

Verein für
Association pour le
Associazione per il



medizinische Qualitätskontrolle
contrôle de qualité médical
controllo di qualità medico

Report

Differential Blood Smear H3

MQ 2018-1

Acknowledgements

The Mythic 18 analyzer was provided by the company Polymed, the ABX Microsemi CRP 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 Microsemi CRP

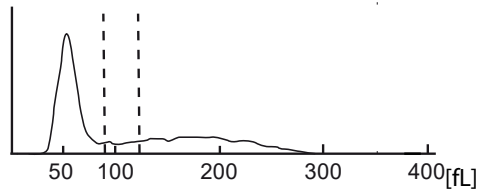


Findings MQ 2018-1 H3A 16 year old woman

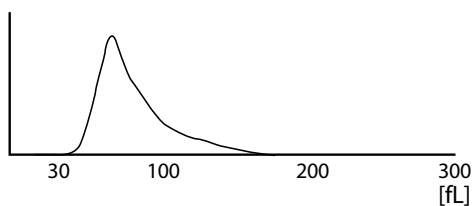
WBC :	5.5	10 ⁹ /L	MCV :	86.5	fL
RBC :	4.46	10 ¹² /L	MCH :	29.3	pg
HGB :	13.1	g/L	MCHC:	33.9	g/L
HCT :	38.6	L/L	RDW :	13.5	%
PLT :	208	10 ⁹ /L	MPV :	8.0	fL
PCT :	0.166	10 ⁻² L/L	PDW :	15.2	%

DIFF:					
%LYM:	48.0	%	#LYM:	2.7	10 ⁹ /L
%MON:	8.6	%	#MON:	0.5	10 ⁹ /L
%GRA:	43.4	%	#GRA:	2.3	10 ⁹ /L

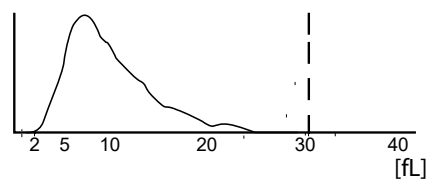
WBC



RBC



PLT

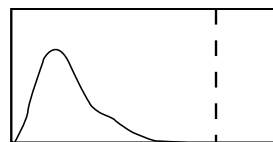
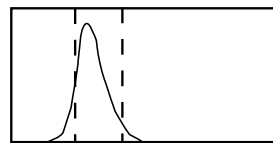
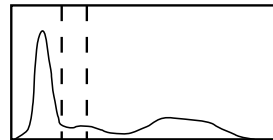


1.2 Mythic



Findings MQ 2018-1 H3A 16 year old woman

WBC	5.6	h	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	2.7	h	10 ⁹ /l	1.2 / 6.8
LYM%	44.0		%	17.0 / 48.0
MON%	7.7		%	2.0 / 10.0
GRA%	483		%	43.0 / 76.0
RBC	4.38		10 ¹² /l	4.00 / 5.70
HGB	120		g/l	140 / 180
HCT	0.362	l	l/l	0.420 / 0.540
MCV	82.6		fl	80.0 / 100.0
MCH	27.4		pg	26.0 / 34.0
MCHC	331		g/l	310 / 365
RDW	15.6		%	10.0 / 16.0
PLT	199	l	10 ⁹ /l	150 / 400
MPV	8.7		fl	7.0 / 11.0
PCT	0.173	l	cl/l	0.100 / 0.500
PDW	15.0		%	10.0 / 18.0



FLAGS :

1.3 Sysmex XP300



Findings MQ 2018-1 H3A
16 year old woman

WBC	5.8	$10^3/\mu\text{L}$	<p>WBC [fL]</p>	
RBC	4.57	$10^6/\mu\text{L}$		
HGB	13.3	g/L		
HCT	36.7	%		
MCV	-80.3	fL		
MCH	29.1	pg		
MCHC	+36.2	g/L		
PLT	196	$10^3/\mu\text{L}$		
LYM%	+48.2	%		<p>RBC [fL]</p>
MXD%	6.8	%		
NEUT%	-45.0	%		
LYM#	2.8	$10^3/\mu\text{L}$	<p>PLT [fL]</p>	
MXD#	0.4	$10^3/\mu\text{L}$		
NEUT#	2.6	$10^3/\mu\text{L}$		
RDW_SD	39.9	fL		
RDW_CV	14.7	%		
PDW	12.6	fL		
MPV	9.3	fL		
P_LCR	20.6	%		
PCT	0.18	%		

