

Verein für
Association pour le
Associazione per il



medizinische Qualitätskontrolle
contrôle de qualité médical
controllo di qualità medico

Report

Differential Blood Smear H3

MQ 2016-4

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

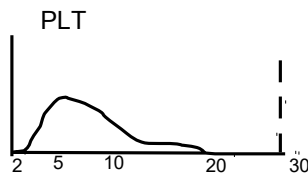
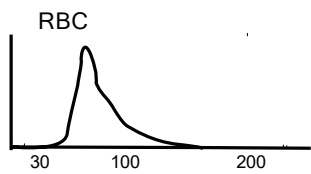
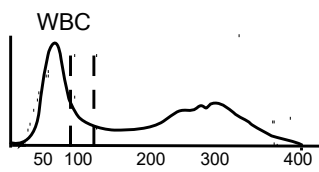
1.1 ABX Micros



Findings MQ 2016-4 H3A 46 year old man

WBC :	5.9	10 ⁹ /L	MCV :	91.2	fL
RBC :	4.66	10 ¹² /L	MCH :	29.2	pg
HGB :	136	g/L	MCHC:	320	g/L
HCT :	426	L/L	RDW :	14.5	%
PLT :	201	10 ⁹ /L	MPV :	7.7	fL
PCT :	154	10 ⁻² L/L	PDW :	15.5	%

DIFF:					
%LYM:	31.7	%	#LYM:	1.8	10 ⁹ /L
%MON:	9.0	%	#MON:	0.5	10 ⁹ /L
%GRA:	59.3	%	#GRA:	3.6	10 ⁹ /L

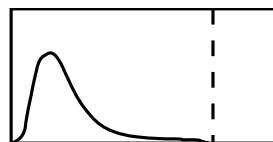
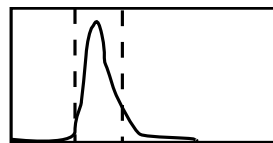
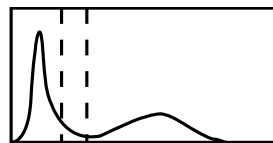


1.2 Mythic



Findings MQ 2016-4 H3A 46 year old man

WBC	5.9	10 ⁹ /l	3.5 /	10.0
LYM	2.5	10 ⁹ /l	1.2 /	3.2
MON	0.4	10 ⁹ /l	0.1 /	1.0
GRA	3.0	10 ⁹ /l	1.2 /	6.8
LYM%	41.6	%	17.0 /	48.0
MON%	6.9	%	2.0 /	10.0
GRA%	51.5	%	43.0 /	76.0
RBC	4.45	10 ¹² /l	4.00 /	5.70
HGB	131	g/l	140 /	180
HCT	0.410	l/l	0.420 /	0.540
MCV	92.1	fl	80.0 /	100.0
MCH	29.4	pg	26.0 /	34.0
MCHC	320	g/l	310 /	365
RDW	12.5	%	10.0 /	16.0
PLT	178	10 ⁹ /l	150 /	400
MPV	7.9	fl	7.0 /	11.0
PCT	0.141	cl/l	0.100 /	0.500
PDW	14.3	%	10.0 /	18.0



FLAGS

1.3 Sysmex XP300



Findings MQ 2016-4 H3A 46 year old man

WBC	5.8	24.2	10 ³ /μL	
RBC	4.56	-3.73	10 ⁶ /μL	
HGB	14.0	-9.0	g/L	
HCT	41.0	-25.8	%	
MCV	89.9	-69.2	fL	
MCH	30.7	-24.1	pg	
MCHC	34.1	34.9	g/L	
PLT	200	161	10 ³ /μL	
LYM%	39.8	-	%	
MXD%	7.3	-	%	
NEUT%	52.9	-	%	
LYM#	2.3	-	10 ³ /μL	
MXD#	0.4	-	10 ³ /μL	
NEUT#	3.1	-	10 ³ /μL	
RDW_SD	43.8	42.5	fL	
RDW_CV	12.1	+17.3	%	
PDW	10.9	+16.9	fL	
MPV	9.7	10.2	fL	
P_LCR	21.2	30.4	%	
PCT	0.19	0.16	%	

