

Verein für
Association pour le
Associazione per il



medizinische Qualitätskontrolle
contrôle de qualité médical
controllo di qualità medico

Report

Differential Blood Smear H3

MQ 2014-4

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

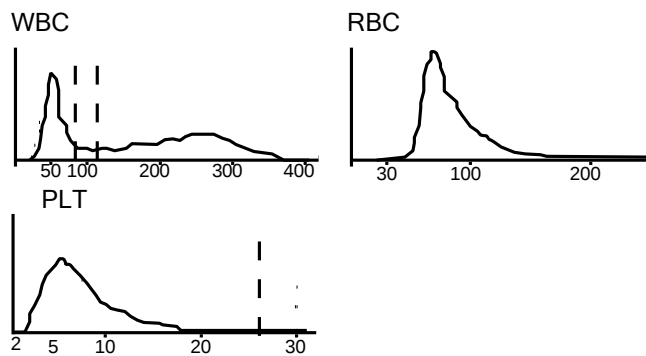


Findings MQ 2014-4 H3A

woman, 32 years

WBC :	4.8	$10^9/L$	MCV :	87.2	fL
RBC :	4.33	$10^{12}/L$	MCH :	29.4	pg
HGB :	127	g/L	MCHC :	337	g/L
HCT :	.377	L/L	RDW :	15.3	H %
PLT :	247	$10^9/L$	MPV :	7.2	fL
PCT :	.179	L $10^{-2}L/L$	PDW :	14.5	%

DIFF :					
%LYM :	33.1	%	#LYM :	1.5	$10^9/L$
%MON :	6.0	%	#MON :	0.2	$10^9/L$
%GRA :	60.9	%	#GRA :	3.1	$10^9/L$



1.2 Mythic


Findings MQ 2014-4 H3A
 woman, 32 years

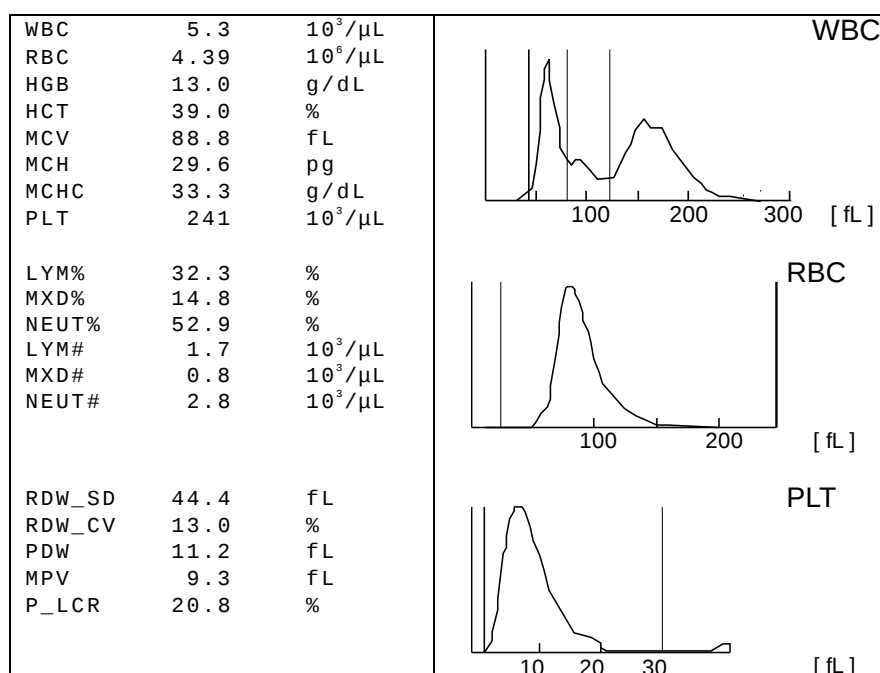
WBC	4.8	$10^9/l$	3.5 /	10.0	
LYM	1.8	$10^9/l$	1.2 /	3.2	
MON	0.4	$10^9/l$	0.1 /	1.0	
GRA	2.6	$10^9/l$	1.2 /	6.8	
LYM%	38.0	%	17.0 /	48.0	
MON%	8.3	%	2.0 /	10.0	
GRA%	53.7	%	43.0 /	76.0	
RBC	4.2	$10^{12}/l$	4.00 /	5.70	
HGB	126	g/l	120 /	180	
HCT	0.371	l/l	0.360 /	0.540	
MCV	88.3	fL	80.0 /	100.0	
MCH	30.0	pg	26.0 /	34.0	
MCHC	340	g/l	310 /	365	
RDW	11.7	%	10.0 /	16.0	
PLT	274	$10^9/l$	150 /	400	
MPV	7.7	fL	7.0 /	11.0	
PCT	0.211	cl/l	0.100 /	0.500	
PDW	16.0	%	10.0 /	18.0	

1.3 Sysmex KX21

**Findings MQ 2014-4 H3A**

woman, 32 years

Analysis	Result	Unit	Reference Value
Blood count			
Hemoglobin	130	g/l	117-153
Hematocrit	0.390	l/l	0.350-0.460
Erythrocytes	4.39	T/l	3.9-5.2
MCV	88.8	fl	80-100
MCH	29.6	pg	26-34
MCHC	* 33	g/l	310-360
Thrombocytes	241	G/l	143-400
MXD	0.8	G/l	3 part Diff (Mono/Eos/Baso)
Leukocytes	5.3	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	2.8	G/l	1.40-8.00
Lymphocytes	1.7	G/l	1.50-4.00



