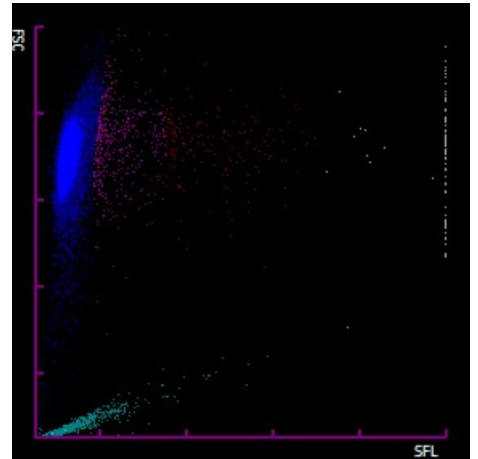
WBC-Histo



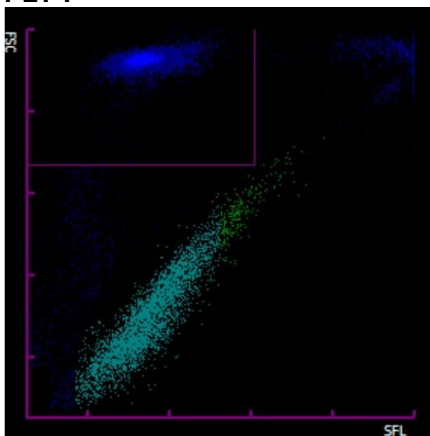
WPC



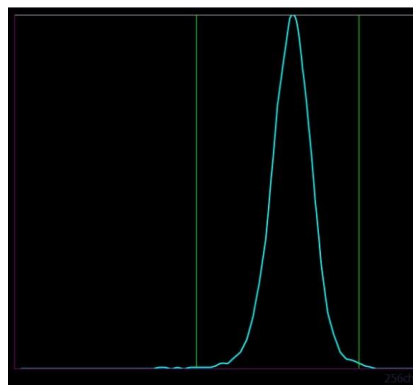
Ret



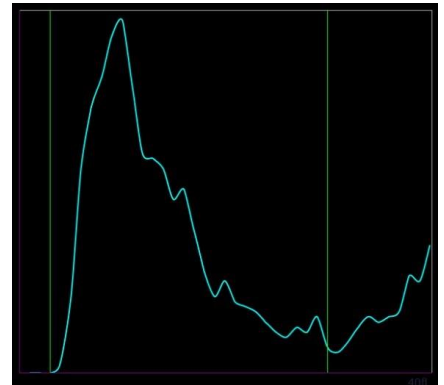
PLT-F



RBC



PLT

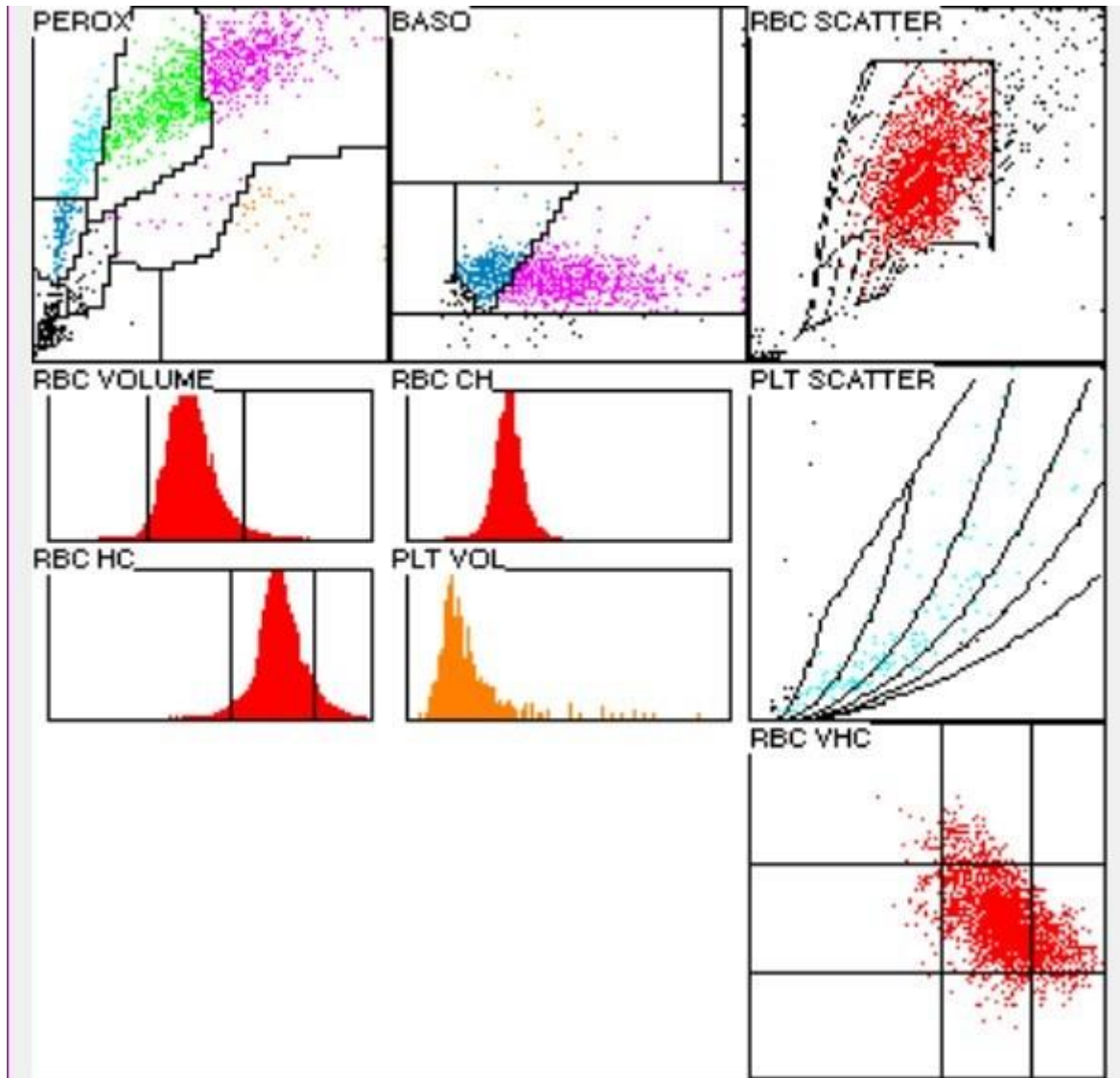


2.5 ADVIA 2120



Findings HAD MQ 2022-4 H3B 60 year old man

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	63	g/l	117-153
Hematocrit	0.186	l/l	0.35-0.46
Erythrocytes	2.12	T/l	3.9-5.2
MCV	87.8	fl	80-100
MCH	29.6	pg	26-34
MCHC	337	g/l	310-360
Mikrocytes	1.5	%	0-2.0
Makrocytes	* 2.5	%	0-2.0
Hypochromic Ec	2.0	%	0-2.0
Hyerchromic Ec	* 7.1	%	0-2.0
RDW	* 16.9	%	11.0-0-14.8
Thrombocytes	* 50	G/l	143-400
Leukocytes	5.71	G/l	3.0-9.6
Leucocytes Differentiation			
Neutrophils	2.22	G/l	1.40-8.00
Monocytes	* 2.07	G/l	0.16-0.95
Eosinophils	0.11	G/l	0.00-0.70
Basophils	0.04	G/l	0.00-0.15
Lymphocytes	* 0.68	G/l	1.50-4.00
LUC	* 0.58	%	0.0-4.0



