

Verein für
Association pour le
Associazione per il



medizinische Qualitätskontrolle
contrôle de qualité médical
controllo di qualità medico

Report

Differential Blood Smear H3

MQ 2016-1

Acknowledgements

The Mythic 18 analyzer was provided by the company Polymed, the ABX Micros CRP 200 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 Micros

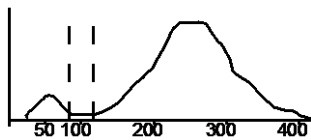


Findings MQ 2016-1 H3A 59 year old women

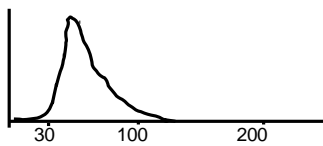
WBC :	16.9	H	10 ⁹ /L	MCV :	70.2	L	fL
RBC :	7.28	H	10 ¹² /L	MCH :	20.3	L	pg
HGB :	147		g/L	MCHC:	288	L	g/L
HCT :	511	H	L/L	RDW :	18.8	H	%
PLT :	348		10 ⁹ /L	MPV :	8.0		fL
PCT :	277		10 ⁻² L/L	PDW :	12.2		%

DIFF:				#LYM:	1.0	L	10 ⁹ /L
%LYM:	6.4	L	%	#MON:	0.2	L	10 ⁹ /L
%MON:	1.7	L	%	#GRA:	15.7	H	10 ⁹ /L
%GRA:	91.9	H	%				

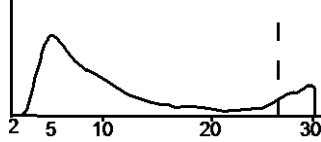
WBC



RBC



PLT

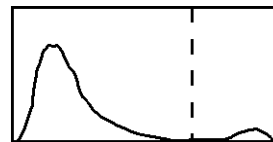
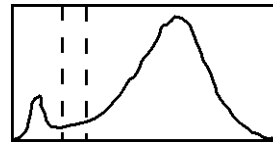


1.2 Mythic



Findings MQ 2016-1, H3A 59 year old women

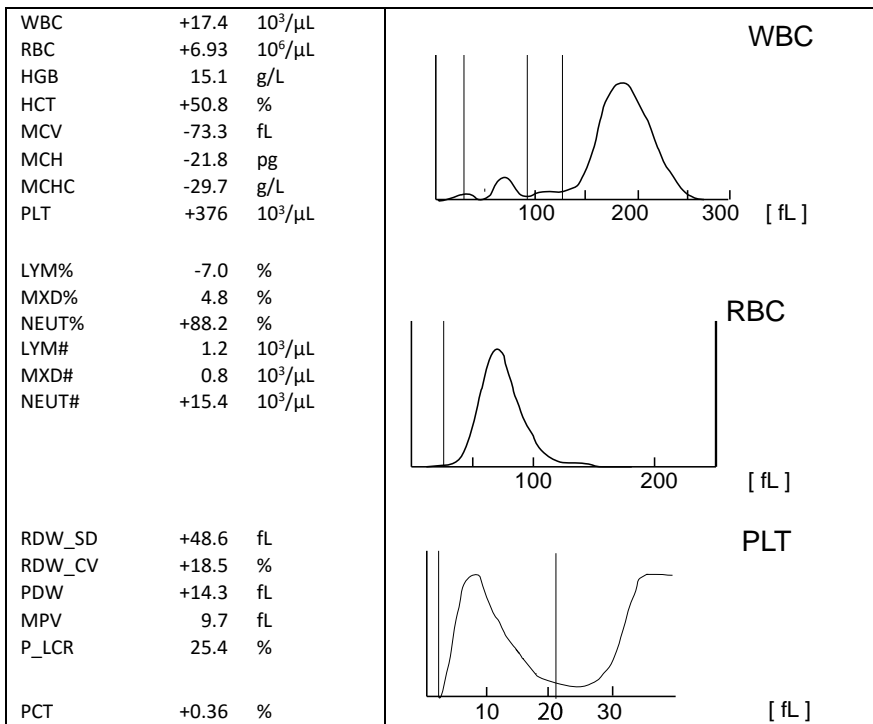
WBC	17.3	H	10 ⁹ /l	3.5 / 10.0
LYM	1.3		10 ⁹ /l	1.2 / 3.2
MON	0.7		10 ⁹ /l	0.1 / 1.0
GRA	15.3	H	10 ⁹ /l	1.2 / 6.8
LYM%	7.7	L	%	17.0 / 48.0
MON%	3.8		%	2.0 / 10.0
GRA%	88.5	H	%	43.0 / 76.0
RBC	6.85	h	10 ¹² /l	4.00 / 5.70
HGB	145		g/l	140 / 180
HCT	0.456		l/l	0.420 / 0.540
MCV	66.6	L	fl	80.0 / 100.0
MCH	21.2	L	pg	26.0 / 34.0
MCHC	318		g/l	310 / 365
RDW	17.5	h	%	10.0 / 16.0
PLT	262		10 ⁹ /l	150 / 400
MPV	8.3	l	fl	7.0 / 11.0
PCT	0.217		cl/l	0.100 / 0.500
PDW	16.9		%	10.0 / 18.0