1.4 Sysmex XE-5000

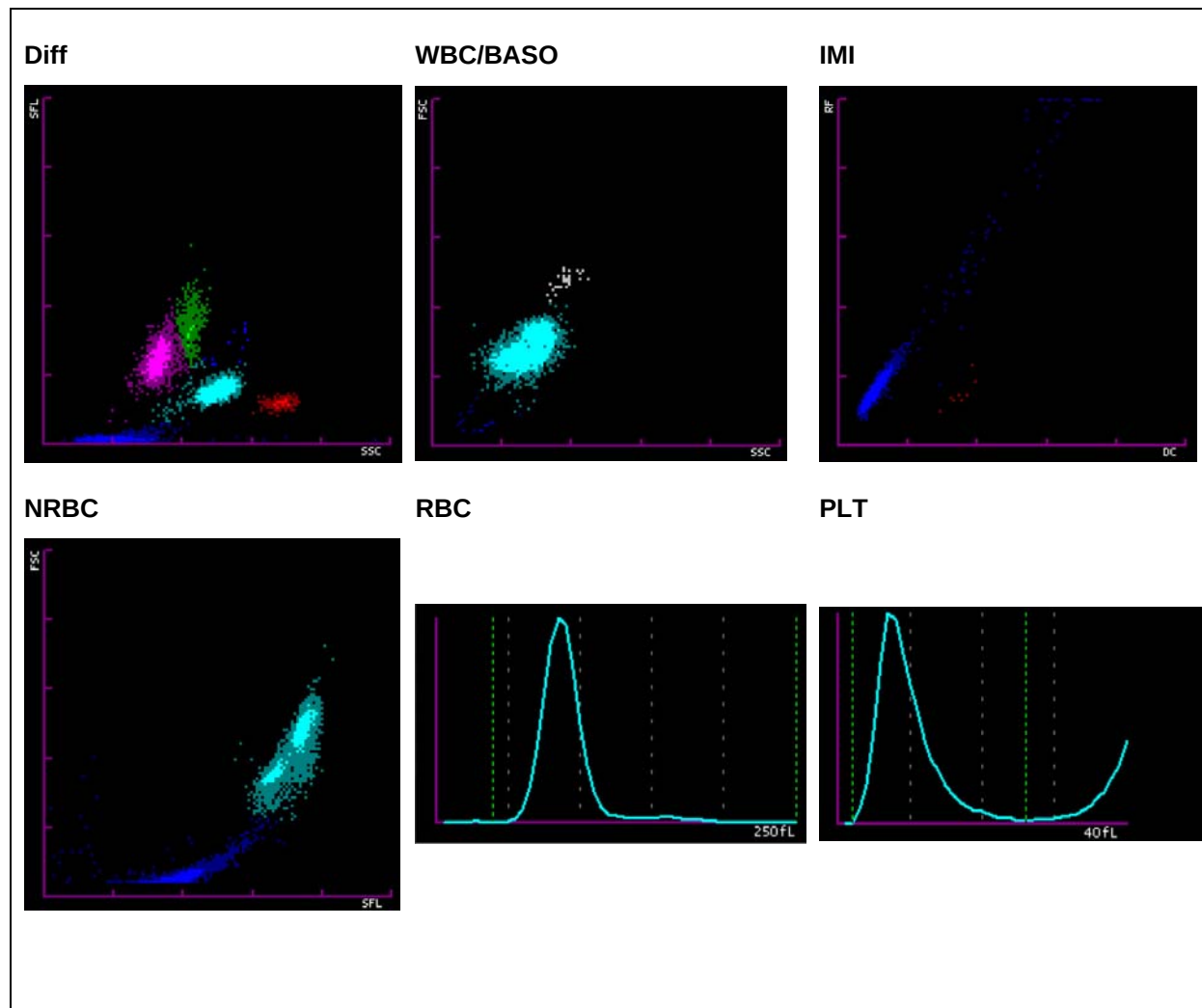


Findings MQ 2014-4 H3A

Woman, 32 years

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	132	g/l	117-153
Hematocrit	0.372	l/l	0.350-0.460
Erythrocytes	4.32	T/l	3.9-5.2
MCV	86.1	fl	80-100
MCH	30.6	pg	26-34
MCHC	355	g/l	310-360
Mikrocytes	13.3	%	11.0-14.8
Thrombocytes	253	G/l	143-400
Leucocytes	5.51	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	2.86	G/l	1.40-8.00
Monocytes	0.57	G/l	0.16-0.95
Eosinophils	0.25	G/l	0.00-0.70
Basophils	0.03	G/l	0.00-0.15
Lymphocytes	1.8	G/l	1.50-4.00
IG abs.	0.02	G/l	0.00-0.03
IG %	0.4	%	0.0-0.5
NRBC abs.	0.00	G/l	
NRBC	0.0	/100 Lc	

