

Verein für
Association pour le
Associazione per il



medizinische Qualitätskontrolle
contrôle de qualité médical
controllo di qualità medico

Report

Differential Blood Smear H3

MQ 2019-4

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

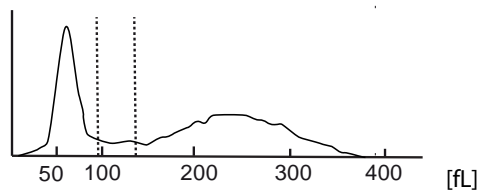


Findings MQ 2019-4 H3A 15 year old woman

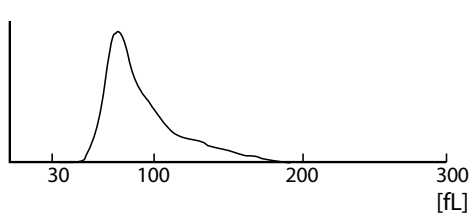
WBC :	6.1	10 ⁹ /L	MCV :	91.5	fL
RBC :	4.42	10 ¹² /L	MCH :	30.9	pg
HGB :	13.7	g/L	MCHC:	33.7	g/L
HCT :	40.5	L/L	RDW :	11.9	%
PLT :	226	10 ⁹ /L	MPV :	7.9	fL
PCT :	0.178	10 ⁻² L/L	PDW :	14.7	%

DIFF:					
%LYM:	35.2	%	#LYM:	2.1	10 ⁹ /L
%MON:	6.3	%	#MON:	0.4	10 ⁹ /L
%GRA:	58.5	%	#GRA:	3.6	10 ⁹ /L

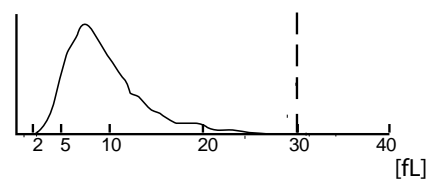
WBC



RBC



PLT

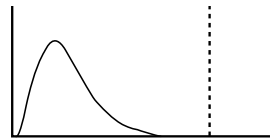
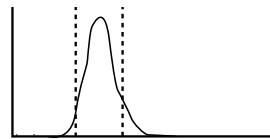
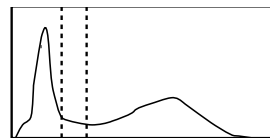


1.2 Mythic



Findings MQ 2019-4 H3A 15 year old woman

WBC	6.5	10 ⁹ /l	3.5 /	10.0
LYM	2.2	10 ⁹ /l	1.2 /	3.2
MON	0.4	10 ⁹ /l	0.1 /	1.0
GRA	3.9	10 ⁹ /l	1.2 /	6.8
LYM%	33.1	%	17.0 /	48.0
MON%	6.9	%	2.0 /	10.0
GRA%	60.0	%	43.0 /	76.0
RBC	4.53	10 ¹² /l	4.00 /	5.70
HGB	143	g/l	120 /	180
HCT	0.422	l/l	0.360 /	0.540
MCV	93.2	fl	80.0 /	100.0
MCH	31.6	pg	26.0 /	34.0
MCHC	339	g/l	310 /	365
RDW	13.3	%	10.0 /	16.0
PLT	224	10 ⁹ /l	150 /	400
MPV	8.1	fl	7.0 /	11.0
PCT	0.181	cl/l	0.100 /	0.500
PDW	16.6	%	10.0 /	18.0

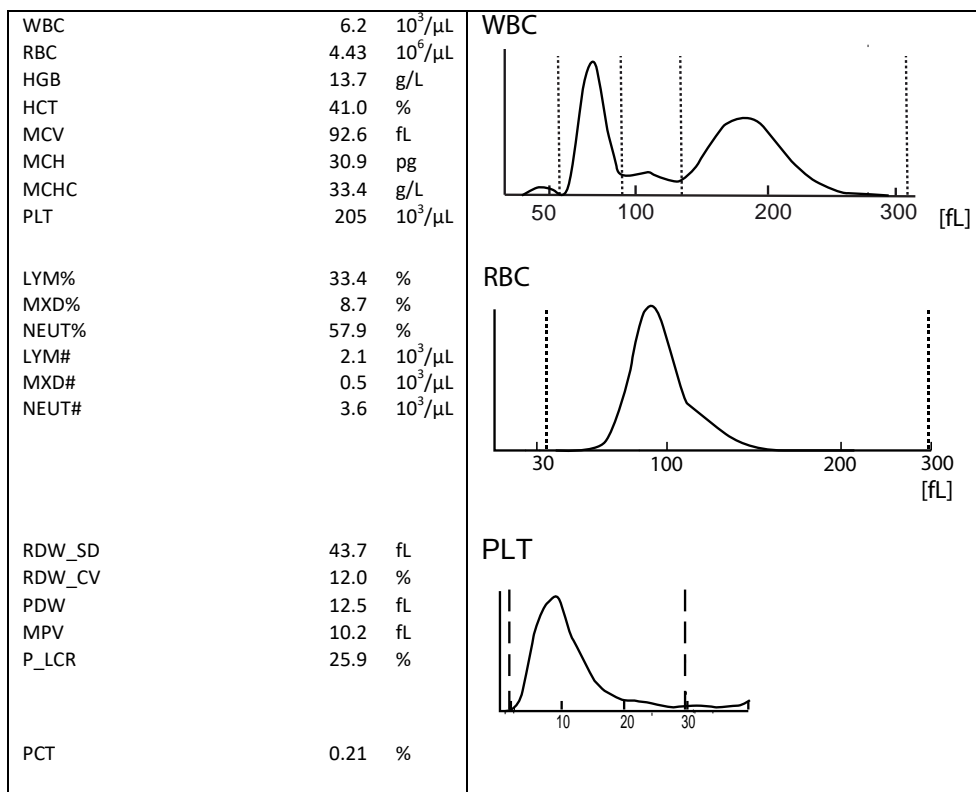


FLAGS :