1.3 Sysmex XP300



Findings MQ 2016-1, H3A
59 year old women



1.4 Sysmex XE-5000

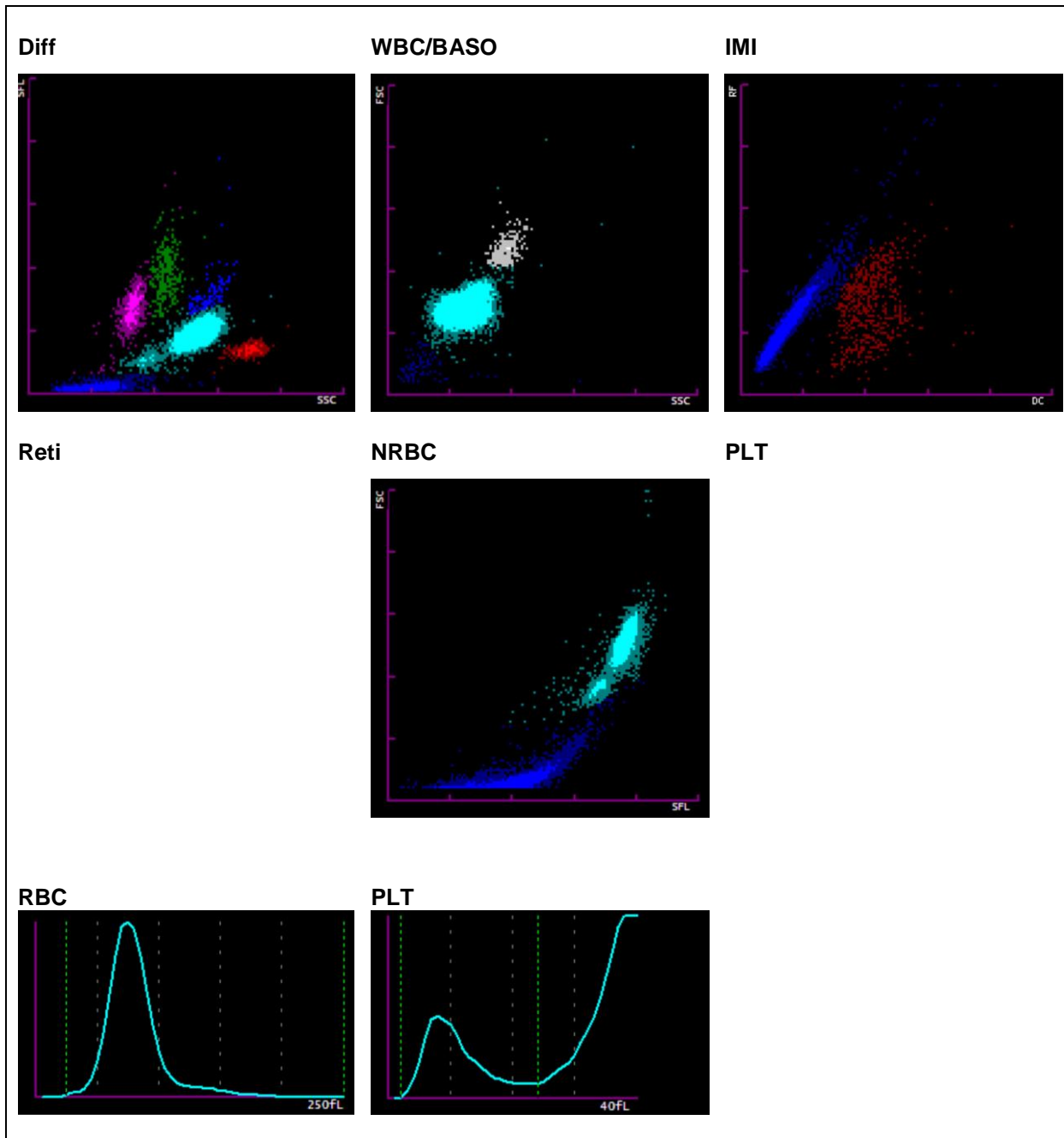


Findings HAD MQ 2016-1 H3A

59 year old women

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	152	g/l	<u>117-153</u>
<u>Hematocrit</u>	0.508	l/l	<u>0.350-0.460</u>
Erythrocytes	6.92	T/l	<u>3.9-5.2</u>
MCV	* 73.4	fl	80-100
MCH	* 22.0	pg	26-34
MCHC	* 299	g/l	310-360
Mikrocytes	* 19.2	%	11.0-14.8
<u>Thrombocytes</u>	344	G/l	143-400
<u>Leucocytes</u>	* 18.03	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	* 15.71	G/l	1.40-8.00
Monocytes	0.40	G/l	0.16-0.95
Eosinophils	0.50	G/l	0.00-0.70
Basophils	* 0.24	G/l	0.00-0.15
Lymphocytes	* 1.18	G/l	1.50-4.00
IG abs.	* 0.16	G/l	0.00-0.03
IG %	* 0.9	%	0.0-0.5
NRBC abs.	0.00	G/l	
NRBC	0.0	/100 Lc	