2.6 Differential Blood Smear

Findings HAD MQ 2022-4 H3B

60 year old man

Analysis	Result	Unit	Reference value
Leucocytes Differentiation			
Neutrophils total	3.37	G/l	1.40-8.00
Monocytes	0.80	G/l	0.16-0.95
Eosinophils	0.17	G/l	0.00-0.70
Basophils	0.03	G/l	0.00-0.15
Lymphocytes	* 0.83	G/l	1.50-4.00
Neutrophils total	0.5	%	40.0-74.0
Neutrophils Band	59.0	%	0.0-20.0
Neutrophils Segmented	* 31.5	%	30.0-50.0
Monocytes	* 27.5	%	3.4-9.0
Eosinophils	* 14.0	%	0.0-7.0
Basophils	3.0	%	0.0-1.5
Lymphocytes	0.5	%	19.0-48.0
Plasmacells	* 14.5	%	0-0.5
Blasts	0.0	%	0
Promyelocytes	0.0	%	0
Myelocytes	* 0.5	%	0
Metamyelocytes	* 2.0	%	0
Others/ damaged cells	* 6.5	%	0

Commentary

Anaemia; slightly hypochromic, clearly anisocytic red blood count with many microcytes and few macrocytes. Slight poikilocytosis with few ovalocytes as well as single teardrop shapes and megalocytes in the perusal. Slight money roll formation. Washout of clearly maturation-dissociated myeloid precursors, no blasts detectable. Neutrophil granulocytes with distinct pyknotic, partly pelgeroid nucleus, very fine cytoplasmic granulation and coarse basophilic streaks. Marked thrombocytopenia; slight anisocytosis of the hypogranulated platelets.

K. Schreiber / PD. Dr. St. Balabanov

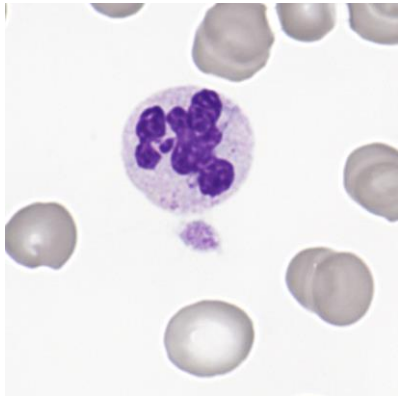


Abb 1. Neutrophil (Seg)

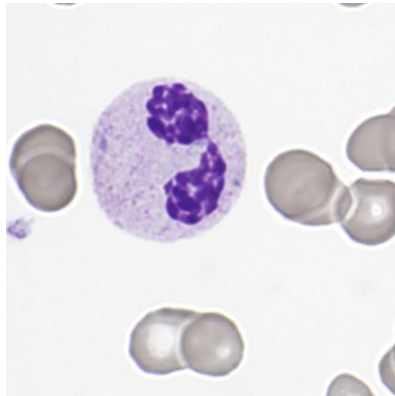


Abb 2. Neutrophil (Seg)

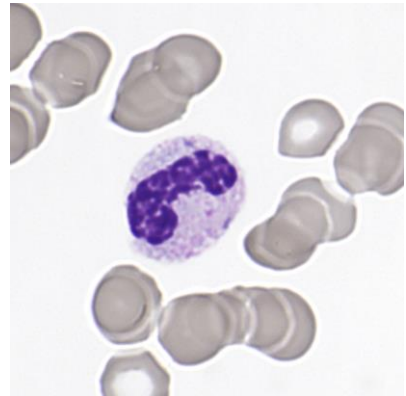


Abb 3. Neutrophil (Band)

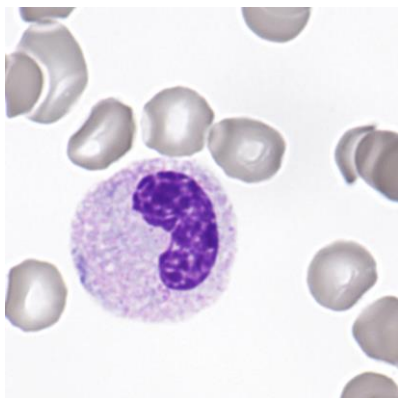


Abb 4. Neutrophil(Band)