1.3 Sysmex XP300



Findings MQ 2019-4 H3A
15 year old woman



1.4 Sysmex XN-20

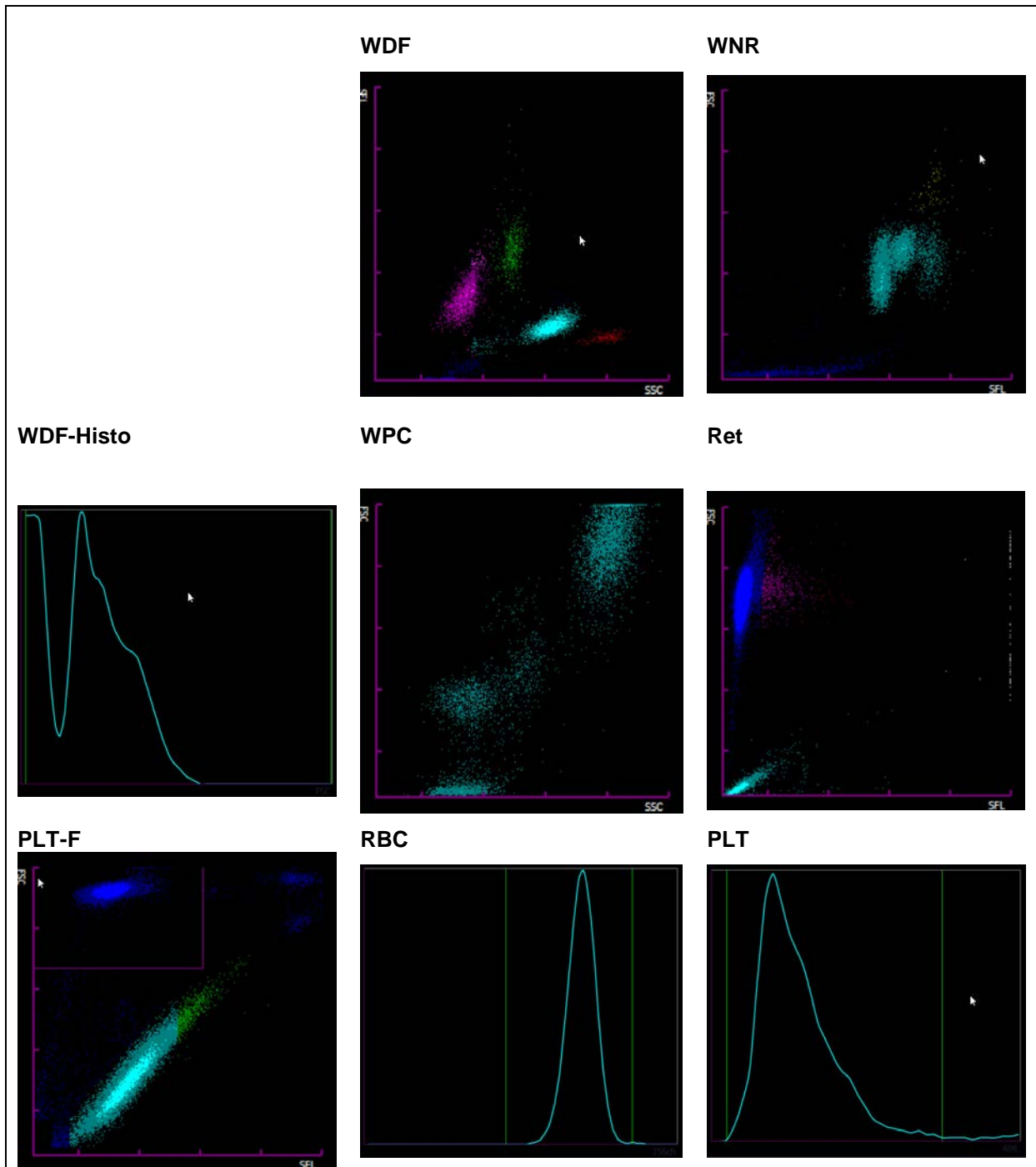


Findings MQ 2019-4 H3A

15 year old woman

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	140	g/l	117-153
<u>Hematocrit</u>	0.420	l/l	0.35-0.46
Erythrocytes	4.42	T/l	3.9-5.2
MCV	95.0	fl	80-100
MCH	31.7	pg	26-34
MCHC	333	g/l	310-360
Mikrocytes	21.1	%	11.0-14.8
<u>Thrombocytes</u>	217	G/l	143-400
<u>Leucocytes</u>	6.23	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	3.42	G/l	1.40 – 8.00
Monocytes	0.48	G/l	0.16 – 0.95
Eosinophils	0.18	G/l	0.00 – 0.70
Basophils	0.06	G/l	0.00-0.15
Lymphocytes	2.08	G/l	1.50 - 4.00
IG abs.	0.01	G/l	0.00 – 0.03
IG %	0.2	%	0.0 – 0.05
NRBC abs.	0.00	G/l	
NRBC	0.0	/100 Lc	