1.4 Sysmex XE-5000

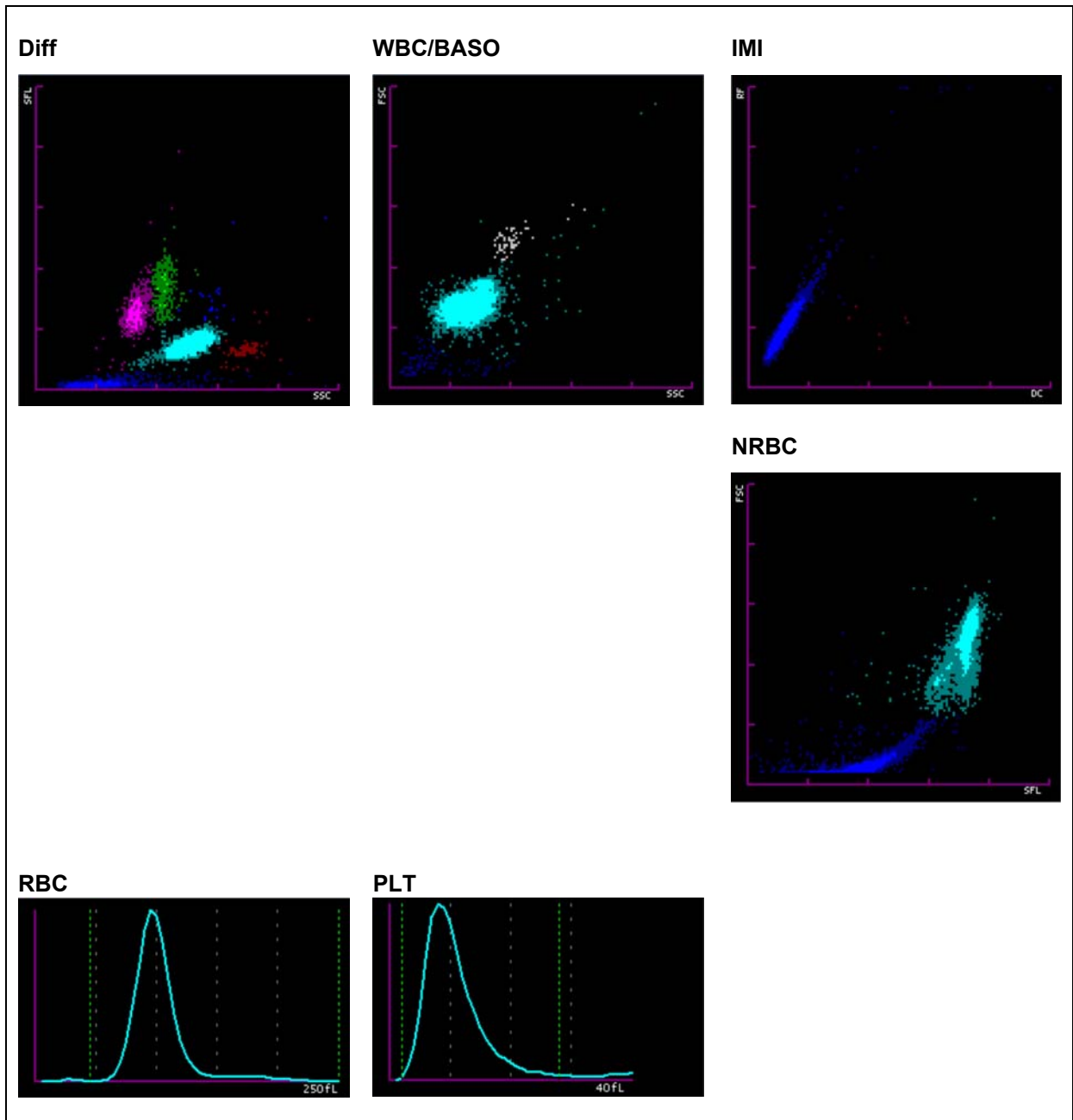


Findings MQ 2016-4 H3A

46 year old man

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	139	g/l	
<u>Hematocrit</u>	0.435	l/l	
Erythrocytes	4.55	T/l	
MCV	95.6	fl	80-100
MCH	30.5	pg	26-34
MCHC	320	g/l	310-360
Mikrocytes	13.3	%	11.0-14.8
<u>Thrombocytes</u>	201	G/l	143-400
<u>Leucocytes</u>	6.00	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	3.27	G/l	1.40 – 8.00
Monocytes	0.39	G/l	0.16 – 0.95
Eosinophils	0.04	G/l	0.00 – 0.70
Basophils	0.02	G/l	0.00-0.15
Lymphocytes	2.28	G/l	1.50 - 4.00
IG abs.	0.01	G/l	0.00 – 0.03
IG %	0.2	%	0.0 – 0.05
NRBC abs.	0.00	G/l	
NRBC	0.0	/100 Lc	