1.4 Sysmex XE-5000

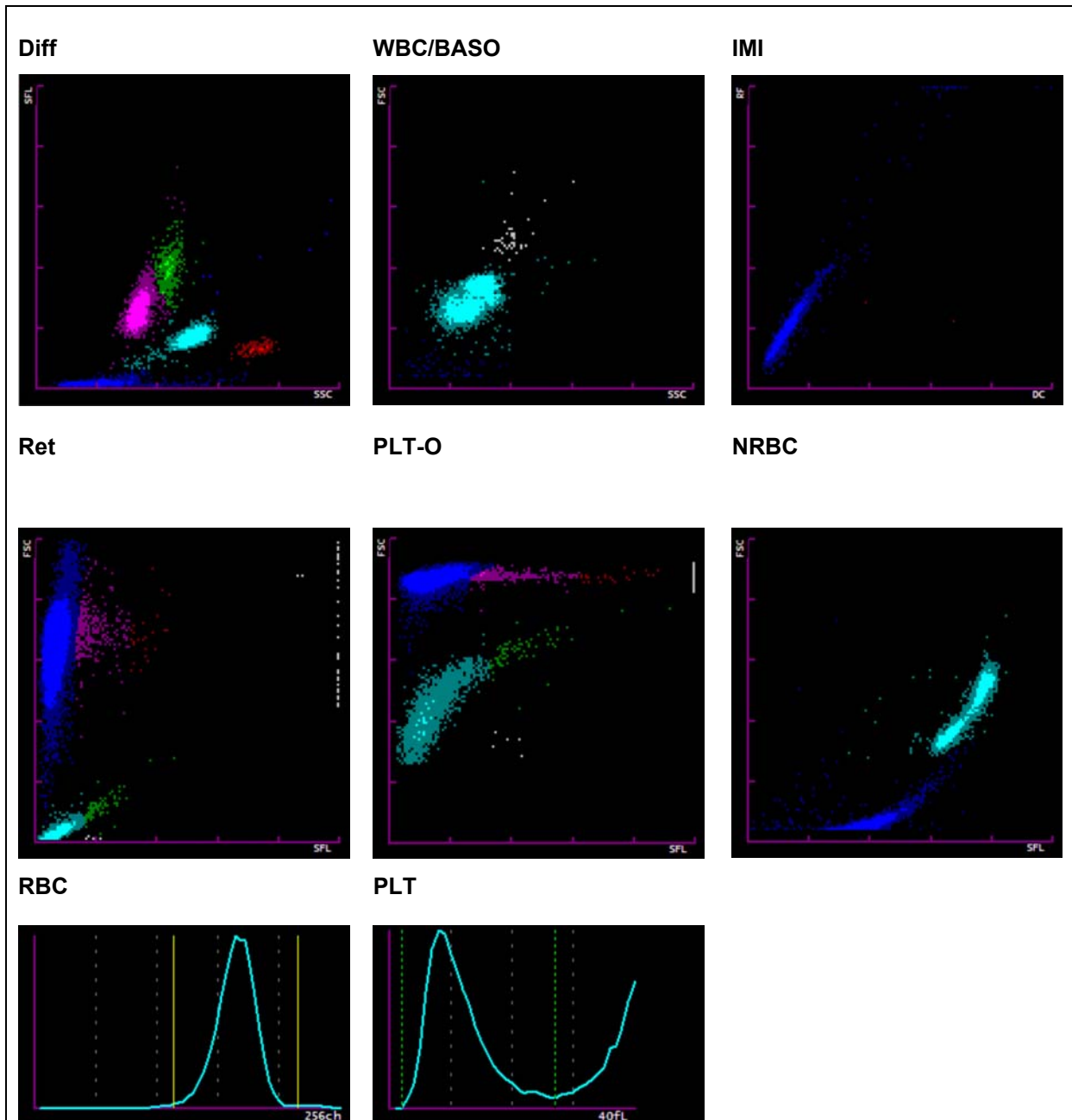


Findings MQ 2018-1 H3A

16 year old woman

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	129	g/l	
<u>Hematocrit</u>	0.392	l/l	
Erythrocytes	4.58	T/l	
MCV	85.6	fl	80-100
MCH	28.2	pg	26-34
MCHC	329	g/l	310-360
Mikrocytes	13.9	%	11.0-14.8
<u>Thrombocytes</u>	* 196	G/l	143-400
<u>Leucocytes</u>	5.93	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	* 2.33	G/l	1.40 – 8.00
Monocytes	0.71	G/l	0.16 – 0.95
Eosinophils	0.23	G/l	0.00 – 0.70
Basophils	0.02	G/l	0.00-0.15
Lymphocytes	* 2.64	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 2018-1 H3A