Findings HAD MQ 2019-4 H3A

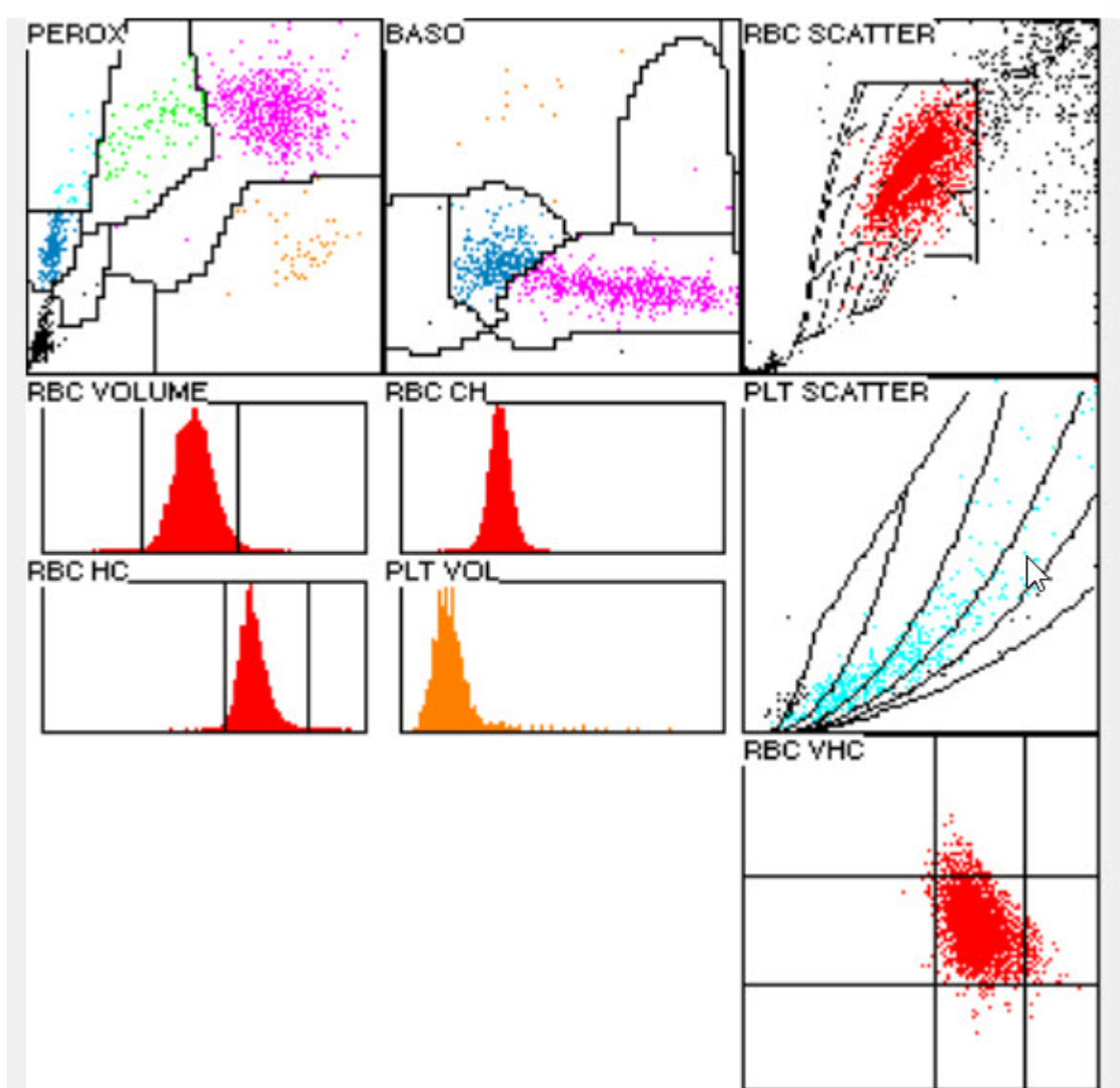


1.5 ADVIA 2120



Findings HAD MQ 2019-4 H3A 15 year old woman

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	138	g/l	117-153
<u>Hematocrit</u>	0.423	l/l	0.35-0.46
Erythrocytes	4.51	T/l	3.9-5.2
MCV	93.7	fl	80-100
MCH	30.6	pg	26-34
MCHC	326	g/l	310-360
Mikrocytes	0.2	%	0-2.0
Macrocytes	1.3	%	0-2.0
Hypochromic Ec	0.6	%	0-2.0
Hyperchromic Ec	0.2	%	0-2.0
RDW	12.6	%	11.0-14.8
<u>Thrombocytes</u>	213	G/l	143-400
Vd. L-SHIFT	0	+	Keine (0)
<u>Leucocytes</u>	5.77	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	3.25	G/l	1.40-8.00
Monocytes	0.32	G/l	0.16-0.95
Eosinophils	0.16	G/l	0.00-0.70
Basophile	0.04	G/l	0.00-0.15
Lymphocytes	1.88	G/l	1.50-4.00
LUC	1.8	%	0.0-4.0



1.6 Differential Blood Smear

Findings HAD MQ 2019-4 H3A

15 year old woman

Analysis	Result	Unit	Reference value
Neutrophils total	3.61	G/l	1.40-8.00
Monocytes	0.17	G/l	0.16-0.95
Eosinophils	0.09	G/l	0.00-0.70
Basophils	0.06	G/l	0.00-0.15
Lymphocytes	1.85	G/l	1.50-4.00
Neutrophils total	62.5	%	40.0-74.0
Neutrophils Band	9.5	%	0.0-20.0
Neutrophils Segmented	* 53.0	%	30.0-50.0
Monocytes	* 3.0	%	3.4-9.0
Eosinophils	1.5	%	0.0-7.0
Basophils	1.0	%	0.0-1.5
Lymphocytes	32.0	%	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	%	

Commentary

Red blood cell count normochromic, normocytic. Neutrophilic granulocytes with fine cytoplasmic granulation. Few lymphocytes slightly reactively altered. Thrombocytes morphologically unremarkable.

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

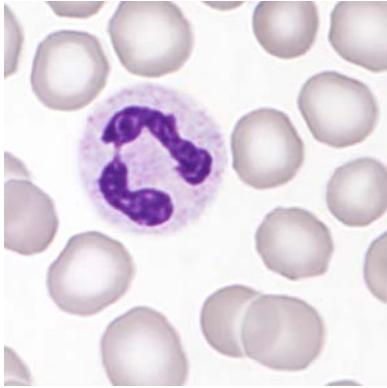


Abb 1. Neutrophile (Seg)

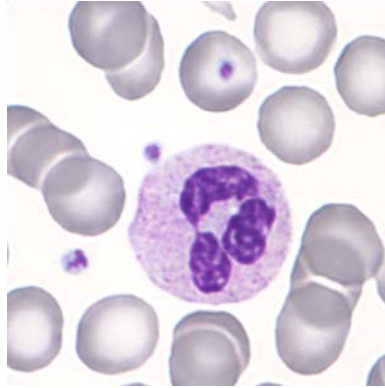


Abb 2. Neutrophile (seg)

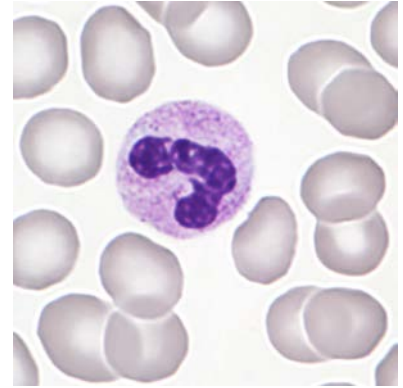


Abb 3. Neutrophile (seg)