Findings HAD MQ 2014-4 H3A



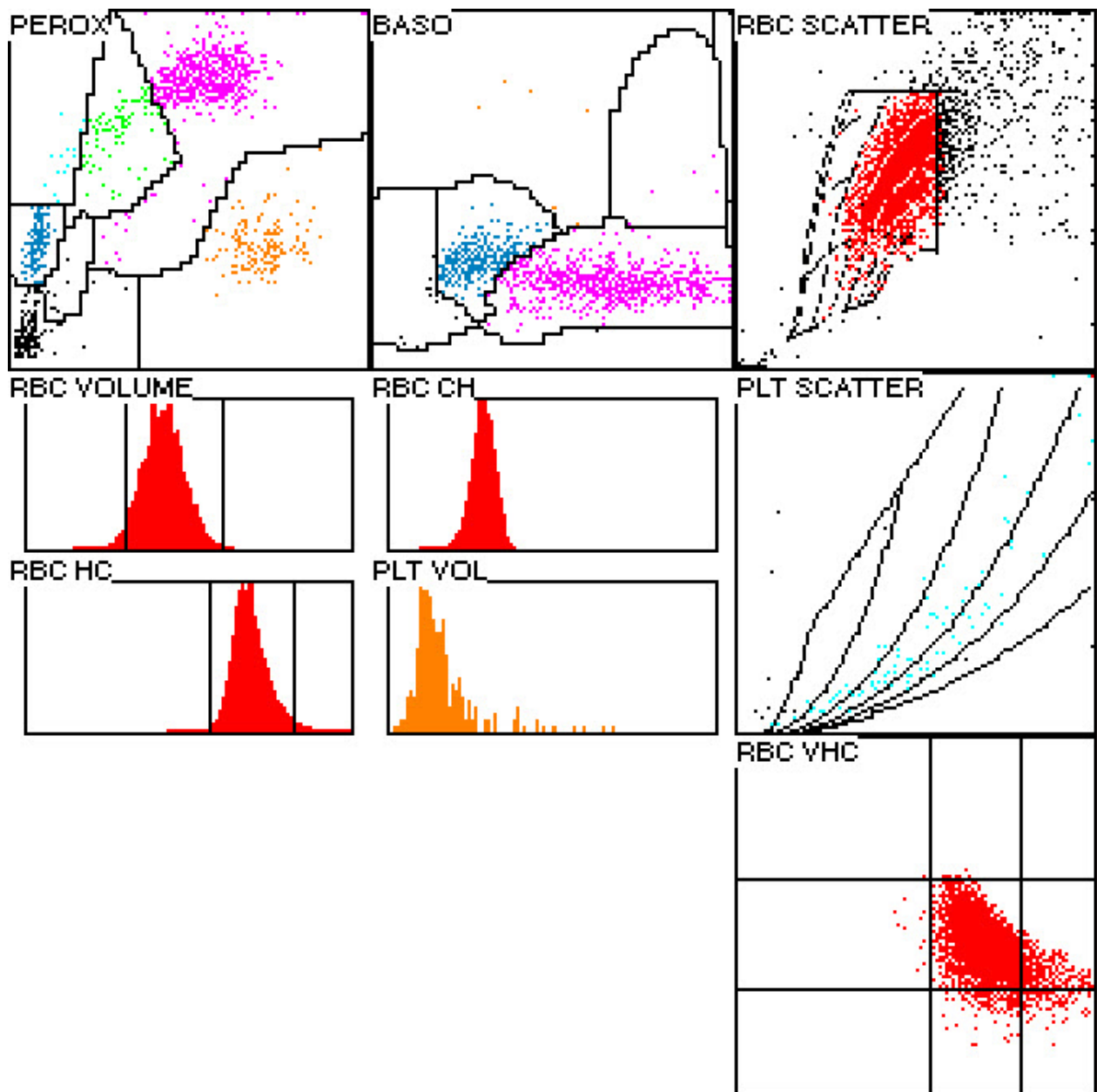
1.5 ADVIA 120



Findings MQ 2014-4 H3A

woman, 32 years

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	128	g/l	117-153
Hematocrit	0.372	l/l	0.350-0.460
Erythrocytes	4.25	T/l	3.9-5.2
MCV	87.5	fl	80-100
MCH	30.1	pg	26-34
MCHC	344	g/l	310-360
Mikrocytes	0.6	%	0-2.0
Makrocytes	0.2	%	0-2.0
Hypochromic Ec	0.1	%	0-2.0
Hyerchromic Ec	0.7	%	0-2.0
RDW	13.0	%	11.0-14.8
Thrombocytes	231	G/l	143-400
Vd. L-SHIFT	0	+	Keine (0)
Leukocytes	5.42	G/l	3.0-9.6
Leucocytes Differentiation			
Neutrophils	2.92	G/l	1.40-8.00
Monocytes	0.45	G/l	0.16-0.95
Eosinophils	0.27	G/l	0.00-0.70
Basophils	0.02	G/l	0.00-0.15
Lymphocytes	1.62	G/l	1.50-4.00
LUC	2.7	%	0.0-4.0



1.6 Differential Blood Smear

Findings MQ 2014-4 H3A

woman, 32 years

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 count is normochromic and normocytic with minor poikilocytosis and few ovalocytes. No erythrocytic inclusions detectable. Neutrophils with fine cytoplasmic granulation without washout of myeloid precursors. The lymphocytes are slightly polymorph in terms of size and nuclei, some with azurophil granulation in the cytoplasm. Platelets with minor anisocytosis, the granulation is unremarkable. No giant forms detectable.

Dr. J. Goede / K. Schreiber

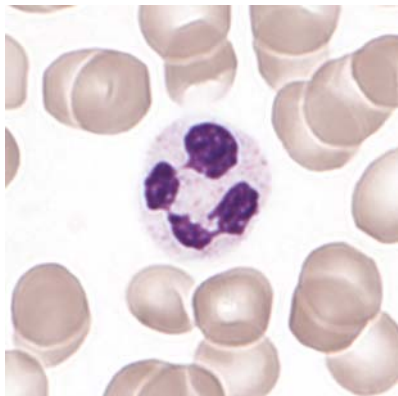


Abb 1. Neutrophil

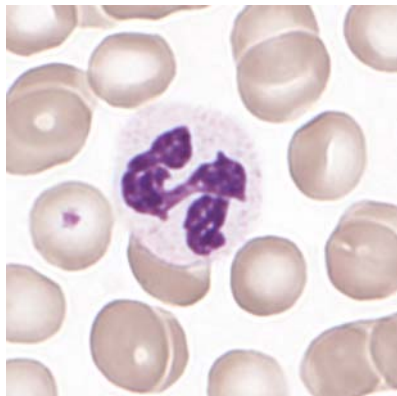


Abb 2. Neutrophil

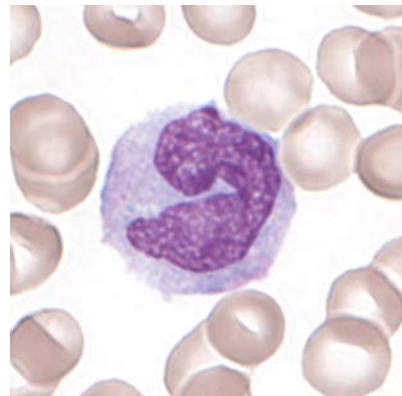


Abb 3. Monocyte

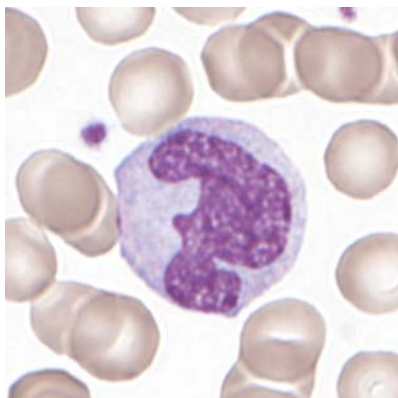


Abb 4. Monocyte

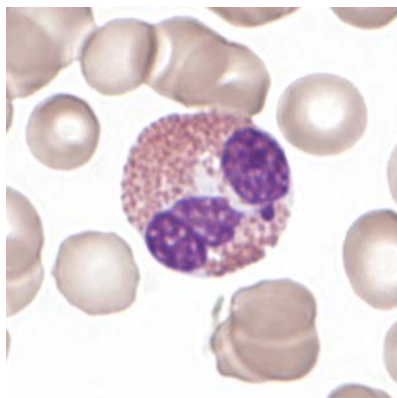


Abb 5. Eosinophil

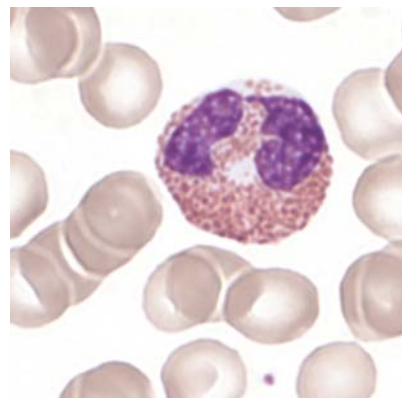


Abb 6. Eosinophil

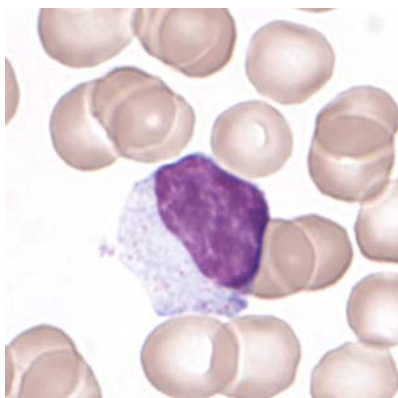


Abb 7. Lymphocyte (LGL)