Findings HAD MQ 2016-1 H3A

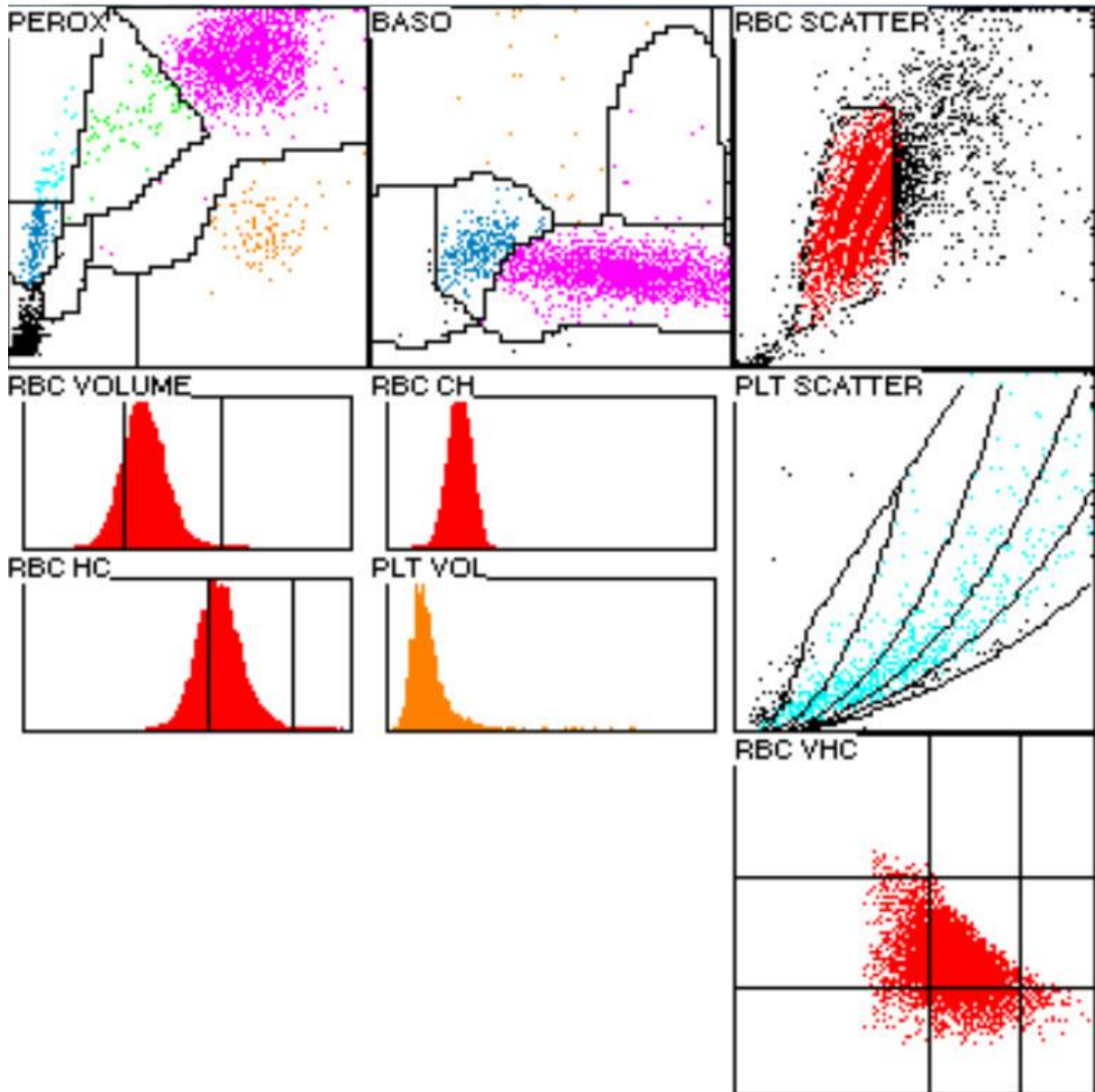


1.5 ADVIA 2120



Findings HAD MQ 2016-1 H3A 59 year old women

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>		g/l	134-170
<u>Hematocrit</u>	148	l/l	0.400-0.500
Erythrocytes	0.517	T/l	4.2-5.7
MCV	7.04	fl	80-100
MCH	* 73.4	pg	26-34
MCHC	* 20.9	g/l	310-360
Mikrocytes	285	%	0-2.0
Macrocytes	* 14.8	%	0-2.0
Hypochromic Ec	0.1	%	0-2.0
Hyperchromic Ec	* 28.9	%	0-2.0
RDW	0.4	%	11.0-14.8
<u>Thrombocytes</u>	* 17.8	G/l	143-400
Vd. L-SHIFT	372	+	Keine (0)
<u>Leucocytes</u>	+	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils		G/l	1.40-8.00
Monocytes	* 15.13	G/l	0.16-0.95
Eosinophils	0.29	G/l	0.00-0.70
Basophile	0.43	G/l	0.00-0.15
Lymphocytes	0.10	G/l	1.50-4.00
LUC	* 1.06	%	0.0-4.0



1.6 Differential Blood Smear

Findings HAD MQ 2016-1 H3A

59 year old women

Analysis	Result	Unit	Reference value
Neutrophils total	15.03	G/l	1.40-8.00
Monocytes	0.26	G/l	0.16-0.95
Eosinophils	0.35	G/l	0.00-0.70
Basophils	0.26	G/l	0.00-0.15
Lymphocytes	1.21	G/l	1.50-4.00
Neutrophils total	87.0	%	40.0-74.0
Neutrophils Band	23.0	%	0.0-20.0
Neutrophils Segmented	* 64.0	%	30.0-50.0
Monocytes	1.5	%	3.4-9.0
Eosinophils	2.0	%	0.0-7.0
Basophils	1.5	%	0.0-1.5
Lymphocytes	7.0	%	19.0-48.0
Plasmacells	0.0	%	0-0.5
Blasts	0.0	%	0
Promyelocytes	0.0	%	0
Myelocytes	0.5	%	0
Metamyelocytes	0.5	%	0
Nucleated Red Cells	0.0	/100 Lc	

Commentary

Neutrophil granulocytes with fine cytoplasmic granulation, a few highly segmented nuclei. Large lymphocytes and nuclear polymorphs. Marked anisocytosis of the thrombocytes, and on close examination rare giant thrombocytes detectable. Red blood picture; marked hypochromasia, marked anisocytosis with many microcytes, poikilocytes with many target cells, rare acanthocytes and spherocytes. No erythrocyte inclusions.

K. Schreiber / PD. Dr. St. Balabanov

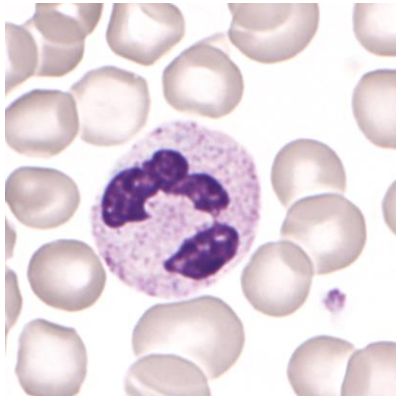


Abb 1. Neutrophil (Seg)

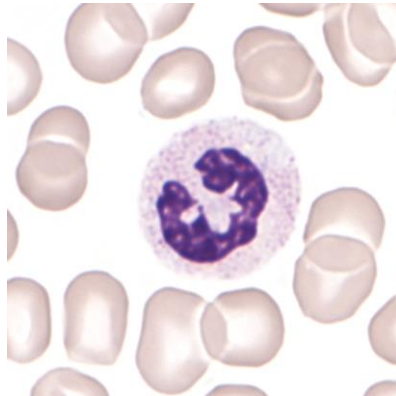


Abb 2. Neutrophil (Band)

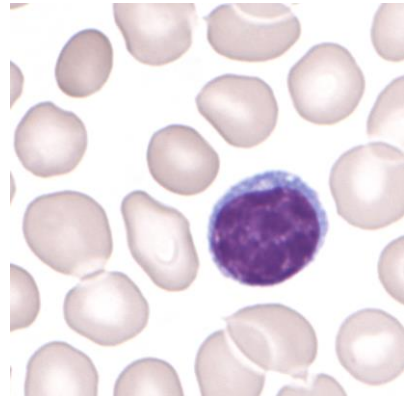


Abb 3. Lymphocyte

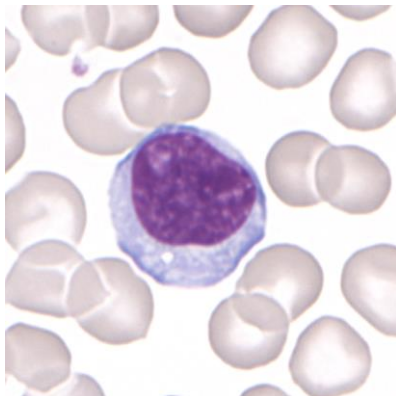


Abb 4. Lymphocyte

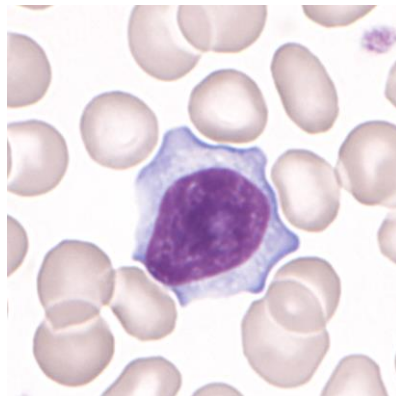


Abb 5. Lymphocyte

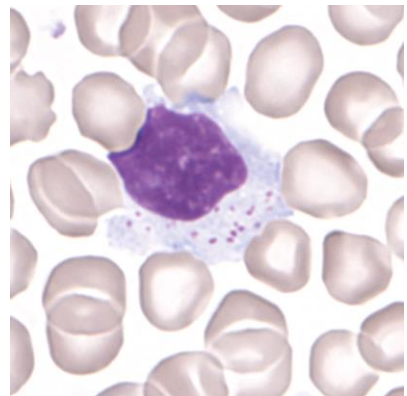


Abb 6. Lymphocyte (LGL)

