

Verein für
Association pour le
Associazione per il



medizinische Qualitätskontrolle
contrôle de qualité médical
controllo di qualità medico

Report

Differential Blood Smear H3

MQ 2015-3

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. 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 2015-3 H3A

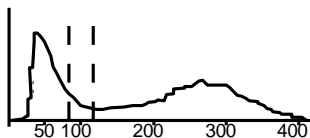
49 year old man

WBC :	11.8	H	$10^9/L$	MCV :	73.8	L	fL
RBC :	4.14		$10^{12}/L$	MCH :	22.2	L	pg
HGB :	92	L	g/L	MCHC:	301	L	g/L
HCT :	306	L	L/L	RDW :	20.5	H	%
PLT :	307		$10^9/L$	MPV :	8.1		fL
PCT :	249		$10^{-2}L/L$	PDW :	14.1		%

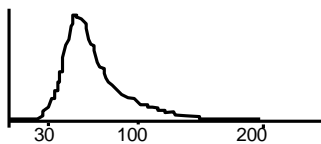
DIFF:

%LYM:	31.4	%	#LYM:	3.7	H	$10^9/L$
%MON:	6.3	%	#MON:	0.7		$10^9/L$
%GRA:	62.3	%	#GRA:	7.4	H	$10^9/L$

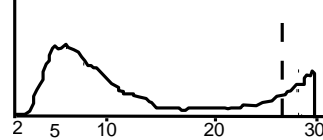
WBC



RBC



PLT

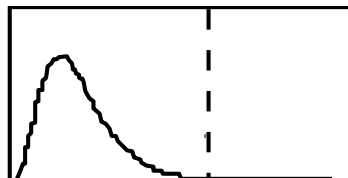
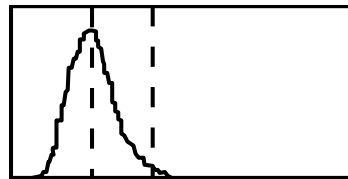
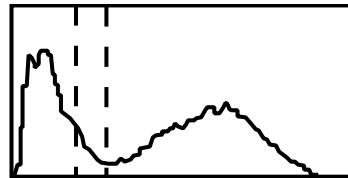


1.2 Mythic



Findings MQ 2015-3, H3A 49 year old man

WBC	11.9	h	10 ⁹ /l	3.5 / 10.0
LYM	4.1	h	10 ⁹ /l	1.2 / 3.2
MON	0.8		10 ⁹ /l	0.1 / 1.0
GRA	7.1	H	10 ⁹ /l	1.2 / 6.8
LYM%	34.1		%	17.0 / 48.0
MON%	6.5		%	2.0 / 10.0
GRA%	59.4		%	43.0 / 76.0
RBC	3.96	l	10 ¹² /l	4.00 / 5.70
HGB	92	l	g/l	140 / 180
HCT	0.271	l	l/l	0.420 / 0.540
MCV	68.4	L	fl	80.0 / 100.0
MCH	23.2	L	pg	26.0 / 34.0
MCHC	339		g/l	310 / 365
RDW	21.3	h	%	10.0 / 16.0
PLT	255		10 ⁹ /l	150 / 400
MPV	7.9		fl	7.0 / 11.0
PCT	0.201		cl/l	0.100 / 0.500
PDW	15.5		%	10.0 / 18.0



1.3 Sysmex XP300



Findings MQ 2015-3 H3A
49 year old man

WBC	12.4	$10^3/\mu\text{L}$	
RBC	4.12	$10^6/\mu\text{L}$	
HGB	93	g/L	
HCT	28.4	%	
MCV	68.9	fL	
MCH	22.6	pg	
MCHC	327	g/L	
PLT	283	$10^3/\mu\text{L}$	
LYM%	34.5	%	
MXD%	7.2	%	
NEUT%	58.2	%	
LYM#	4.3	$10^3/\mu\text{L}$	
MXD#	0.9	$10^3/\mu\text{L}$	
NEUT#	7.2	$10^3/\mu\text{L}$	
RDW_SD	48.9	fL	
RDW_CV	22.1	%	
PDW	13.0	fL	
MPV	9.3	fL	
P_LCR	21.2	%	
PCT	0.26	%	