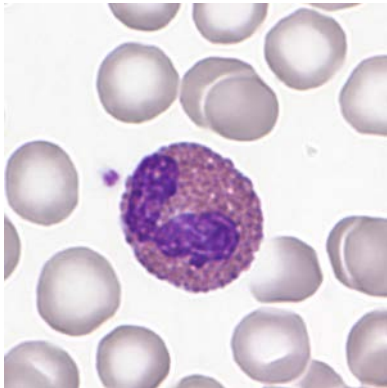


Abb 4. Eosinophile

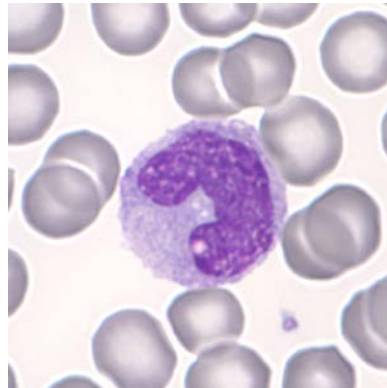


Abb 5. Monocyte

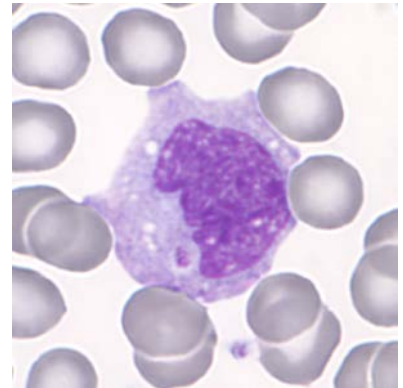


Abb 6. Monocyte

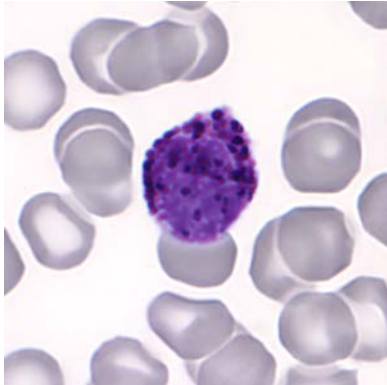


Abb 7. Basophile

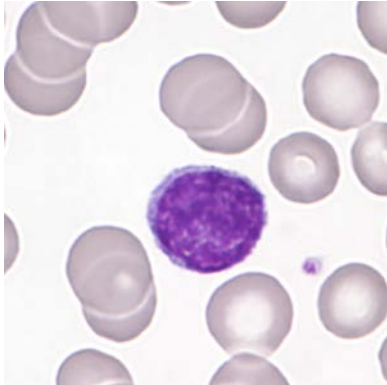


Abb 8. Lymphocyte (LGL)

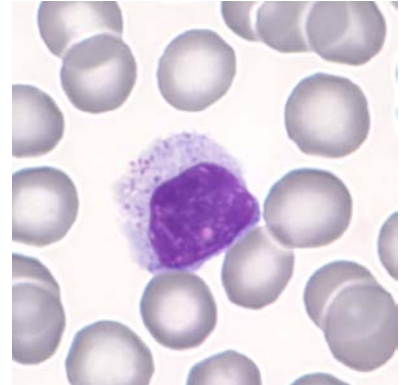


Abb 9. Lymphocyte (LGL)

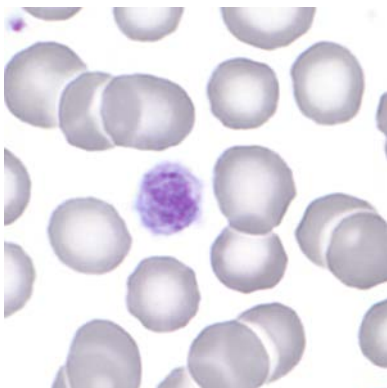


Abb 10. Platelets (macro)

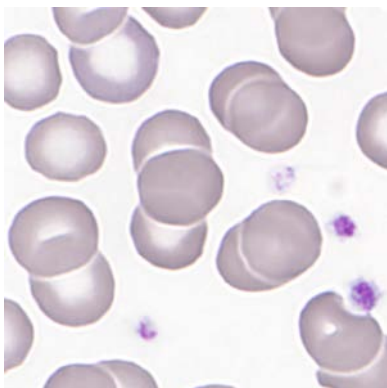


Abb 11. Platelets

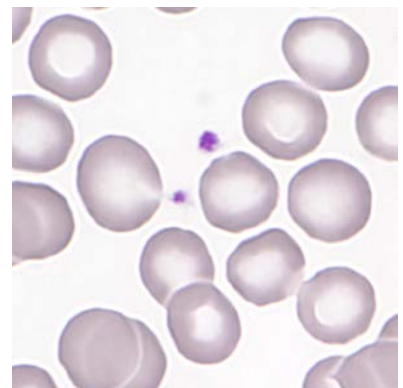


Abb 12. Platelets

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>	6	8	9	6	6	2		1	1		
<i>Neutrophils Segmented.</i>				2	8	34	137	61	4		
<i>Eosinophils</i>	8	216	22								
<i>Basophile</i>	92	154									
<i>Monocytes</i>	1	12	121	13							
<i>Lymphocytes</i>				3	14	139	81	9			
<i>Plasmacells</i>	242	3	1								
<i>Blasts</i>	243	2	1								
<i>Promyelocytes</i>	244	2									
<i>Myelocytes</i>	244	2									
<i>Metamyelocyten</i>	239	7									
<i>Erythrocytes Nucleated</i>	246										
<i>Unknown</i>	238	6	2								
<i>Smudge cells</i>	231	14	1								

Evaluation H3-A

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	9	3	0	<i>Hypochromic Ec</i>	28	9	2
<i>Pelger-Hüet Anomaly</i>	2	0	0	<i>Polychromatic Ec</i>	8		
<i>Coarse Granulation</i>	4	2		<i>Anisocytes</i>	72	9	1
<i>Basophilic Stripling</i>	3	1		<i>Mikrocytes</i>	22		
<i>Vacuoles</i>	23	3		<i>Makrocytes</i>	16	1	1
<i>Reaktive Lymphocytes</i>	54	11		<i>Megalocytes</i>	3		1
<i>Atypical Lymphocytes</i>	2	2		<i>Poikilocytosis</i>	29	4	
<i>Others</i>	4	2		<i>Ovalocytes</i>	29	3	
				<i>Target Cells</i>	9		
				<i>Akanthocytes</i>	4		
<i>Anisocytosis</i>	63	11	2	<i>Echinocytes</i>	8		
<i>Megakaryocyte Nucleaus</i>	8	2		<i>Sickle Cells</i>			
<i>Granulation</i>	8			<i>Fragmentocytes</i>	4		
<i>Others</i>	2		2	<i>Spherocytes</i>	2		
				<i>Stomatocytes</i>	8	4	
				<i>Basophilic Stripling</i>	3	1	
				<i>Howell-Jolly Bodies</i>			
				<i>Pappenheim Bodies</i>			
				<i>Others</i>	3		
				<i>s</i>			

Commentary

The smear comes from a healthy donor.

