

Verein für
Association pour le
Associazione per il



medizinische Qualitätskontrolle
contrôle de qualité médical
controllo di qualità medico

Report

Differential Blood Smear H3

MQ 2014-2

Acknowledgements

The Mythic 18 analyzer was provided by the company Polymed. MQ employees conducted the measurements.

The ABX Micros CRP 200 instrument was provided to [sic: by] the company by Axonlabs. MQ employees conducted the measurements.

The findings of the KX21, XE-5000, ADVA 120 devices and of the microscopic blood counts were generated by the Zentrallabor des Medizinbereichs Diagnostik HAD der Klinik für Hämatologie des Universitätsspitals Zürich (Central Laboratory of Medical Diagnostic HAD of the University Hospital Zurich Hematology Clinic). The lab is ISO/IEC 17025 certified (STS 445). Dr. Jeroen Goede 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 2014-2 H3A

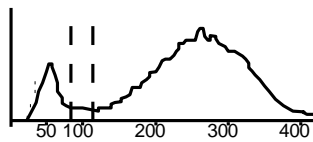
34 old man

WBC :	12.9	H	$10^9/L$	MCV :	65.3	L	fL
RBC :	5.76		$10^{12}/L$	MCH :	21.8	L	pg
HGB :	126		g/L	MCHC:	334		g/L
HCT :	.377		L/L	RDW :	19.3	H	%
PLT :	167		$10^9/L$	MPV :	7.6		fL
PCT :	.127		$10^{-2}L/L$	PDW :	6.3	L	%

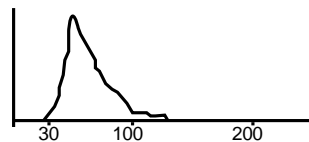
DIFF:

%LYM:	10.7	L	%	#LYM:	1.3		$10^9/L$
%MON:	2.5	L	%	#MON:	0.3		$10^9/L$
%GRA:	86.8	H	%	#GRA:	11.3	H	$10^9/L$

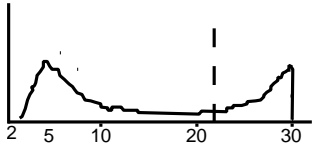
WBC



RBC



PLT



1.2 Mythic



Findings MQ 2014-2 H3A
34 old man

WBC	12.4	h	10 ⁹ /l	3.5 / 10.0	
LYM	1.2		10 ⁹ /l	1.2 / 3.2	
MON	0.5		10 ⁹ /l	0.1 / 1.0	
GRA	10.7		10 ⁹ /l	1.2 / 6.8	
LYM%	10.0	H	%	17.0 / 48.0	
MON%	3.8	L	%	2.0 / 10.0	
GRA%	86.2		%	43.0 / 76.0	
RBC	6.08	h	10 ¹² /l	4.00 / 5.70	
HGB	120		g/l	120 / 180	
HCT	0.369		l/l	0.360 / 0.540	
MCV	60.7	L	fl	80.0 / 100.0	
MCH	19.7	L	pg	26.0 / 34.0	
MCHC	325		g/l	310 / 365	
RDW	20.8	H	%	10.0 / 16.0	
PLT	208		10 ⁹ /l	150 / 400	
MPV	8.0		fl	7.0 / 11.0	
PCT	0.166		cl / l	0.100 / 0.500	
PDW	13.5		%	10.0 / 18.0	

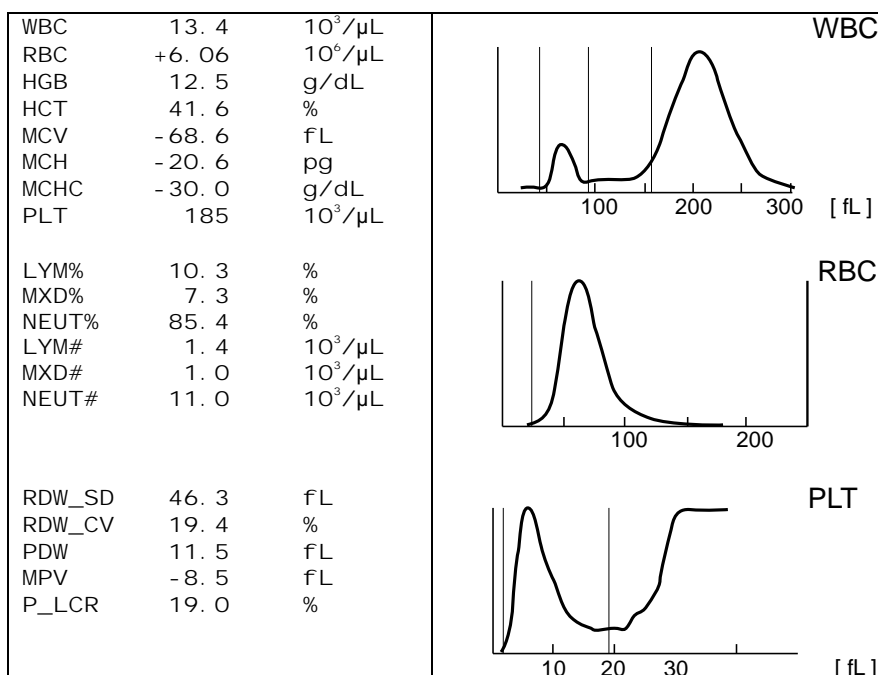
1.3 Sysmex KX21



Findings MQ 2014-2 H3A

34 old man

Analysis	Result	Unit	Reference Value
Blood count			
Hemoglobin	125	g/l	134-170
Hematocrit	0.416	l/l	0.400-0.500
Erythrocytes	6.06	T/l	4.2-5.7
MCV	* 68.6	fl	80-100
MCH	* 20.6	pg	26-34
MCHC	* 300	g/l	310-360
Thrombocytes	185	G/l	143-400
MXD	1.00	G/l	3 part Diff (Mono/Eos/Baso)
Leukocytes	* 13.4	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophiles	* 11.00	G/l	1.40-8.00
Lymphocytes	* 1.4	G/l	1.50-4.00