1.4 Sysmex XE-5000

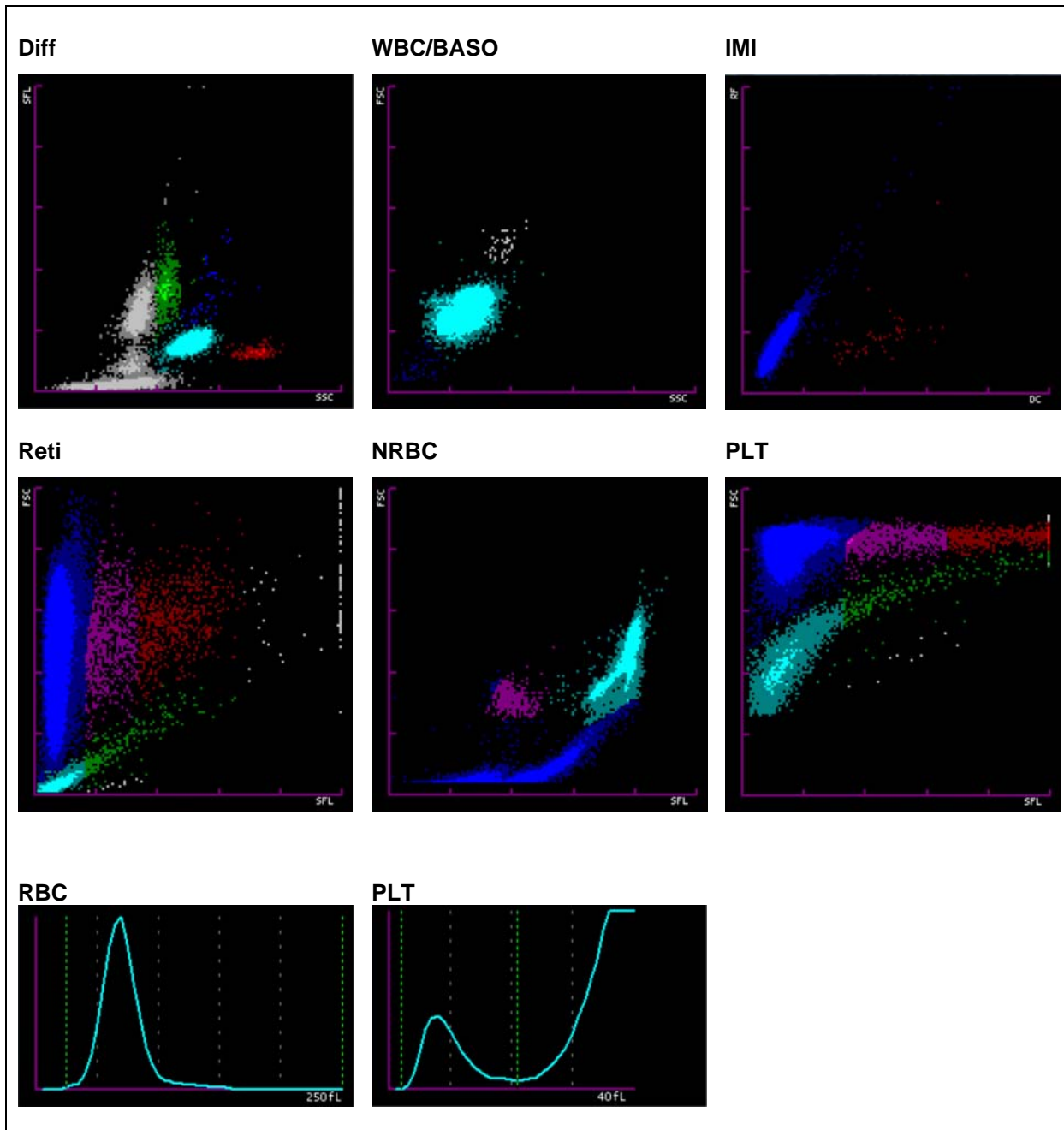


Findings HAD MQ 2015-3 H3A

49 year old man

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	89	g/l	134-170
<u>Hematocrit</u>	0.265	l/l	0.400-0.500
Erythrocytes	3.9	T/l	4.2-5.7
MCV	67.9	fl	80-100
MCH	22.8	pg	26-34
MCHC	336	g/l	310-360
Mikrocytes	19.7	%	11.0-14.8
<u>Thrombocytes</u>	278	G/l	143-400
<u>Leucocytes</u>	10.79	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	6.62	G/l	1.40-8.00
Monocytes	0.85	G/l	0.16-0.95
Eosinophils	0.27	G/l	0.00-0.70
Basophils	0.03	G/l	0.00-0.15
Lymphocytes	3.02	G/l	1.50-4.00
IG abs.	0.05	G/l	0.00-0.03
IG %	0.5	%	0.0-0.5
NRBC abs.	0.73	G/l	
NRBC	6.7	/100 Lc	