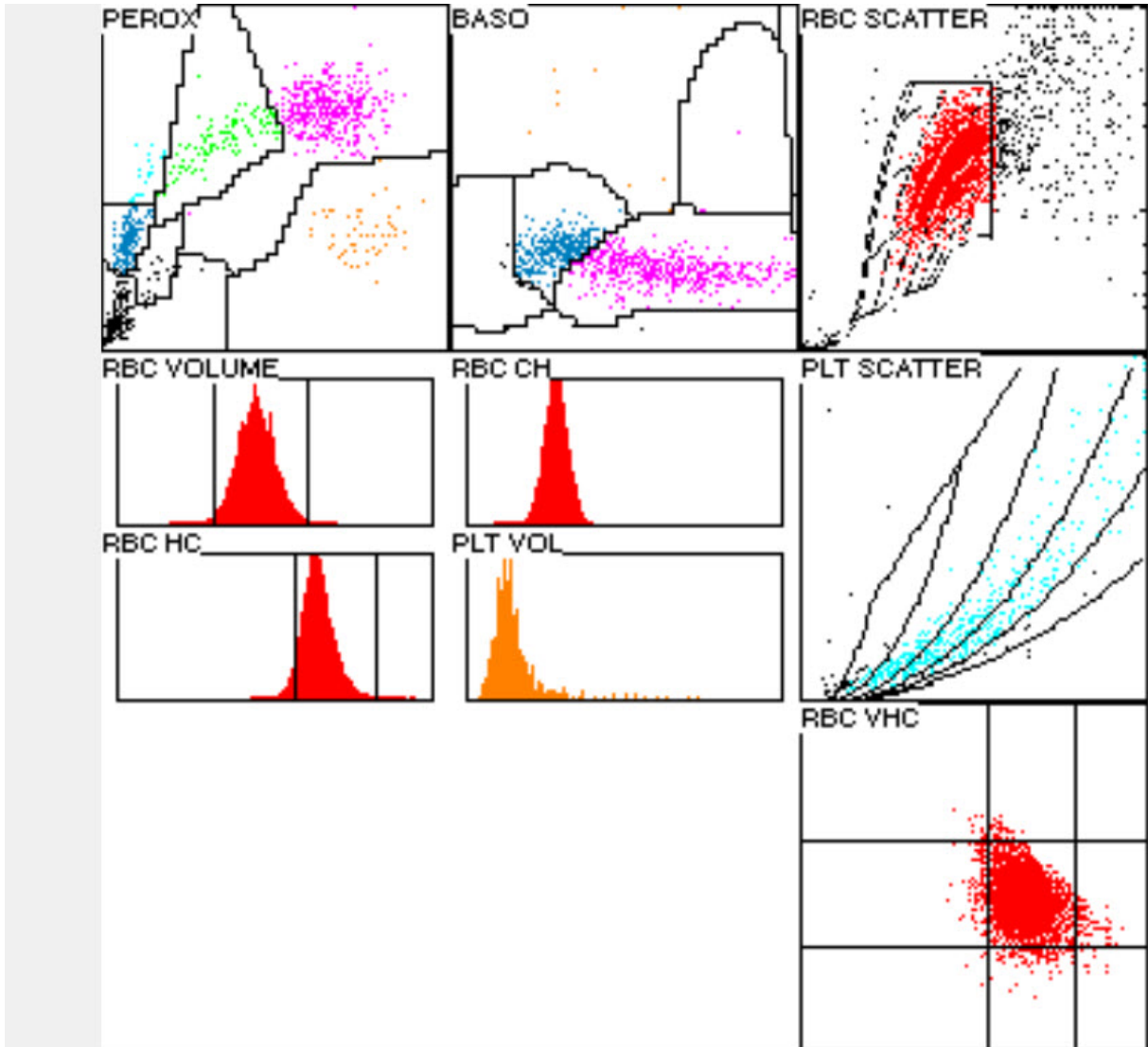


1.5 ADVIA 2120



Findings HAD MQ 2018-1 H3A 16 year old woman

Analysis	Result	Unit	Reference value
Blood Count	130		
<u>Hemoglobin</u>	0.398	g/l	134-170
<u>Hematocrit</u>	4.52	l/l	0.400-0.500
Erythrocytes	88.1	T/l	4.2-5.7
MCV	28.8	fl	80-100
MCH	328	pg	26-34
MCHC	0.9	g/l	310-360
Mikrocytes	0.5	%	0-2.0
Macrocytes	* 4.5	%	0-2.0
Hypochromic Ec	0.2	%	0-2.0
Hyperchromic Ec	13.7	%	0-2.0
RDW	196	%	11.0-14.8
<u>Thrombocytes</u>	0	G/l	143-400
Vd. L-SHIFT	5.50	+	None (0)
<u>Leucocytes</u>		G/l	3.0-9.6
Leucocyte Differentiation	2.30		
Neutrophils	0.47	G/l	1.40-8.00
Monocytes	0.21	G/l	0.16-0.95
Eosinophils	0.7	G/l	0.00-0.70
Basophile	43.0	G/l	0.00-0.15
Lymphocytes	2.	G/l	1.50-4.00
LUC	130	%	0.0-4.0



1.6 Differential Blood Smear

Findings HAD MQ 2018-1 H3A

16 year old woman

Analysis	Result	Unit	Reference value
Neutrophils total	2.09	G/l	1.40-8.00
Monocytes	0.47	G/l	0.16-0.95
Eosinophils	0.30	G/l	0.00-0.70
Basophils	0.06	G/l	0.00-0.15
Lymphocytes	2.59	G/l	1.50-4.00
Neutrophils total	* 38.0	%	40.0-74.0
Neutrophils Band	1.5	%	0.0-20.0
Neutrophils Segmented	36.5	%	30.0-50.0
Monocytes	8.5	%	3.4-9.0
Eosinophils	5.5	%	0.0-7.0
Basophils	1.0	%	0.0-1.5
Lymphocytes	47.0	%	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

Red blood cell count normochromic, normocytic. Neutrophil granulocytes with fine cytoplasmic granulation. Lymphocytes changed slightly reactively. Thrombocytes morphologically normal.