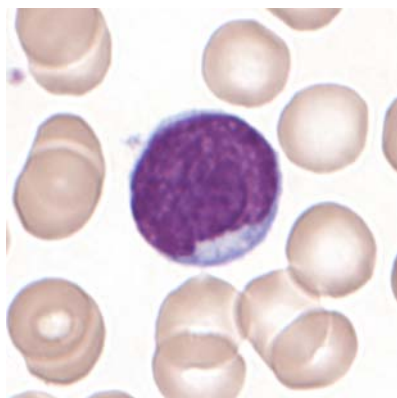


Abb 8. Lymphocyte

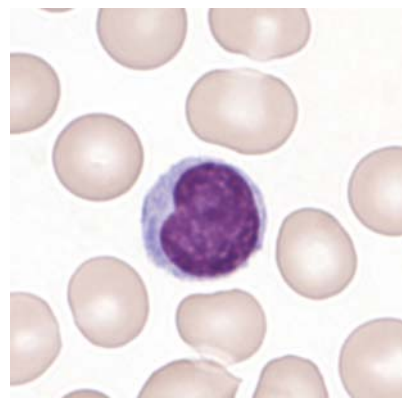


Abb 9. Lymphocyte

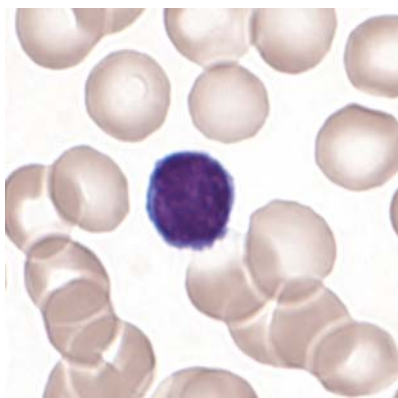


Abb 10. Lymphocyte

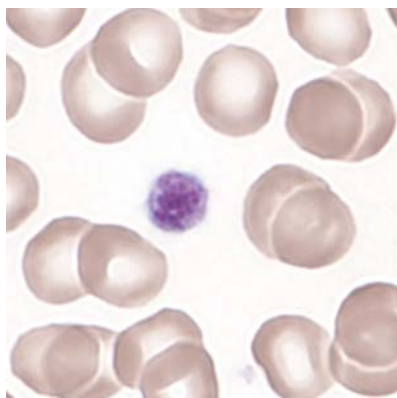


Abb 11. Thrombocyte (Macro)

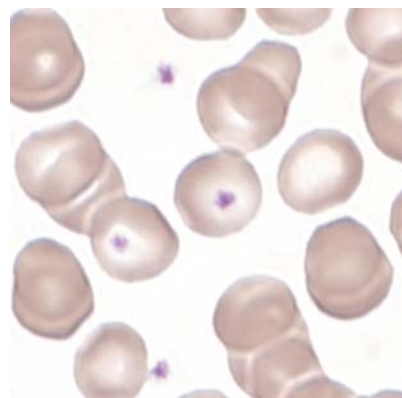


Abb 12. Thrombocyte

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>	17	101	115*	54	4	2		1			
<i>Neutrophils Segmented.</i>					3	32	134*	119	5	1	
<i>Eosinophils</i>	4	191*	94	5							
<i>Basophile</i>	136	157*	1								
<i>Monocytes</i>	13	92	160*	29							
<i>Lymphocytes</i>	1			2	31	202*	57	1			
<i>Plasmacells</i>	284*	10									
<i>Blasts</i>	289*	2	1	2							
<i>Promyelocytes</i>	294*										
<i>Myelocytes</i>	289*	4	1								
<i>Metamyelozyten</i>	290*	4									
<i>Erythrocytes Nucleated</i>	294*										
<i>Unknown</i>	287*	7									
<i>Smudge cells</i>	283*	11									

Evaluation H3-A

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	26	1		<i>Hypochromic Ec</i>	40	5	2
<i>Pelger-Hüet Anomaly</i>	1			<i>Polychromatic Ec</i>	25	2	
<i>Coarse Granulation</i>	31	3	1	<i>Anisocytes</i>	101	15	
<i>Basophilic Strippling</i>	5			<i>Mikrocytes</i>	33	1	
<i>Vacuoles</i>	21	3		<i>Makrocytes</i>	21	5	
<i>Reaktive Lymphocytes</i>	37	8		<i>Megalocytes</i>	3		
<i>Atypical Lymphocytes</i>	1			<i>Poikilocytosis</i>	52*	4	
<i>Others</i>	3			<i>Ovalocytes</i>	48	2	
				<i>Target Cells</i>	11	1	
				<i>Akanthocytes</i>	12	1	
<i>Anisocytosis</i>	60*	12	1	<i>Echinocytes</i>	8	1	
<i>Megakaryocyte Nucleaus</i>	12			<i>Sickle Cells</i>			
<i>Granulation</i>	9	1		<i>Fragmentocytes</i>	6		
<i>Others</i>				<i>Spherocytes</i>			
				<i>Stomatocytes</i>	12	2	
				<i>Basophilic Strippling</i>	3		
				<i>Howell-Jolly Bodies</i>	2	1	
				<i>Pappenheim Bodies</i>	1		
				<i>Others</i>	1		

1.8 Qualab Codes

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

Code	Text	Anzahl
29	Normal Blood Smear	337
30	Pathologic findings, refer to expert	18
27	Erythrocytes, other:	5
26	Tear Drops	2
25	Basophilic strippling	1
24	Howell-Jolly Körperchen	2
23	Erythrocytes agglutination	1
22	Rouleau	9
21	Spherocytes	2
20	Fragmentocytes	5
19	Targetcells	4
18	Stomatocytes	6
17	Elliptocytes/Ovalocytes	10
16	Poikilocytosis	14
15	Polychromatophilic Red Cells	5
14	Hypochromic Erythrocytes	16
13	Makrocytes	11
12	Mikrocytes	13
11	Thrombocytes, Giant	1
10	Plättchenaggregate	1
9	Riesenplättchen	9
8	Leukocytes, other:	8
6	Atypical Lymphocytes, probably neoplastic	3
5	Atypical Lymphocytes, probably reactive	17
4	Neutrophils, Toxic Changes	6
3	Pelger Hüet Anomaly	1
2	Neutrophils, left shift	4
1	Neutrophils, hypersegmentation of nucleus	15
	Total	376

