

Verein für
Association pour le
Associazione per il



medizinische Qualitätskontrolle
contrôle de qualité médical
controllo di qualità medico

Report

Differential Blood Smear H3

MQ 2014-3

Acknowledgements

The Mythic 18 analyzer was provided by the company Polymed and the ABX Micros CRP 200 analyzer by the company Axonlab. 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 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

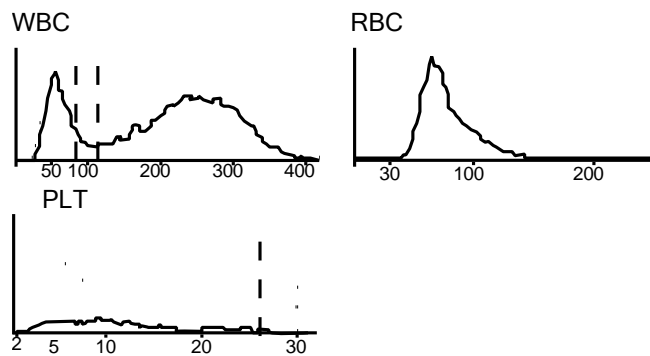


Findings MQ 2014-3 H3A

39 year old man

WBC :	6.1	10 ⁹ /L	MCV :	84.9	fL
RBC :	4.88	10 ¹² /L	MCH :	28.2	pg
HGB :	138	g/L	MCHC:	332	g/L
HCT :	.415	L/L	RDW :	16.3	H %
PLT :	39	L 10 ⁹ /L	MPV :	9.3	fL
PCT :	.036	L 10 ⁻² L/L	PDW :	14.3	%

DIFF:				
%LYM:	19.9	%	#LYM:	1.2 10 ⁹ /L
%MON:	4.9	%	#MON:	0.3 10 ⁹ /L
%GRA:	75.2	%	#GRA:	4.6 10 ⁹ /L



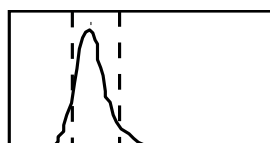
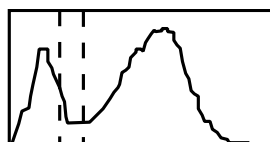
1.2 Mythic



Findings MQ 2014-3, H3A

39 year old man

WBC	6.2	$10^9/l$	3.5 /	10.0
LYM	1.3	$10^9/l$	1.2 /	3.2
MON	0.4	$10^9/l$	0.1 /	1.0
GRA	4.5	$10^9/l$	1.2 /	6.8
LYM%	20.7	%	17.0 /	48.0
MON%	6.1	%	2.0 /	10.0
GRA%	73.2	%	43.0 /	76.0
RBC	4.92	$10^{12}/l$	4.00 /	5.70
HGB	140	g/l	140 /	180
HCT	0.409	l/l	0.420 /	0.540
MCV	83.1	fl	80.0 /	100.0
MCH	28.5	pg	26.0 /	34.0
MCHC	342	g/l	310 /	365
RDW	15.4	%	10.0 /	16.0
PLT	56	L $10^9/l$	150 /	400
MPV	9.0	fl	7.0 /	11.0
PCT	0.050	l cl/l	0.100 /	0.500
PDW	13.0	%	10.0 /	18.0



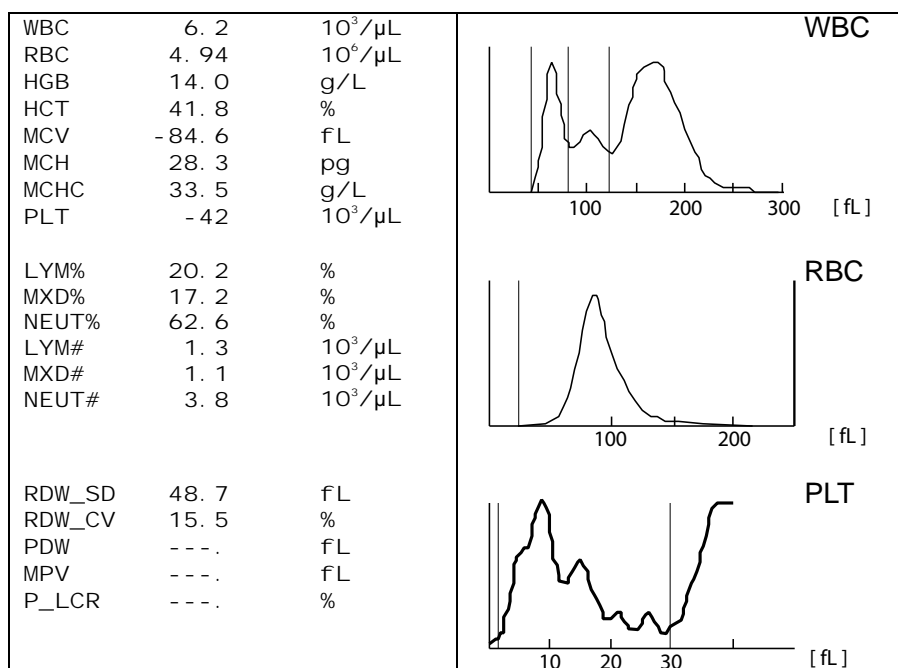
1.3 Sysmex KX21



Findings HAD MQ 2014-3 H3A

39 year old man

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	140	g/l	134-170
<u>Hematocrit</u>	0.418	l/l	0.400-0.500
Erythrocytes	4.94	T/l	4.2-5.7
MCV	84.6	fl	80-100
MCH	28.3	pg	26-34
MCHC	* 34	g/l	310-360
<u>Thrombocytes</u>	* 42	G/l	143-400
MPV	Not measurable		
Mixed population	1.10	G/l	3 part Diff (Mono/Eos/Baso)
<u>Leucocytes</u>	6.2	G/l	3.0-9.6
Leucocyte Differentiation			
<u>Neutrophils</u>	3.8	G/l	1.40-8.00
Lymphocytes	* 1.3	G/l	1.50-4.00