1.4 Sysmex XE-5000

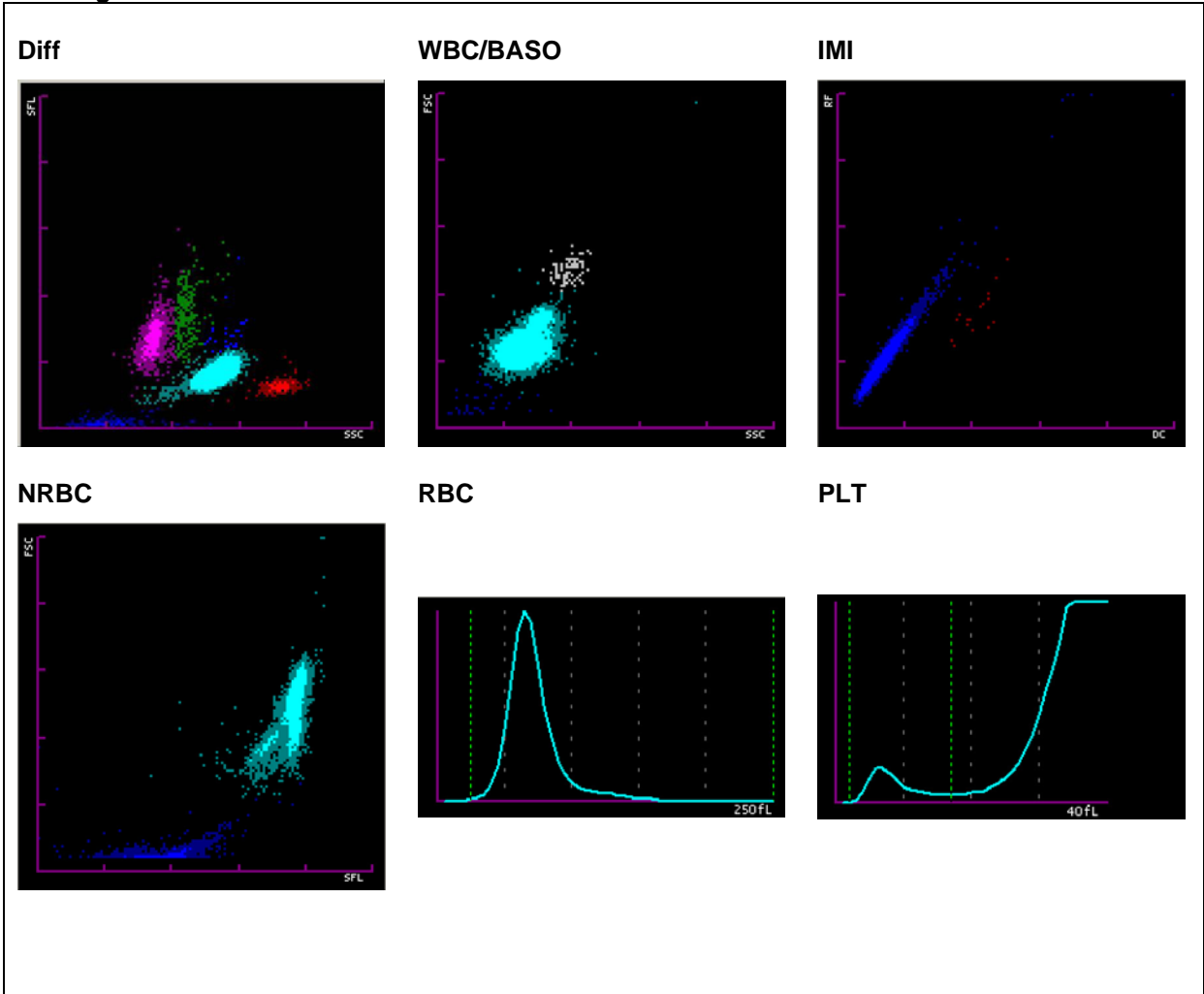


Findings MQ 2014-2 H3A

34 old man

Analysis		Result	Unit	Reference value
Blood Count				
Hemoglobin	*	130	g/l	134-170
Hematocrit		0.402	l/l	0.400-0.500
Erythrocytes	*	6.04	T/l	4.2-5.7
MCV	*	66.6	fl	80-100
MCH	*	21.5	pg	26-34
MCHC		323	g/l	310-360
Mikrocytes	*	19.3	%	11.0-14.8
Thrombocytes		162	G/l	143-400
Leucocytes	*	14.4	G/l	3.0-9.6
Leucocyte Differentiation				
Neutrophils	*	12.1	G/l	1.40-8.00
Monocytes		0.32	G/l	0.16-0.95
Eosinophils		0.44	G/l	0.00-0.70
Basophils		0.07	G/l	0.00-0.15
Lymphocytes	*	1.47	G/l	1.50-4.00
IG abs.	*	0.04	G/l	0.00-0.03
IG %		0.3	%	0.0-0.5
NRBC abs.		0.00	G/l	
NRBC		0.0	/100 Lc	