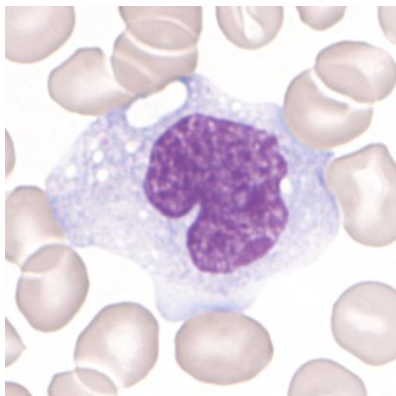


Abb 7. Monocyte

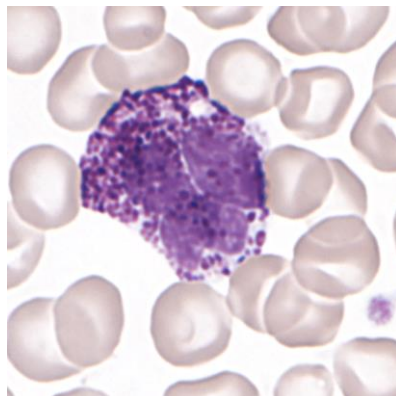


Abb 8. Basophil

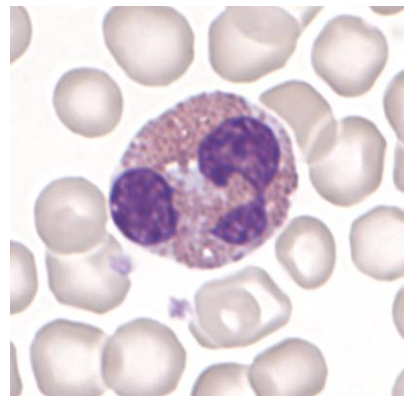


Abb 9. Eosinophil

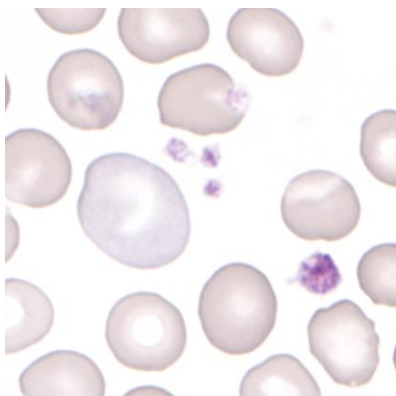


Abb 10. Polychromasia

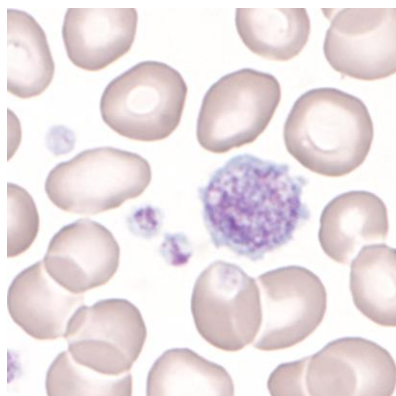


Abb 11. Giant Thrombocytes

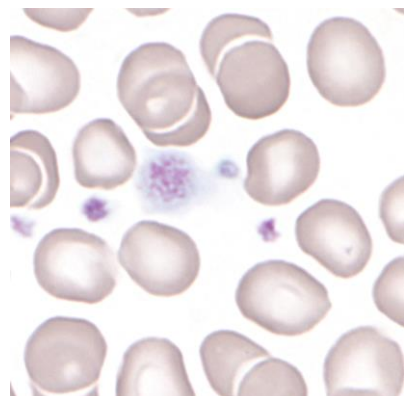


Abb 12. Anisocytosis of the Tc

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>	1	8	38	109	114*	37	11	8	0	2	2
<i>Neutrophils Segmented.</i>	2	1	1	1	2	9	17	71	105*	97	24
<i>Eosinophils</i>	28	277*	22	3							
<i>Basophile</i>	93	234*	3								
<i>Monocytes</i>	54	258*	18								
<i>Lymphocytes</i>	0	24	214*	87	5						
<i>Plasmacells</i>	327*	2	1								
<i>Blasts</i>	327*	3									
<i>Promyelocytes</i>	327*	3									
<i>Myelocytes</i>	329*	1									
<i>Metamyelozyten</i>	325*	5									
<i>Erythrocytes Nucleated</i>	310*	20									
<i>Unknown</i>	322*	7	0	1							
<i>Smudge cells</i>	312*	15	3								

Evaluation H3-A

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	25	10	2	<i>Hypochromic Ec</i>	72*	37	6
<i>Pelger-Hüet Anomaly</i>	9	2		<i>Polychromatic Ec</i>	136*	49	2
<i>Coarse Granulation</i>	110*	48	6	<i>Anisocytes</i>	125	109*	6
<i>Basophilic Stripling</i>	34	4	1	<i>Mikrocytes</i>	106	63*	1
<i>Vacuoles</i>	35	5		<i>Makrocytes</i>	75*	19	1
<i>Reaktive Lymphocytes</i>	35	3		<i>Megalocytes</i>	15	2	
<i>Atypical Lymphocytes</i>	6	1		<i>Poikilocytosis</i>	93*	10	1
<i>Others</i>				<i>Ovalocytes</i>	117*	7	
				<i>Target Cells</i>	16		
				<i>Akanthocytes</i>	10		
<i>Anisocytosis</i>	111	77*	9	<i>Echinocytes</i>	12	1	1
<i>Megakaryocyte Nucleaus</i>	22	6	0	<i>Sickle Cells</i>	1	1	
<i>Granulation</i>	32	8	1	<i>Fragmentocytes</i>	5		
<i>Others</i>				<i>Spherocytes</i>	8	2	
				<i>Stomatocytes</i>	61*	9	1
				<i>Basophilic Stripling</i>	7	1	
				<i>Howell-Jolly Bodies</i>	5	2	1
				<i>Pappenheim Bodies</i>			
				<i>Others</i>			

Commentary

Smear H3-A is from a patient with polycythaemia vera.