2 Sample B

2.1 ABX Micros



Findings MQ 2014-4 H3B

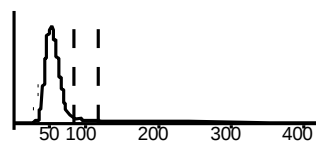
woman, 54 years

WBC :	11.0	H	$10^9/L$	MCV :	92.8	L	fL
RBC :	4.40		$10^{12}/L$	MCH :	30.0	L	pg
HGB :	132		g/L	MCHC:	323		g/L
HCT :	408		L/L	RDW :	13.3	H	%
PLT :	286		$10^9/L$	MPV :	7.0		fL
PCT :	.199		$10^{-2}L/L$	PDW :	12.7		%

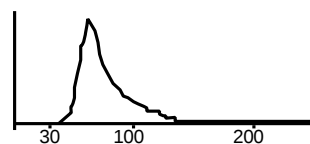
WBC Flags : M2

DIFF:							
%LYM:	79.2	H	%	#LYM:	8.6	H	$10^9/L$
%MON:	6.2		%	#MON:	0.6		$10^9/L$
%GRA:	14.6	L	%	#GRA:	1.8		$10^9/L$

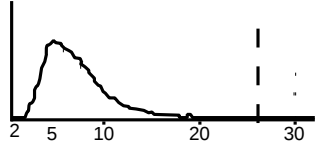
WBC



RBC



PLT

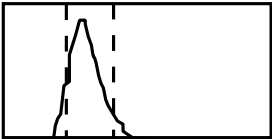
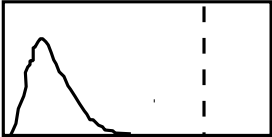


2.2 Mythic



Findings MQ 2014-4 H3B

woman, 54 years

WBC	11.4	h	10 ⁹ /l	3.5	/	10.0	
LYM	8.4	H	10 ⁹ /l	1.2	/	3.2	
MON	1.2	H	10 ⁹ /l	0.1	/	1.0	
GRA	1.8		10 ⁹ /l	1.2	/	6.8	
LYM%	74.0	H	%	17.0	/	48.0	
MON%	10.2	h	%	2.0	/	10.0	
GRA%	15.8	L	%	43.0	/	76.0	
RBC	4.43		10 ¹² /l	4.00	/	5.70	
HGB	127		g/l	120	/	180	
HCT	0.391		l/l	0.360	/	0.540	
MCV	88.3		fL	80.0	/	100.0	
MCH	28.7		pg	26.0	/	34.0	
MCHC	325		g/l	310	/	365	
RDW	13.8		%	10.0	/	16.0	
PLT	266		10 ⁹ /l	150	/	400	
MPV	7.5		fL	7.0	/	11.0	
PCT	0.200		cl/l	0.100	/	0.500	
PDW	14.6		%	10.0	/	18.0	

2.3 Sysmex KX21



Findings MQ 2014-4 H3B

woman, 54 years

Analysis	Result	Unit	Reference Value
Blood count			
Hemoglobin	126	g/l	117-153
Hematocrit	0.381	l/l	0.35-0.460
Erythrocytes	4.45	T/l	3.9-5.2
MCV	85.6	fl	80-100
MCH	28.3	pg	26-34
MCHC	* 33	g/l	310-360
Thrombocytes	276	G/l	143-400
Leukocytes	* 11.7	G/l	3.0-9.6

WBC	11.7		$10^3/\mu\text{L}$	WBC
RBC	4.45		$10^6/\mu\text{L}$	
HGB	12.6		g/dL	
HCT	38.1		%	RBC
MCV	-85.6		fL	
MCH	28.3		pg	
MCHC	33.1		g/dL	PLT
PLT	276		$10^3/\mu\text{L}$	
LYM%	+84.8		%	
MXD%	---.-		%	
NEUT%	---.-		%	
LYM#	9.9		$10^3/\mu\text{L}$	
MXD#T2	---.-		$10^3/\mu\text{L}$	
NEUT#T2	---.-		$10^3/\mu\text{L}$	
RDW_SD	45.6		fL	
RDW_CV	13.4		%	
PDW	10.0		fL	
MPV	-8.7		fL	
P_LCR	16.8		%	