Findings HAD MQ 2015-3 H3A

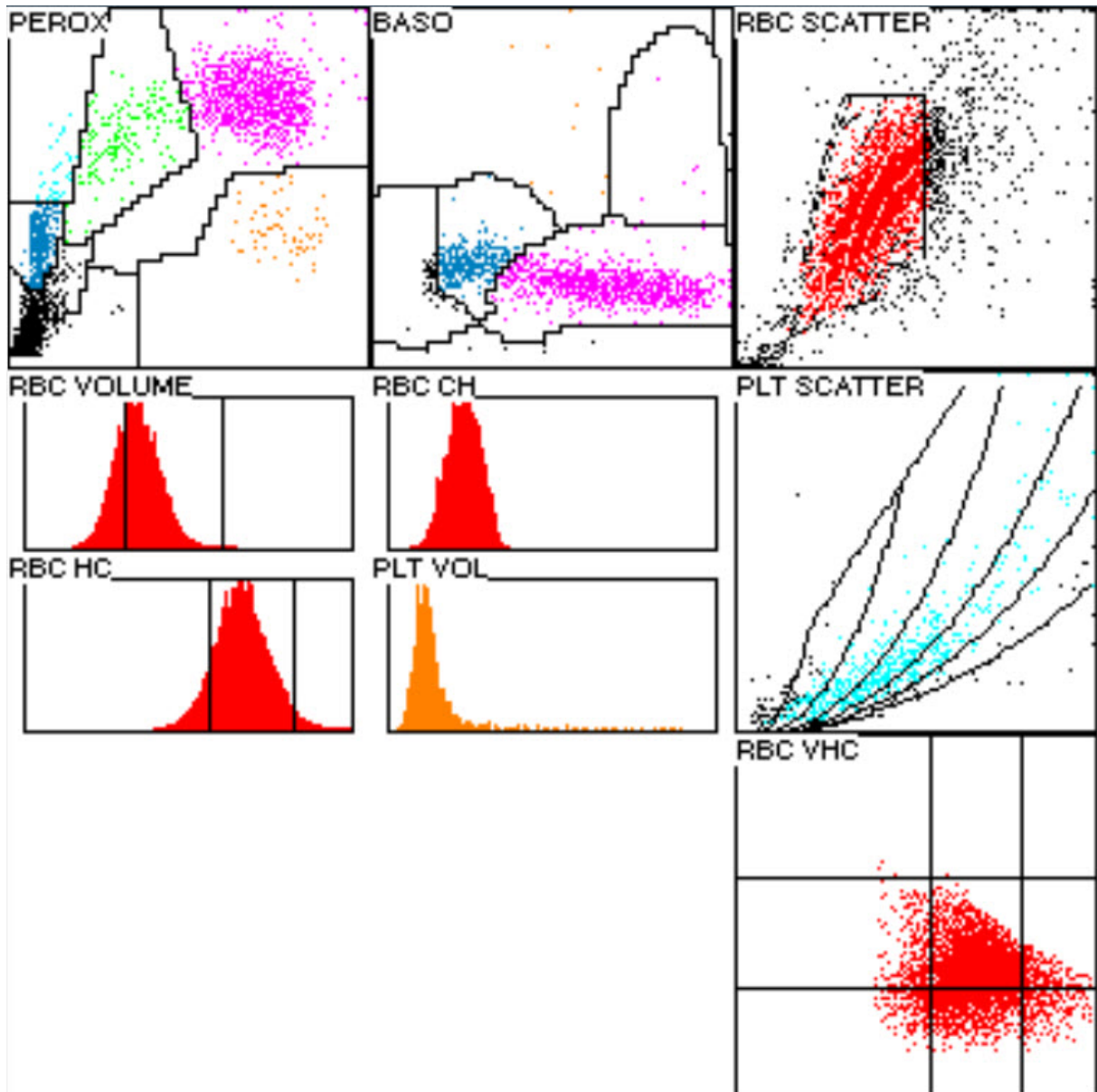


1.5 ADVIA 2120



Findings HAD MQ 2015-3 H3A 49 year old man

Analysis		Result	Unit	Reference value
Blood Count				
<u>Hämoglobin</u>	*	89	g/l	134-170
<u>Hämatokrit</u>	*	0.266	l/l	0.400-0.500
Erythrozyten	*	3.88	T/l	4.2-5.7
MCV	*	68.4	fl	80-100
MCH	*	23.0	pg	26-34
MCHC		336	g/l	310-360
Mikrozyten	*	27.2	%	0-2.0
Makrozyten		0	%	0-2.0
Hypochrome Ec	*	10.0	%	0-2.0
Hyperchrome Ec	*	2.7	%	0-2.0
RDW	*	19.7	%	11.0-14.8
<u>Thrombozyten</u>		263	G/l	143-400
Vd. L-SHIFT		0	+	Keine (0)
<u>Leukozyten</u>	*	10.69	G/l	3.0-9.6
Blutbild				
Neutrophile		6.57	G/l	1.40-8.00
Monozyten		0.59	G/l	0.16-0.95
Eosinophile		0.26	G/l	0.00-0.70
Basophile		0.05	G/l	0.00-0.15
Lymphozyten		3.00	G/l	1.50-4.00
LUC		2.2	%	0.0-4.0



1.6 Differential Blood Smear

Findings HAD MQ 2015-3 H3A

49 year old man

Analysis	Result	Unit	Reference value
Neutrophils total	6.58	G/l	1.40-8.00
Monocytes	0.59	G/l	0.16-0.95
Eosinophils	0.30	G/l	0.00-0.70
Basophils	0.00	G/l	0.00-0.15
Lymphocytes	2.43	G/l	1.50-4.00
Neutrophils total	66.5	%	40.0-74.0
Neutrophils Band	5.0	%	0.0-20.0
Neutrophils Segmented	* 61.5	%	30.0-50.0
Monocytes	6.0	%	3.4-9.0
Eosinophils	3.0	%	0.0-7.0
Basophils	0.0	%	0.0-1.5
Lymphocytes	24.5	%	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
Nucleated Red Cells	8	/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, Dr. J. Goede

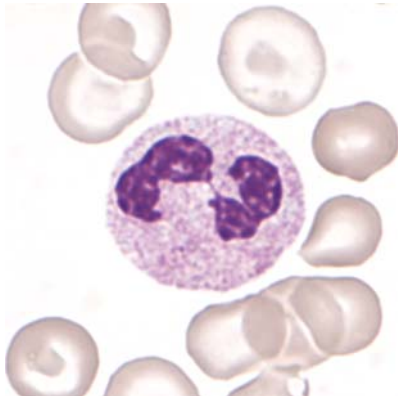


Abb 1. Neutrophil (Seg)

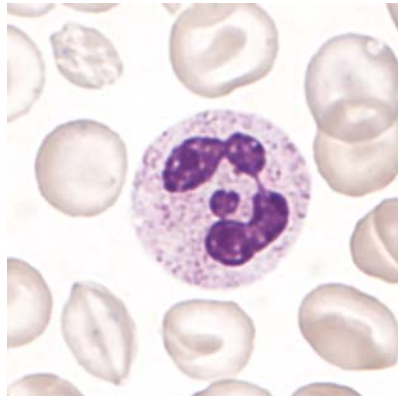


Abb 2. Neutrophil (Seg)

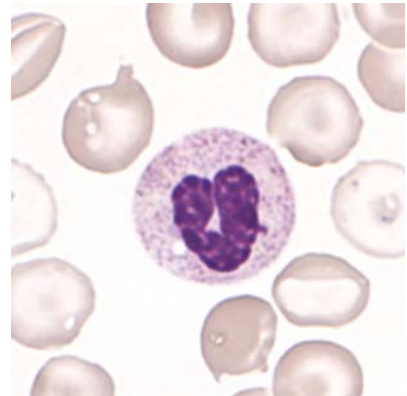


Abb 3. Neutrophil (Band)

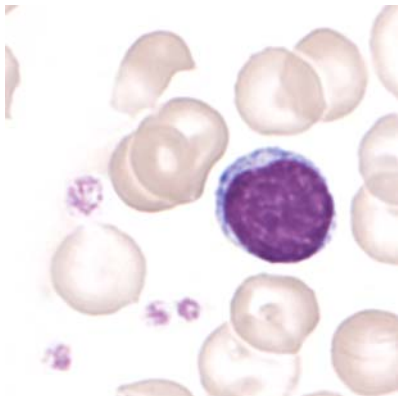


Abb 4. Lymphocyte

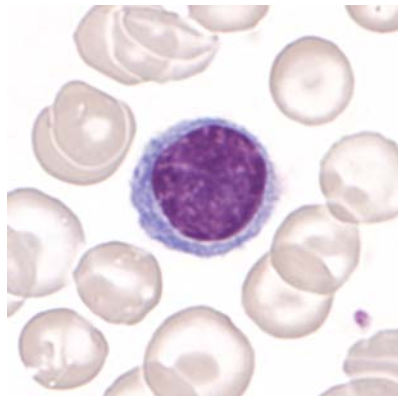


Abb 5. Lymphocyte

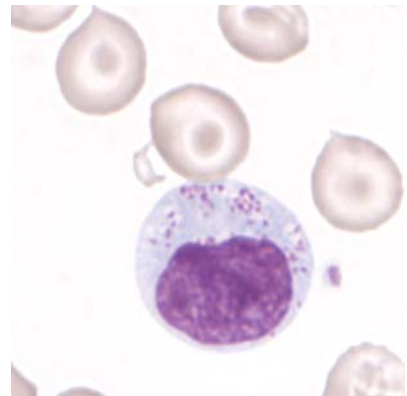


Abb 6. Lymphocyte (LGL)