1.8 Qualab Codes

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

Code	Text	Number
2	Neutrophils, left shift	113
30	Pathologic findings, refer to expert	109
15	Polychromatophilic Red Cells	103
12	Microcytes	102
31	Pathologic findings	95
9	Macrothrombocytes	65
14	Hypochromic Erythrocytes	64
4	Neutrophils, Toxic Changes	59
29	Normal findings	57
13	Macrocytes	37
18	Stomatocytes	33
17	Elliptocytes/Ovalocytes	27
16	Poikilocytosis	25
1	Neutrophils, hypersegmentation of nucleus	17
8	Leucocytes other:	15
5	Atypical lymphocytes, probably reactive	14
27	Erythrocytes, other	12
11	Thrombocytes, others	10
22	Rouleaux	10
19	Targetcells	8
10	Thrombocyte aggregates	4
26	Teardrops	4
3	Pelger Hüet Anomaly	3
25	Basophilic strippling	3
20	Fragmentocytes	2
21	Spherocytes	2
24	Howell-Jolly bodies	2
23	Erythrocytes agglutination	1
99	Total	323

2 Sample B

2.1 ABX Micros



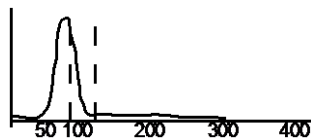
Findings MQ 2016-1 H3B

50 year old man

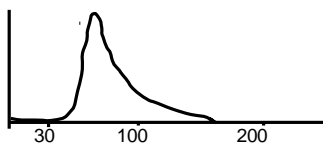
WBC :	36.9	H	$10^9/L$	MCV :	94.8	fL
RBC :	5.28		$10^{12}/L$	MCH :	31.9	pg
HGB :	169	H	g/L	MCHC:	337	g/L
HCT :	0.501	L	L/L	RDW :	14.7	%
PLT :	164		$10^9/L$	MPV :	7.1	fL
PCT :	116		$10^{-2}/L/L$	PDW :	14.6	%

DIFF:						
%LYM:	49.4	H	%	#LYM:	18.2	H $10^9/L$
%MON:	30.3	H	%	#MON:	11.1	H $10^9/L$
%GRA:	20.3	L	%	#GRA:	7.6	H $10^9/L$

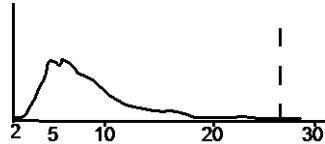
WBC



RBC



PLT



2.2 Mythic



Findings MQ 2016-1 H3B

50 year old man

WBC	36.0	H	10 ⁹ /l	3.5	/	10.0
LYM	26.6		10 ⁹ /l	1.2	/	3.2
MON	3.1		10 ⁹ /l	0.1	/	1.0
GRA	6.3	H	10 ⁹ /l	1.2	/	6.8
LYM%	73.9		%	17.0	/	48.0
MON%	8.6		%	2.0	/	10.0
GRA%	17.5		%	43.0	/	76.0



RBC	4.97	I	10 ¹² /l	4.00	/	5.70
HGB	160	I	g/l	140	/	180
HCT	0.473	I	l/l	0.420	/	0.540
MCV	95.2		fl	80.0	/	100.0
MCH	32.2		pg	26.0	/	34.0
MCHC	338		g/l	310	/	365
RDW	14.6		%	10.0	/	16.0



PLT	153	I	10 ⁹ /l	150	/	400
MPV	7.7		fl	7.0	/	11.0
PCT	0.118	I	cl/l	0.100	/	0.500
PDW	14.4		%	10.0	/	18.0



2.3 Sysmex XP300



Findings MQ 2016-1 H3B 50 year old man

WBC	+36.2	10 ³ /μL	<p>WBC [fL]</p> <p>RBC [fL]</p> <p>PLT [fL]</p>
RBC	5.01	10 ⁶ /μL	
HGB	16.4	g/dL	
HCT	46.2	%	
MCV	92.2	fL	
MCH	32.7	pg	
MCHC	35.5	g/dL	
PLT	184	10 ³ /μL	
LYM%	--,-	%	
MXD%	--,-	%	
NEUT%	--,-	%	
LYM#	--,-	10 ³ /μL	
MXD#T2	--,-	10 ³ /μL	
NEUT#T2	--,-	10 ³ /μL	
RDW_SD	+49.3	fL	
RDW_CV	14.2	%	
PDW	10.6	fL	
MPV	9.2	fL	
P_LCR	18.7	%	
PCT	0.17	%	