Findings HAD MQ 2014-2 H3A



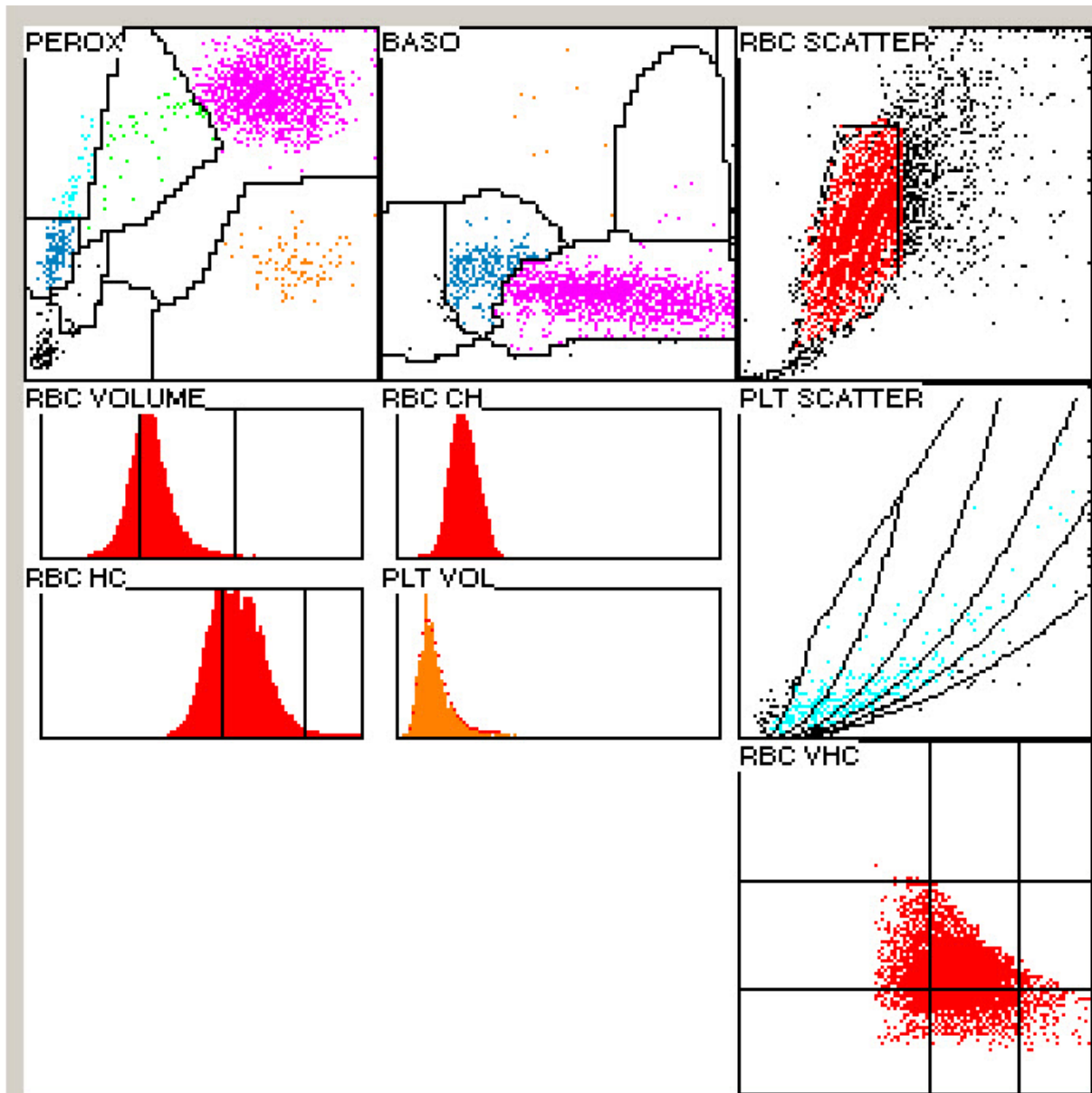
1.5 ADVIA 120



Findings MQ 2014-2 H3A

34 old man

Analysis		Result	Unit	Reference value
Blood Count				
Hemoglobin	*	126	g/l	134-170
Hematocrit		0.412	l/l	0.400-0.500
Erythrocytes	*	6.08	T/l	4.2-5.7
MCV	*	67.7	fl	80-100
MCH	*	20.6	pg	26-34
MCHC	*	305	g/l	310-360
Mikrocytes	*	26.8	%	0-2.0
Makrocytes		0	%	0-2.0
Hypochromic Ec	*	29.5	%	0-2.0
Hyerchromic Ec		0.9	%	0-2.0
RDW	*	19.0	%	0-2.0
Thrombocytes		152	G/l	143-400
Vd. L-SHIFT		+	+	Keine (0)
Leukocytes	*	13.36	G/l	3.0-9.6
Leucocytes Differentiation				
Neutrophils	*	11.26	G/l	1.40-8.00
Monocytes		0.25	G/l	0.16-0.95
Eosinophils		0.48	G/l	0.00-0.70
Basophils		0.05	G/l	0.00-0.15
Lymphocytes	*	1.17	G/l	1.50-4.00
LUC		1.2	%	0.0-4.0



1.6 Differential Blood Smear

Findings MQ 2014-2 H3A

34 old man

Untersuchungen		Resultat	Einheit	Referenzwert
Neutrophils total	*	10.69	G/l	1.40-8.00
Monocytes		0.33	G/l	0.16-0.95
Eosinophils		0.40	G/l	0.00-0.70
Basophils		0.07	G/l	0.00-0.15
Lymphocytes		1.87	G/l	1.50-4.00
Neutrophils total	*	80.0	%	40.0-74.0
Neutrophils Band		3.0	%	0.0-20.0
Neutrophils Segmented	*	77.0	%	30.0-50.0
Monocytes	*	2.5	%	3.4-9.0
Eosinophils		3.0	%	0.0-7.0
Basophils		0.5	%	0.0-1.5
Lymphocytes	*	14.0	%	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	

Comment

The red blood cell count shows an increased erythrocyte number, significant hypochromasia, discrete polychromasia, marked anisocytosis with many microcytes, minor poikilocytosis with few acanthocytes and ovalocytes, rare eliptocytes and stomatocytes, with transmitted light microscopy 1-2 teardrop shapes can be seen per field of view. No erythrocytic inclusions, in transmitted light microscopy one erythroblast. Absolute neutrophilia; the cytoplasmic granulation of neutrophils is mostly fine, rarely discretely coarse, many have high-to hyper-segmented nuclei. No migration of myeloid precursors. The lymphocytes are usually small with dense chromatin structures and a narrow to medium-wide cytoplasmic boundaries. There is minor platelet anisocytosis. No giant forms are detectable. Dr. J. Goede / K. Schreiber