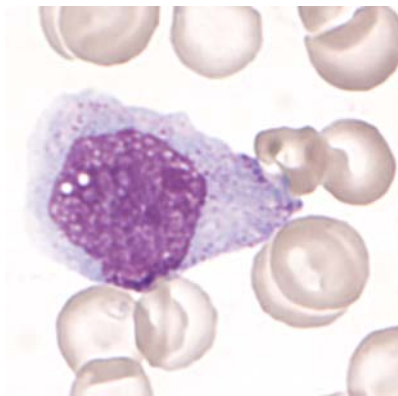


Abb 7. Monocyte

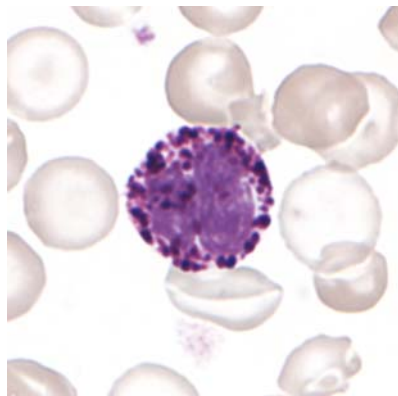


Abb 8. Basophil

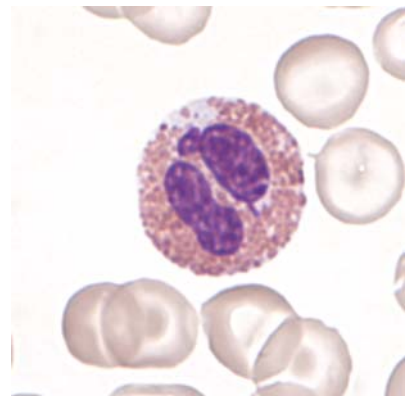


Abb 9. Eosinophil

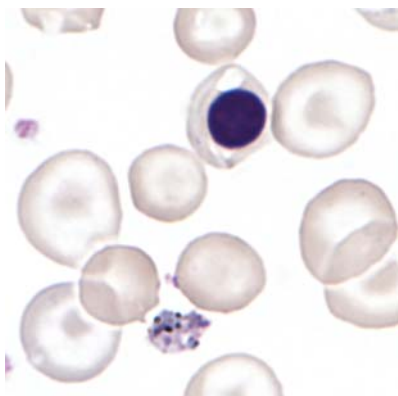


Abb 10. Erythroblast

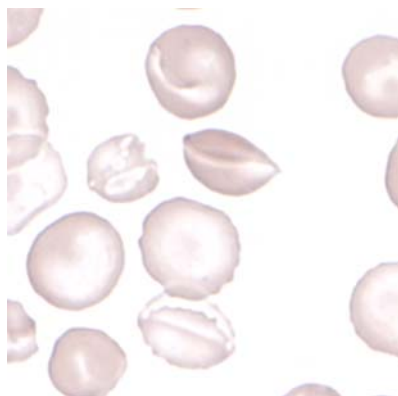


Abb 11. Poikilocytosis

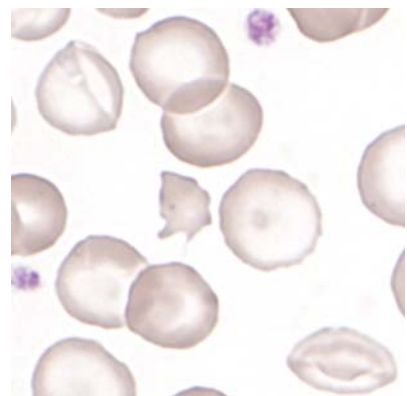


Abb 12. Poikilocytosis

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>	9	107	120*	80	13	6		1	1		
<i>Neutrophils Segmented.</i>	1		1	2	3	13	45	156	112*	4	
<i>Eosinophils</i>	37	281*	15	3							
<i>Basophile</i>	198*	139									
<i>Monocytes</i>	18	147	161*	10	1						
<i>Lymphocytes</i>			1	16	199*	107	14				
<i>Plasmacells</i>	324*	11	1	1							
<i>Blasts</i>	326*	8	2		1						
<i>Promyelocytes</i>	334*	2		1							
<i>Myelocytes</i>	322*	12	3								
<i>Metamyelozyten</i>	326*	11									
<i>Erythrocytes Nucleated</i>	135	23	86*	83	10						
<i>Unknown</i>	323*	11	2	1							
<i>Smudge cells</i>	314*	18	5								

Evaluation H3-A

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	50	5	1	<i>Hypochromic Ec</i>	49	126*	99
<i>Pelger-Hüet Anomaly</i>	5			<i>Polychromatic Ec</i>	95	96	17
<i>Coarse Granulation</i>	74	28	4	<i>Anisocytes</i>	83	135*	40
<i>Basophilic Stripping</i>	6	6		<i>Mikrocytes</i>	86	76*	14
<i>Vacuoles</i>	42	2	1	<i>Makrocytes</i>	84	52	10
<i>Reaktive Lymphocytes</i>	60	10	1	<i>Megalocytes</i>	23	4	2
<i>Atypical Lymphocytes</i>	4	1		<i>Poikilocytosis</i>	107	56*	13
<i>Others</i>	5			<i>Ovalocytes</i>	43	6	1
				<i>Target Cells</i>	49	101	117*
				<i>Akanthocytes</i>	53*	4	1
<i>Anisocytosis</i>	75	115*	37	<i>Echinocytes</i>	38	5	
<i>Megakaryocyte Nucleaus</i>	38	21	2	<i>Sickle Cells</i>	4	1	2
<i>Granulation</i>	27	13	3	<i>Fragmentocytes</i>	63	10	1
<i>Others</i>				<i>Spherocytes</i>	44*	4	
				<i>Stomatocytes</i>	43	16	3
				<i>Basophilic Stripping</i>	33	6	
				<i>Howell-Jolly Bodies</i>	37	1	
				<i>Pappenheim Bodies</i>	7		
				<i>Others</i>	8	1	