2.4 Sysmex XE-5000

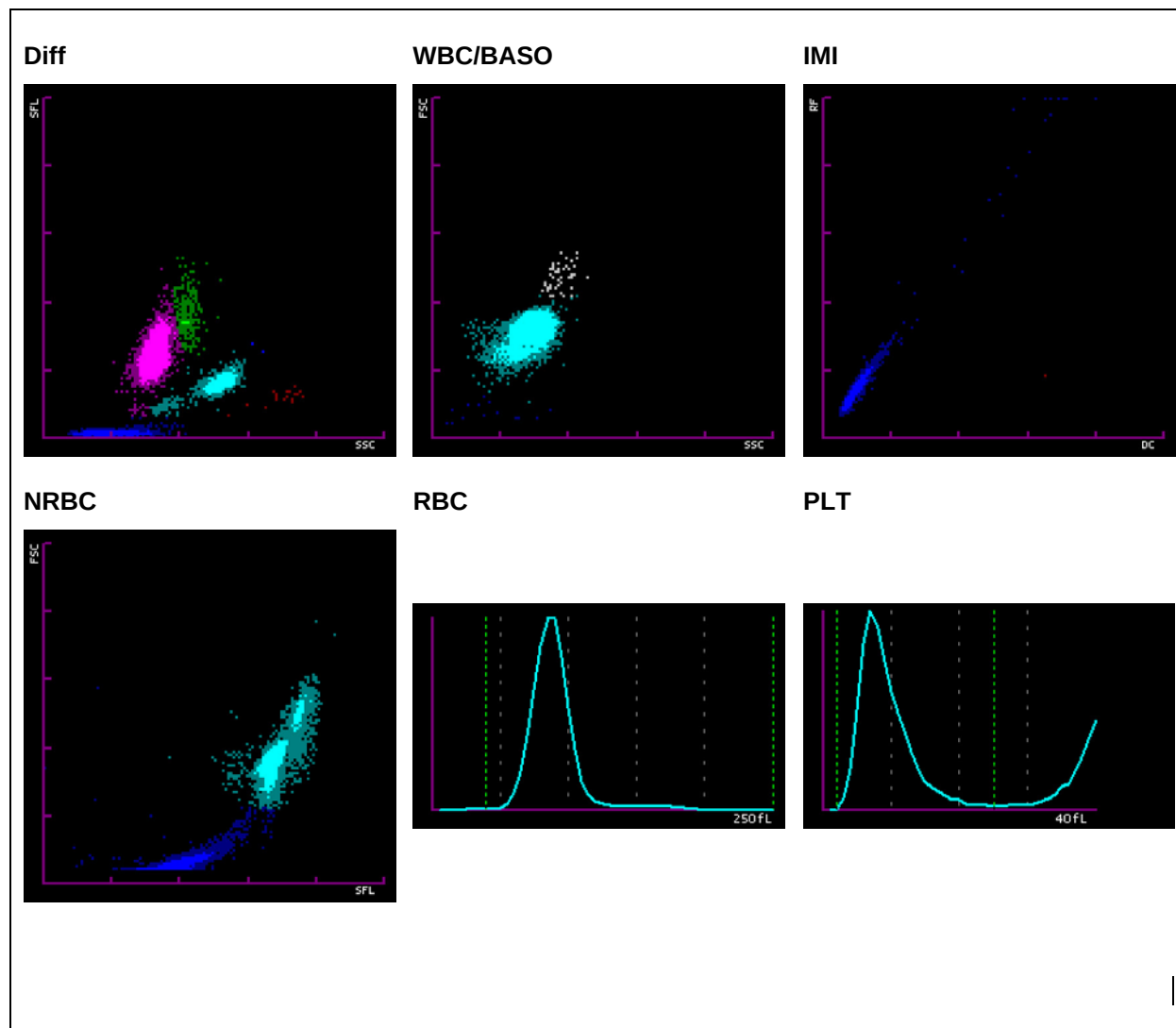


Findings MQ 2014-4 H3B

woman, 54 years

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	128	g/l	117-13
Hematocrit	0.375	l/l	0.350-0.460
Erythrocytes	4.36	T/l	3.9-5.2
MCV	86.0	fl	80-100
MCH	29.4	pg	26-34
MCHC	341	g/l	310-360
Mikrocytes	13.9	%	11.0-14.8
Thrombocytes	292	G/l	143-400
Leucocytes	* 12.04	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	1.40	G/l	1.40-8.00
Monocytes	0.42	G/l	0.16-0.95
Eosinophils	0.03	G/l	0.00-0.70
Basophils	0.04	G/l	0.00-0.15
Lymphocytes	* 10.15	G/l	1.50-4.00
IG abs.	0.00	G/l	0.00-0.03
IG %	0.0	%	0.0-0.5
NRBC abs.	0.00	G/l	
NRBC	0.0	/100 Lc	