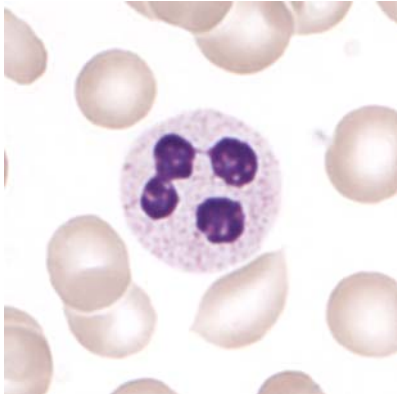


Abb 1. Neutrophil

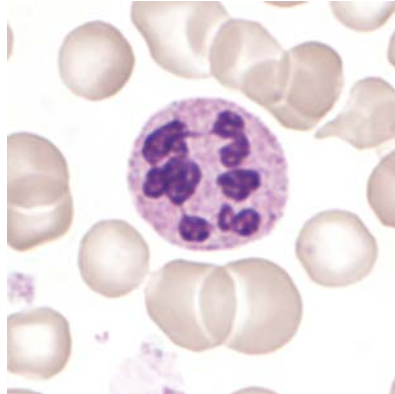


Abb 2. Neutrophil, hyperseg

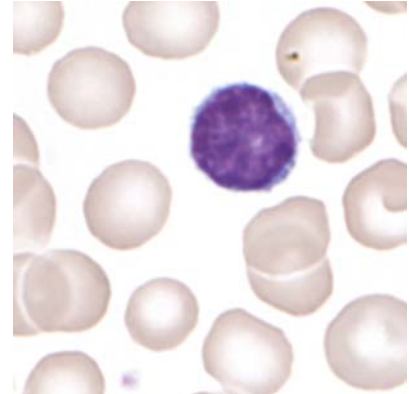


Abb 3. Lymphocyte

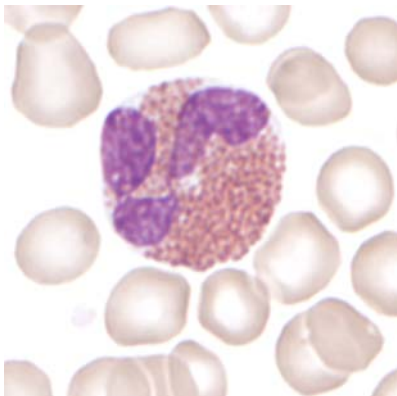


Abb 4. Eosinophil

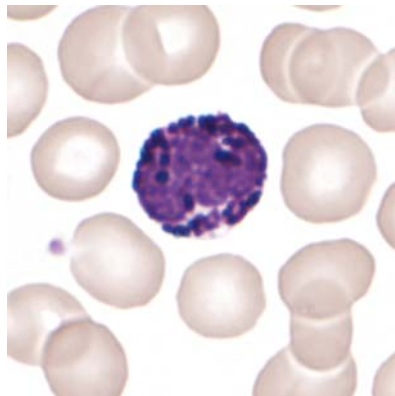


Abb 5. Basophil

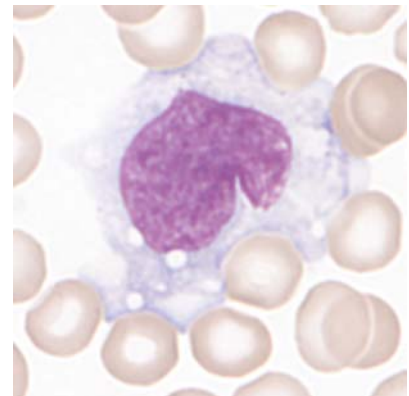


Abb 6. Monocyte

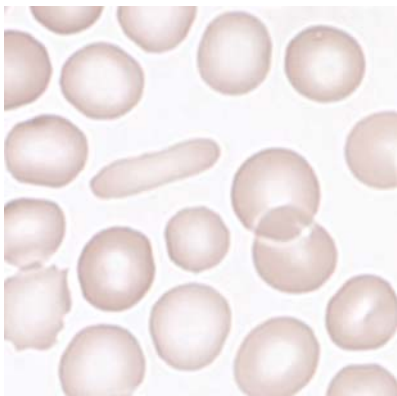


Abb 7. Ovalocytes,
Microcytes

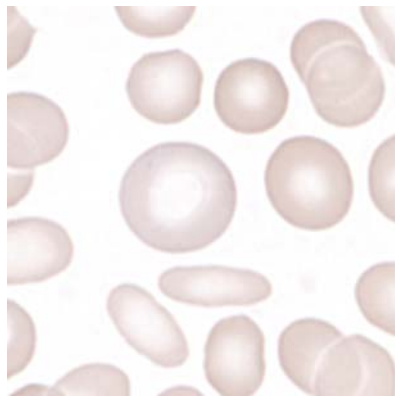


Abb 8. Polychromasia,
Ovalocytes

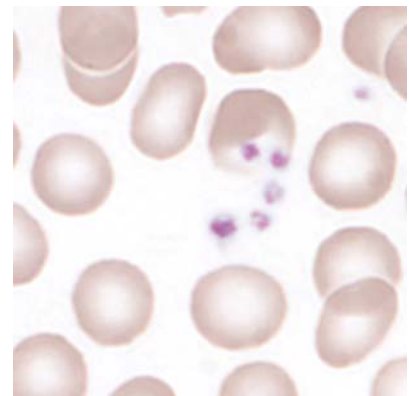


Abb 9. Thrombozytes

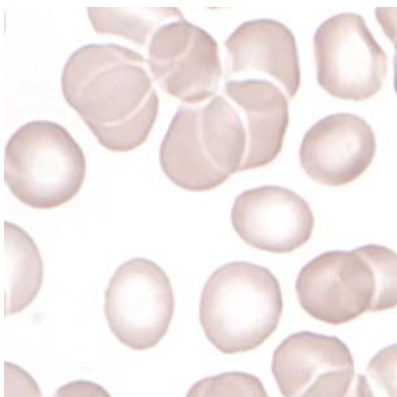


Abb 10. Hypochromasia

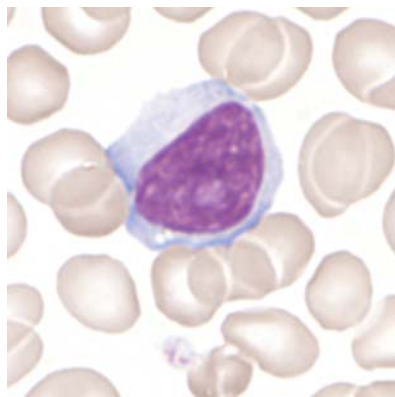


Abb 11. Lymphocyte

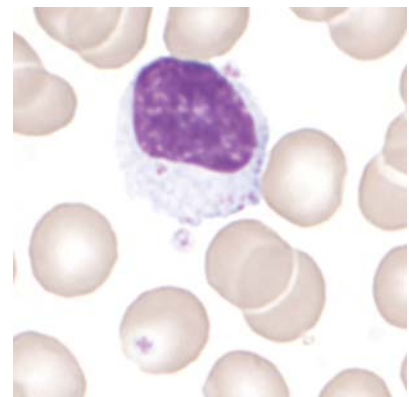


Abb 12. Lymphocyte (LGL)

1.7 Summary of participant results

Leucozyte Differential 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>	39	189*	80	48	12	1	1			1	
<i>Neutrophils Segmented.</i>	1	1			1		1	12	51	174*	130
<i>Eosinophils</i>	11	290*	69	1							
<i>Basophile</i>	186*	184		1							
<i>Monocytes</i>	52	294*	25								
<i>Lymphocytes</i>	1	4	81	270*	12	2		1			
<i>Plasmacells</i>	366*	3		1	1						
<i>Blasts</i>	367*	3	1								
<i>Promyelocytes</i>	371*										
<i>Myelocytes</i>	370*	1									
<i>Metamyelozyten</i>	371*										
<i>Erythrocytes Nucleated</i>	365*	5	1								
<i>Unknown</i>	367*	4									
<i>Smudge cells</i>	356*	15									

Evaluation H3-A

	<i>light</i>	<i>medium</i>	<i>strong</i>		<i>light</i>	<i>medium</i>	<i>strong</i>
<i>Hypersegmentation</i>	90	102*	45	<i>Hypochromic Ec</i>	97	54*	4
<i>Pelger-Huet Anomaly</i>	1			<i>Polychromatic Ec</i>	107*	16	1
<i>Coarse Granulation</i>	99	40	6	<i>Anisocytes</i>	109	129*	21
<i>Basophilic Stripling</i>	16	4		<i>Mikrocytes</i>	108	53*	13
<i>Vacuoles</i>	23	6		<i>Makrocytes</i>	104	33	3
<i>Reaktive Lymphocytes</i>	40	3	2	<i>Megalocytes</i>	34	12	1
<i>Atypical Lymphocytes</i>				<i>Poikilocytosis</i>	134*	21	4
<i>Others</i>	9	1		<i>Ovalocytes</i>	133*	24	
				<i>Target Cells</i>	12	1	
				<i>Akanthocytes</i>	12*	1	
<i>Anisocytosis</i>	76*	12		<i>Echinocytes</i>	12		
<i>Megakaryocyte Nucleaus</i>	6	1		<i>Sickle Cells</i>	1		
<i>Granulation</i>	13			<i>Fragmentocytes</i>	7	1	
<i>Others</i>	1			<i>Spherocytes</i>	25	2	
				<i>Stomatocytes</i>	18*		
				<i>Basophilic Stripling</i>	16		
				<i>Howell-Jolly Bodies</i>	6		
				<i>Pappenheim Bodies</i>		1	
				<i>Others</i>	14		1