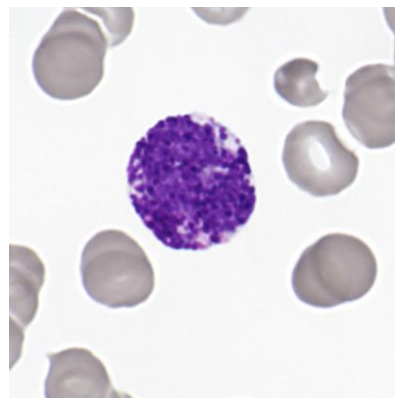


Abb 5. Basophile

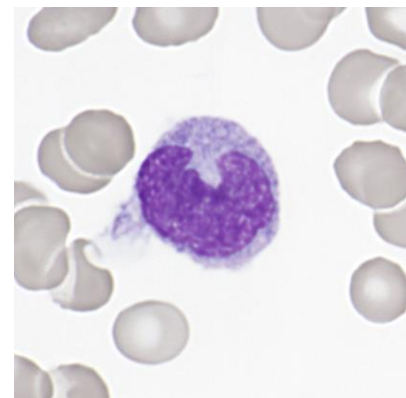


Abb 6. Monocyte

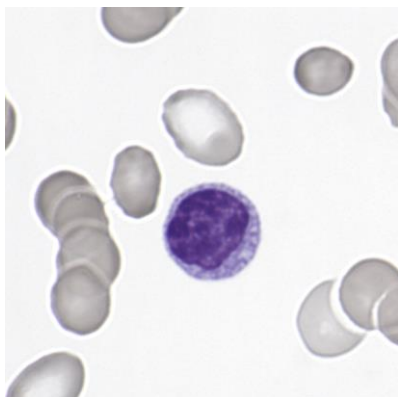


Abb 7. Lymphocyte

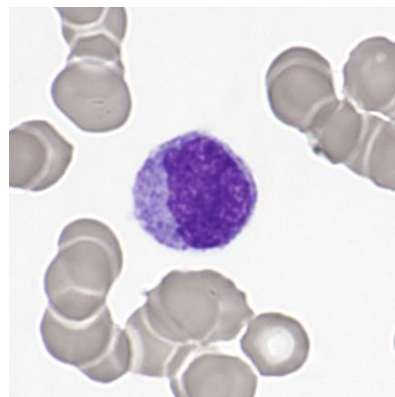


Abb 8. Lymphocyte

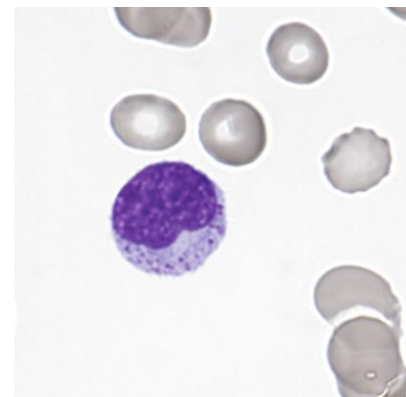


Abb 9. Lymphocyte

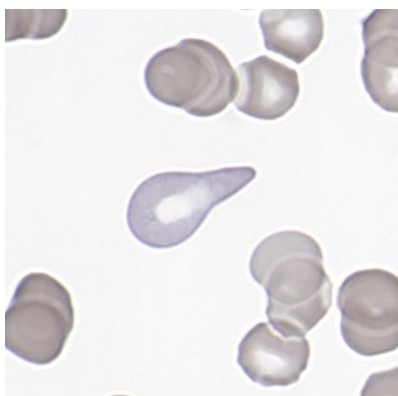


Abb 10. Ec Teardrop

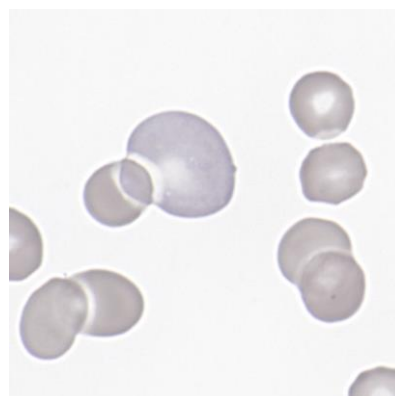


Abb 11. Ec, Megalocyte

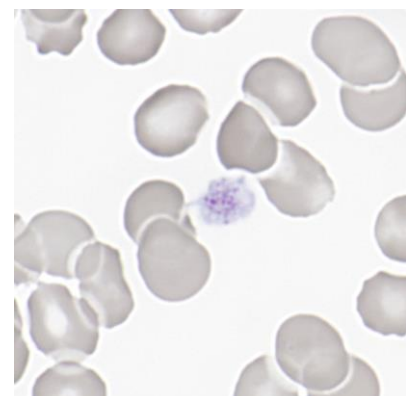


Abb 12. Platelets

2.7 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>		7	11	55	93	16	3				
<i>Neutrophils Segmented.</i>				3	32	86	52	9	2	1	
<i>Eosinophils</i>	31	151	2	1							
<i>Basophile</i>	49	132	4								
<i>Monocytes</i>	4	30	60	86	5						
<i>Lymphocytes</i>		2		32	85	52	11	3			
<i>Plasmacells</i>	182	3									
<i>Blasts</i>	177	5	2								
<i>Promyelocytes</i>	175	10									
<i>Myelocytes</i>	112	68	5								
<i>Metamyelocyten</i>	91	77	13	4							
<i>Erythrocytes Nucleated</i>	180	5									
<i>Unknown</i>	177	4	1	3							
<i>Smudge cells</i>	173	8	4								

Evaluation H3-B

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	11	4		<i>Hypochromic Ec</i>	42	28	6
<i>Pelger-Hüet Anomaly</i>	21	12	4	<i>Polychromatic Ec</i>	71	11	2
<i>Coarse Granulation</i>	38	4		<i>Anisocytes</i>	75	69	6
<i>Basophilic Stripling</i>	46	16	2	<i>Mikrocytes</i>	54	35	4
<i>Vacuoles</i>	49	9	1	<i>Makrocytes</i>	50	6	1
<i>Atypical Lymph, reactive</i>	48	13	2	<i>Megalocytes</i>	7	1	