1.8 Qualab Codes

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

Code	Text	Number
29	Normal findings	198
5	Atypical lymphocytes, probably reactive	39
30	Pathologic findings, refer to expert	26
9	Macrothrombocytes	17
31	Pathologic findings	17
14	Hypochromic Erythrocytes	11
12	Microcytes	10
17	Elliptocytes/Ovalocytes	10
16	Poikilocytosis	9
22	Rouleaux	9
4	Neutrophils, Toxic Changes	8
13	Macrocytes	8
2	Neutrophils, left shift	7
1	Neutrophils, hypersegmentation of nucleus	6
11	Thrombocytes, others	6
10	Thrombocyte aggregates	5
18	Stomatocytes	5
19	Targetcells	4
8	Leucocytes other:	3
6	Atypical lymphocytes, probably neoplastic	2
15	Polychromatophilic Red Cells	2
21	Spherocytes	2
26	Teardrops	2
27	Erythrocytes, other	2
23	Erythrocytes agglutination	1
25	Basophilic strippling	1
99	Total	239

2 Sample B

2.1 ABX Microsemi CRP



Findings MQ 2019-4 H3B

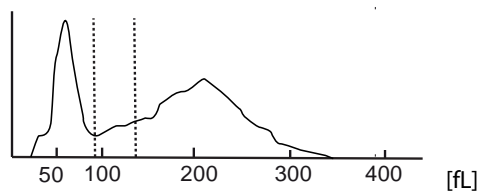
18 year old man

WBC :	6.4	$10^9/L$	MCV :	64.5	L	fL
RBC :	5.15	$10^{12}/L$	MCH :	20.0	L	pg
HGB :	10.3	L g/L	MCHC:	31.0	L	g/L
HCT :	33.2	L L/L	RDW :	16.0	H	%
PLT :	263	$10^9/L$	MPV :	7.7		fL
PCT :	0.203	$10^{-2}L/L$	PDW :	20.5	H	%

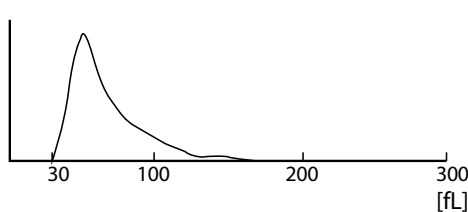
WBC FLAGS:

%LYM:	28.4	%	#LYM:	1.8	$10^9/L$
%MON:	8.6	%	#MON:	0.6	$10^9/L$
%GRA:	63.0	%	#GRA:	4.0	$10^9/L$

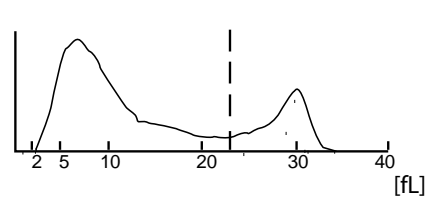
WBC



RBC



PLT



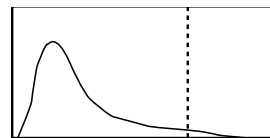
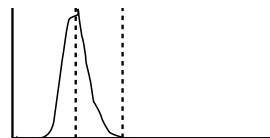
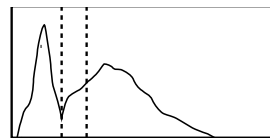
2.2 Mythic



Findings MQ 2019-4 H3B

18 year old man

WBC	6.5	10 ⁹ /l	3.5 /	10.0
LYM	1.8	10 ⁹ /l	1.2 /	3.2
MON	0.8	10 ⁹ /l	0.1 /	1.0
GRA	3.9	10 ⁹ /l	1.2 /	6.8
LYM%	27.8	%	17.0 /	48.0
MON%	12.2	H %	2.0 /	10.0
GRA%	60.0	%	43.0 /	76.0
RBC	5.03	10 ¹² /l	4.00 /	5.70
HGB	106	g/l	120 /	180
HCT	0.321	l/l	0.360 /	0.540
MCV	63.8	fl	80.0 /	100.0
MCH	21.1	pg	26.0 /	34.0
MCHC	330	g/l	310 /	365
RDW	18.4	%	10.0 /	16.0
PLT	226	10 ⁹ /l	150 /	400
MPV	9.1	fl	7.0 /	11.0
PCT	0.206	cl/l	0.100 /	0.500
PDW	15.5	%	10.0 /	18.0



FLAGS:

2.3 Sysmex XP300



Findings MQ 2019-4 H3B
18 year old man

WBC		6.5	$10^3/\mu\text{L}$	
RBC		4.95	$10^6/\mu\text{L}$	
HGB	-	10.1	g/dL	
HCT	-	33.2	%	
MCV	-	67.1	fL	
MCH	-	20.4	pg	
MCHC	-	30.4	g/dL	
PLT		237	$10^3/\mu\text{L}$	
LYM%		27.2	%	
MXD%		11.9	%	
NEUT%		60.9	%	
LYM#		1.8	$10^3/\mu\text{L}$	
MXD#		0.8	$10^3/\mu\text{L}$	
NEUT#		3.9	$10^3/\mu\text{L}$	
RDW_SD		43.0	fL	
RDW_CV	+	17.0	%	
PDW		12.4	fL	
MPV		9.4	fL	
P_LCR		22.4	%	
PCT		0.22	%	