Findings HAD MQ 2016-4 H3A

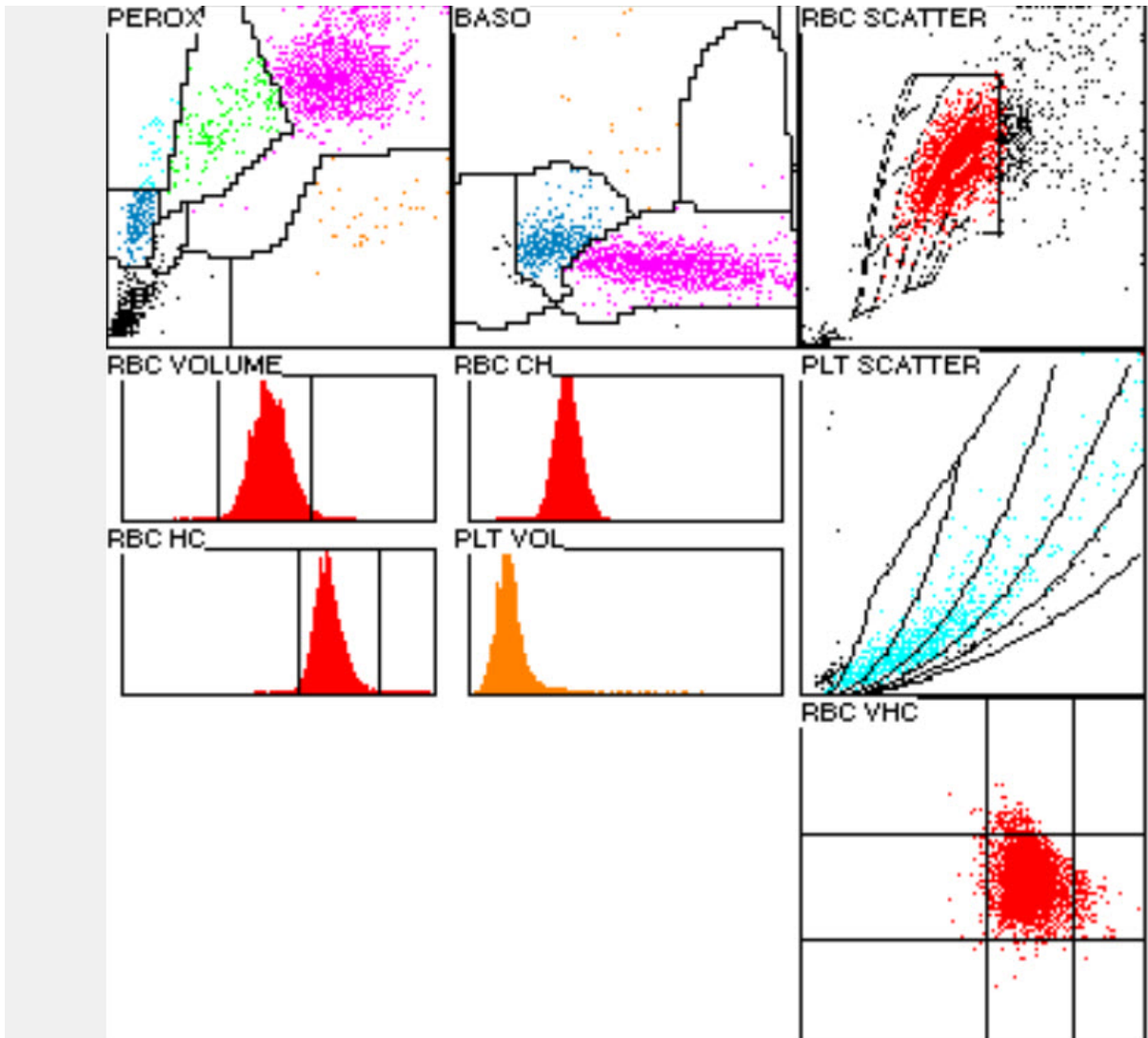


1.5 ADVIA 2120



Findings HAD MQ 2016-4 H3A 48 year old man

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	148	g/l	134-170
<u>Hematocrit</u>	0.416	l/l	0.400-0,500
Erythrocytes	4.49	T/l	4.2-5.7
MCV	92.8	fl	80-100
MCH	32.9	pg	26-34
MCHC	354	g/l	310-360
Mikrocytes	0.2	%	0-2.0
Macrocytes	1.1	%	0-2.0
Hypochromic Ec	0.5	%	0-2.0
Hyperchromic Ec	0.7	%	0-2.0
RDW	12.7	%	11.0-14.8
<u>Thrombocytes</u>	349	G/l	143-400
Vd. L-SHIFT	0	+	None (0)
<u>Leucocytes</u>	* 9.83	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	* 8.11	G/l	1.40-8.00
Monocytes	0.49	G/l	0.16-0.95
Eosinophils	0.10	G/l	0.00-0.70
Basophile	0.03	G/l	0.00-0.15
Lymphocytes	* 0.96	G/l	1.50-4.00
LUC	1.3	%	0.0-4.0



1.6 Differential Blood Smear

Findings HAD MQ 2016-3 H3A

62 year old women

Analysis	Result	Unit	Reference value
Neutrophils total	3.17	G/l	1.40-8.00
Monocytes	0.37	G/l	0.16-0.95
Eosinophils	0.08	G/l	0.00-0.70
Basophils	0.03	G/l	0.00-0.15
Lymphocytes	2.01	G/l	1.50-4.00
Neutrophils total	56.0	%	40.0-74.0
Neutrophils Band	10.0	%	0.0-20.0
Neutrophils Segmented	46.0	%	30.0-50.0
Monocytes	6.5	%	3.4-9.0
Eosinophils	1.50	%	0.0-7.0
Basophils	0.5	%	0.0-1.5
Lymphocytes	35.5	%	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	0.0	/100 Lc	

Commentary

The red blood count is normochromic and normocytic. There are no erythrocytic inclusions detectable. Neutrophil granulocytes with fine cytoplasmic granulation. The lymphocytes are polymorphic in terms of size and nuclei, <10% with azurophilic granulation. Minor platelet anisocytosis. No giant forms detectable.

K. Schreiber / PD. Dr. St. Balabanov

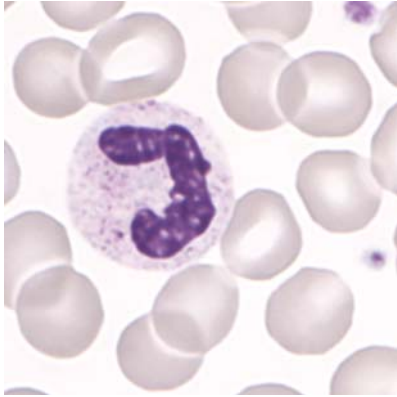


Abb 1. Neutrophil (Seg)

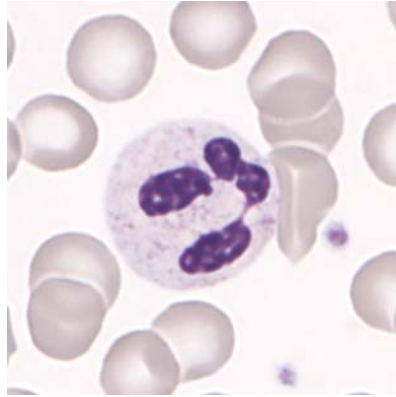


Abb 2. Neutrophil (Seg)

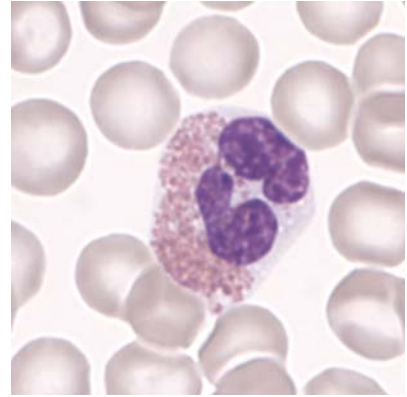


Abb 3. Eosinophil

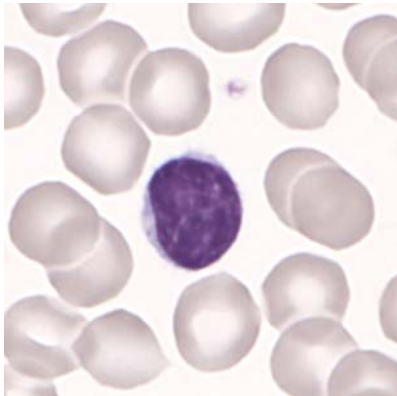


Abb 4. Lymphocyte

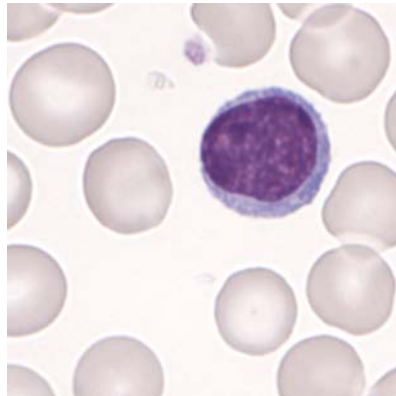


Abb 5. Lymphocyte

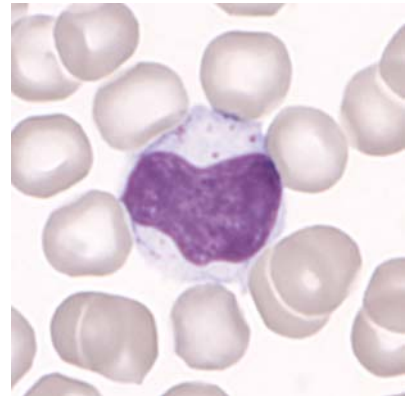


Abb 6. Lymphocyte (LGL)