K. Schreiber / PD. Dr. St. Balabanov

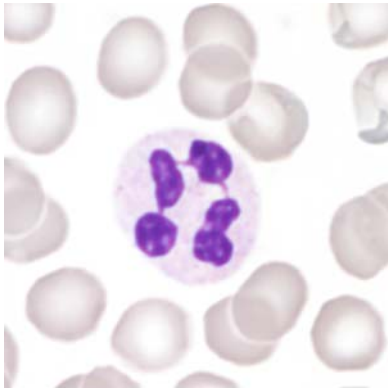


Abb 1. Neutrophil (Seg)

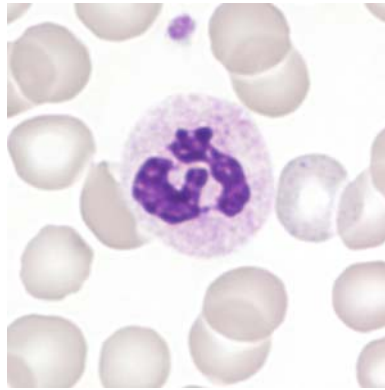


Abb 2. Neutrophil (Seg)

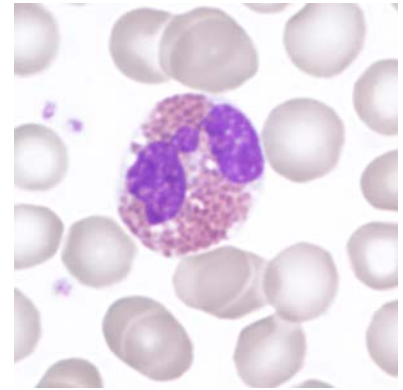


Abb 3. Eosinophile

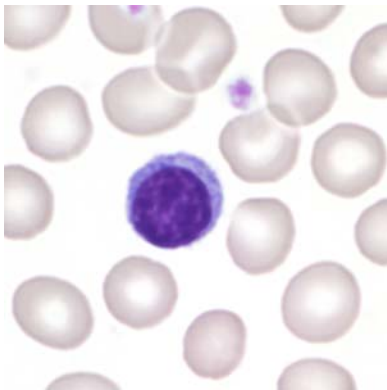


Abb 4. Lymphocyte

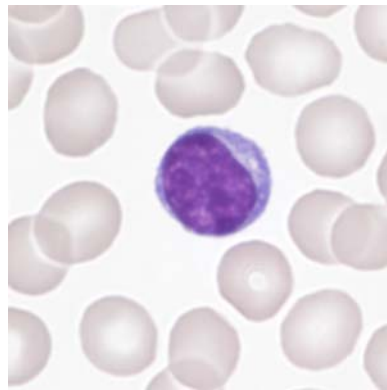


Abb 5. Lymphocyte

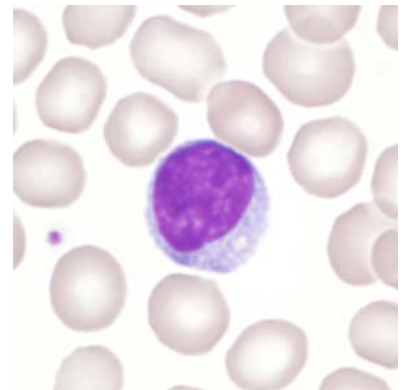


Abb 6. Lymphocyte

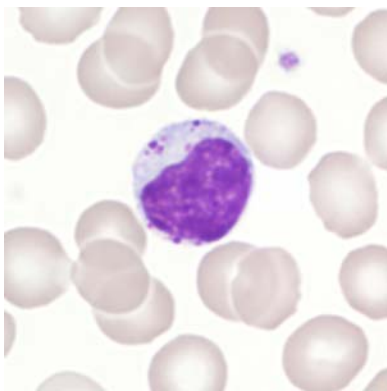


Abb 7. Lymphocyte (LGL)