1.4 Sysmex XE-5000

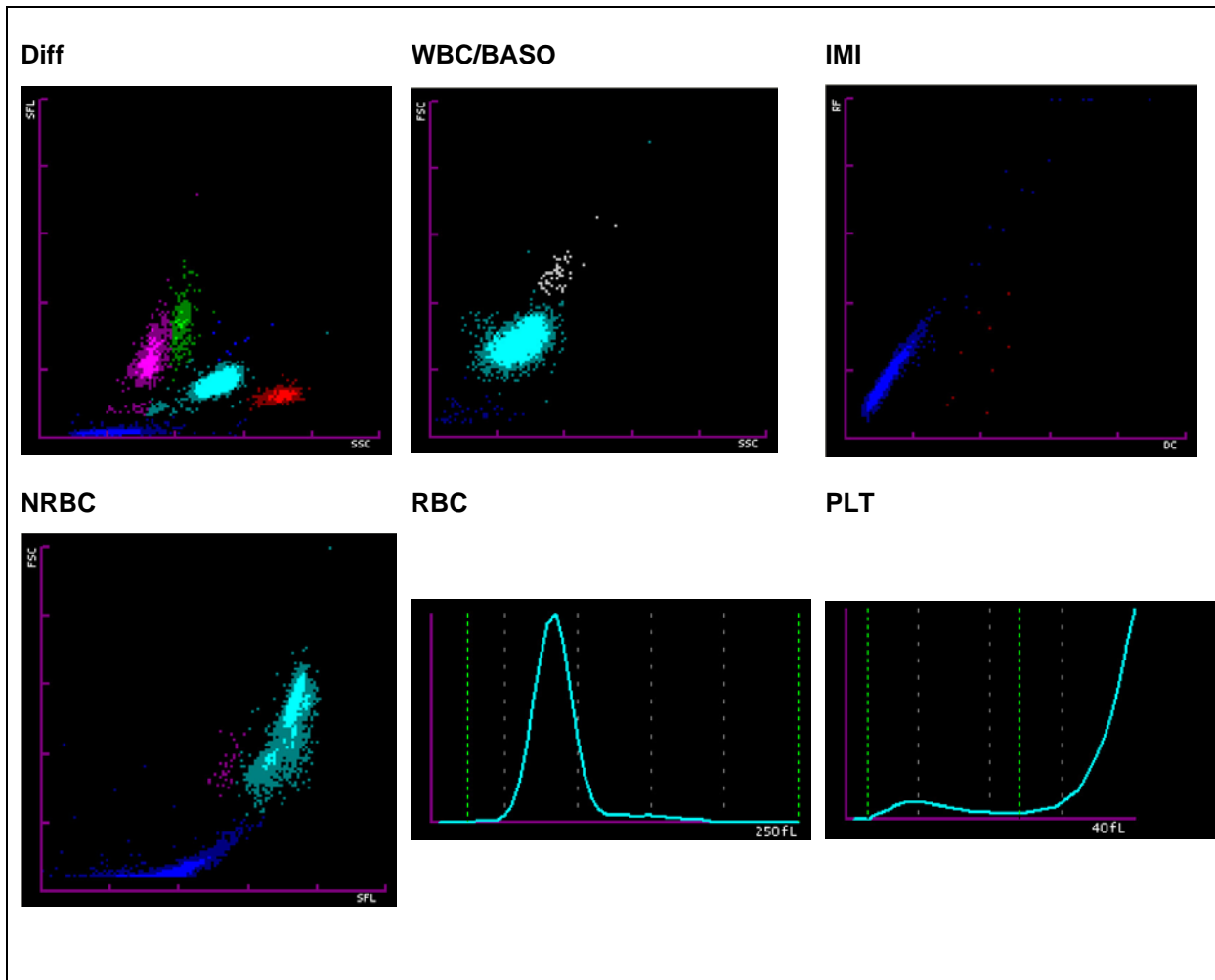


Findings HAD MQ 2014-3 H3A

39 year old man

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	104	g/l	134-170
Hematocrit	0.319	l/l	0.400-0.500
Erythrocytes	4.06	T/l	4.2-5.7
MCV	* 78.6	fl	80-100
MCH	* 25.6	pg	26-34
MCHC	326	g/l	310-360
Mikrocytes	* 7.2	%	0-2.0
Makrocytes	0	%	0-2.0
Hypochromic Ec	* 9.3	%	0-2.0
Hyerchromic Ec	1.6	%	0-2.0
RDW	* 16.4	%	11.0-14.8
<u>Thrombocytes</u>	* 122	G/l	143-400
<u>Leucocytes</u>	* 12.62	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	2.36	G/l	1.40-8.00
Monocytes	* 1.00	G/l	0.16-0.95
Eosinophils	0.24	G/l	0.00-0.70
Basophils	0.04	G/l	0.00-0.15
Lymphocytes	* 8.98	G/l	1.50-4.00
IG abs.	0.03	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 2014-3 H3A