1.8 Qualab Codes

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

Code	Text	Anzahl
1	Hypersegmented Neutrophils	163
29	Normal Blood Smear	149
30	Pathologic findings, referred to expert	96
12	Mikrocytes	95
14	Hypochromic Erythrocytes	75
16	Poikilocytosis	62
13	Makrocytes	56
17	Elliptocytes/Ovalocytes	49
15	Polychromatophilic Red Cells	44
4	Neutrophils, Toxic Changes	27
2	Left shift	19
21	Spherocytes	13
26	Tear Drops	12
27	Erythrocytes, other:	12
5	Lymphocytes, reactive	11
8	Leukocytes, other:	8
22	Rouleau	8
18	Stomatocytes	6
25	Basophilic strippling	6
9	Giant Thrombocytes	5
19	Targetcells	5
24	Howell-Jolly Bodies	3
11	Thrombocytes, Giant	2
6	Lymphocytes, neoplastic	1
10	Thrombocytes aggregates	1
23	Erythrocytes agglutination	1

2 Sample B

2.1 ABX Micros



Findings MQ 2014-2 H3B

53 years old woman

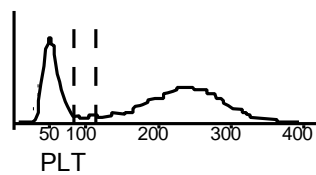
WBC :	7.3	$10^9/L$	MCV :	61.6	L	fL
RBC :	6.19	H $10^{12}/L$	MCH :	17.7	L	pg
HGB :	110	L g/L	MCHC:	288	L	g/L
HCT :	.382	L/L	RDW :	16.2	H	%
PLT :	158	$10^9/L$	MPV :	8.8	L	fL
PCT :	.139	$10^{-2}L/L$	PDW :	0.0	L	%

WBC Fl ags : M2 G1 G2 G3

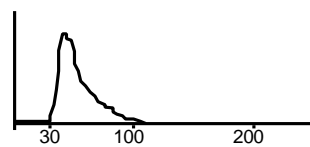
DI FF:

%LYM:	29.4	%	#LYM:	2.1	$10^9/L$
%MON:	3.1	L %	#MON:	0.2	L $10^9/L$
%GRA:	67.5	%	#GRA:	5.0	$10^9/L$

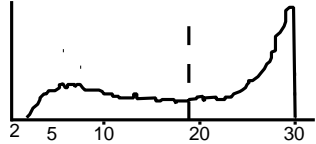
WBC



RBC



PLT



2.2 Mythic



Findings MQ 2014-2 H3B

53 years old woman

WBC	7.9		10 ⁹ /l	3.5 / 10.0	
LYM	2.4		10 ⁹ /l	1.2 / 3.2	
MON	0.4		10 ⁹ /l	0.1 / 1.0	
GRA	5.1		10 ⁹ /l	1.2 / 6.8	
LYM%	30.4		%	17.0 / 48.0	
MON%	4.8		%	2.0 / 10.0	
GRA%	64.8		%	43.0 / 76.0	
RBC	6.25	h	10 ¹² /l	4.00 / 5.70	
HGB	110	l	g/l	120 / 180	
HCT	0.355	l	l/l	0.360 / 0.540	
MCV	56.8	L	fl	80.0 / 100.0	
MCH	17.6	L	pg	26.0 / 34.0	
MCHC	310		g/l	310 / 365	
RDW	15.7		%	10.0 / 16.0	
PLT	170		10 ⁹ /l	150 / 400	
MPV	9.9		fl	7.0 / 11.0	
PCT	0.168		cl/l	0.100 / 0.500	
PDW	28.0	H	%	10.0 / 18.0	

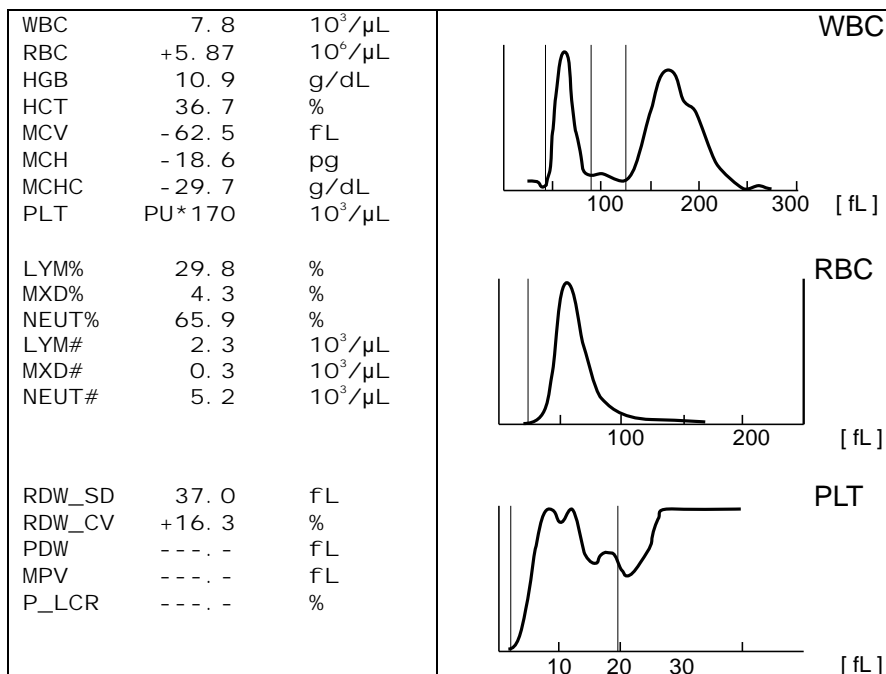
2.3 Sysmex KX21



Findings MQ 2014-2 H3B

53 years old woman

Analysis	Result	Unit	Reference Value
Blood count			
Hemoglobin	* 109	g/l	117-153
Hematocrit	* 0.367	l/l	0.350-0.460
Erythrocytes	5.87	T/l	3.9-5.2
MCV	* 62.5	fl	80-100
MCH	* 18.6	pg	26-34
MCHC	* 297	g/l	310-360
Thrombocytes	170	G/l	143-400
Leukocytes	7.8	G/l	3.0-9.6