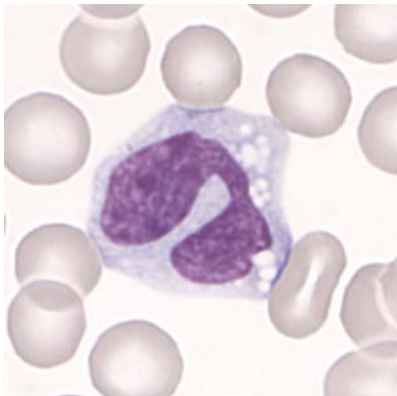


Abb 7. Monocyte

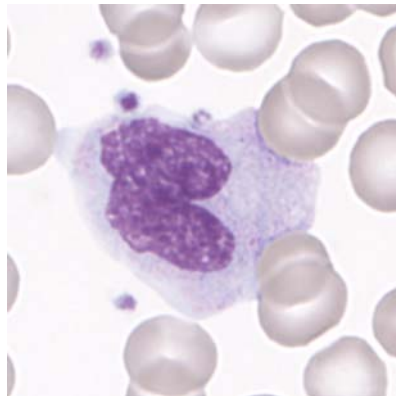


Abb 8. Monocyte

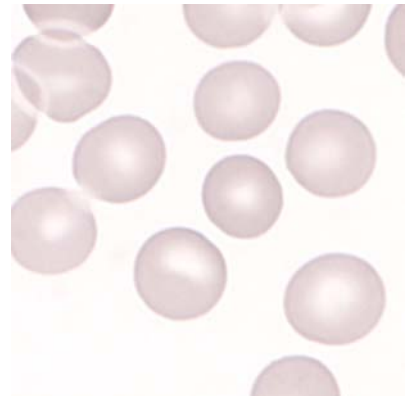


Abb 9. Erythrocytes

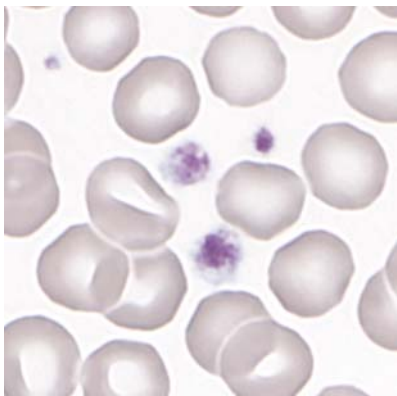


Abb 10. Thrombocytes

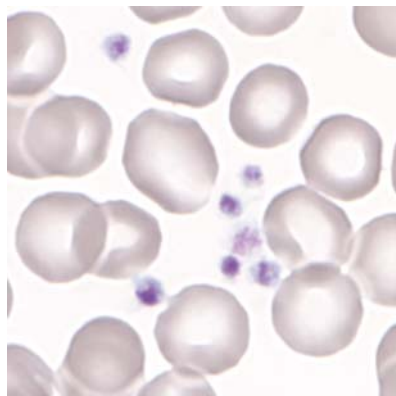


Abb 11. Thrombocytes

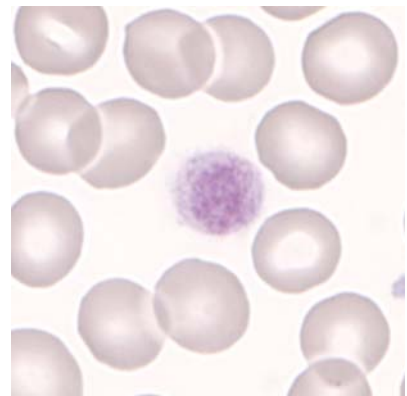


Abb 12. Giant Thrombocyte

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>	2	80	102	113*	12		1	2			
<i>Neutrophils Segmented.</i>	1	1		1	13	82	170*	43	1		
<i>Eosinophils</i>	42	262*	7	1							
<i>Basophile</i>	177*	133	2	0							
<i>Monocytes</i>	14	107	174*	17							
<i>Lymphocytes</i>					6	114*	176	16			
<i>Plasmacells</i>	304*	6	2								
<i>Blasts</i>	305*	5	1	1							
<i>Promyelocytes</i>	309*	2	1								
<i>Myelocytes</i>	304*	6	2								
<i>Metamyelozyten</i>	305*	6	1								
<i>Erythrocytes Nucleated</i>	310*	2									
<i>Unknown</i>	305*	5	1	1							
<i>Smudge cells</i>	285*	23	3	1							

Evaluation H3-A

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	8	2		<i>Hypochromic Ec</i>	48	8	
<i>Pelger-Hüet Anomaly</i>	1			<i>Polychromatic Ec</i>	20	5	
<i>Coarse Granulation</i>	72	15	1	<i>Anisocytes</i>	131	13	1
<i>Basophilic Stripling</i>	5	2		<i>Mikrocytes</i>	44	2	
<i>Vacuoles</i>	24	6		<i>Makrocytes</i>	40	4	
<i>Reaktive Lymphocytes</i>	85	22	4	<i>Megalocytes</i>	3	1	
<i>Atypical Lymphocytes</i>	3	4		<i>Poikilocytosis</i>	36	2	
<i>Others</i>	3	4		<i>Ovalocytes</i>	17		
				<i>Target Cells</i>	31	7	
				<i>Akanthocytes</i>	12		
<i>Anisocytosis</i>	113*	40	2	<i>Echinocytes</i>	21	1	
<i>Megakaryocyte Nucleaus</i>	12	6		<i>Sickle Cells</i>			
<i>Granulation</i>	24	6		<i>Fragmentocytes</i>	4		
<i>Others</i>				<i>Spherocytes</i>	6	1	
				<i>Stomatocytes</i>	24	2	1
				<i>Basophilic Stripling</i>	8		
				<i>Howell-Jolly Bodies</i>	2	1	
				<i>Pappenheim Bodies</i>	1		
				<i>Others</i>			1

Commentary

Smear H3-A is from a healthy employee.