2.4 Sysmex XE-5000

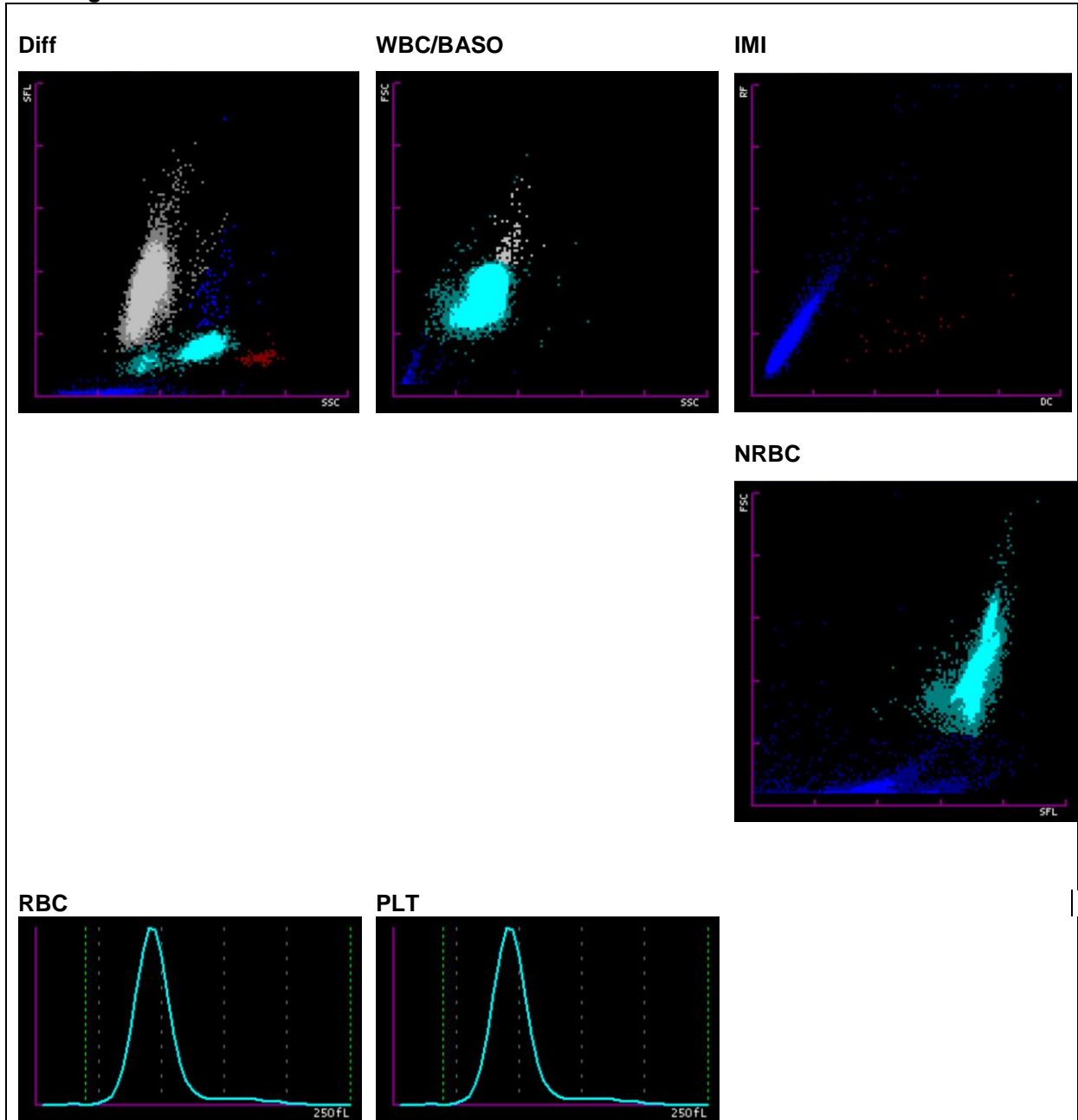


Findings HAD MQ 2016-1 H3B

50 year old man

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	168	g/l	<u>134-170</u>
Hematocrit	0.474	l/l	<u>0.400-0.500</u>
Erythrocytes	5.17	T/l	<u>4.2-5.7</u>
MCV	91.7	fl	80-100
MCH	32.5	pg	26-34
MCHC	354	g/l	310-360
Mikrocytes	14.0	%	11.0-14.8
Thrombocytes	158	G/l	143-400
Leucocytes	* 37.25	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	4.72	G/l	1.40-8.00
Monocytes	0.78	G/l	0.16-0.95
Eosinophils	0.12	G/l	0.00-0.70
Basophils	0.07	G/l	0.00-0.15
Lymphocytes	* 31.56	G/l	1.50-4.00
IG abs.	0.09	G/l	0.00-0.03
IG %	0.2	%	0.0-0.5
NRBC abs.	0.00	G/l	
NRBC	0.0	/100 Lc	