1.8 Qualab Codes

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

Code	Text	Number
19	Targetcells	210
14	Hypochromic Erythrocytes	188
30	Pathologic findings, refer to expert	156
31	Pathologic findings	121
15	Polychromatophilic Red Cells	106
9	Macrothrombocytes	97
12	Microcytes	79
29	Normal findings	46
13	Macrocytes	43
16	Poikilocytosis	42
27	Erythrocytes, other	34
5	Atypical lymphocytes, probably reactive	24
20	Fragmentocytes	19
18	Stomatocytes	18
4	Neutrophils, Toxic Changes	13
21	Spherocytes	12
1	Neutrophils, hypersegmentation of nucleus	11
24	Howell-Jolly bodies	11
22	Rouleaux	10
17	Elliptocytes/Ovalocytes	8
25	Basophilic strippling	8
2	Neutrophils, left shift	6
26	Teardrops	4
11	Thrombocytes, others	3
3	Pelger Hüet Anomaly	2
8	Leucocytes other:	2
28	Parasites	2
10	Thrombocyte aggregates	1
23	Erythrocytes agglutination	1
99	Total	340

2 Sample B

2.1 ABX Micros



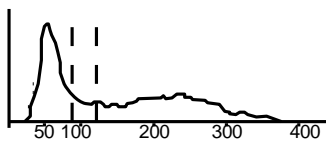
Findings MQ 2015-3 H3B

65 year old woman

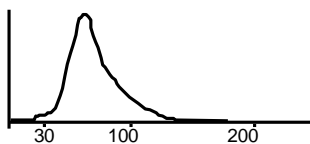
WBC :	4.2	$10^9/L$	MCV :	78.7	L	fL
RBC :	2.82	$L \cdot 10^{12}/L$	MCH :	24.4	L	pg
HGB :	69	L	MCHC:	311	L	g/L
HCT :	222	L	RDW :	17.9	H	%
PLT :	112	$L \cdot 10^9/L$	MPV :	7.8		fL
PCT :	0.87	$L \cdot 10^{-2}L/L$	PDW :	7.5	L	%

DIFF:					
%LYM:	34.9	%	#LYM:	1.4	$10^9/L$
%MON:	8.9	%	#MON:	0.3	$10^9/L$
%GRA:	56.2	%	#GRA:	2.5	$10^9/L$

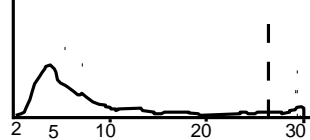
WBC



RBC



PLT



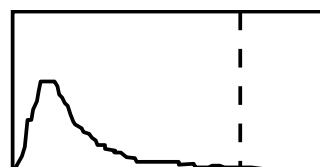
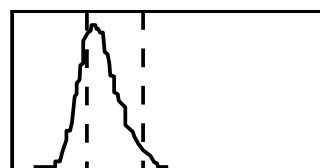
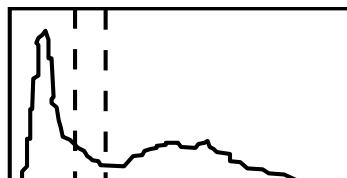
2.2 Mythic



Findings MQ 2015-3 H3B

65 year old woman

WBC	4.3		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	2.1		10 ⁹ /l	1.2 / 6.8
LYM%	41.6		%	17.0 / 48.0
MON%	9.4		%	2.0 / 10.0
GRA%	49.0		%	43.0 / 76.0
RBC	2.88	I	10 ¹² /l	4.00 / 5.70
HGB	72	L	g/l	140 / 180
HCT	0.229	L	l/l	0.420 / 0.540
MCV	79.5	I	fl	80.0 / 100.0
MCH	25.0	I	pg	26.0 / 34.0
MCHC	314		g/l	310 / 365
RDW	17.7	h	%	10.0 / 16.0
PLT	97	I	10 ⁹ /l	150 / 400
MPV	8.7		fl	7.0 / 11.0
PCT	0.084	I	cl/l	0.100 / 0.500
PDW	11.4		%	10.0 / 18.0



2.3 Sysmex XP300



Findings MQ 2015-3 H3B 65 year old woman

WBC		4.2	$10^3/\mu\text{L}$		
RBC	-	2.82	$10^6/\mu\text{L}$		
HGB	-	7.0	g/dL		
HCT	-	23.3	%		
MCV	-	82.6	fL		
MCH	-	24.8	pg		
MCHC	-	30.0	g/dL		
PLT	-	96	$10^3/\mu\text{L}$		
LYM%		32.6	%		
MXD%	+	17.9	%		
NEUT%	-	49.5	%		
LYM#		1.4	$10^3/\mu\text{L}$		
MXD#T2		0.8	$10^3/\mu\text{L}$		
NEUT#T2		2.0	$10^3/\mu\text{L}$		
RDW_SD	+	53.8	fL		
RDW_CV	+	17.9	%		
PDW		11.0	fL		
MPV		8.4	fL		
P_LCR		18.3	%		
PCT	-	0.08	%		