1.8 Qualab Codes

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

Code	Text	Number
29	Normal findings	215
5	Atypical lymphocytes, probably reactive	78
30	Pathologic findings, refer to expert	49
9	Macrothrombocytes	42
14	Hypochromic Erythrocytes	25
31	Pathologic findings	24
19	Targetcells	23
13	Macrocytes	21
12	Microcytes	16
16	Poikilocytosis	15
18	Stomatocytes	15
22	Rouleaux	15
4	Neutrophils, Toxic Changes	13
15	Polychromatophilic Red Cells	13
2	Neutrophils, left shift	11
6	Atypical lymphocytes, probably neoplastic	8
27	Erythrocytes, other	8
11	Thrombocytes, others	6
17	Elliptocytes/Ovalocytes	6
10	Thrombocyte aggregates	5
1	Neutrophils, hypersegmentation of nucleus	4
8	Leucocytes other:	3
21	Spherocytes	3
25	Basophilic strippling	2
23	Erythrocytes agglutination	1
24	Howell-Jolly bodies	1
26	Teardrops	1
28	Parasites	1
99	Total	311

2 Sample B

2.1 ABX Micros



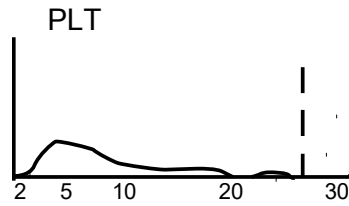
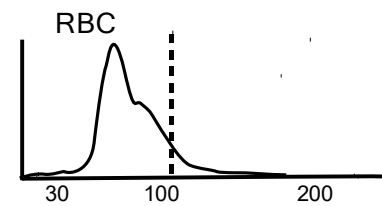
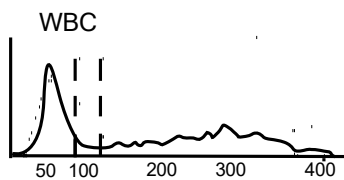
Findings MQ 2016-4 H3B

70 year old women

WBC :	1.7	L	10 ⁹ /L	MCV :	73.0	L	fL
RBC :	4.69		10 ¹² /L	MCH :	24.8	L	pg
HGB :	117	L	g/L	MCHC:	340		g/L
HCT :	343	L	L/L	RDW :	17.4	H	%
PLT :	107	\$	10 ⁹ /L	MPV :	8.7	\$	fL
PCT :	.093	\$	10 ⁻² L/L	PDW :	13.4	\$	%

WBC Flags: G3

DIFF:							
%LYM:	38.4	%	#LYM:	0.6	L	10 ⁹ /L	
%MON:	5.3	%	#MON:	0.0	L	10 ⁹ /L	
%GRA:	56.3	%	#GRA:	1.1	L	10 ⁹ /L	

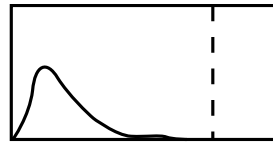
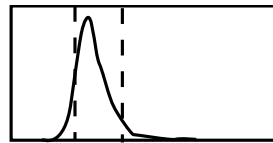
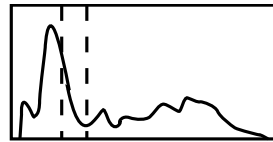


2.2 Mythic



Findings MQ 2016-4 H3B 70 year old women

WBC	5.9	10 ⁹ /l	3.5 /	10.0
LYM	2.5	10 ⁹ /l	1.2 /	3.2
MON	0.4	10 ⁹ /l	0.1 /	1.0
GRA	3.0	10 ⁹ /l	1.2 /	6.8
LYM%	41.6	%	17.0 /	48.0
MON%	6.9	%	2.0 /	10.0
GRA%	51.5	%	43.0 /	76.0
RBC	4.45	10 ¹² /l	4.00 /	5.70
HGB	131	g/l	140 /	180
HCT	0.410	l/l	0.420 /	0.540
MCV	92.1	fl	80.0 /	100.0
MCH	29.4	pg	26.0 /	34.0
MCHC	320	g/l	310 /	365
RDW	12.5	%	10.0 /	16.0
PLT	178	10 ⁹ /l	150 /	400
MPV	7.9	fl	7.0 /	11.0
PCT	0.141	cl/l	0.100 /	0.500
PDW	14.3	%	10.0 /	18.0



2.3 Sysmex XP300



Findings MQ 2016-4 H3B 70 year old women

WBC	-2.0	$10^3/\mu\text{L}$	
RBC	4.33	$10^6/\mu\text{L}$	
HGB	-11.4	g/dL	
HCT	-34.9	%	
MCV	-80.6	fL	
MCH	-26.3	pg	
MCHC	32.7	g/dL	
PLT	-121	$10^3/\mu\text{L}$	
LYM%	37.4	%	
MXD%	+13.7	%	
NEUT%	-48.9	%	
LYM#	-0.7	$10^3/\mu\text{L}$	
MXD#T2	0.3	$10^3/\mu\text{L}$	
NEUT#T2	-1.0	$10^3/\mu\text{L}$	
RDW_SD	41.4	fL	
RDW_CV	13.1	%	
PDW	12.9	fL	
MPV	9.0	fL	
P_LCR	20.6	%	
PCT	-0.11	%	