Findings HAD MQ 2016-1 H3B

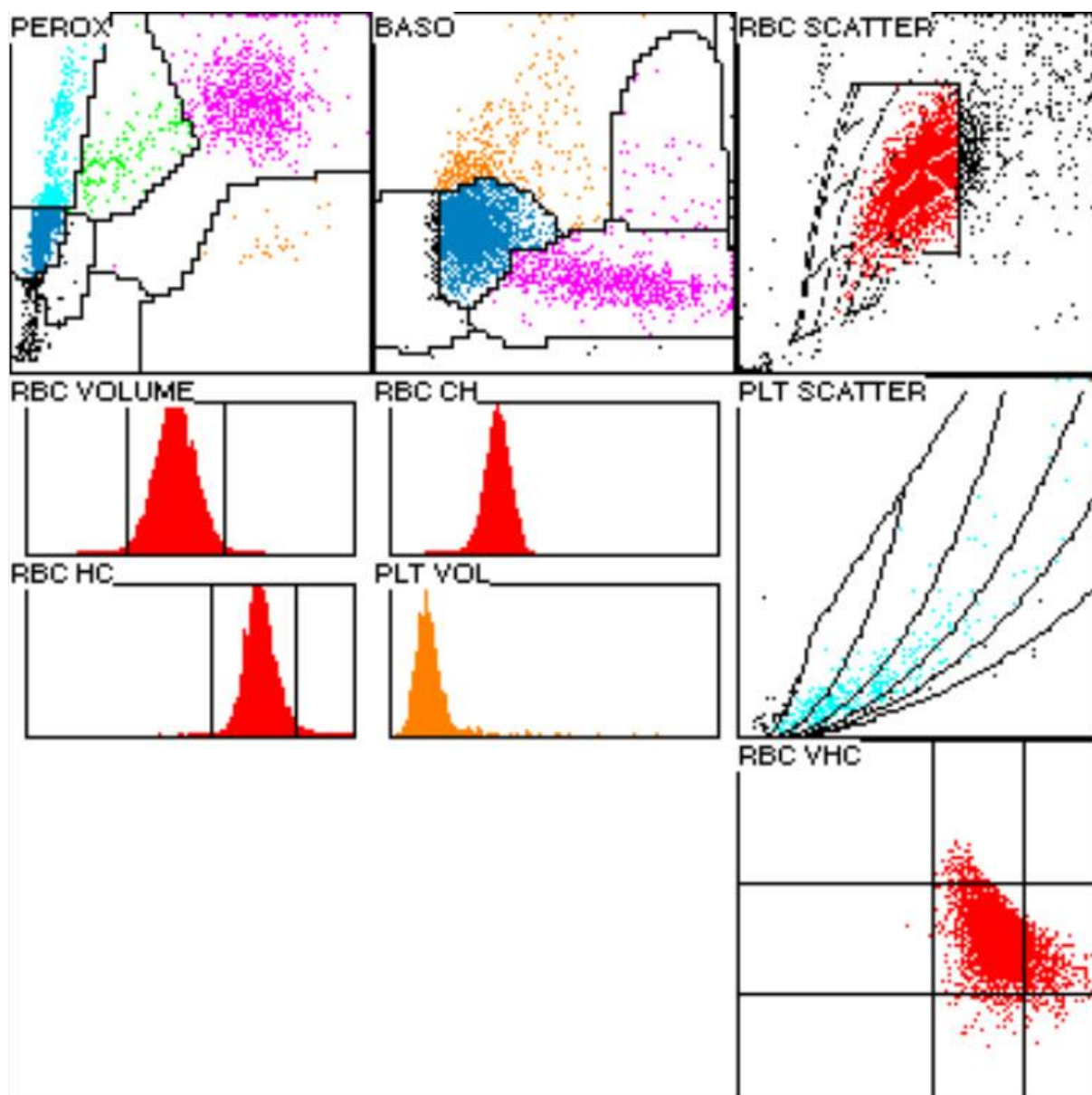


2.5 ADVIA 2120



Findings HAD MQ 2016-1 H3B 50 year old man

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	159	g/l	134-170
Hematocrit	0.459	l/l	0.400-0.500
Erythrocytes	5.06	T/l	4.2-5.7
MCV	90.8	fl	80-100
MCH	31.5	pg	26-34
MCHC	347	g/l	310-360
Mikrocytes	0.8	%	0-2.0
Makrocytes	0.9	%	0-2.0
Hypochromic Ec	0.1	%	0-2.0
Hyerchromic Ec	* 2.5	%	0-2.0
RDW	13.9	%	11.0-0-14.8
Thrombocytes	161	G/l	143-400
Vd. L-SHIFT	0	+	none (0)
Leukocytes	* 38.04	G/l	3.0-9.6
Leucocytes Differentiation			
Neutrophils	5.02	G/l	1.40-8.00
Monocytes	0.71	G/l	0.16-0.95
Eosinophils	0.16	G/l	0.00-0.70
Basophils	* 2.25	G/l	0.00-0.15
Lymphocytes	* 27.24	G/l	1.50-4.00
LUC	* 12.9	%	0.0-4.0



2.6 Differential Blood Smear

Findings HAD MQ 2016-1 H3B

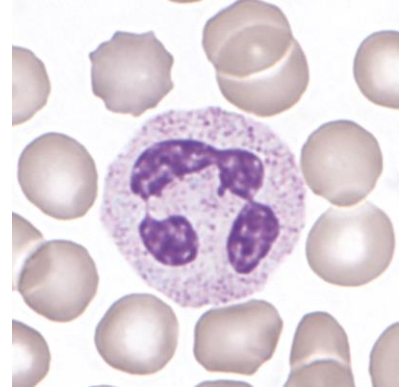
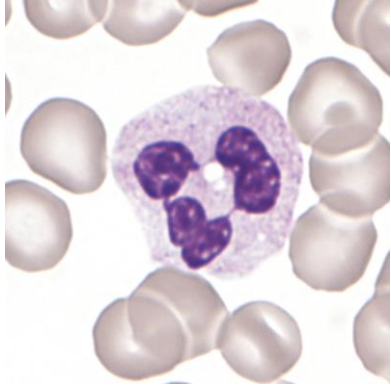
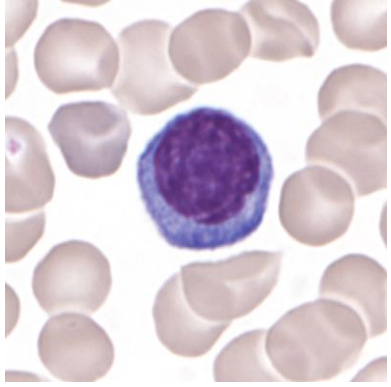
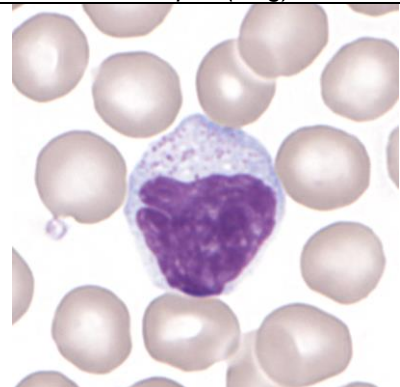
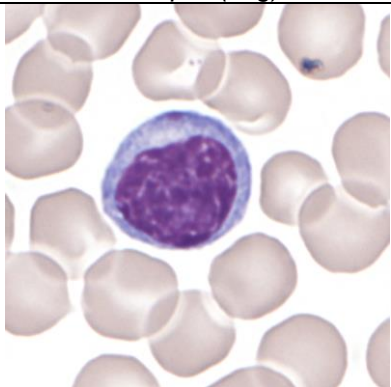
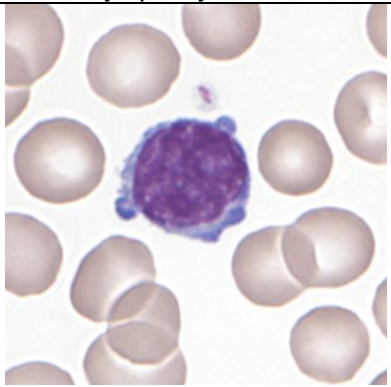
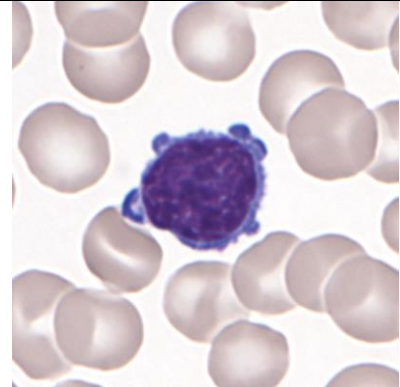
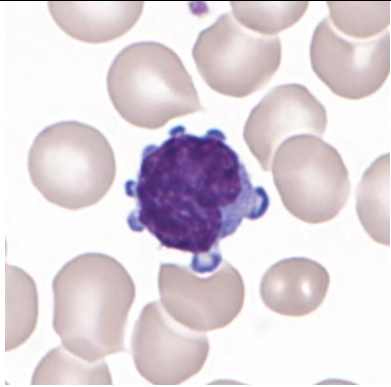
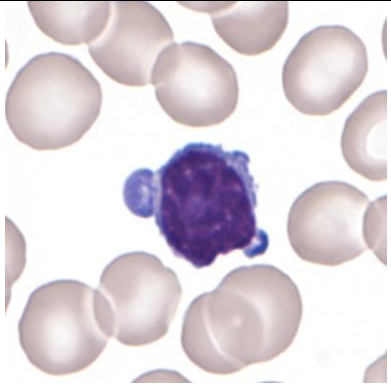
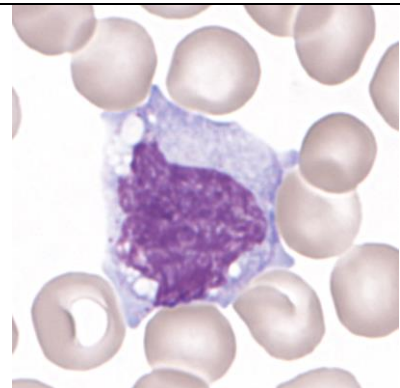
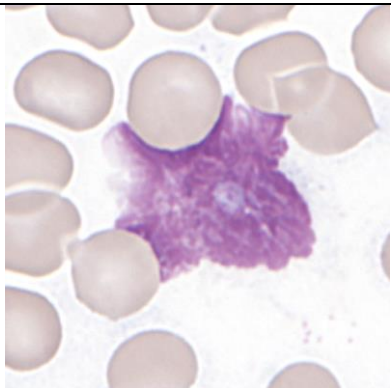
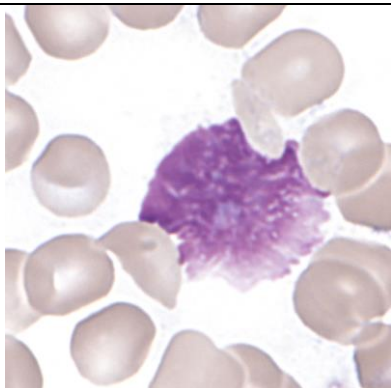
50 year old man