2.4 Sysmex XE-5000

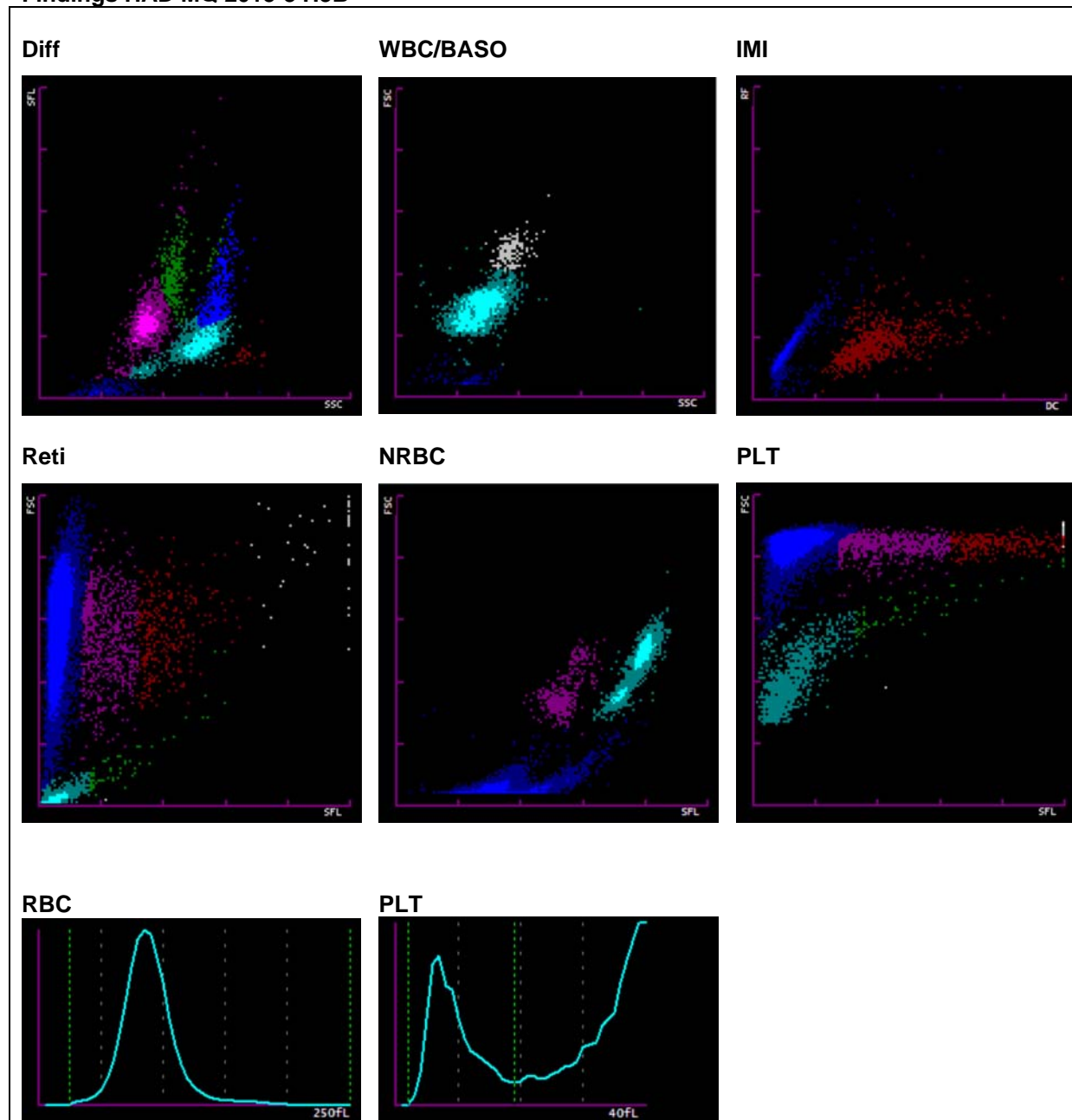


Findings HAD MQ 2015-3 H3B

65 year old woman

Analysis		Result	Unit	Reference value
Blood Count				
Hemoglobin	*	70.0	g/l	117-153
Hematocrit	*	0.239	l/l	0.350-0.460
Erythrocytes	*	2.74	T/l	3.9-5.2
MCV		87.2	fl	80-100
MCH	*	25.5	pg	26-34
MCHC	*	293	g/l	310-360
Mikrocytes	*	19.1	%	11.0-14.8
Thrombocytes	*	86	G/l	143-400
Leucocytes		3.6	G/l	3.0-9.6
Leucocyte Differentiation				
Neutrophils	*	1.36	G/l	1.40-8.00
Monocytes		0.4	G/l	0.16-0.95
Eosinophils		0.04	G/l	0.00-0.70
Basophils		0.23	G/l	0.00-0.15
Lymphocytes		1.57	G/l	1.50-4.00
IG abs.	*	0.48	G/l	0.00-0.03
IG %	*	13.3	%	0.0-0.5
NRBC abs.		0.63	G/l	
NRBC		17.4	/100 Lc	