Findings HAD MQ 2014-4 H3B



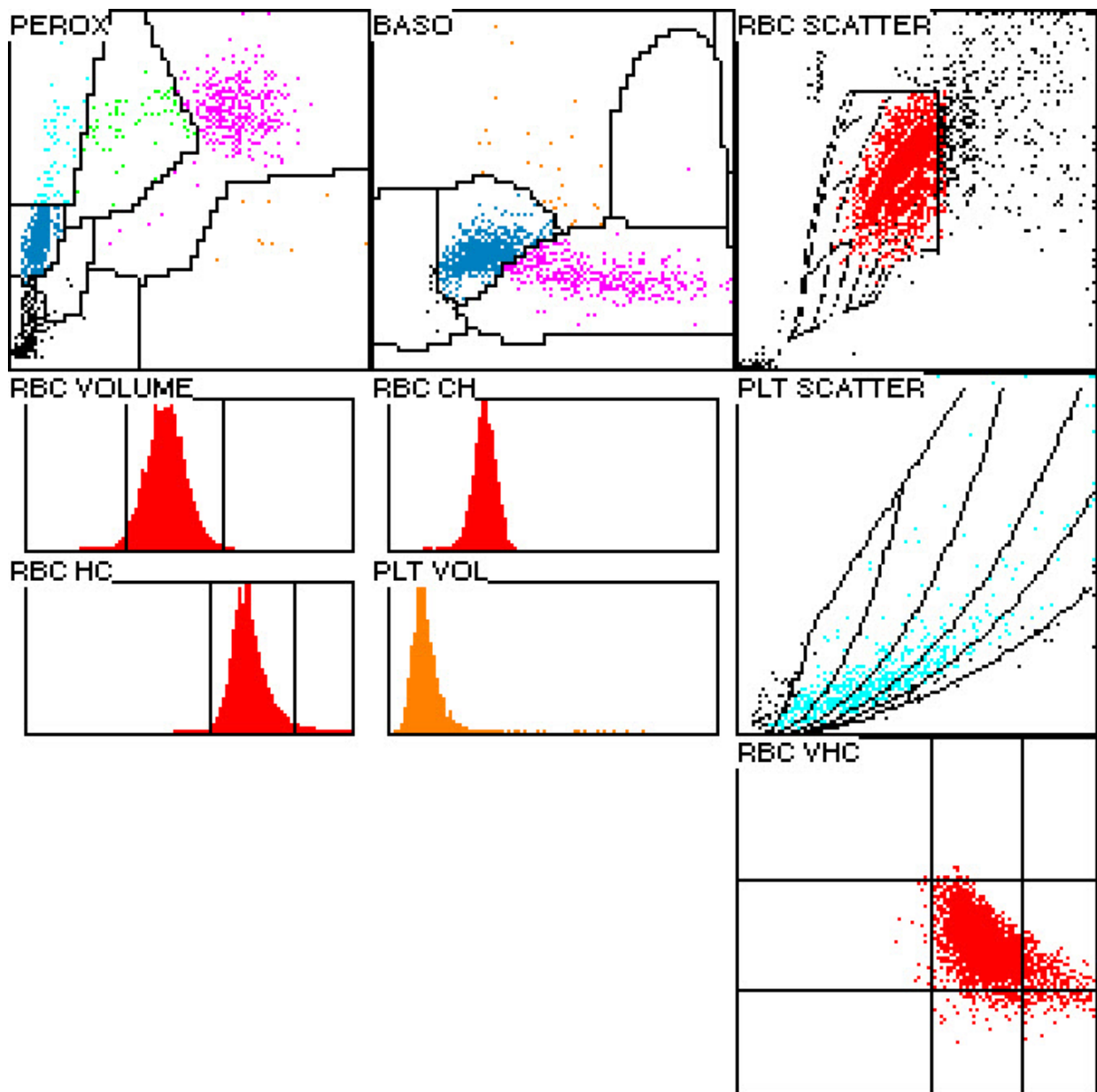
2.5 ADVIA 120



Findings MQ 2014-4 H3B

woman, 54 years

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	129	g/l	117-153
Hematocrit	0.383	l/l	0.350-0.460
Erythrocytes	4.49	T/l	3.9-5.2
MCV	85.2	fl	80-100
MCH	28.6	pg	26-34
MCHC	336	g/l	310-360
Mikrocytes	1.6	%	0-2.0
Makrocytes	0.1	%	0-2.0
Hypochromic Ec	* 0.3	%	0-2.0
Hyerchromic Ec	2.7	%	0-2.0
RDW	13.9	%	11.0-0-14.8
Thrombocytes	294	G/l	143-400
Vd. L-SHIFT	0	+	Keine (0)
Leukocytes	* 12.07	G/l	3.0-9.6
Leucocytes Differentiation			
Neutrophils	1.64	G/l	1.40-8.00
Monocytes	0.26	G/l	0.16-0.95
Eosinophils	0.04	G/l	0.00-0.70
Basophils	0.07	G/l	0.00-0.15
Lymphocytes	* 9.78	G/l	1.50-4.00



2.6 Differential Blood Smear

Findings MQ 2014-4 H3B

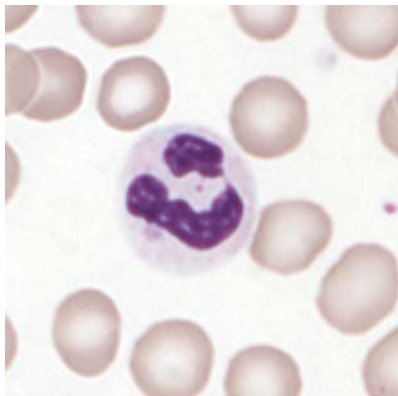
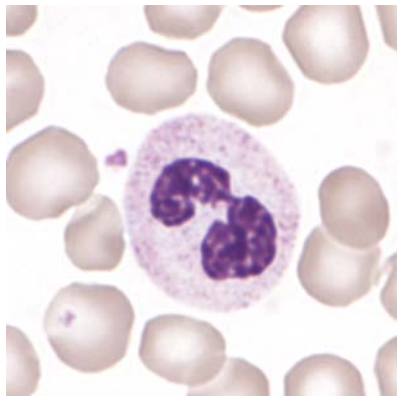
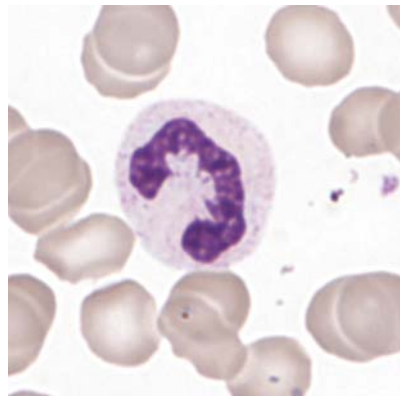
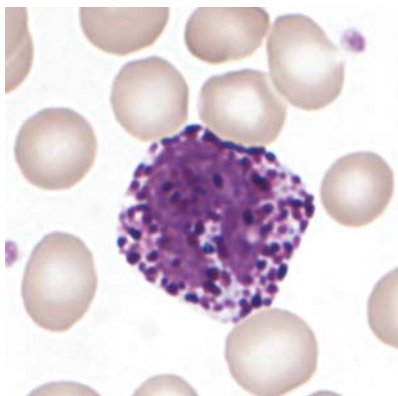
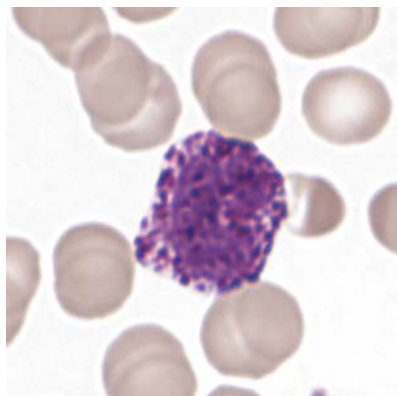
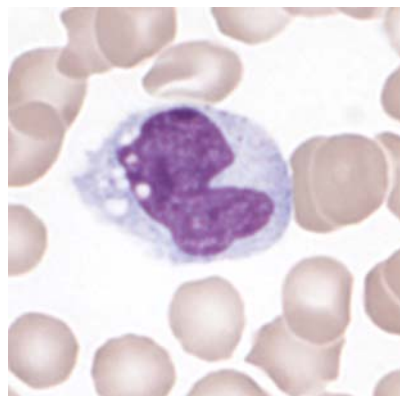
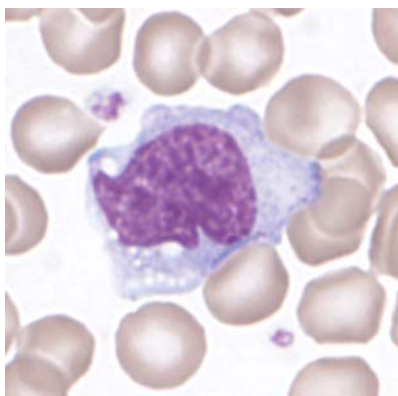
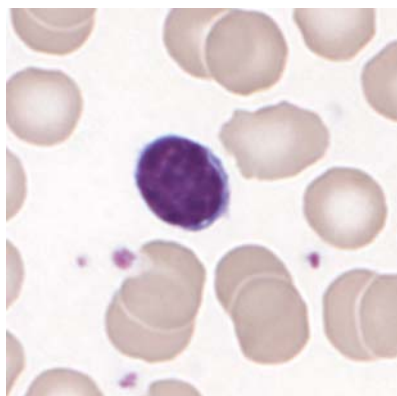
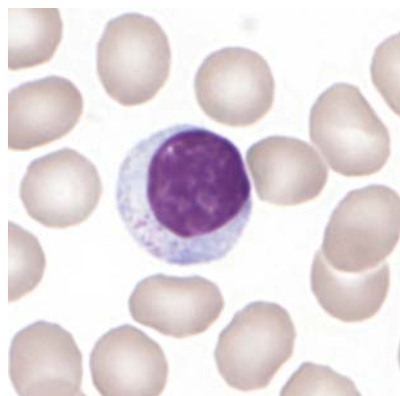
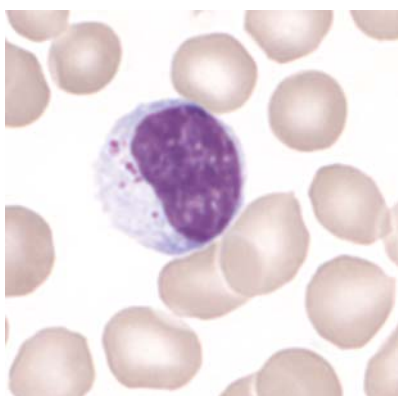
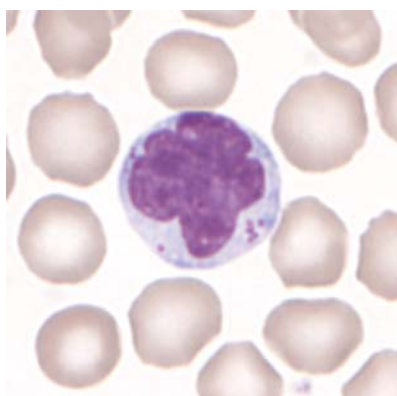
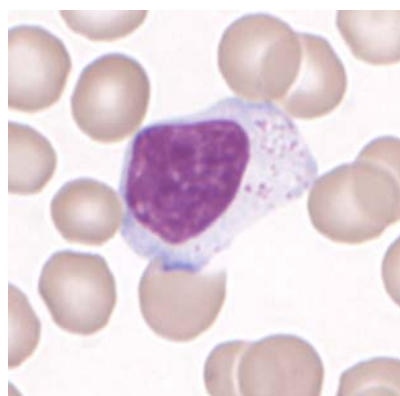
woman, 54 years