Analysis	Result	Unit	Reference value
Leucocytes Differentiation			
Neutrophils total	5.71	G/l	1.40-8.00
Monocytes	0.38	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	* 31.95	G/l	1.50-4.00
Neutrophils total	* 15.0	%	40.0-74.0
Neutrophils Band	1.0	%	0.0-20.0
Neutrophils Segmented	* 14.0	%	30.0-50.0
Monocytes	1.0	%	3.4-9.0
Eosinophils	0.0	%	0.0-7.0
Basophils	0.0	%	0.0-1.5
Lymphocytes	* 84.0	%	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	/100 Lc	

Commentary

The red blood picture is normochronic and normocytic. There are no erythrocytic inclusions detectable. Leukocytosis with absolute lymphocytosis. The lymphocytes are atypically neoplastic. Small to medium-sized forms with round to oval nucleus, the nucleus chromatin is dense to granulated, a good 1/3 with an indicated to clear nucleolus, <5% with nucleus indentation, the cytoplasm margin is medium-wide and dark basophilic. 10% of the lymphatic cells are damaged, and were counted as belonging to lymphocytes. Neutrophilic granulocytes with fine cytoplasmic granulation. Minor anisocytosis of the platelets, rare agranular forms are detectable. No giant forms.

K. Schreiber / PD. Dr. St. Balabanov

		
<i>Abb 1. Neutrophil (Seg)</i>	<i>Abb 2. Neutrophil (seg)</i>	<i>Abb 3. Lymphocyte</i>
		
<i>Abb 4. Lymphocyte (LGL)</i>	<i>Abb 5. Lymphocyte</i>	<i>Abb 6. Atypical lymphocytes, probably neoplastic</i>
		
<i>Abb 7. Atypical lymphocytes, probably neoplastic</i>	<i>Abb 8. Atypical lymphocytes, probably neoplastic</i>	<i>Abb 9. Atypical lymphocytes, probably neoplastic</i>
		
<i>Abb 10. Monocyte</i>	<i>Abb 11. Smudge cells</i>	<i>Abb 12. Smudge cells</i>

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>	126	190*	4	7	2						
<i>Neutrophils Segmented.</i>	4	11	133	179*	1			1			
<i>Eosinophils</i>	217*	111	1								
<i>Basophile</i>	293*	35									1
<i>Monocytes</i>	60	244*	21	3							1
<i>Lymphocytes</i>	5	9	2	1	5		4	4	2	86*	211
<i>Plasmacells</i>	320*	5	1	2				1			
<i>Blasts</i>	298*	10	3	2		4	1	3	1	1	6
<i>Promyelocytes</i>	323*	3	1	2							
<i>Myelocytes</i>	321*	4	1	1							2
<i>Metamyelozyten</i>	324*	5									
<i>Erythrocytes Nucleated</i>	327*	2									
<i>Unknown</i>	312*	9	2	1		1				2	2
<i>Smudge cells</i>	188	43	66*	32							

Beurteilung H3-B

	<i>light</i>	<i>medium</i>	<i>strong</i>		<i>light</i>	<i>medium</i>	<i>strong</i>
<i>Hypersegmentation</i>	15	2		<i>Hypochromic Ec</i>	23	6	1
<i>Pelger-Hüet Anomaly</i>				<i>Polychromatic Ec</i>	72	5	
<i>Coarse Granulation</i>	47	17	3	<i>Anisocytes</i>	154	33	
<i>Basophilic Stripling</i>	3	2		<i>Mikrocytes</i>	70	6	
<i>Vacuoles</i>	28	5	2	<i>Makrocytes</i>	61	6	
<i>Atypical Lymph, reactive</i>	31	25	24	<i>Megalocytes</i>	4	1	
<i>Atypical Lymph, neoplastic</i>	24	39	65*	<i>Poikilocytosis</i>	74	5	
<i>Others</i>				<i>Ovalocytes</i>	25	5	
				<i>Target Cells</i>	44	4	
				<i>Akanthocytes</i>	18	1	
<i>Anisocytosis</i>	61*	13	1	<i>Echinocytes</i>	12		1
<i>Megakaryocyte Nucleus</i>	6			<i>Sickle Cells</i>	1		
<i>Granulation</i>	14	2		<i>Fragmentocytes</i>	13	2	
<i>Others</i>				<i>Spherocytes</i>	17	1	
				<i>Stomatocytes</i>	18	2	
				<i>Basophilic Stripling</i>	8	1	
				<i>Howell-Jolly Bodies</i>			
				<i>Pappenheim Bodies</i>	2		
				<i>Others</i>	3		

Commentary

Smear H3-B is from a patient with T-cell prolymphocytic leukemia (T-PLL).

2.8 Qualab Codes

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

Code	Text	Number
30	Pathologic findings, refer to expert	247
6	Atypical lymphocytes, probably neoplastic	140
5	Atypical lymphocytes, probably reactive	70
31	Pathologic findings	59
8	Leucocytes other:	43
15	Polychromatophilic Red Cells	34
12	Microcytes	30
16	Poikilocytosis	25
13	Macrocytes	22
19	Targetcells	19
4	Neutrophils, Toxic Changes	16
27	Erythrocytes, other	11
14	Hypochromic Erythrocytes	10
17	Elliptocytes/Ovalocytes	9
22	Rouleaux	9
1	Neutrophils, hypersegmentation of nucleus	8
11	Thrombocytes, others	8
18	Stomatocytes	8
21	Spherocytes	7
9	Macrothrombocytes	6
20	Fragmentocytes	5
26	Teardrops	5
25	Basophilic stripping	3
2	Neutrophils, left shift	2
7	Auer rods	2
10	Thrombocyte aggregates	1
23	Erythrocytes agglutination	1
29	Normal findings	1
99	Total	321