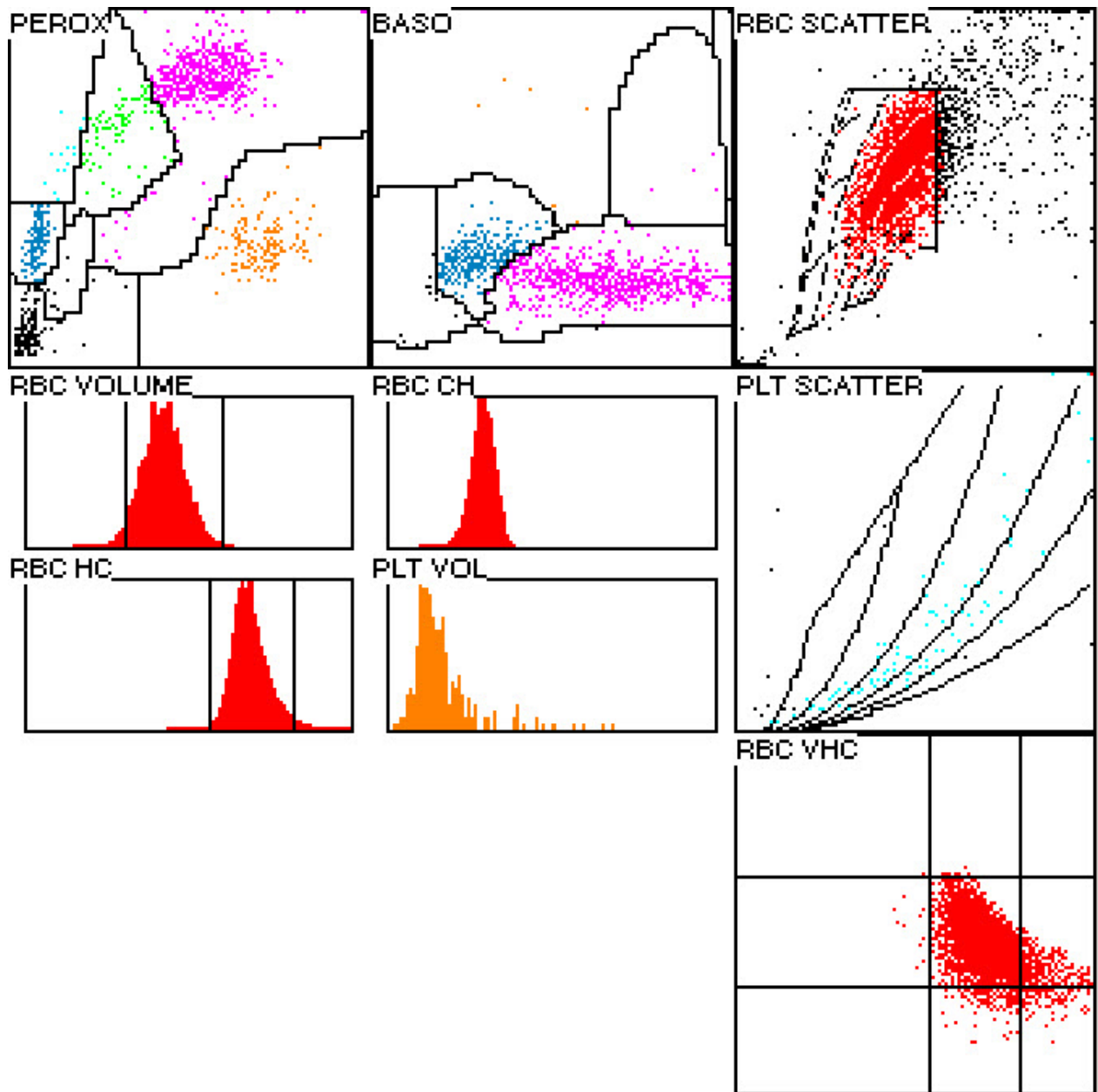


1.5 ADVIA 2120



Findings HAD MQ 2014-3 H3A 39 year old man

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	144	g/l	134-170
<u>Hematocrit</u>	0.411	l/l	0.400-0.500
Erythrocytes	4.89	T/l	4.2-5.7
MCV	84.1	fl	80-100
MCH	29.4	pg	26-34
MCHC	350	g/l	310-360
Mikrocytes	* 2.8	%	0-2.0
Makrocytes	0.1	%	0-2.0
Hypochromic Ec	0.3	%	0-2.0
Hyperchromic Ec	* 2.6	%	0-2.0
RDW	* 15.1	%	0-2.0
<u>Thrombozyten</u>	* 33	G/l	143-400
Vd. L-SHIFT	0	+	Keine (0)
<u>Leucocytes</u>	6.73	G/l	3.0-9.6
Leucocyte differentiation			
Neutrophils	4.23	G/l	1.40-8.00
Monocytes	0.42	G/l	0.16-0.95
Eosinophils	0.62	G/l	0.00-0.70
Basophils	0.03	G/l	0.00-0.15
Lymphocytes	* 1.32	G/l	1.50-4.00
LUC	1.7	%	0.0-4.0



1.6 Differential Blood Smear

Findings HAD MQ 2014-3 H3A

39 year old man

Analysis	Result	Unit	Reference value
Neutrophils total	4.48	G/l	1.40-8.00
Monocytes	0.3	G/l	0.16-0.95
Eosinophils	0.57	G/l	0.00-0.70
Basophils	0.1	G/l	0.00-0.15
Lymphocytes	* 1.28	G/l	1.50-4.00
Neutrophils total	66.5	%	40.0-74.0
Neutrophils Band	5.5	%	0.0-20.0
Neutrophils Segmented	* 61	%	30.0-50.0
Monocytes	4.5	%	3.4-9.0
Eosinophils	* 8.5	%	0.0-7.0
Basophils	1.5	%	0.0-1.5
Lymphocytes	19.0	%	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 count is normochromic and normocytic, slight poikilocytosis with few ovalocytes and acanthocytes. No erythrocytic inclusions. Neutrophilic granulocytes usually have a fine cytoplasmic granulation, few slightly coarse.

The lymphocytes are usually small with little cytoplasm, few with azurophil granulation.

Thrombocytopenia with mild anisocytosis and rare agranular forms. No giant forms.