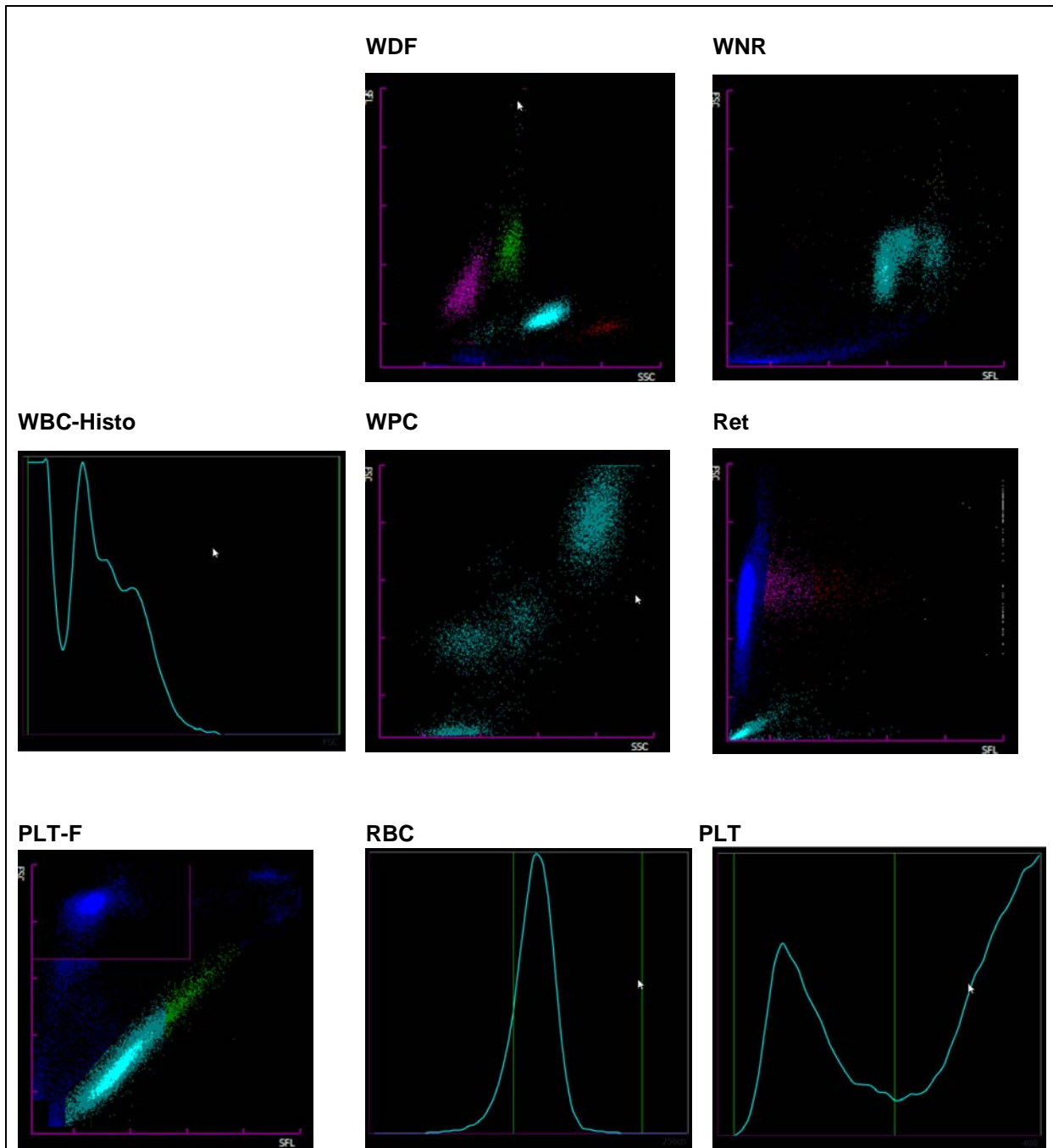
2.4 Sysmex XN-20



Findings MQ 2019-4 H3B 18 year old man

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	104	g/l	117-153
Hematocrit	0.337	l/l	0.35-0.46
Erythrocytes	5.07	T/l	3.9-5.2
MCV	66.5	fl	80-100
MCH	20.5	pg	26-34
MCHC	309	g/l	310-360
Thrombocytes	244	G/l	143-400
Leucocytes	6.41	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	59.4	G/l	1.40-8.00
Monocytes	13.1	G/l	0.16-0.95
Eosinophils	3.0	G/l	0.00-0.70
Basophils	0.5	G/l	0.00-0.15
Lymphocytes	23.7	G/l	1.50-4.00
IG abs.	0.02	G/l	0.00-0.03
IG %	0.3	%	0.0-0.5
NRBC abs.	0.03	G/l	
NRBC	0.5	/100 Lc	