Findings HAD MQ 2015-3 H3B



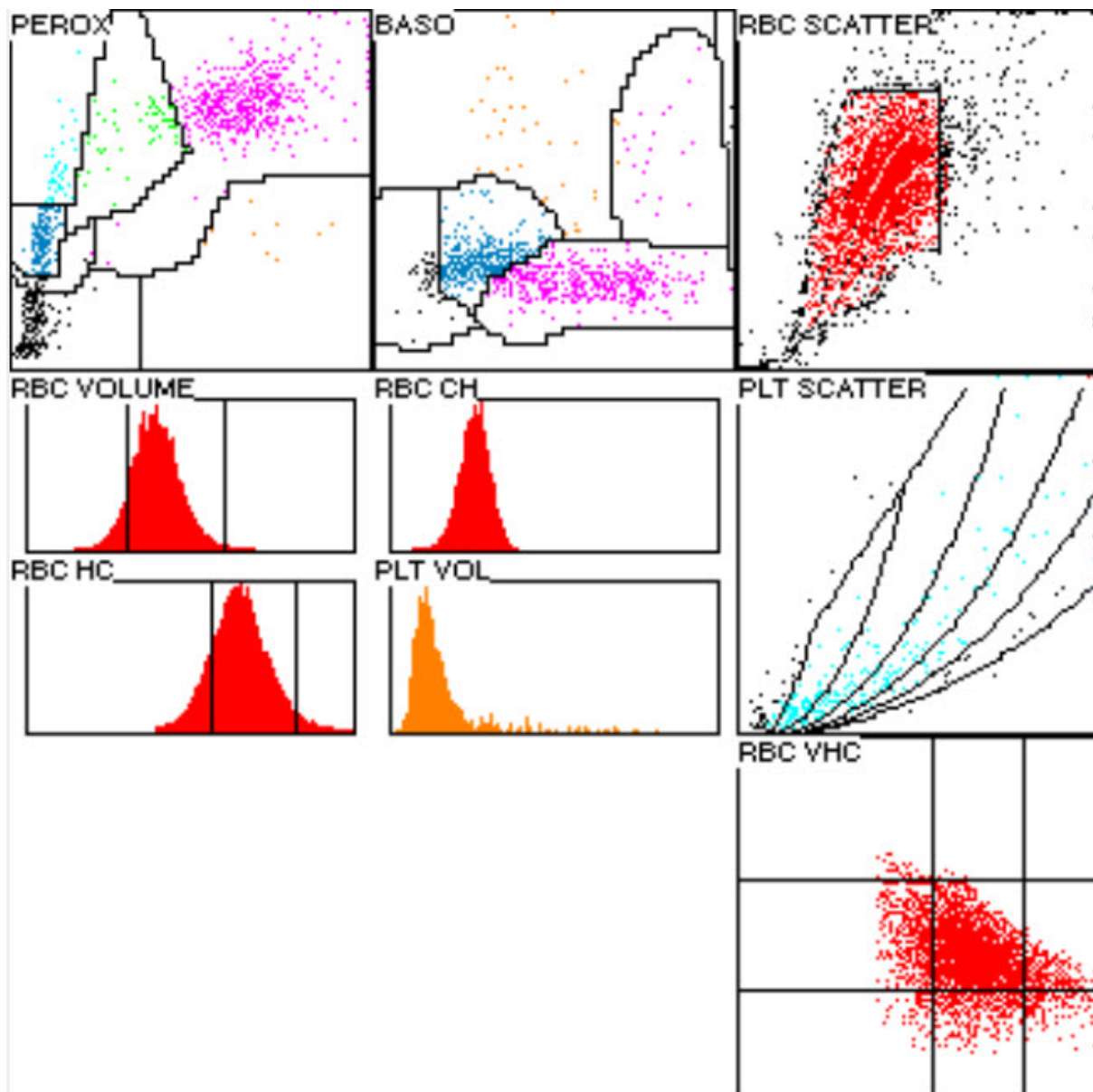
2.5 ADVIA 2120



Findings HAD MQ 2015-3 H3B

65 year old woman

Analysis		Result	Unit	Reference value
Blood Count				
Hemoglobin	*	70	g/l	117-153
Hematocrit	*	0.212	l/l	0.350-0.460
Erythrocytes	*	2.66	T/l	3.9-5.2
MCV	*	79.6	fl	80-100
MCH		26.5	pg	26-34
MCHC		333	g/l	310-360
Mikrocytes	*	8.1	%	0-2.0
Makrocytes		0.4	%	0-2.0
Hypochromic Ec	*	17.3	%	0-2.0
Hyerchromic Ec	*	2.7	%	0-2.0
RDW	*	18.7	%	11.0-0-14.8
Thrombocytes	*	97	G/l	143-400
Vd. L-SHIFT		0	+	Keine (0)
Leukocytes		4.17	G/l	3.0-9.6
Leucocytes Differentiation		3.86		
Neutrophils		2.47	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		0.15	G/l	0.00-0.15
Lymphocytes	*	1.23	G/l	1.50-4.00
LUC	*	4.6	%	0.0-4.0



2.6 Differential Blood Smear

Findings HAD MQ 2015-3 H3B

65 year old woman

Analysis	Result	Unit	Reference value
Neutrophils total	1.83	G/l	1.40-8.00
Monocytes	0.17	G/l	0.16-0.95
Eosinophils	0.04	G/l	0.00-0.70
Basophils	0.15	G/l	0.00-0.15
Lymphocytes	* 0.91	G/l	1.50-4.00
Neutrophils total	45.0	%	40.0-74.0
Neutrophils Band	* 30.0	%	0.0-20.0
Neutrophils Segmented	* 15.0	%	30.0-50.0
Monocytes	4.5	%	3.4-9.0
Eosinophils	1.0	%	0.0-7.0
Basophils	* 3.0	%	0.0-1.5
Lymphocytes	28.0	%	19.0-48.0
Plasmacells	0.0	%	0-0.5
Blasts	* 1.0	%	0
Promyelocytes	* 3.0	%	0
Myelocytes	* 8.0	%	0
Metamyelocytes	* 6.0	%	0
Nucleated Red Cells	12.0	/100 Lc	

Commentary

Expansion of the myeloid precursors up to 1% blasts.

Neutrophil granulocytes with mostly intermediate, in places coarse cytoplasmic granulation.


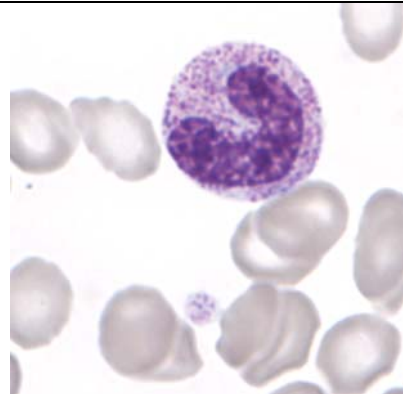
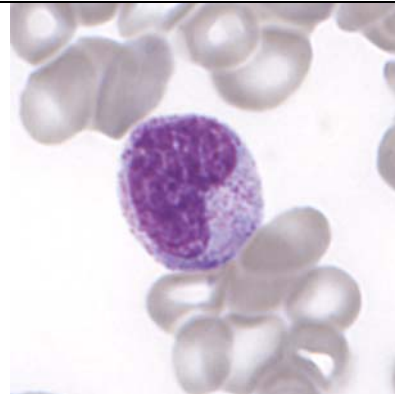