K. Schreiber, Dr. J. Goede

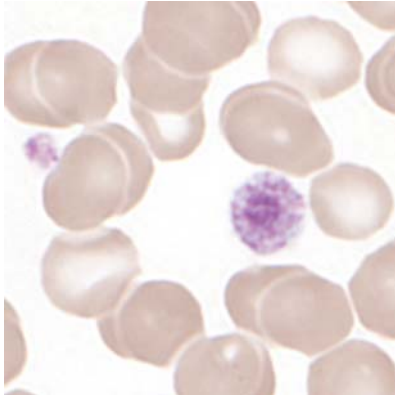


Abb 1. Thrombocyte

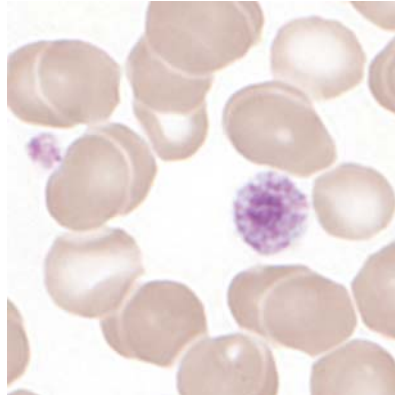


Abb 2. Thrombocyte

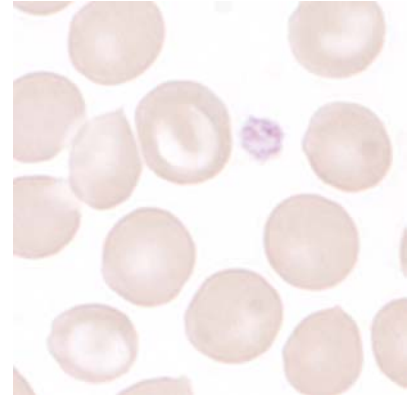


Abb 3. Thrombocyte

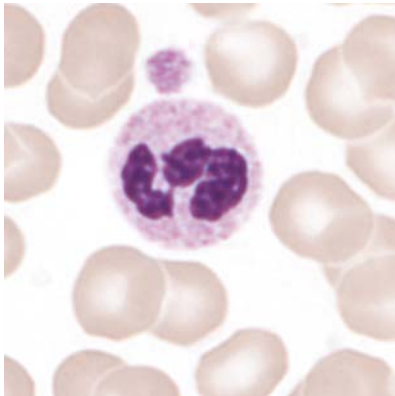


Abb 4. Neutrophil

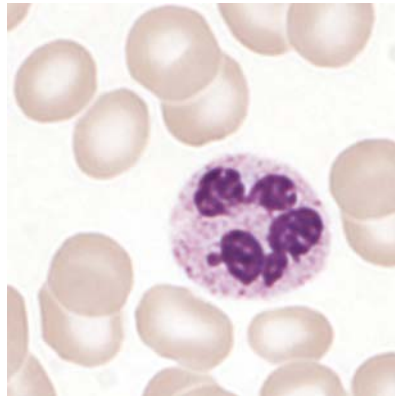


Abb 5. Neutrophil

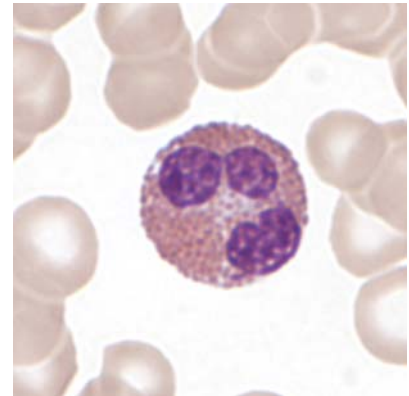


Abb 6. Eosinophil

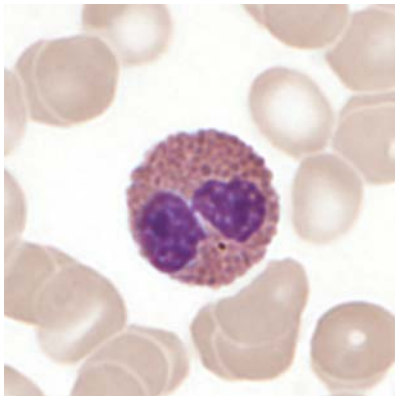


Abb 7. Eosinophil

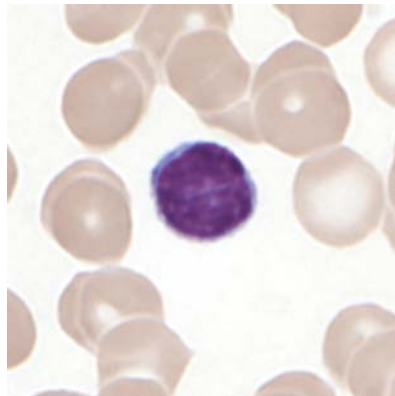


Abb 8. Lymphocyte

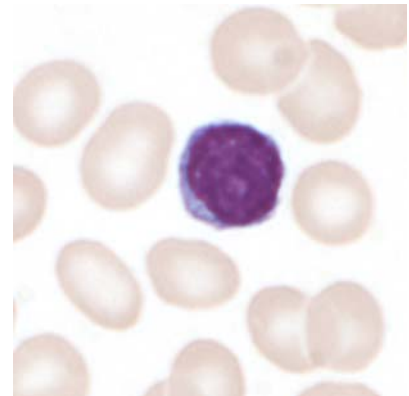


Abb 9. Lymphocyte

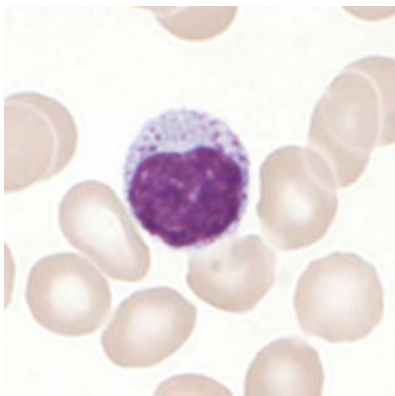


Abb 10. Lymphocyt LGL

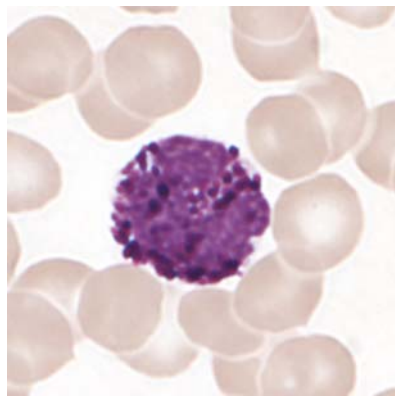


Abb 11. Basophil

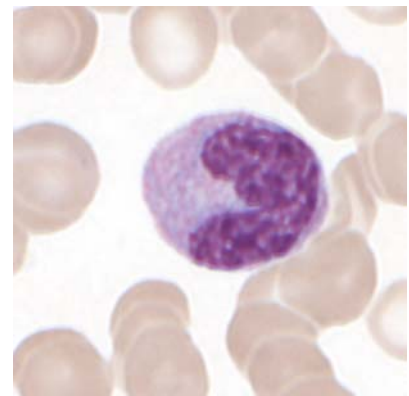


Abb 12. Monocyte

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>	10	146	126*	44	10	2		1			
<i>Neutrophils Segmented.</i>	1				2	5	36	152	133*	10	
<i>Eosinophils</i>	2	52	202*	83							
<i>Basophile</i>	138	200*		1							
<i>Monocytes</i>	11	189*	134	4	1						
<i>Lymphocytes</i>	1		1	70*	237	27	1	2			
<i>Plasmacells</i>	331*	7		1							
<i>Blasts</i>	337*	2									
<i>Promyelocytes</i>	338*	1									
<i>Myelocytes</i>	333*	6									
<i>Metamyelozyten</i>	331*	8									
<i>Erythrocytes Nucleated</i>	338*	1									
<i>Unknown</i>	334*	5									
<i>Smudge cells</i>	316*	18	5								

Evaluation H3-A

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	35	11	1	<i>Hypochromic Ec</i>	63	14	1
<i>Pelger-Hüet Anomaly</i>	1			<i>Polychromatic Ec</i>	36	3	
<i>Coarse Granulation</i>	82	33	1	<i>Anisocytes</i>	153	31	
<i>Basophilic Stripling</i>	5			<i>Mikrocytes</i>	60	8	
<i>Vacuoles</i>	21	4		<i>Makrocytes</i>	57	7	
<i>Reaktive Lymphocytes</i>	56	9	1	<i>Megalocytes</i>	3	2	
<i>Atypical Lymphocytes</i>				<i>Poikilocytosis</i>	76*	10	
<i>Others</i>	10	1		<i>Ovalocytes</i>	70*	3	
				<i>Target Cells</i>	50	5	
				<i>Akanthocytes</i>	17*		
<i>Anisocytosis</i>	94*	49	1	<i>Echinocytes</i>	20	2	
<i>Megakaryocyte Nucleaus</i>	17	4		<i>Sickle Cells</i>	1		
<i>Granulation</i>	20	3	3	<i>Fragmentocytes</i>	14		
<i>Others</i>				<i>Spherocytes</i>	3		
				<i>Stomatocytes</i>	7	2	
				<i>Basophilic Stripling</i>	12		
				<i>Howell-Jolly Bodies</i>	4		
				<i>Pappenheim Bodies</i>	1		
				<i>Others</i>	6		

1.8 Qualab Codes

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

Code	Text	Number
29	Normal findings	214
30	Pathologic findings, refer to expert	96
11	Thrombocytes, others	76
8	Leucocytes other:	49
9	Macrothrombocytes	34
14	Hypochromic Erythrocytes	33
16	Poikilocytosis	33
4	Neutrophils, Toxic Changes	28
1	Neutrophils, hypersegmentation of nucleus	27
5	Macrocytes	25
13	Atypical lymphocytes, probably reactive	25
12	Microcytes	24
19	Targetcells	21
17	Elliptocytes/Ovalocytes	15
22	Rouleaux	15
15	Polychromatophilic Red Cells	12
27	Erythrocytes, other	11
10	Thrombocyte aggregates	5
24	Howell-Jolly bodies	4
2	Basophilic strippling	3
18	Neutrophils, left shift	3
20	Stomatocytes	3
25	Fragmentocytes	3
26	Teardrops	3
7	Auer rods	1
21	Spherocytes	1
23	Erythrocytes agglutination	1
28	Parasites	1