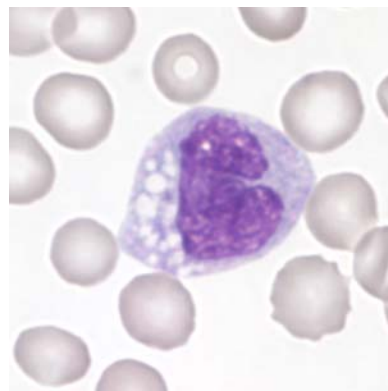


Abb 8. Monocyte

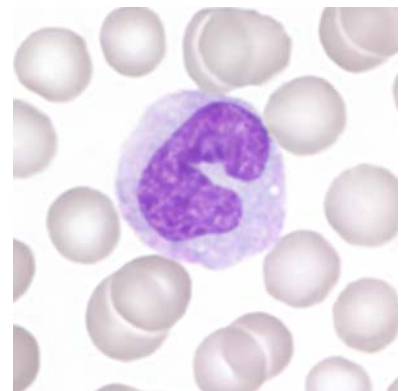


Abb 9. Monocyte

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	128	111	35	3	1	2				
<i>Neutrophils Segmented.</i>	2		1	4	42	161	77	3			
<i>Eosinophils</i>	10	217	62	1							
<i>Basophile</i>	143	146				1					
<i>Monocytes</i>	11	81	156	41	1						
<i>Lymphocytes</i>			2		1	14	169	99	5		
<i>Plasmacells</i>	278	11		1							
<i>Blasts</i>	289			1							
<i>Promyelocytes</i>	289	1									
<i>Myelocytes</i>	284	5		1							
<i>Metamyelocyten</i>	283	5	2								
<i>Erythrocytes Nucleated</i>	287	3									
<i>Unknown</i>	289	1									
<i>Smudge cells</i>	268	14	5	3							

Evaluation H3-A

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	16	2	3	<i>Hypochromic Ec</i>	30	7	2
<i>Pelger-Hüet Anomaly</i>	1			<i>Polychromatic Ec</i>	23	2	
<i>Coarse Granulation</i>	19	3	1	<i>Anisocytes</i>	104	17	
<i>Basophilic Stripling</i>	4		1	<i>Mikrocytes</i>	48	3	
<i>Vacuoles</i>	18	2		<i>Makrocytes</i>	15	5	
<i>Reaktive Lymphocytes</i>	57	15	3	<i>Megalocytes</i>		1	
<i>Atypical Lymphocytes</i>	4			<i>Poikilocytosis</i>	37	4	
<i>Others</i>	2	3		<i>Ovalocytes</i>	35	1	
				<i>Target Cells</i>	8		
				<i>Akanthocytes</i>	11	1	
<i>Anisocytosis</i>	86	18	3	<i>Echinocytes</i>	17	2	1
<i>Megakaryocyte Nucleaus</i>	6	2		<i>Sickle Cells</i>	1		
<i>Granulation</i>	9	2	1	<i>Fragmentocytes</i>	6		
<i>Others</i>	1			<i>Spherocytes</i>	3		
				<i>Stomatocytes</i>	12	1	
				<i>Basophilic Stripling</i>	3		
				<i>Howell-Jolly Bodies</i>	3		
				<i>Pappenheim Bodies</i>	2		
				<i>Others</i>	2		

Commentary

Smear H3-A is from a healthy teenager.

1.8 Qualab Codes

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

Code	Text	Number
29	Normal findings	220
5	Atypical lymphocytes, probably reactive	51
31	Pathologic findings	30
30	Pathologic findings, refer to expert	26
22	Rouleaux	17
1	Neutrophils, hypersegmentation of nucleus	16
9	Macrothrombocytes	14
12	Microcytes	14
16	Poikilocytosis	14
14	Hypochromic Erythrocytes	13
11	Thrombocytes, others	10
15	Polychromatophilic Red Cells	10
27	Erythrocytes, other	8
13	Macrocytes	7
18	Stomatocytes	6
26	Teardrops	6
6	Atypical lymphocytes, probably neoplastic	5
8	Leucocytes other:	5
2	Neutrophils, left shift	4
17	Elliptocytes/Ovalocytes	4
4	Neutrophils, Toxic Changes	3
20	Fragmentocytes	3
10	Thrombocyte aggregates	1
21	Spherocytes	1
24	Howell-Jolly bodies	1
99	Total	283

2 Sample B

2.1 ABX Microsemi CRP



Findings MQ 2018-1 H3B

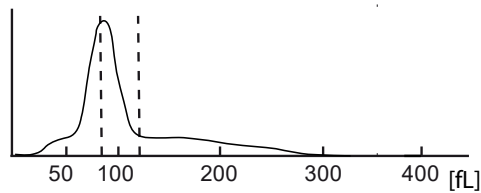
70 year old woman

WBC :	36.5	H	10 ⁹ /L	MCV :	77.4	L	fL
RBC :	3.27	L	10 ¹² /L	MCH :	25.8	L	pg
HGB :	85	L	g/L	MCHC:	333		g/L
HCT :	0.253	L	L/L	RDW :	16.9	H	%
PLT :	--	D	10 ⁹ /L	MPV :	7.9	D	fL
PCT :	7.415	D	10 ⁻² L/L	PDW :	11.8	D	%