<i>Atypical Lymph, neoplastic</i>	6			<i>Poikilocytosis</i>	84	31	1
<i>Others</i>	6	3	1	<i>Ovalocytes</i>	55	4	
				<i>Target Cells</i>	15	1	
				<i>Akanthocytes</i>	31	1	
<i>Anisocytosis</i>	76	20	2	<i>Echinocytes</i>	35	16	
<i>Megakaryocyte Nucleaus</i>	6	3		<i>Sickle Cells</i>	2		
<i>Granulation</i>	13	6		<i>Fragmentocytes</i>	36	1	
<i>Others</i>	2	2		<i>Spherocytes</i>	26	2	
				<i>Stomatocytes</i>	5		
				<i>Basophilic Stripling</i>	34	4	
				<i>Howell-Jolly Bodies</i>	3	1	
				<i>Pappenheim Bodies</i>		1	
				<i>Others</i>	13	2	2

The blood came from a woman with anemia and a left shift.

2.8 Qualab Codes

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

Code	Text	Number
30	Pathologic findings, refer to expert	102
2	Neutrophils, left shift	72
31	Pathologic findings	68
16	Poikilocytosis	49
12	Microcytes	44
4	Neutrophils, Toxic Changes	43
14	Hypochromic Erythrocytes	39
15	Polychromatophilic Red Cells	31
3	Pelger Hüet Anomaly	27
5	Atypical lymphocytes, probably reactive	26
8	Leucocytes other:	25
22	Rouleaux	25
11	Thrombocytes, others	20
9	Macrothrombocytes	19
20	Fragmentocytes	19
13	Macrocytes	14
25	Basophilic strippling	11
27	Erythrocytes, other	11
17	Elliptocytes/Ovalocytes	9
21	Spherocytes	8
26	Teardrops	8
1	Neutrophils, hypersegmentation of nucleus	6
29	Normal findings	5
6	Atypical lymphocytes, probably neoplastic	4
19	Targetcells	4
24	Howell-Jolly bodies	2
10	Thrombocyte aggregates	1
99	Total	184