2 Sample B

2.1 ABX Micros



Findings MQ 2014-3 H3B

44 year old man

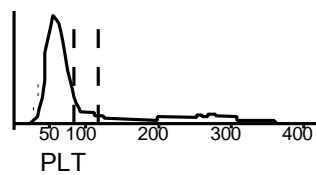
WBC :	11.0	H	$10^9/L$	MCV :	74.3	L	fL
RBC :	4.00		$10^{12}/L$	MCH :	25.0	L	pg
HGB :	100	L	g/L	MCHC:	337		g/L
HCT :	297	L	L/L	RDW :	18.4	H	%
PLT :	101	L	$10^9/L$	MPV :	7.1		fL
PCT :	.071	L	$10^{-2}L/L$	PDW :	14.5		%

WBC Fl ags : G1 G3

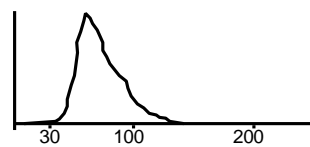
DIFF:

%LYM:	64.6	H	%	#LYM:	7.0	H	$10^9/L$
%MON:	8.9	L	%	#MON:	0.9	H	$10^9/L$
%GRA:	26.5		%	#GRA:	3.1		$10^9/L$

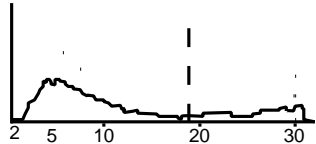
WBC



RBC



PLT



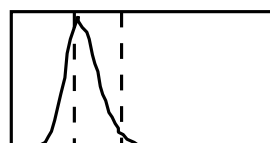
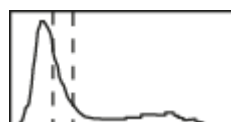
2.2 Mythic



Findings MQ 2014-3 H3B

44 year old man

WBC	10.9	h	10 ⁹ /l	3.5 / 10.0
LYM	5.4	h	10 ⁹ /l	1.2 / 3.2
MON	2.3	H	10 ⁹ /l	0.1 / 1.0
GRA	3.2		10 ⁹ /l	1.2 / 6.8
LYM%	49.9	h	%	17.0 / 48.0
MON%	20.8	H	%	2.0 / 10.0
GRA%	29.3	L	%	43.0 / 76.0
RBC	4.06		10 ¹² /l	4.00 / 5.70
HGB	96	l	g/l	140 / 180
HCT	0.293	l	l/l	0.420 / 0.540
MCV	72.2	l	fl	80.0 / 100.0
MCH	23.6	L	pg	26.0 / 34.0
MCHC	328		g/l	310 / 365
RDW	19.8	h	%	10.0 / 16.0
PLT	129	l	10 ⁹ /l	150 / 400
MPV	8.0		fl	7.0 / 11.0
PCT	0.103		cl /l	0.100 / 0.500
PDW	13.6		%	10.0 / 18.0



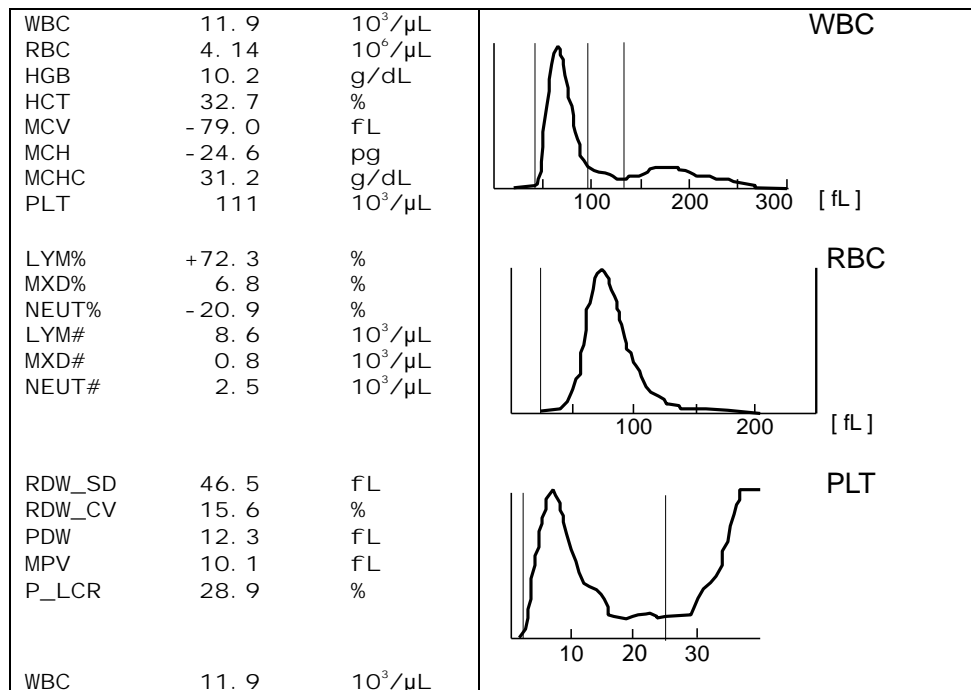
2.3 Sysmex KX21



Findings HAD MQ 2014-3 H3B

44 year old man

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	102	g/l	134-170
<u>Hematocrit</u>	0.327	l/l	0.400-0.500
Erythrocytes	4.14	T/l	4.2-5.7
MCV	* 79.0	fl	80-100
MCH	* 24.6	pg	26-34
MCHC	* 312	g/l	310-360
<u>Thrombocytes</u>	* 15.6	%	11.0-0-14.8
MPV	* 111	G/l	143-400
Mixed population	6.8	G/l	3 part Diff (Mono/Eos/Baso)
<u>Leucocytes</u>	* 11.9	G/l	3.0-9.6
Leucocyte Differentiation			
<u>Neutrophils</u>	2.5	G/l	1.40-8.00
Lymphocytes	* 8.6	G/l	1.50-4.00