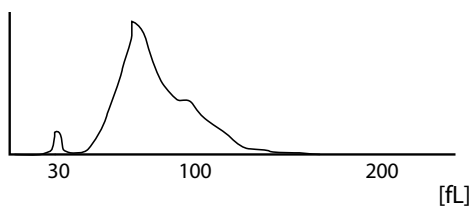
WBC FLAGS: M2 G1 G2

DIFF:				#LYM:	10.9	H	10 ⁹ /L
%LYM:	30.0		%	#MON:	15.6	H	10 ⁹ /L
%MON:	43.0	H	%	#GRA:	10.0	H	10 ⁹ /L
%GRA:	27.0	I	%				

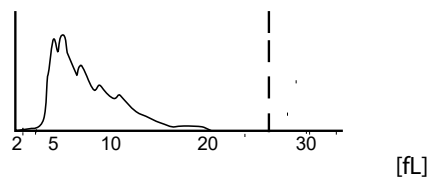
WBC



RBC



PLT



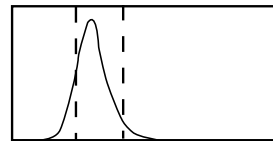
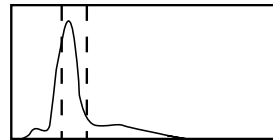
2.2 Mythic



Findings MQ 2018-1 H3B

70 year old woman

WBC	32.1	H	10 ⁹ /l	3.5	/	10.0
LYM	4.6	h	10 ⁹ /l	1.2	/	3.2
MON	17.5	H	10 ⁹ /l	0.1	/	1.0
GRA	10.0	H	10 ⁹ /l	1.2	/	6.8
LYM%	14.4	L	%	17.0	/	48.0
MON%	54.6	H	%	2.0	/	10.0
GRA%	31.0	L	%	43.0	/	76.0
RBC	2.99	l	10 ¹² /l	4.00	/	5.70
HGB	89	l	g/l	140	/	180
HCT	0.253	l	l/l	0.420	/	0.540
MCV	84.6		fl	80.0	/	100.0
MCH	29.8		pg	26.0	/	34.0
MCHC	352		g/l	310	/	365
RDW	16.6	h	%	10.0	/	16.0
PLT	42	L	10 ⁹ /l	150	/	400
MPV	8.0		fl	7.0	/	11.0
PCT	0.034	l	cl/l	0.100	/	0.500
PDW	6.8	L	%	10.0	/	18.0



FLAGS: FL2FL4 FR1

LEUCOCYTOSIS LYMPHOCYTOSIS MONOCYTOSIS GRANULOCYTOSIS ANEMIA MICORCYTES ANISOCYTOSIS THROMBOPENIA

2.3 Sysmex XP300



Findings MQ 2018-1 H3B 70 year old woman

WBC	+33.4	$10^3/\mu\text{L}$	<p>WBC</p>
RBC	-3.08	$10^6/\mu\text{L}$	
HGB	-9.0	g/dL	
HCT	-25.7	%	
MCV	-83.4	fL	
MCH	29.2	pg	
MCHC	35.0	g/dL	
PLT	34	$10^3/\mu\text{L}$	<p>RBC</p>
LYM%	-	%	
MXD%	-	%	
NEUT%	-	%	
LYM#	-	$10^3/\mu\text{L}$	
MXD#	-	$10^3/\mu\text{L}$	
NEUT#	-	$10^3/\mu\text{L}$	
RDW_SD	+49.4	fL	<p>PLT</p>
RDW_CV	15.8	%	
PDW	9.7	fL	
MPV	8.1	fL	
P_LCR	17.4	%	
PCT	0.03	%	