Findings HAD MQ 2019-4 H3B

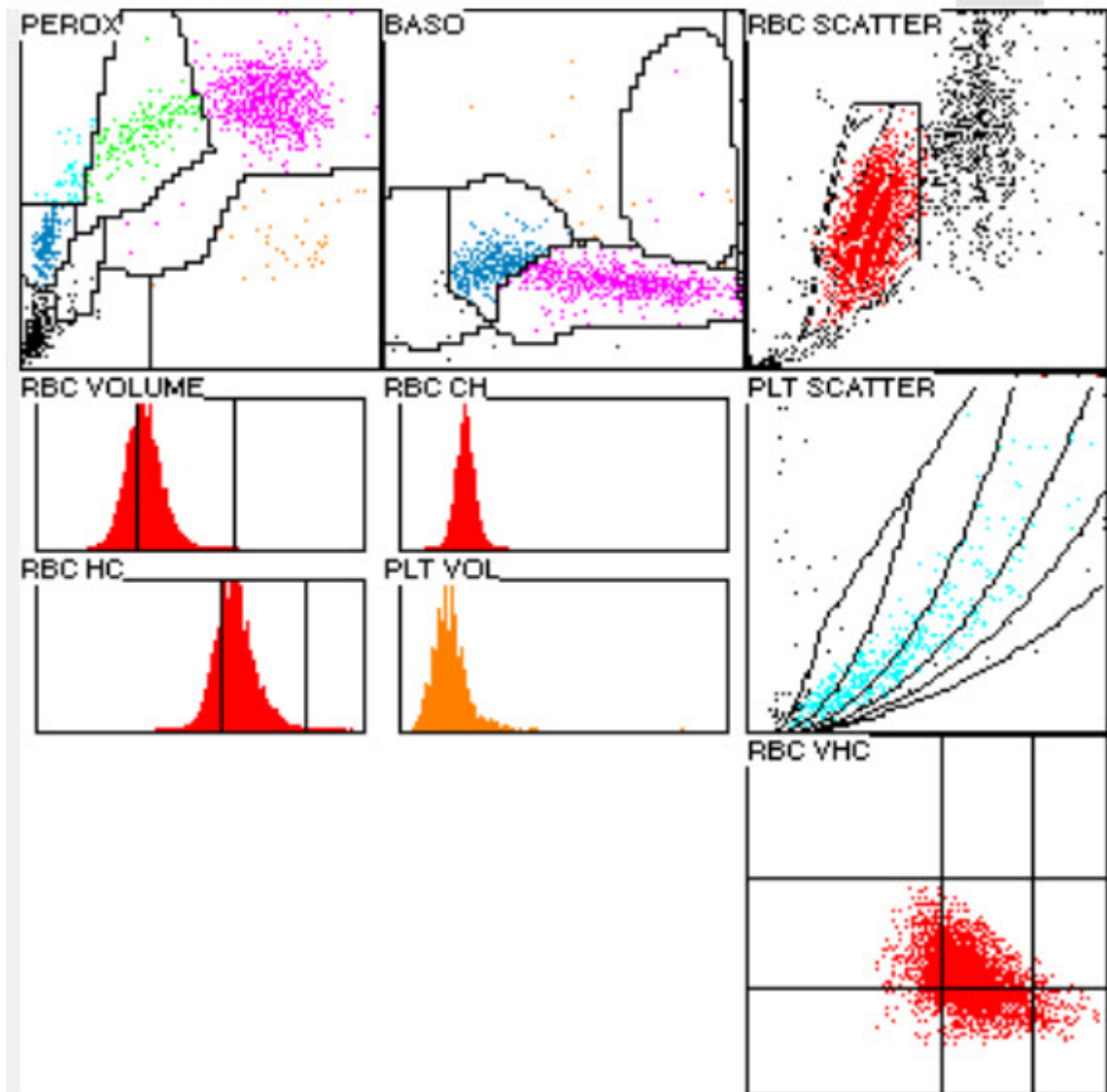


2.5 ADVIA 2120



Findings HAD MQ 2019-4 H3B 18 year old man

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	105	g/l	117-153
Hematocrit	0.336	l/l	0.35-0.46
Erythrocytes	5.16	T/l	3.9-5.2
MCV	* 65.1	fl	80-100
MCH	* 20.4	pg	26-34
MCHC	314	g/l	310-360
Mikrocytes	* 32.1	%	0-2.0
Makrocytes	0	%	0-2.0
Hypochromic Ec	* 21.0	%	0-2.0
Hyerchromic Ec	0.5	%	0-2.0
RDW	* 16.8	%	11.0-0-14.8
Thrombocytes	229	G/l	143-400
Leukocytes	6.44	G/l	3.0-9.6
Leucocytes Differentiation			
Neutrophils	3.92	G/l	1.40-8.00
Monocytes	0.57	G/l	0.16-0.95
Eosinophils	0.15	G/l	0.00-0.70
Basophils	0.03	G/l	0.00-0.15
Lymphocytes	1.57	G/l	1.50-4.00
LUC	0.19	%	0.0-4.0



2.6 Differential Blood Smear

Findings MQ 2019-4 H3B

18 year old man

Analysis	Result	Unit	Reference value
Leucocytes Differentiation			
Neutrophils total	4.22	G/l	1.40-8.00
Monocytes	0.35	G/l	0.16-0.95
Eosinophils	0.16	G/l	0.00-0.70
Basophils	0.06	G/l	0.00-0.15
Lymphocytes	1.64	G/l	1.50-4.00
Neutrophils total	65.5	%	40.0-74.0
Neutrophils Band	5.0	%	0.0-20.0
Neutrophils Segmented	* 60.5	%	30.0-50.0
Monocytes	5.5	%	3.4-9.0
Eosinophils	2.5	%	0.0-7.0
Basophils	1.0	%	0.0-1.5
Lymphocytes	25.5	%	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
Others/ damaged cells	0.0	%	0

Commentary

Red blood cell count hypochromic and anisocytic with many microcytes. Slight poikilocytosis with few ovalocytes, acanthocytes and echinocytes, individual target cells. Neutrophilic granulocytes with fine cytoplasmic granulation. Lymphocytes morphologically unremarkable. Slight anisocytosis of the thrombocytes

K. Schreiber / PD. Dr. St. Balabanov

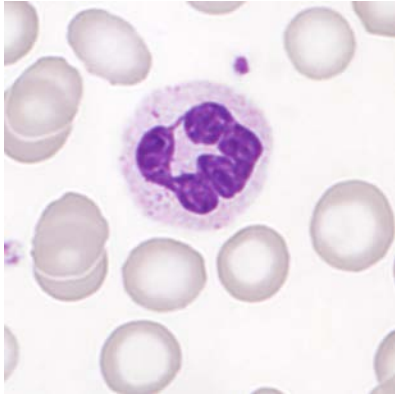


Abb 1. Neutrophil (Seg)

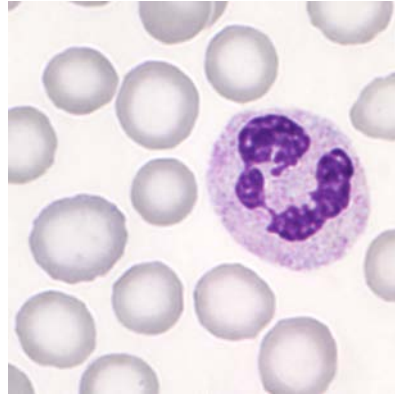


Abb 2. Neutrophil (Seg)

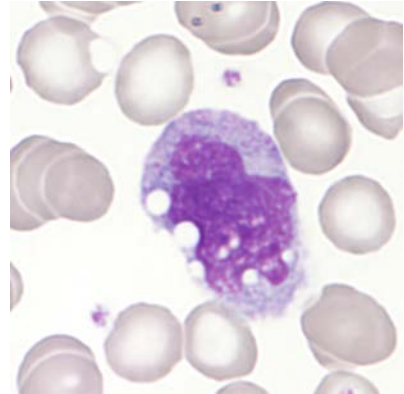


Abb 3. Monocyte

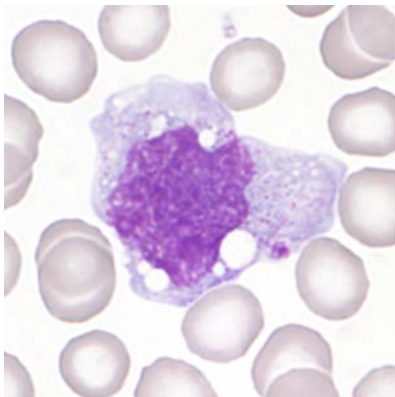


Abb 4. Monocyte

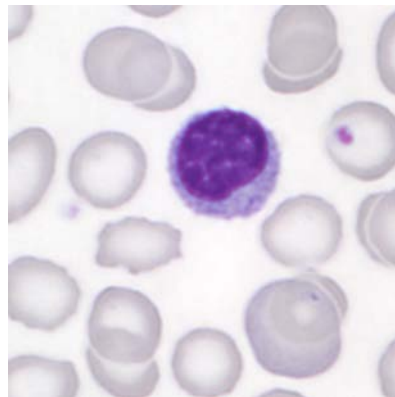


Abb 5. Lymphocyte

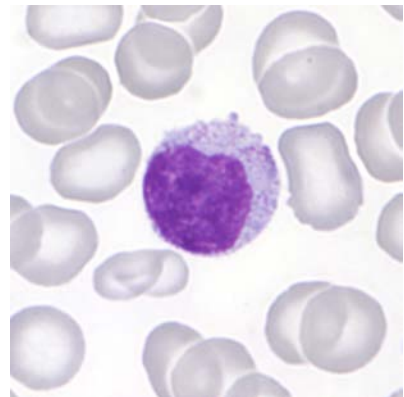


Abb 6. Lymphocyte

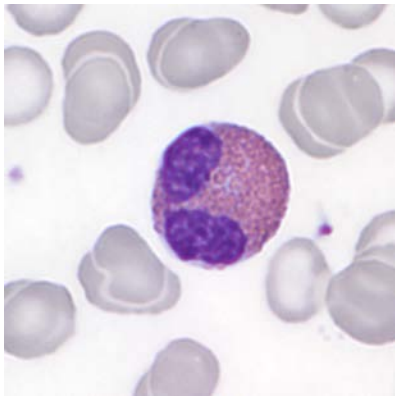


Abb 7. Eosinophile

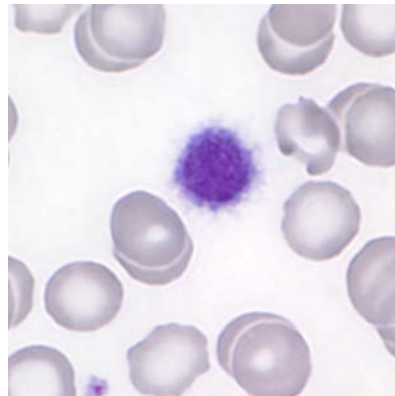


Abb 8. Platelets (macro)