2.4 Sysmex XE-5000

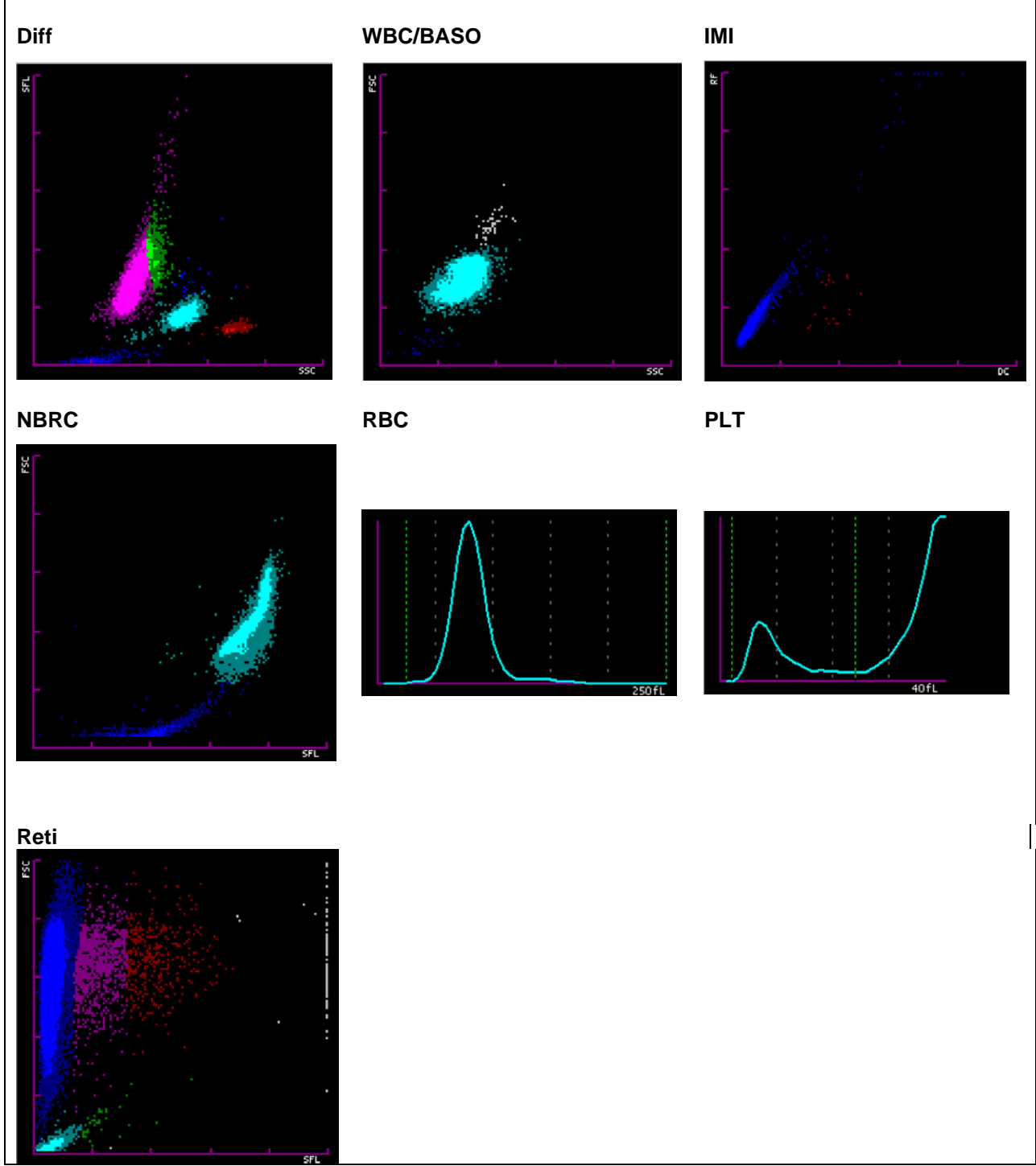


Findings HAD MQ 2014-3 H3B

44 year old man

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	104	g/l	134-170
Hematocrit	0.319	l/l	0.400-0.500
Erythrocytes	4.06	T/l	4.2-5.7
MCV	* 78.6	fl	80-100
MCH	* 25.6	pg	26-34
MCHC	326	g/l	310-360
Mikrocytes	* 7.2	%	0-2.0
Makrocytes	0	%	0-2.0
Hypochromic Ec	* 9.3	%	0-2.0
Hyerchromic Ec	1.6	%	0-2.0
RDW	* 16.4	%	11.0-14.8
<u>Thrombocytes</u>	* 122	G/l	143-400
<u>Leucocytes</u>	* 12.62	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	2.36	G/l	1.40-8.00
Monocytes	* 1.00	G/l	0.16-0.95
Eosinophils	0.24	G/l	0.00-0.70
Basophils	0.04	G/l	0.00-0.15
Lymphocytes	* 8.98	G/l	1.50-4.00
IG abs.	0.03	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 2014-3 H3B