2.4 Sysmex XE-5000

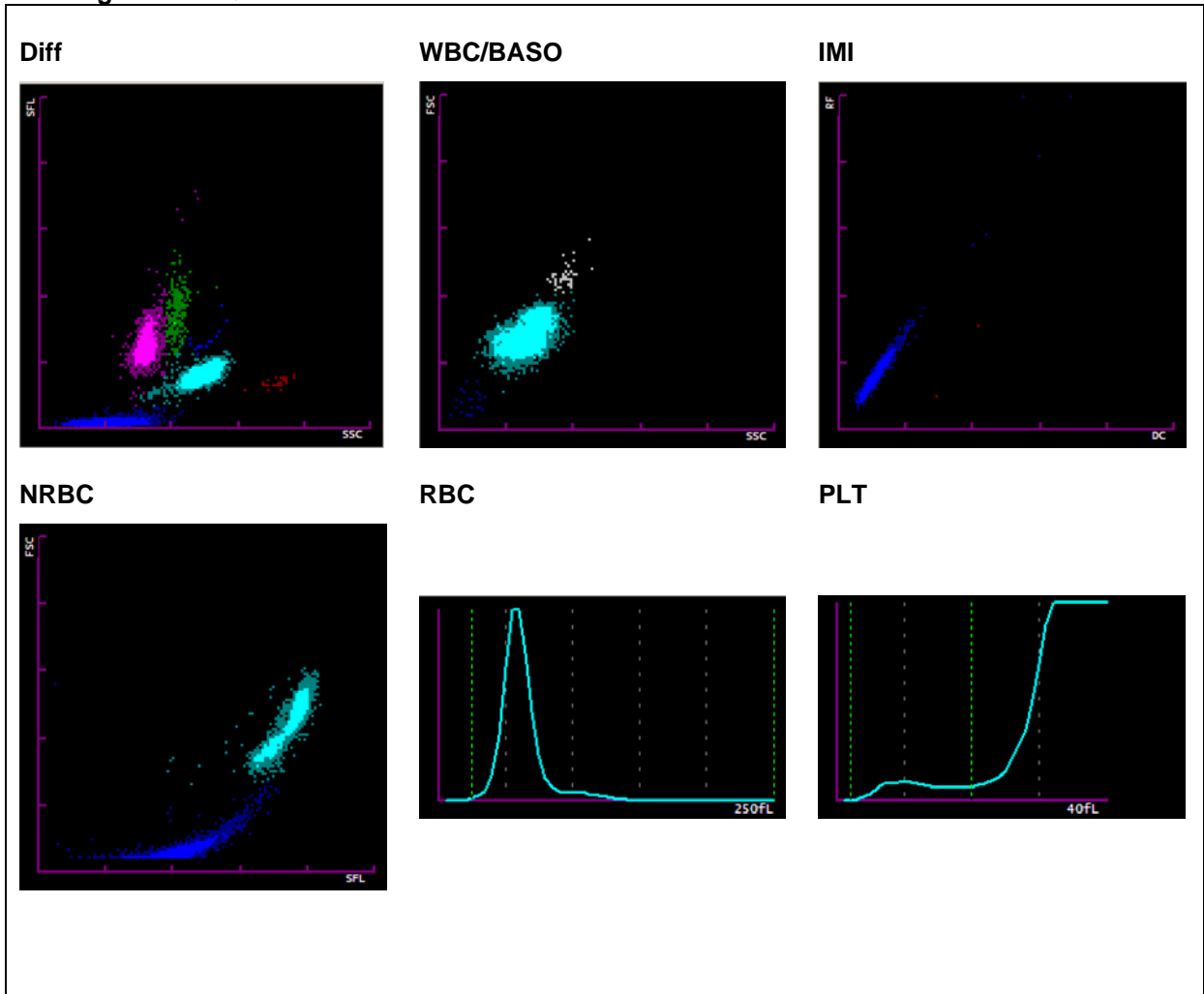


Findings MQ 2014-2 H3B

53 years old woman

Analysis		Result	Unit	Reference value
Blood Count				
Hemoglobin	*	111	g/l	117-153
Hematocrit	*	0.339	l/l	0.350-0.460
Erythrocytes	*	5.83	T/l	3.9-5.2
MCV	*	58.1	fl	80-100
MCH	*	19.0	pg	26-34
MCHC		327	g/l	310-360
Mikrocytes	*	16.3	%	310-360
Thrombocytes		170	G/l	143-400
Leucocytes		8.07	G/l	3.0-9.6
Leucocyte Differentiation				
Neutrophils		5.42	G/l	1.40-8.00
Monocytes		0.33	G/l	0.16-0.95
Eosinophils		0.03	G/l	0.00-0.70
Basophils		0.02	G/l	0.00-0.15
Lymphocytes		2.27	G/l	1.50-4.00
IG abs.		0.01	G/l	0.00-0.03
IG %		0.1	%	0.0-0.5
NRBC abs.		0.00	G/l	
NRBC		0.0	/100 Lc	