2.4 Sysmex XE-5000

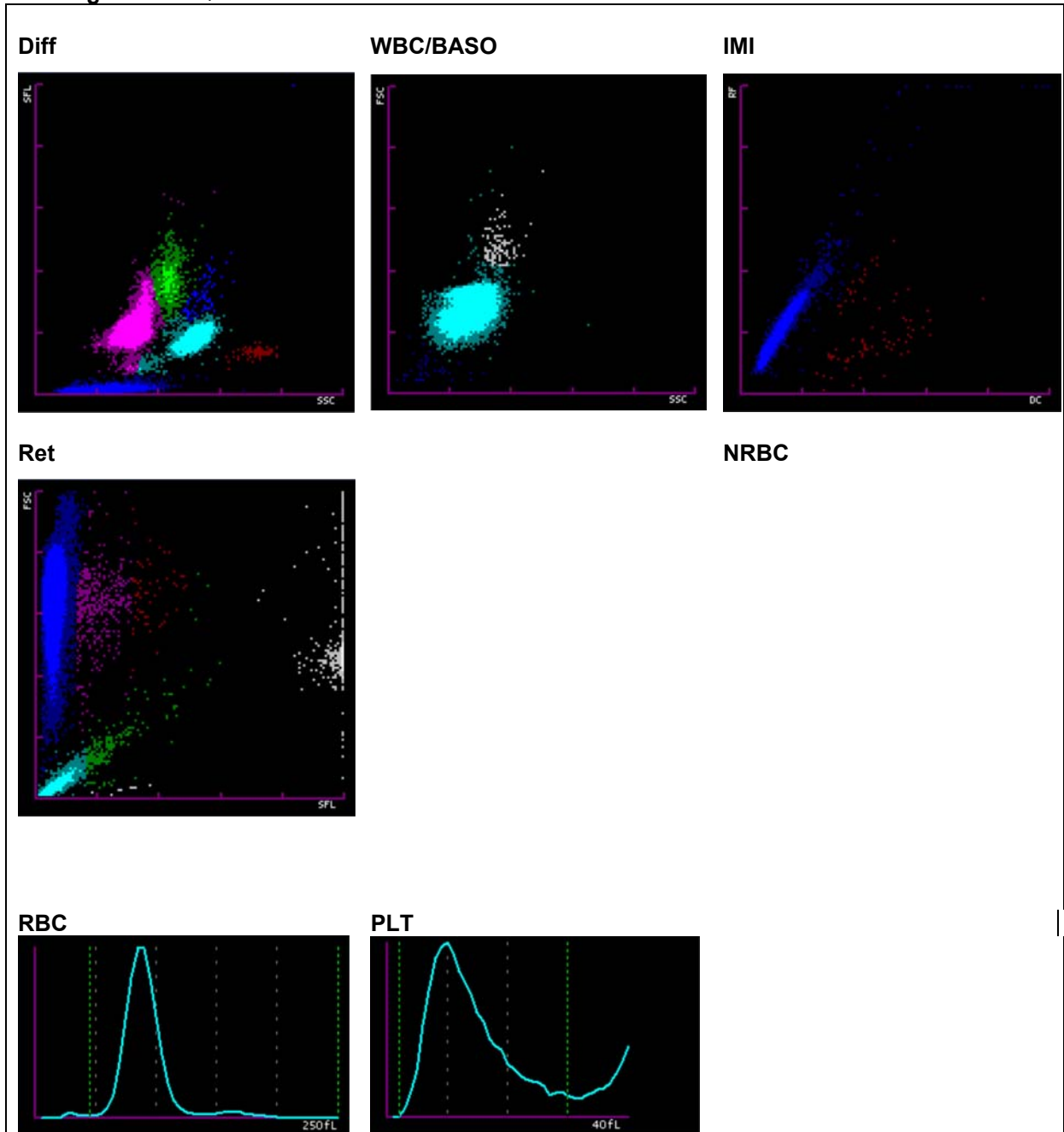


Findings MQ 2016-4 H3B

70 year old women

Analysis		Result	Unit	Reference value
Blood Count				
Hemoglobin	*	111	g/l	117-153
Hematocrit	*	0.341	l/l	0.350-0.460
Erythrocytes		4.25	T/l	3.9-5.2
MCV		80.2	fl	80-100
MCH		26.1	pg	26-34
MCHC		326	g/l	310-360
Mikrocytes		13.5	%	11.0-14.8
Thrombocytes	*	117	G/l	143-400
Leucocytes	*	1.9	G/l	3.0-9.6
Leucocyte Differentiation				
Neutrophils	*	0.86	G/l	1.40-8.00
Monocytes		0.30	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	*	0.75	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 2016-4 H3B