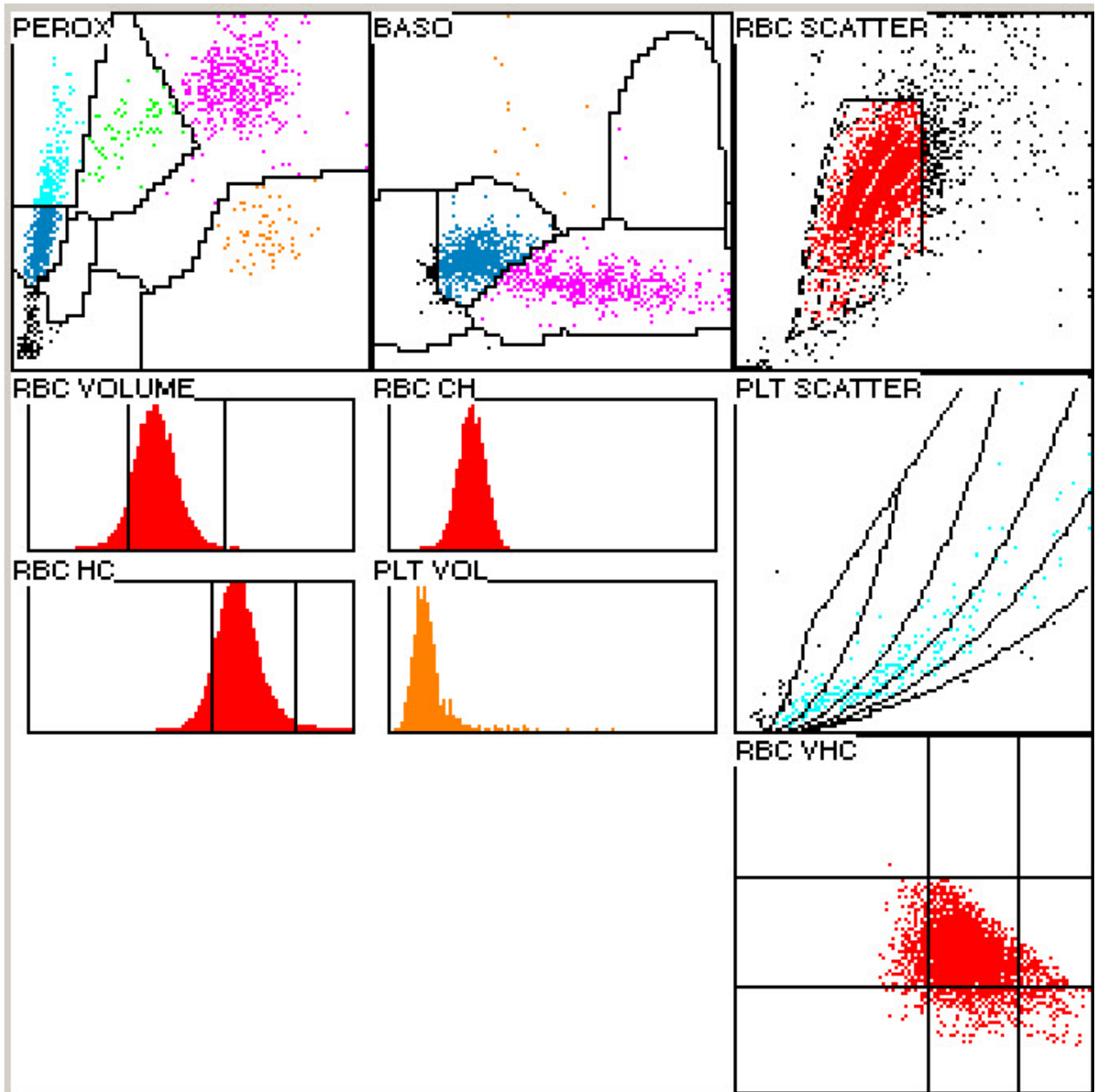
2.5 ADVIA 2120



Findings HAD MQ 2014-3 H3B

44 year old man

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	104	g/l	134-170
Hematocrit	0.323	l/l	0.400-0.500
Erythrocytes	4.15	T/l	4.2-5.7
MCV	* 77.8	fl	80-100
MCH	* 25.2	pg	26-34
MCHC	323	g/l	310-360
Mikrocytes	* 7.2	%	0-2.0
Makrocytes	0.0	%	0-2.0
Hypochromic Ec	* 9.3	%	0-2.0
Hyerchromic Ec	1.6	%	0-2.0
RDW	* 16.5	%	11.0-0-14.8
Thrombocytes	* 107	G/l	143-400
Vd. L-SHIFT	0	+	Keine (0)
Leukocytes	* 12.59	G/l	3.0-9.6
Leucocytes Differentiation			
Neutrophils	2.51	G/l	1.40-8.00
Monocytes	0.36	G/l	0.16-0.95
Eosinophils	0.28	G/l	0.00-0.70
Basophils	0.05	G/l	0.00-0.15
Lymphocytes	* 7.76	G/l	1.50-4.00



2.6 Differential Blood Smear

Findings HAD MQ 2014-3 H3B

44 year old man

Analysis	Result	Unit	Reference value
Neutrophils total	2.39	G/l	1.40-8.00
Monocytes	0.69	G/l	0.16-0.95
Eosinophils	0.25	G/l	0.00-0.70
Basophils	0.06	G/l	0.00-0.15
Lymphocytes	* 9.19	G/l	1.50-4.00
Neutrophils total	* 19.0	%	40.0-74.0
Neutrophils Band	6.0	%	0.0-20.0
Neutrophils Segmented	* 13.0	%	30.0-50.0
Monocytes	5.5	%	3.4-9.0
Eosinophils	2.0	%	0.0-7.0
Basophils	0.5	%	0.0-1.5
Lymphocytes	* 73.0	%	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

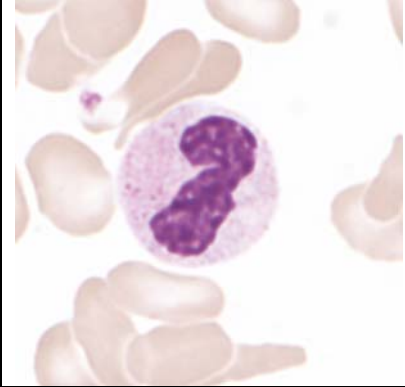

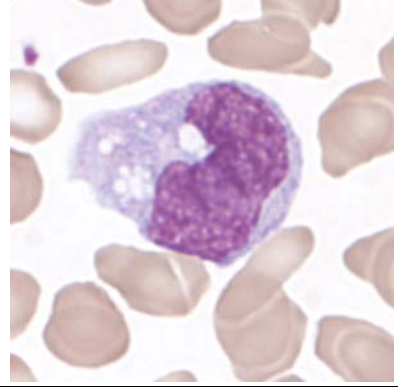
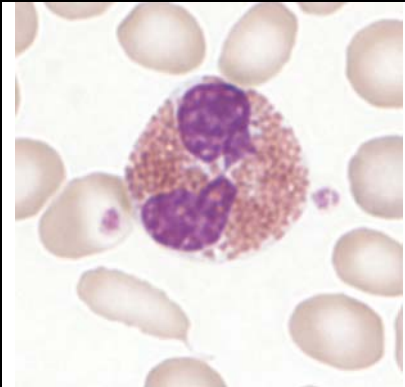
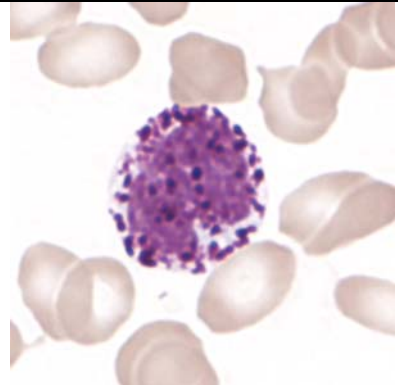
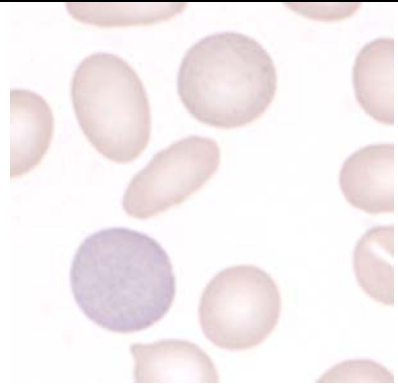
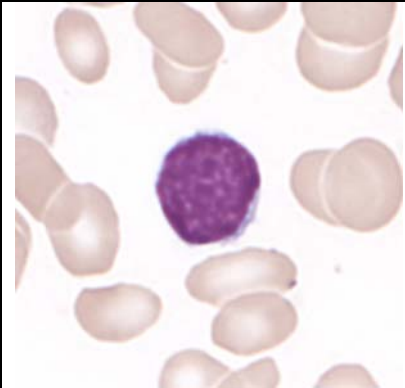
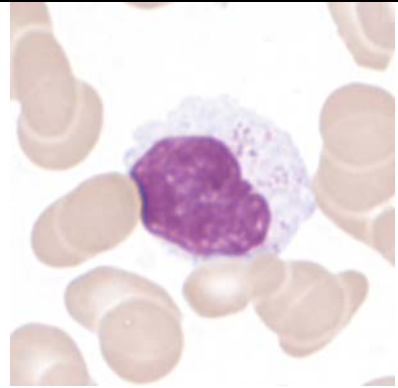
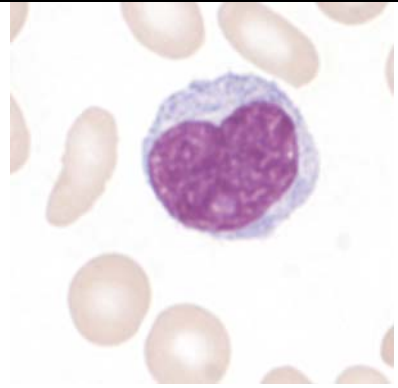
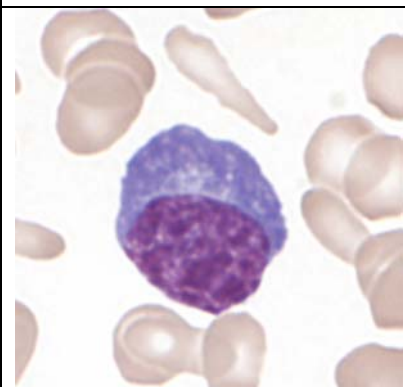
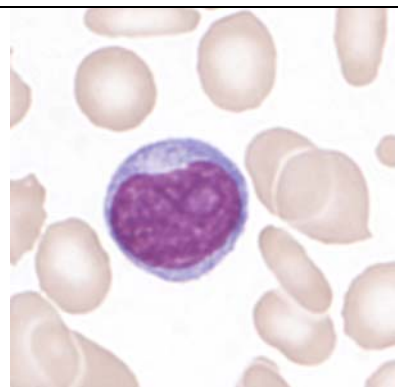
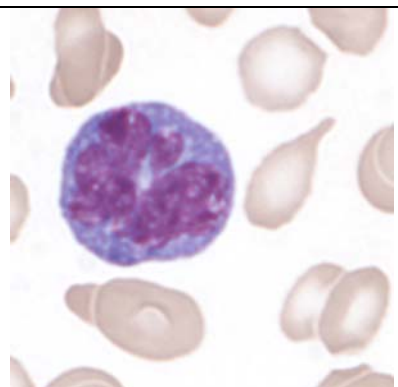
Nuclei shapes are round to ovoid, some are indented and / or with incisions or folds in nuclei, the chromatin is irregular and dense, some with indication of a nucleolus, the cytoplasm border is usually narrow and medium-basophilic, some with fine cytoplasmic pseudopods.