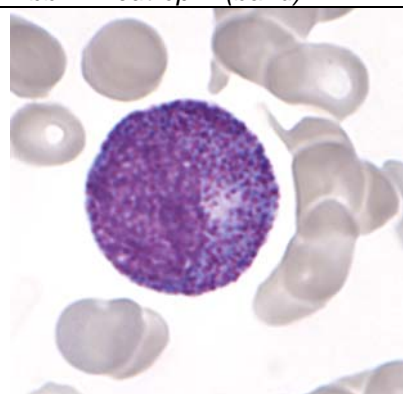


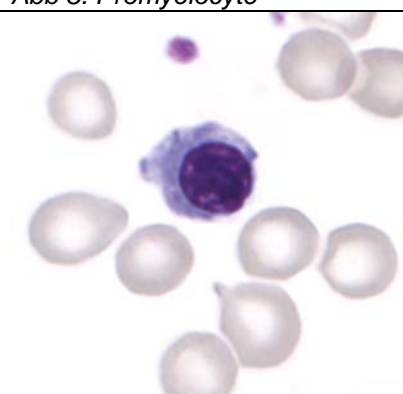

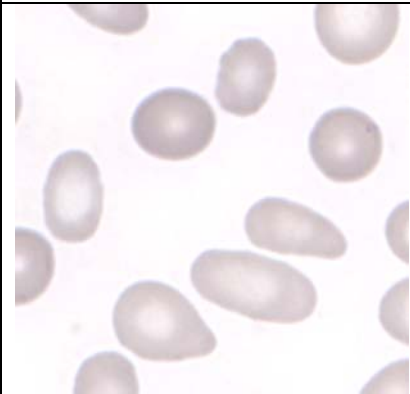
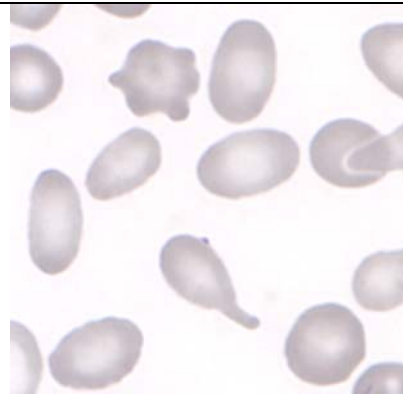
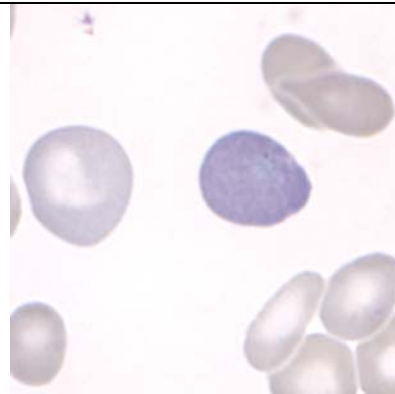
Large lymphocytes and nuclear polymorphs, <10% with azurophilic granulation.

Thrombocytopenia, the anisocytosis of the thrombocytes is mild, a few agranular forms.

On close examination rare giant forms and megakaryocyte nuclear remnants detectable.

In the red blood picture, anemia, mild hypochromasia, anisocytosis with many microcytes and few macrocytes, discrete polychromasia, marked poikilocytosis with many ovalocytes/elliptocytes, few akantocytes and many teardrop forms. No clear erythrocyte inclusions. 12 erythroblasts/100 leukocytes were counted.

K. Schreiber / Dr. J. Goede

		
<i>Abb 1. Neutrophil (Seg)</i>	<i>Abb 2. Neutrophil (band)</i>	<i>Abb 3. Metamyelocyte</i>
		
<i>Abb 4. Myelocyte</i>	<i>Abb 5. Promyelocyte</i>	<i>Abb 6. Monocyte</i>
		
<i>Abb 7. Erythroblast</i>	<i>Abb 8. Erythroblast</i>	<i>Abb 9. Lymphocyte</i>
		
<i>Abb 10. Ovalocytes</i>	<i>Abb 11. Teardrops</i>	<i>Abb 12. Polychromasia</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>		4	10	67	149*	88	17	1			
<i>Neutrophils Segmented.</i>	3	9	42	163*	91	23	3	2			
<i>Eosinophils</i>	125	195*	13	2		1					
<i>Basophile</i>	59	203*	64	8		1	1				
<i>Monocytes</i>	46	191	84*	13	1		1				
<i>Lymphocytes</i>	1	2		16	131*	106	54	23	3		
<i>Plasmacells</i>	296*	30	7	2	1						
<i>Blasts</i>	221	84*	14	8	4	4	1				
<i>Promyelocytes</i>	165	113*	46	9	2			1			
<i>Myelocytes</i>	100	66	110*	42	13	4		1			
<i>Metamyelozyten</i>	143	53	104*	35	1						
<i>Erythrocytes Nucleated</i>	125	10	49	133*	15	3	1				
<i>Unknown</i>	300*	24	4	5	2				1		
<i>Smudge cells</i>	308*	19	7	1	1						

Beurteilung H3-B

	<i>light</i>	<i>medium</i>	<i>strong</i>		<i>light</i>	<i>medium</i>	<i>strong</i>
<i>Hypersegmentation</i>	7	4	4	<i>Hypochromic Ec</i>	85*	79	23
<i>Pelger-Hüet Anomaly</i>	10		1	<i>Polychromatic Ec</i>	90*	124	32
<i>Coarse Granulation</i>	73	118	52	<i>Anisocytes</i>	80	146*	39
<i>Basophilic Stripling</i>	21	9	1	<i>Mikrocytes</i>	88	80*	14
<i>Vacuoles</i>	42	11	2	<i>Makrocytes</i>	84*	17	5
<i>Atypical Lymph, reactive</i>	44	22	6	<i>Megalocytes</i>	12	4	2
<i>Atypical Lymph, neoplastic</i>	1		1	<i>Poikilocytosis</i>	90	113*	51
<i>Others</i>	11	6	2	<i>Ovalocytes</i>	112	67*	8
				<i>Target Cells</i>	15	5	
				<i>Akanthocytes</i>	30*	25	8
<i>Anisocytosis</i>	96*	59	14	<i>Echinocytes</i>	15	4	
<i>Megakaryocyte Nucleus</i>	35	5	2	<i>Sickle Cells</i>	2	1	1
<i>Granulation</i>	31	11	5	<i>Fragmentocytes</i>	22	8	1
<i>Others</i>				<i>Spherocytes</i>	10	2	1
				<i>Stomatocytes</i>	15	2	
				<i>Basophilic Stripling</i>	101	27	1
				<i>Howell-Jolly Bodies</i>	10	2	
				<i>Pappenheim Bodies</i>	4		
				<i>Others</i>	7	12	8

2.8 Qualab Codes

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

Code	Text	Number
30	Pathologic findings, refer to expert	222
15	Polychromatophilic Red Cells	136
31	Pathologic findings	133
16	Poikilocytosis	121
2	Neutrophils, left shift	116
26	Teardrops	113
12	Microcytes	68
14	Hypochromic Erythrocytes	67
4	Neutrophils, Toxic Changes	65
25	Basophilic strippling	42
17	Elliptocytes/Ovalocytes	41
5	Atypical lymphocytes, probably reactive	28
9	Macrothrombocytes	28
8	Leucocytes other:	25
22	Rouleaux	25
27	Erythrocytes, other	24
13	Macrocytes	23
6	Atypical lymphocytes, probably neoplastic	15
20	Fragmentocytes	11
11	Thrombocytes, others	7
1	Neutrophils, hypersegmentation of nucleus	5
3	Pelger Hüet Anomaly	3
18	Stomatocytes	3
19	Targetcells	3
24	Howell-Jolly bodies	3
10	Thrombocyte aggregates	2
21	Spherocytes	2
28	Parasites	1
29	Normal findings	1
99	Total	339