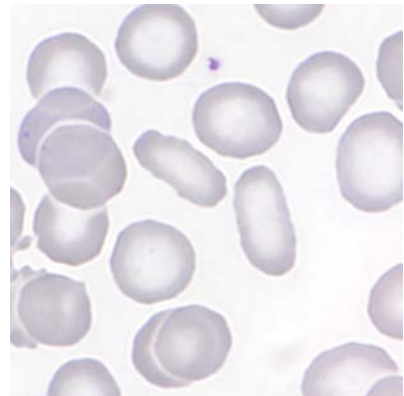


Abb 9. Ovalocytes

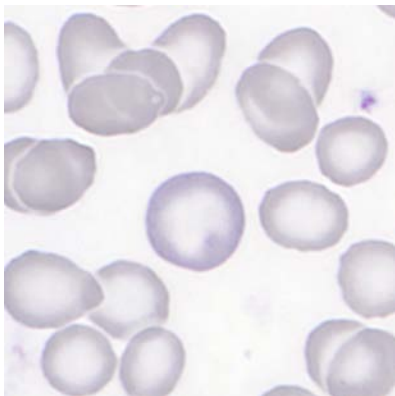


Abb 10. Polychromasia

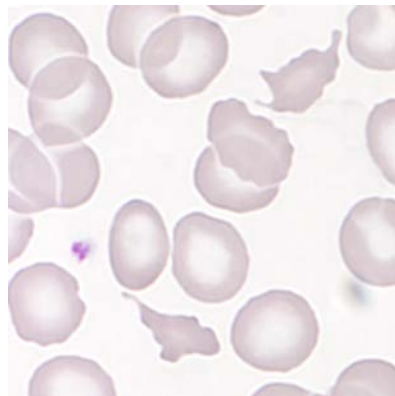


Abb 11. Poikilocytosis

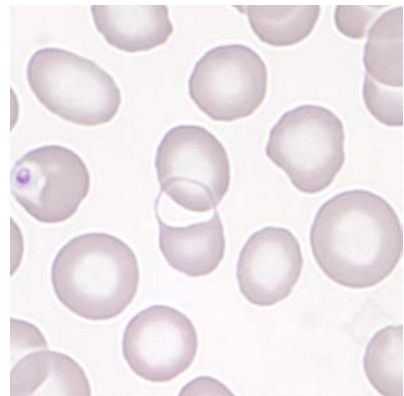


Abb 12. Poikilocytosis

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>	63	127	35	15	2		1		1		
<i>Neutrophils Segmented.</i>		1		1	1	6	38	145	51	1	
<i>Eosinophils</i>	12	25	27								
<i>Basophile</i>	117	127									
<i>Monocytes</i>	1	77	118	39							
<i>Lymphocytes</i>			2	5	9	119	26	1	1		
<i>Plasmacells</i>	238	6									
<i>Blasts</i>	239	5									
<i>Promyelocytes</i>	242	2									
<i>Myelocytes</i>	236	7	1								
<i>Metamyelocyten</i>	24	4									
<i>Erythrocytes Nucleated</i>	241	3									
<i>Unknown</i>	231	7	5	1							
<i>Smudge cells</i>	225	15	4								

Evaluation H3-B

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	77	38	9	<i>Hypochromic Ec</i>	57	118	34
<i>Pelger-Hüet Anomaly</i>	2			<i>Polychromatic Ec</i>	71	1	
<i>Coarse Granulation</i>	25	9		<i>Anisocytes</i>	9	95	9
<i>Basophilic Stripling</i>	5	1		<i>Mikrocytes</i>	58	71	23
<i>Vacuoles</i>	24	8		<i>Makrocytes</i>	39	5	1
<i>Atypical Lymph, reactive</i>	44	16		<i>Megalocytes</i>	5		
<i>Atypical Lymph, neoplastic</i>	4			<i>Poikilocytosis</i>	112	37	3
<i>Others</i>	8		1	<i>Ovalocytes</i>	117	21	
				<i>Target Cells</i>	65	12	1
				<i>Akanthocytes</i>	5	5	1
<i>Anisocytosis</i>	9	33	3	<i>Echinocytes</i>	35	7	1
<i>Megakaryocyte Nucleaus</i>	12	3		<i>Sickle Cells</i>	4		
<i>Granulation</i>	12	4		<i>Fragmentocytes</i>	62	7	
<i>Others</i>	1		2	<i>Spherocytes</i>	4		
				<i>Stomatocytes</i>	8		
				<i>Basophilic Stripling</i>	1	1	
				<i>Howell-Jolly Bodies</i>	3		
				<i>Pappenheim Bodies</i>	1		
				<i>Others</i>	8	2	

Commentary

The smear comes from a patient with thalassemia minor.

2.8 Qualab Codes

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

Code	Text	Number
14	Hypochromic Erythrocytes	168
12	Microcytes	108
30	Pathologic findings, refer to expert	108
31	Pathologic findings	89
1	Neutrophils, hypersegmentation of nucleus	75
16	Poikilocytosis	70
17	Elliptocytes/Ovalocytes	42
5	Atypical lymphocytes, probably reactive	33
15	Polychromatophilic Red Cells	27
20	Fragmentocytes	27
19	Targetcells	26
9	Macrothrombocytes	24
22	Rouleaux	17
29	Normal findings	15
4	Neutrophils, Toxic Changes	11
13	Macrocytes	10
6	Atypical lymphocytes, probably neoplastic	9
27	Erythrocytes, other	9
26	Teardrops	7
2	Neutrophils, left shift	5
10	Thrombocyte aggregates	4
11	Thrombocytes, others	3
18	Stomatocytes	2
21	Spherocytes	2
8	Leucocytes other:	1
24	Howell-Jolly bodies	1
25	Basophilic strippling	1
99	Total	240