Neutrophils usually have fine cytoplasmic granulation, few are slightly coarse.

Mild thrombocytopenia with mild anisocytosis. No giant forms detectable.

In the red blood cell count, hypochromic anemia, with mild anisocytosis with few microcytes, discrete polychromasia, marked poikilocytosis with abundance of ovalocytes, rare echinocytes and elliptocytes, rare teardrop shapes and basophilic stippled erythrocytes are seen.

K. Schreiber / Dr. J. Goede

		
<i>Abb 1. Neutrophilic granulocyte</i>	<i>Abb 2. Neutrophil</i>	<i>Abb 3. Monocyte</i>
		
<i>Abb 4. Eosinophilic granulocyte</i>	<i>Abb 5. Basophilic granulocyte</i>	<i>Abb 6. Polychromasia</i>
		
<i>Abb 7. Lymphocyte, typical</i>	<i>Abb 8. Lymphocyte (LGL)</i>	<i>Abb 9. Lymphocyte, atypical</i>
		
<i>Abb 10. Lymphocyte, atypical</i>	<i>Abb 11. Lymphocyte, atypical</i>	<i>Abb 12. Lymphocyte, atypical</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>	6	124	174*	32	3						
<i>Neutrophils Segmented.</i>	2	4	34	252*	45	2					
<i>Eosinophils</i>	39	275*	24	1							
<i>Basophile</i>	250*	89									
<i>Monocytes</i>	46	194	76*	17	3	1		1	1		
<i>Lymphocytes</i>	3		3	10	5	12	19	29	68	165*	25
<i>Plasmacells</i>	314*	19	1	1	2				1		1
<i>Blasts</i>	278*	16	10	6	11	8	1	5	2	1	1
<i>Promyelocytes</i>	325*	7	4	2						1	
<i>Myelocytes</i>	312*	13	4	5	3		1	1			
<i>Metamyelozyten</i>	324*	12	2	1							
<i>Erythrocytes Nucleated</i>	325*	13			1						
<i>Unknown</i>	301*	15	5	10	1	3	2	1	1		
<i>Smudge cells</i>	300*	29	6	2		2					

Beurteilung H3-B

	<i>light</i>	<i>medium</i>	<i>strong</i>		<i>light</i>	<i>medium</i>	<i>strong</i>
<i>Hypersegmentation</i>	5	2	1	<i>Hypochromic Ec</i>	93	80	18
<i>Pelger-Hüet Anomaly</i>	3			<i>Polychromatic Ec</i>	111*	46	6
<i>Coarse Granulation</i>	45*	16	3	<i>Anisocytes</i>	91	128	35
<i>Basophilic Stripling</i>	10	1	1	<i>Mikrocytes</i>	103	65	4
<i>Vacuoles</i>	35	7	5	<i>Makrocytes</i>	63	19	
<i>Atypical Lymph, reactive</i>	44	50	30	<i>Megalocytes</i>	17		1
<i>Atypical Lymph, neoplastic</i>	1	7	5	<i>Poikilocytosis</i>	108	91*	26
<i>Others</i>	32	53	37	<i>Ovalocytes</i>	46	121*	116
				<i>Target Cells</i>	13	8	
				<i>Akanthocytes</i>	27	3	
<i>Anisocytosis</i>	74*	24	5	<i>Echinocytes</i>	21*	1	1
<i>Megakaryocyte Nucleaus</i>	7	3		<i>Sickle Cells</i>	10		2
<i>Granulation</i>	16	3		<i>Fragmentocytes</i>	35	6	2
<i>Others</i>				<i>Spherocytes</i>	10	1	
				<i>Stomatocytes</i>	3		
				<i>Basophilic Stripling</i>	87	24	5
				<i>Howell-Jolly Bodies</i>	7	1	
				<i>Pappenheim Bodies</i>	2		
				<i>Others</i>	7	1	

2.8 Qualab Codes

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

Code	Text	Number
30	Pathologic findings, refer to expert	323
17	Elliptocytes/Ovalocytes	223
16	Poikilocytosis	116
6	Atypical lymphocytes, probably neoplastic	101
5	Atypical lymphocytes, probably reactive	100
14	Hypochromic Erythrocytes	98
12	Microcytes	83
15	Polychromasia	70
25	Basophilic strippling	58
26	Teardrops	34
8	Leucocytes other:	30
4	Neutrophils, Toxic Changes	23
22	Rouleaux	22
13	Macrocytes	17
11	Thrombocytes, others	15
9	Macrothrombocytes	13
2	Neutrophils, left shift	7
20	Fragmentocytes	6
27	Erythrocytes, other	6
19	Targetcells	5
10	Thrombocyte aggregates	4
23	Erythrocytes agglutination	3
24	Howell-Jolly bodies	3
29	Normal findings	3
1	Neutrophils, hypersegmentation of nucleus	1
3	Pelger Hüet Anomaly	1
7	Auer rods	1
21	Spherocytes	1