2.4 Sysmex XE-5000

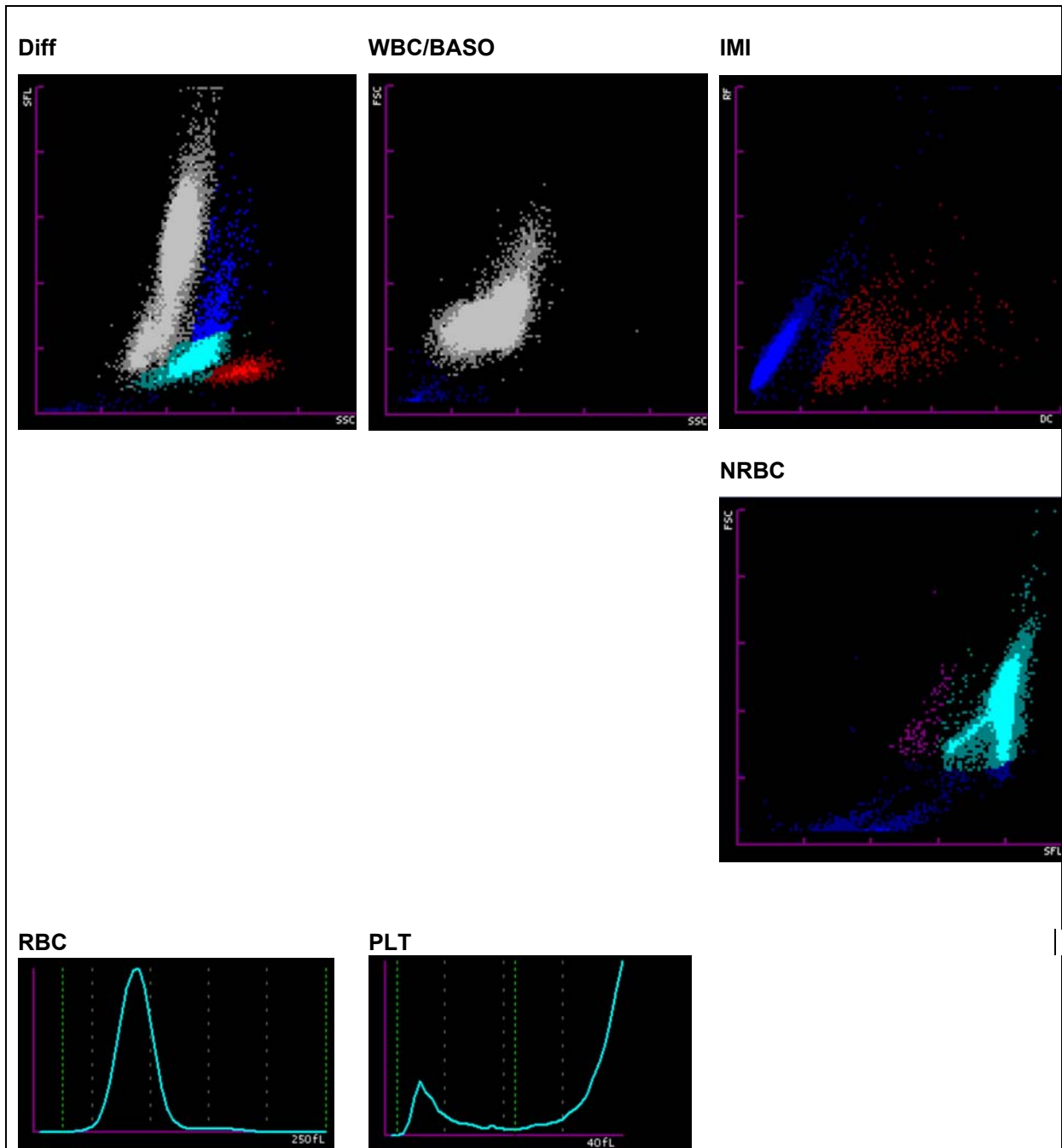


Findings MQ 2018-1 H3B

70 year old woman

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	* 88	g/l	117-153
Hematocrit	* 0.263	l/l	0.350-0.460
Erythrocytes	* 3.04	T/l	3.9-5.2
MCV	86.5	fl	80-100
MCH	28.9	pg	26-34
MCHC	335	g/l	310-360
Thrombocytes	* 24	G/l	3.0-9.6
Leucocytes	* 36.28	g/l	117-153
Leucocyte Differentiation			
Neutrophils	2.87	G/l	1.40-8.00
Monocytes	12.76	G/l	0.16-0.95
Eosinophils	0.85	G/l	0.00-0.70
Basophils	0.81	G/l	0.00-0.15
Lymphocytes	18.99	G/l	1.50-4.00
IG abs.	0.69	G/l	0.00-0.03
IG %	1.9	%	0.0-0.5