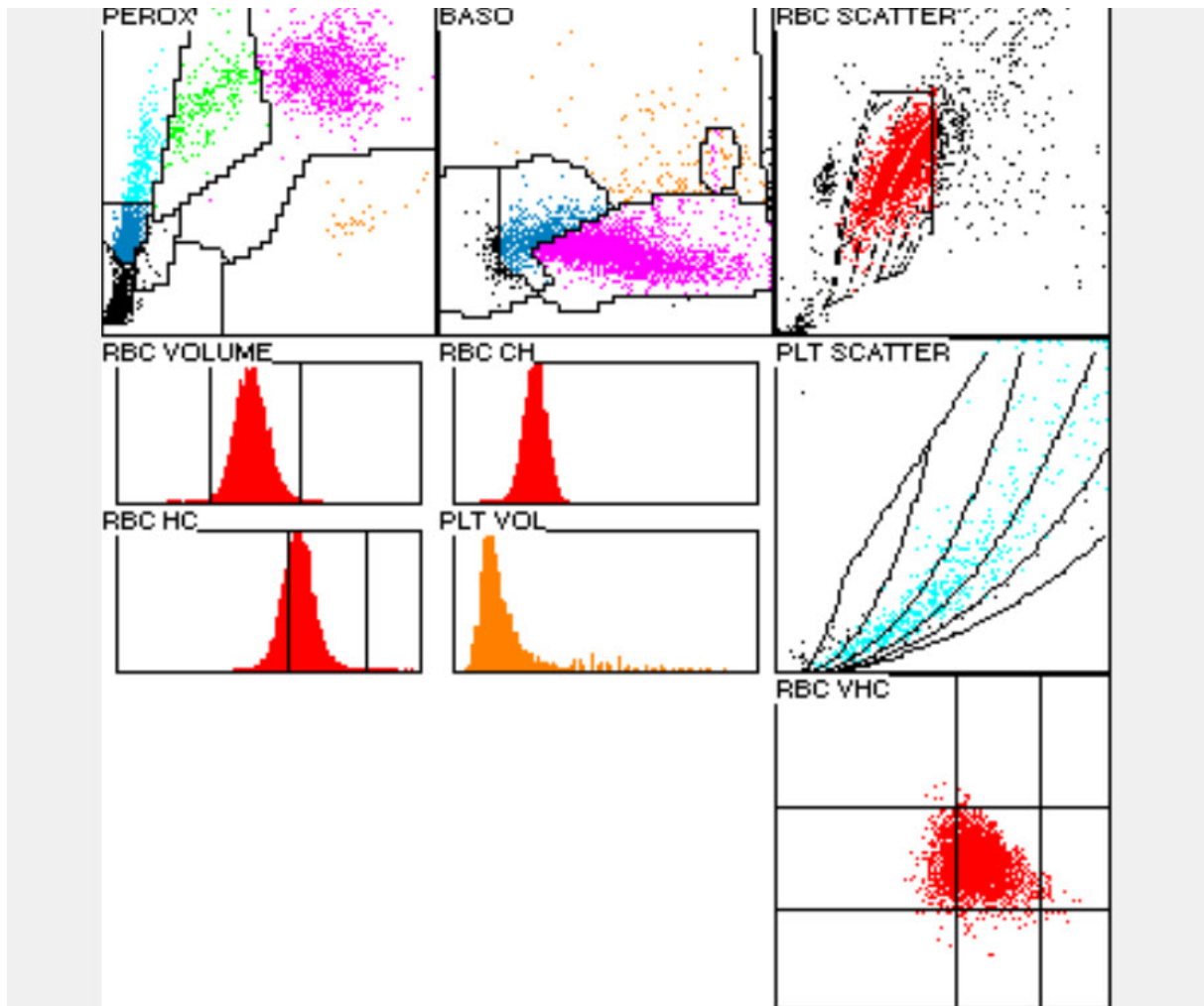


2.5 ADVIA 2120



Findings HAD MQ 2016-4 H3B 70 year old woman

Analysis		Result	Unit	Reference value
Blood Count	*	112		
Hemoglobin	*	0.347	g/l	117-153
Hematocrit		4.26	l/l	0.350-0.460
Erythrocytes		81.4	T/l	3.9-5.2
MCV		26.2	fl	80-100
MCH		322	pg	26-34
MCHC		1.3	g/l	310-360
Mikrocytes		0	%	0-2.0
Makrocytes	*	16.8	%	0-2.0
Hypochromic Ec		0.3	%	0-2.0
Hyerchromic Ec		12.2	%	0-2.0
RDW	*	134	%	11.0-0-14.8
Thrombocytes		0	G/l	143-400
Vd. L-SHIFT	*	1.92	+	Keine (0)
Leukocytes			G/l	3.0-9.6
Leucocytes Differentiation	*	0.96		
Neutrophils		0.16	G/l	1.40-8.00
Monocytes		0.00	G/l	0.16-0.95
Eosinophils		0.02	G/l	0.00-0.70
Basophils	*	0.69	G/l	0.00-0.15
Lymphocytes	*	5.2	G/l	1.50-4.00
LUC	*	112	%	0.0-4.0



2.6 Differential Blood Smear

Findings MQ 2016-4 H3B

70 year old woman

Analysis		Result	Unit	Reference value
Leucocytes Differentiation				
Neutrophils total	*	0.98	G/l	1.40-8.00
Monocytes		0.22	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	*	0.72	G/l	1.50-4.00
Neutrophils total		51.0	%	40.0-74.0
Neutrophils Band		12.0	%	0.0-20.0
Neutrophils Segmented		39.0	%	30.0-50.0
Monocytes	*	11.5	%	3.4-9.0
Eosinophils		0.0	%	0.0-7.0
Basophils		0.0	%	0.0-1.5
Lymphocytes		37.5	%	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		0.0	/100 Lc	

Commentary

Anemia, thrombocytopenia and absolute neutropenia - pancytopenia.

Neutrophil granulocytes with fine cytoplasmic granulation, few with karyopyknosis.

The lymphocytes are small with a dense chromatin structure and a small amount of cytoplasm, and isolated atypical, probably reactively changed forms.

Platelets with minor anisocytosis, very rare agranular forms in microscopy.

In the red blood picture there is minor hypochromasia, the erythrocytes are normocytic. There are no erythrocytic inclusions.

K. Schreiber / PD. Dr. St. Balabanov

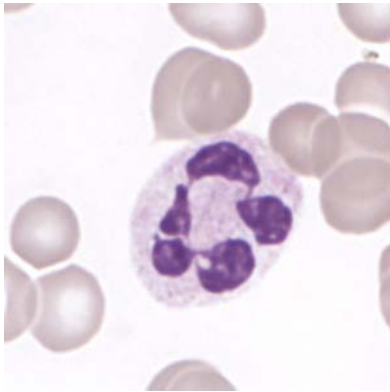


Abb 1. Neutrophil (Seg)

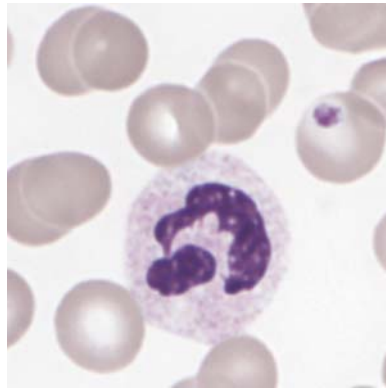


Abb 2. Neutrophil (Seg)

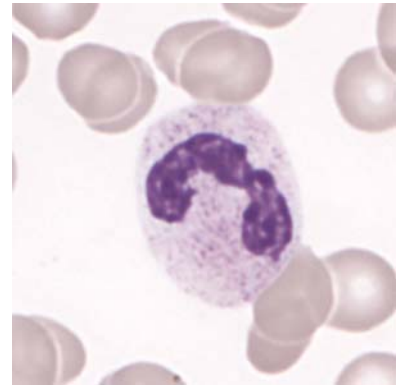


Abb 3. Neutrophil (Band)