Analysis		Result	Unit	Reference value
Neutrophils total		1.81	G/l	1.40-8.00
Monocytes		0.48	G/l	0.16-0.95
Eosinophils		0.06	G/l	0.00-0.70
Basophils		0.18	G/l	0.00-0.15
Lymphocytes	*	9.54	G/l	1.50-4.00
Neutrophils total	*	15.0	%	40.0-74.0
Neutrophils Band		2.0	%	0.0-20.0
Neutrophils Segmented	*	13.0	%	30.0-50.0
Monocytes		4.0	%	3.4-9.0
Eosinophils		0.5	%	0.0-7.0
Basophils		1.5	%	0.0-1.5
Lymphocytes	*	79.0	%	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

Leukocytosis with marked absolute lymphocytosis; 1/3 of the lymphocytes are small, with dense and narrow nuclear chromatin structures, and small plasmatic. Around 65% of typical lymphocytes are larger, with broad cytoplasm margins and sometimes rough azur granulation (LGL). Neutrophils with fine cytoplasmic granulation. Minor platelet anisocytosis, no giant forms detectable. The red blood count is normochromic and normocytic with minor poikilocytosis, and isolated ovalocytes. No erythrocytic inclusions.

Dr. med. J. Goede / K. Schreiber.

*Abb 1. Neutrophil**Abb 2. Neutrophil**Abb 3. Neutrophil**Abb 4. Basophil**Abb 5. Basophil**Abb 6. Monocyte**Abb 7. Monocyte**Abb 8. Lymphocyte**Abb 9. Lymphocyte (LGL)**Abb 10. Lymphocyte (LGL)**Abb 11. Lymphocyte (LGL)**Abb 12. Lymphocyte (LGL)*

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>	22	191*	75	6							
<i>Neutrophils Segmented.</i>	2	19	147	124*				2			
<i>Eosinophils</i>	212*	80	2								
<i>Basophile</i>	186	107*		1							
<i>Monocytes</i>	53	201*	26	9	2	2		1			
<i>Lymphocytes</i>		2	1	6	8	3	4	7	11	52*	200
<i>Plasmacells</i>	280*	12	1		1						
<i>Blasts</i>	277*	6	2	1	1		2	1	3	1	
<i>Promyelocytes</i>	283*	4		4		1	1			1	
<i>Myelocytes</i>	279*	7	1	3	1		1			2	
<i>Metamyelozyten</i>	287*	5		2							
<i>Erythrocytes Nucleated</i>	293*	1									
<i>Unknown</i>	276*	7	2	1	1	2		2	1	1	1
<i>Smudge cells</i>	240*	26	22	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>	6	2	1	<i>Hypochromic Ec</i>	37	9	2
<i>Pelger-Huet Anomaly</i>				<i>Polychromatic Ec</i>	23	5	2
<i>Coarse Granulation</i>	23	9	2	<i>Anisocytes</i>	127	57	2
<i>Basophilic Stripling</i>	8	1		<i>Mikrocytes</i>	86	16	
<i>Vacuoles</i>	27	5		<i>Makrocytes</i>	36	5	1
<i>Atypical Lymph, reactive</i>	32	44	51	<i>Megalocytes</i>	5	5	
<i>Atypical Lymph, neoplastic</i>	3	3	6	<i>Poikilocytosis</i>	76*	13	1
<i>Others</i>	17	15	31	<i>Ovalocytes</i>	96*	12	
				<i>Target Cells</i>	5		
				<i>Akanthocytes</i>	20		
<i>Anisocytosis</i>	65*	16	1	<i>Echinocytes</i>	19	2	
<i>Megakaryocyte Nucleus</i>	8	2		<i>Sickle Cells</i>			
<i>Granulation</i>	7	5		<i>Fragmentocytes</i>	6	2	
<i>Others</i>				<i>Spherocytes</i>	12		
				<i>Stomatocytes</i>	5		
				<i>Basophilic Stripling</i>	10	1	
				<i>Howell-Jolly Bodies</i>	2		
				<i>Pappenheim Bodies</i>			
				<i>Others</i>	4		1

2.8 Qualab Codes

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

Code	Text	Anzahl
30	Pathologic findings, refer to expert	317
29	Normal Blood smear	5
27	Erythrocytes, other:	15
26	Tear Drops	5
25	Basophilic strippling	6
24	Howell-Jolly Körperchen	3
23	Erythrocytes agglutination	2
22	Rouleau	14
21	Spherocytes	6
20	Fragmentocytes	2
18	Stomatocytes	1
17	Elliptocytes/Ovalocytes	55
16	Poikilocytosis	47
15	Polychromatophilic Red Cells	19
14	Hypochromic Erythrocytes	19
13	Makrocytes	26
12	Mikrocytes	72
11	Thrombocytes, Giant	6
10	Plättchenaggregate	4
9	Riesenplättchen	18
8	Leukocytes, other:	35
7	Auer rods	4
6	Atypical Lymphocytes, probably neoplastic	99
5	Atypical Lymphocytes, probably reactive	150
4	Neutrophils, Toxic Changes	16
2	Neutrophils, left shift	3
1	Neutrophils, hypersegmentation of nucleus	5
	Total	376