Findings HAD MQ 2014-2 H3B

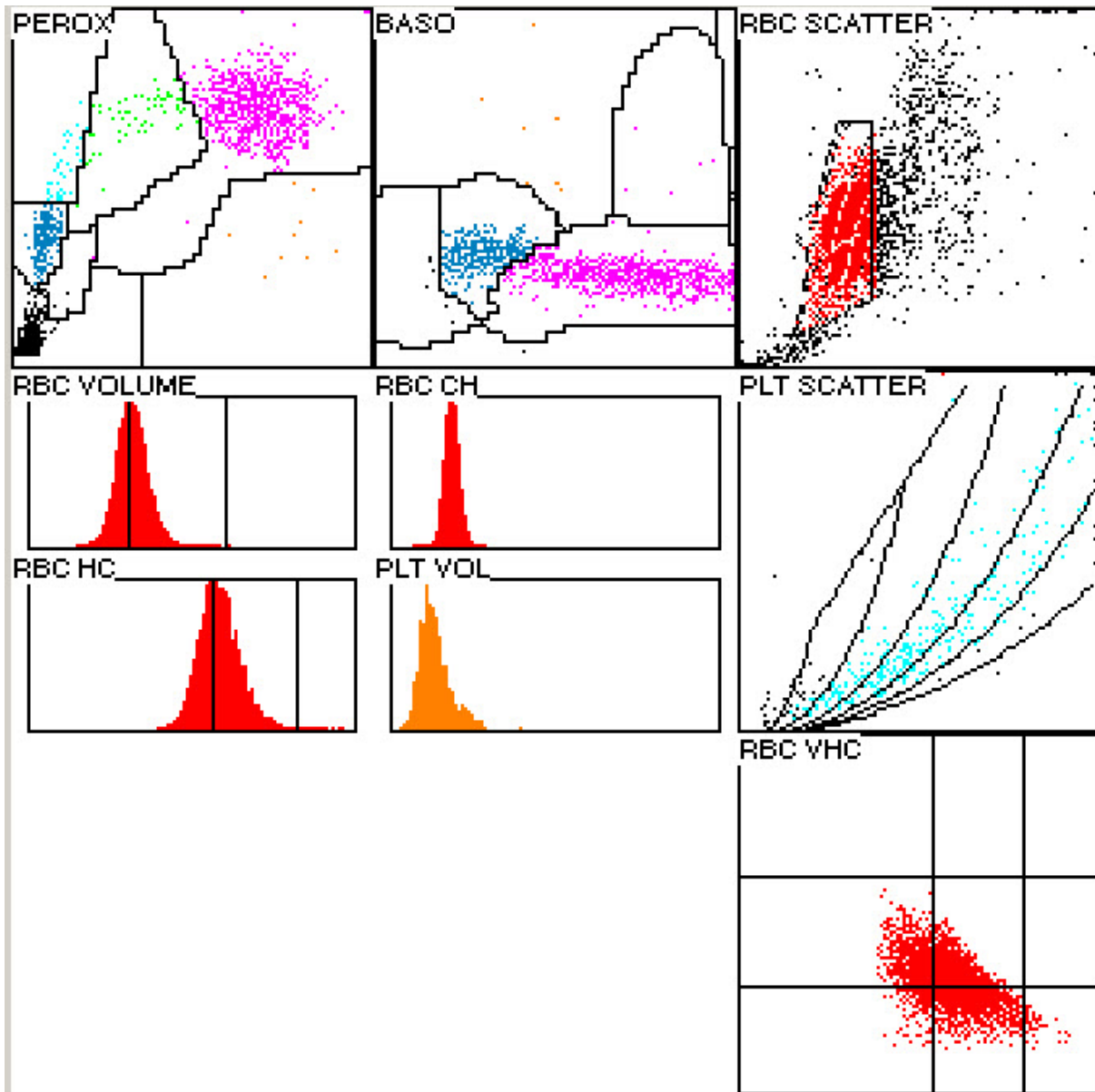


2.5 ADVIA 120



Findings MQ 2014-2 H3B 53 years old woman

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	* 107	g/l	117-153
Hematocrit	0.369	l/l	0.350-0.460
Erythrocytes	* 5.86	T/l	3.9-5.2
MCV	* 63.0	fl	80-100
MCH	* 18.3	pg	26-34
MCHC	* 290	g/l	310-360
Mikrocytes	* 38.6	%	0-2.0
Makrocytes	0.0	%	0-2.0
Hypochromic Ec	* 36.7	%	0-2.0
Hyerchromic Ec	0.1	%	0-2.0
RDW	* 15.5	%	0-2.0
Thrombocytes	* 132	G/l	143-400
Vd. L-SHIFT	0	+	Keine (0)
Leukocytes	8.13	G/l	3.0-9.6
Leucocytes Differentiation			
Neutrophils	5.46	G/l	1.40-8.00
Monocytes	0.23	G/l	0.16-0.95
Eosinophils	0.05	G/l	0.00-0.70
Basophils	0.04	G/l	0.00-0.15
Lymphocytes	2.03	G/l	1.50-4.00



2.6 Differential Blood Smear

Findings MQ 2014-2 H3B

53 years old woman

Analysis	Result	Unit	Reference value
Neutrophils total	5.77	G/l	1.40-8.00
Monocytes	0.24	G/l	0.16-0.95
Eosinophils	0.04	G/l	0.00-0.70
Basophils	0.04	G/l	0.00-0.15
Lymphocytes	2.03	G/l	1.50-4.00
Neutrophils total	71.0	%	40.0-74.0
Neutrophils Band	4.0	%	0.0-20.0
Neutrophils Segmented	* 67.0	%	30.0-50.0
Monocytes	* 3.0	%	3.4-9.0
Eosinophils	0.5	%	0.0-7.0
Basophils	0.5	%	0.0-1.5
Lymphocytes	25.0	%	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	

Comment

In the red blood cell picture anemia is seen with marked anisocytosis of the erythrocytes in the form of a significantly increased proportion of microcytes. Slightly less pronounced is a red cell hypochromasia with mild polychromasia and moderate poikilocytosis with a few acanthocytes, few ovalocytes and many target cells, rare erythrocytes with basophilic stippling. Confirmed erythrocytic inclusions do not appear. The neutrophilic cytoplasm is finely granulated with individual forms containing highly-segmented nuclei in transmitted light microscopy. Migration of precursors is not detectable. The lymphatic elements impress with mature cells with low-grade size and nuclear pleomorphism in the sense of reactive changes. Platelet anisocytosis is evident by transmitted light with recurring confirmed giant forms with mostly dense granulation. Dr. med. J. Goede / K. Schreiber.



Abb 1. Neutrophil

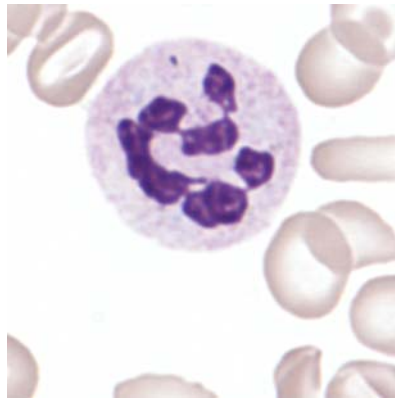


Abb 2. Neutrophil hypersegmentated

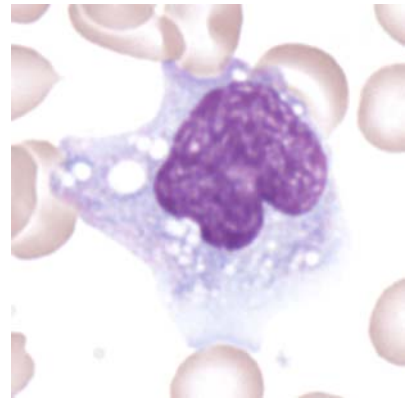


Abb 3. Monocyte

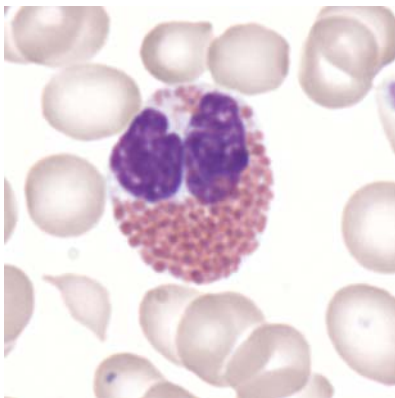


Abb 4. Eosinophil

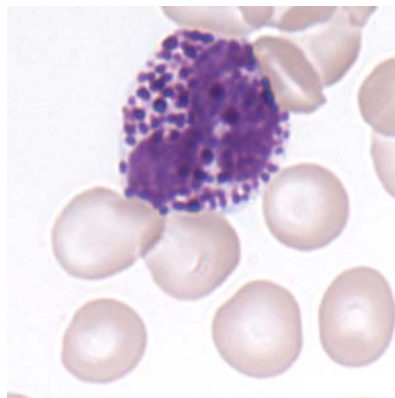


Abb 5. Basophil

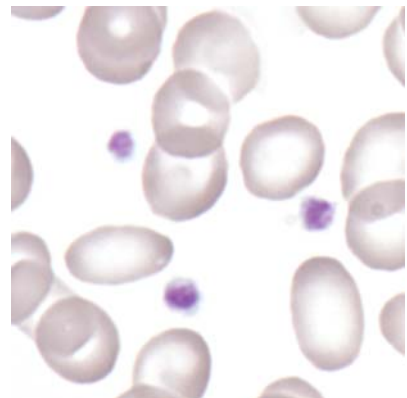


Abb 6. Thrombocytes, Ovalocytes

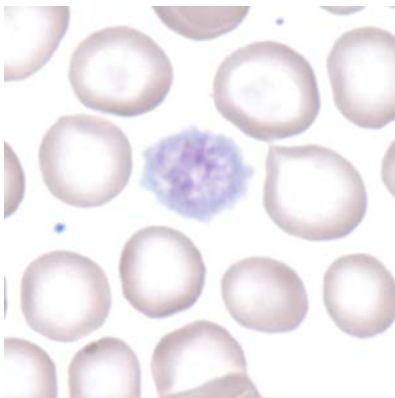


Abb 7. Giant thrombocyte

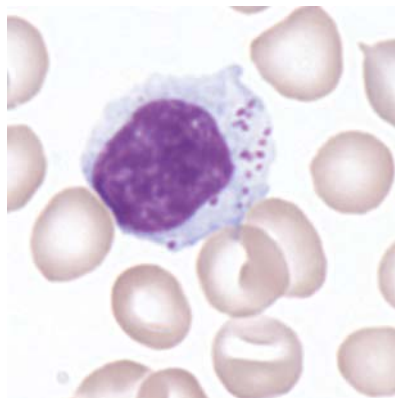


Abb 8. Lymphocyte (LGL)