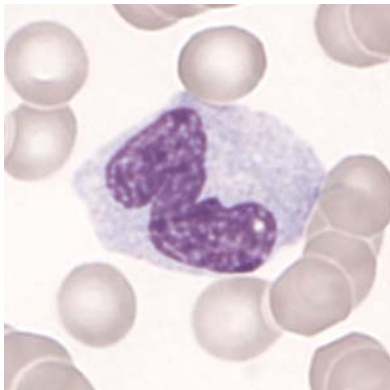


Abb 4. Monocyte

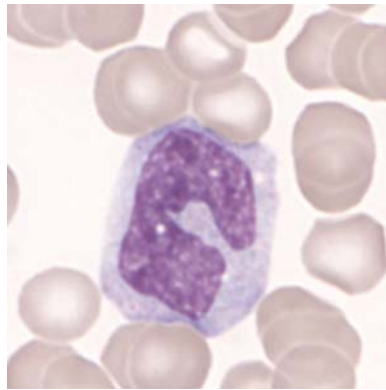


Abb 5. Monocyte

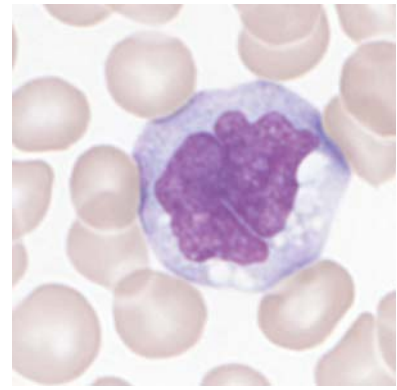


Abb 6. Monocyte

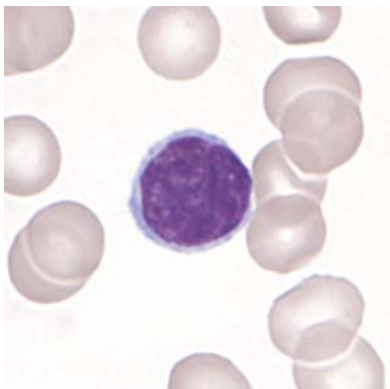


Abb 7. Lymphocyte

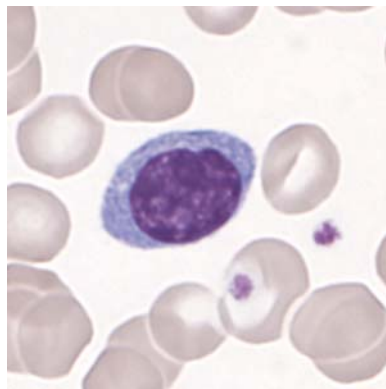


Abb 8. Lymphocyte

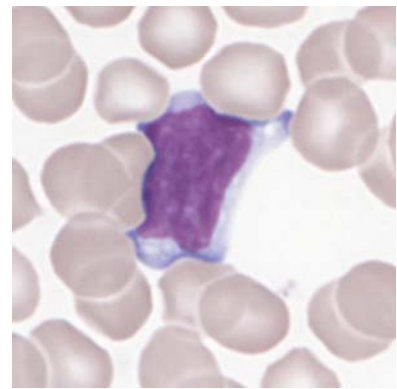


Abb 9. Lymphocyte
(atypical, reactive)

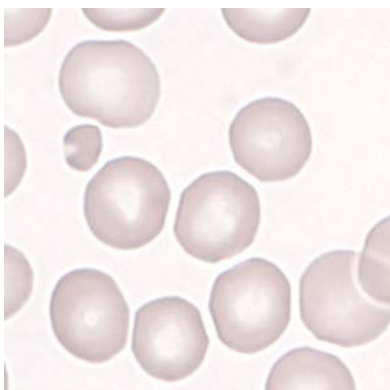


Abb 10. Anisocytosis

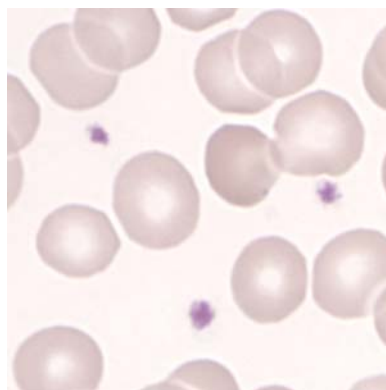


Abb 11. Thrombocytes

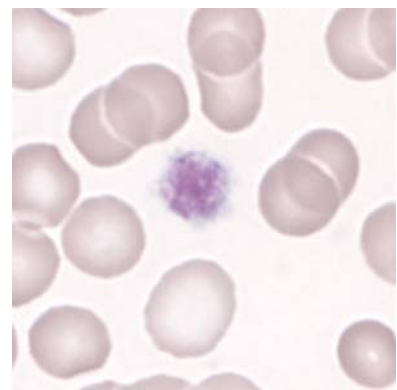


Abb 12. Giant Thrombocyte

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	31	92	138*	37	6	1	1			
<i>Neutrophils Segmented.</i>	3			14	70	149*	65	8	1		
<i>Eosinophils</i>	274*	35	1								
<i>Basophile</i>	293*	16	1								
<i>Monocytes</i>	9	71	123	103*	3		1			1	
<i>Lymphocytes</i>	3			1	5	64*	180	48	9	119*	127
<i>Plasmacells</i>	298*	11		1							
<i>Blasts</i>	287*	6	11	5			1				
<i>Promyelocytes</i>	300*	8	2	0							
<i>Myelocytes</i>	289*	15	4	2							
<i>Metamyelozyten</i>	296*	11	3								
<i>Erythrocytes Nucleated</i>	305*	5									
<i>Unknown</i>	288*	13	5	2	1		1			1	
<i>Smudge cells</i>	278*	27	5								

Beurteilung H3-B

	<i>light</i>	<i>medium</i>	<i>strong</i>		<i>light</i>	<i>medium</i>	<i>strong</i>
<i>Hypersegmentation</i>	12	1	1	<i>Hypochromic Ec</i>	93*	56	3
<i>Pelger-Hüet Anomaly</i>	3			<i>Polychromatic Ec</i>	53	5	1
<i>Coarse Granulation</i>	46	14	4	<i>Anisocytes</i>	161	55	7
<i>Basophilic Stripling</i>	8	3		<i>Mikrocytes</i>	111	28	7
<i>Vacuoles</i>	33	11	3	<i>Makrocytes</i>	51	5	
<i>Atypical Lymph, reactive</i>	51	30	6	<i>Megalocytes</i>	10	1	
<i>Atypical Lymph, neoplastic</i>	8	6		<i>Poikilocytosis</i>	56	6	
<i>Others</i>	27	14	5	<i>Ovalocytes</i>	46	6	1
				<i>Target Cells</i>	14	5	1
				<i>Akanthocytes</i>	5		
<i>Anisocytosis</i>	116*	31	9	<i>Echinocytes</i>	5	1	
<i>Megakaryocyte Nucleaus</i>	13	4	1	<i>Sickle Cells</i>			1
<i>Granulation</i>	12	8	1	<i>Fragmentocytes</i>	6	2	
<i>Others</i>				<i>Spherocytes</i>	15	3	
				<i>Stomatocytes</i>	16	2	
				<i>Basophilic Stripling</i>	10		
				<i>Howell-Jolly Bodies</i>	7		
				<i>Pappenheim Bodies</i>	1		
				<i>Others</i>	3	2	

Commentary

Smear H3-B is from a patient with pancytopenia.

2.7 Qualab Codes

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

Code	Text	Number
30	Pathologic findings, refer to expert	206
12	Microcytes	86
14	Hypochromic Erythrocytes	82
5	Atypical lymphocytes, probably reactive	70
31	Pathologic findings	54
6	Atypical lymphocytes, probably neoplastic	41
22	Rouleaux	39
9	Macrothrombocytes	38
8	Leucocytes other:	31
29	Normal findings	28
13	Macrocytes	27
15	Polychromatophilic Red Cells	22
2	Neutrophils, left shift	21
4	Neutrophils, Toxic Changes	18
16	Poikilocytosis	17
11	Thrombocytes, others	12
17	Elliptocytes/Ovalocytes	11
21	Spherocytes	8
27	Erythrocytes, other	8
1	Neutrophils, hypersegmentation of nucleus	7
10	Thrombocyte aggregates	7
18	Stomatocytes	7
19	Targetcells	7
20	Fragmentocytes	2
23	Erythrocytes agglutination	2
24	Howell-Jolly bodies	2
25	Basophilic strippling	2
26	Teardrops	2
28	Parasites	1
99	Total	310