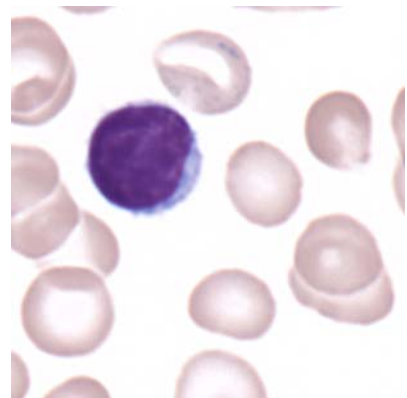


Abb 9. Lymphocyte, Microcytes

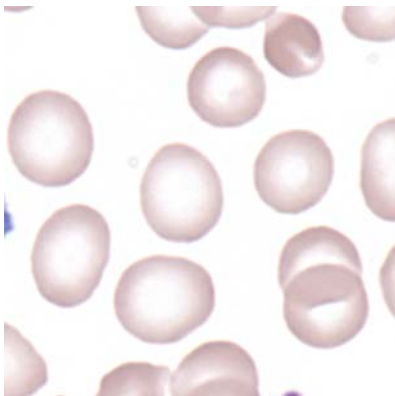


Abb 10. Ec, hypochrom

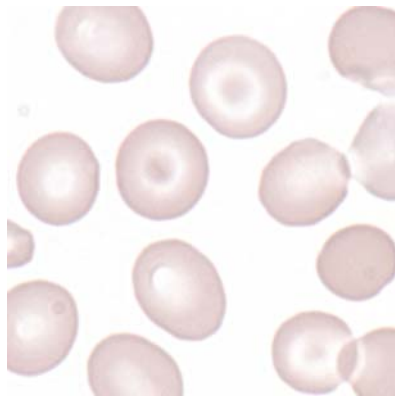


Abb 11. Ec, Targetcells

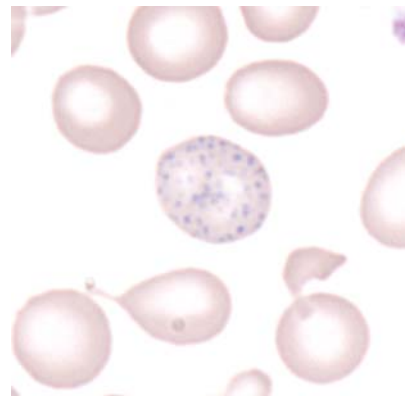


Abb 12. Ec, basophilic stripling

2.7 Summary of participant results

Leukozyte 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	111*	130	96	19	5	1		1		
<i>Neutrophils Segmented.</i>	1		1		2	15	42	149	151*	9	
<i>Eosinophils</i>	200*	169	1								
<i>Basophile</i>	210*	159	1								
<i>Monocytes</i>	33	274*	56	6	1						
<i>Lymphocytes</i>	2		2	9	197*	143	16	1			
<i>Plasmacells</i>	357*	12	1								
<i>Blasts</i>	356*	7	4	2	1						
<i>Promyelocytes</i>	366*	3		1							
<i>Myelocytes</i>	363*	2	1	2	2						
<i>Metamyelozyten</i>	360*	10									
<i>Erythrocytes Nucleated</i>	362*	7	1								
<i>Unknown</i>	355*	12	2	1							
<i>Smudge cells</i>	341*	23	6								

Beurteilung H3-B

	<i>light</i>	<i>medium</i>	<i>strong</i>		<i>light</i>	<i>medium</i>	<i>strong</i>
<i>Hypersegmentation</i>	50	13	2	<i>Hypochromic Ec</i>	91	136*	51
<i>Pelger-Hüet Anomaly</i>	1			<i>Polychromatic Ec</i>	127*	21	4
<i>Coarse Granulation</i>	22	5	1	<i>Anisocytes</i>	122	133*	38
<i>Basophilic Stripling</i>	7	1		<i>Mikrocytes</i>	94	92*	30
<i>Vacuoles</i>	19	4		<i>Makrocytes</i>	67	9	2
<i>Reaktive Lymphocytes</i>	54*	22	1	<i>Megalocytes</i>	16	1	
<i>Atypical Lymphocytes</i>				<i>Poikilocytosis</i>	142	113*	18
<i>Others</i>	11	10	3	<i>Ovalocytes</i>	143*	44	4
				<i>Target Cells</i>	119	87*	18
				<i>Akanthocytes</i>	48*	6	
<i>Anisocytosis</i>	102	49*	11	<i>Echinocytes</i>	21	4	
<i>Megakaryocyte Nucleaus</i>	29	8	1	<i>Sickle Cells</i>	6		
<i>Granulation</i>	25	6	1	<i>Fragmentocytes</i>	69	11	
<i>Others</i>	2			<i>Spherocytes</i>	22	3	
				<i>Stomatocytes</i>	27	5	
				<i>Basophilic Stripling</i>	111*	28	1
				<i>Howell-Jolly Bodies</i>	18	4	
				<i>Pappenheim Bodies</i>	7		
				<i>Others</i>	27		1

2.8 Qualab Codes

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

Code	Text	Anzahl
30	Pathologic findings, referend to expert	221
14	Hypochromic Erythrocytes	177
16	Poikilocytosis	149
19	Targetcells	141
12	Mikrocytes	132
25	Basophilic Stripping	59
17	Elliptocytes/Ovalocytes	52
15	Polychromatic erythrocytes	43
29	Normaler Befund	41
9	Thrombocytes, giant	38
26	Teardrops	35
5	Lymphocytes, reactive	23
20	Fragmentocytes	19
1	Neutrophils, hypersegmentation	19
27	Erythrocytes, other	15
22	Rouleaux	15
24	Howell-Jolly Bodies	12
13	Makrocytes	12
11	Thrombocytes, other	8
4	Neutrophils, toxic changes	8
18	Stomatocytes	7
21	Spherocytes/Mikrospherocytes	6
2	Left Shift	5
10	Thrombocytes, aggregates	3
8	Leucocytes, other:	3
6	Lymphocytes, neoplastic	3
7	Auer Rods	2
3	Pelger-Huet Anomaly	1