Findings HAD MQ 2018-1 H3B

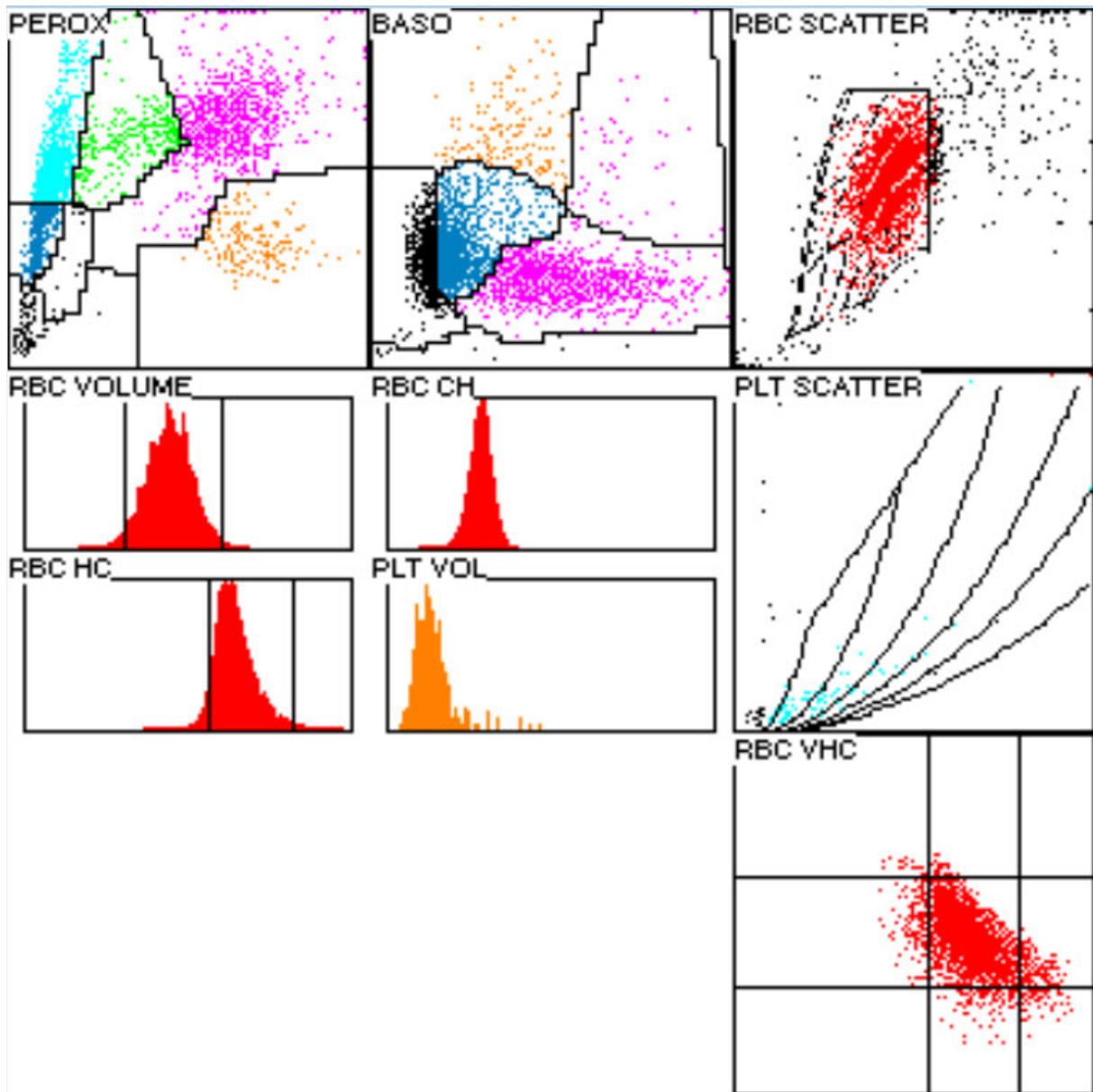


2.5 ADVIA 2120



Findings HAD MQ 2018-1 H3B 70 year old woman

Analysis		Result	Unit	Reference value
Blood Count				
Hemoglobin	*	88	g/l	134-170
Hematocrit	*	0.268	l/l	0.400-0.500
Erythrocytes	*	3.04	T/l	4.2-5.7
MCV		88.3	fl	80-100
MCH		29.1	pg	26-34
MCHC		329	g/l	310-360
Mikrocytes	*	2.1	%	0-2.0
Makrocytes		0.6	%	0-2.0
Hypochromic Ec	*	5.8	%	0-2.0
Hyerchromic Ec		1.3	%	0-2.0
RDW	*	15.7	%	11.0-0-14.8
Thrombocytes	*	28	G/l	143-400
Vd. L-SHIFT		0	+	Keine (0)
Leukocytes	*	35.02	G/l	3.0-9.6
Leucocytes Differentiation				
Neutrophils		4.86	G/l	1.40-8.00
Monocytes	*	1.34	G/l	0.16-0.95
Eosinophils	*	0.79	G/l	0.00-0.70
Basophils	*	0.71	G/l	0.00-0.15
Lymphocytes	*	7.05	G/l	1.50-4.00
LUC	*	20.27	%	0.0-4.0



2.6 Differential Blood Smear

Findings MQ 2018-1 H3B

70 year old woman

Analysis		Result	Unit	Reference value
Leucocytes Differentiation				
Neutrophils total		5.78	G/l	1.40-8.00
Monocytes	*	1.23	G/l	0.16-0.95
Eosinophils	*	1.05	G/l	0.00-0.70
Basophils	*	0.35	G/l	0.00-0.15
Lymphocytes	*	4.03	G/l	1.50-4.00
Neutrophils total	*	16.5	%	40.0-74.0
Neutrophils Band		5.5	%	0.0-20.0
Neutrophils Segmented	*	11.0	%	30.0-50.0
Monocytes		3.5	%	3.4-9.0
Eosinophils		3.0	%	0.0-7.0
Basophils		1.0	%	0.0-1.5
Lymphocytes	*	11.5	%	19.0-48.0
Plasmacells		0.0	%	0-0.5
Blasts		0.0	%	0
Promyelocytes	*	0.5	%	0
Myelocytes	*	1.5	%	0
Metamyelocytes	*	0.5	%	0
Others/ damaged cells		62.0	%	0
Erythroblasts		5.78	/100 Lc	0

Commentary

The 62% others correspond to neoplastic lymphocytes. Medium-sized to large blastoid/ blast-like cells noticeable, with a repeatedly sinuated core, stringy, irregular chromatin and 1-3 clear nucleoli. The cytoplasmic border is dark basophilic, thin to medium-wide, and has multiple cytoplasmic vacuoles, seldom located over the core. Neutrophil granulocytes with fine cytoplasmic granulation and few with core pyknosis. Washout of few maturation-dissociative myeloid pre-stages up to 0.5% promyelocytes. Red blood cell count slightly hypochromic and slightly anisocytic with few acanthocytes and spherocytes. Severe thrombocytopenia; the thrombocytes are often hypogranular to agranular. Upon examination, cytoplasmic blasts can be seen sporadically. CH/ Dr. C. Widmer

K. Schreiber / PD. Dr. St. Balabanov

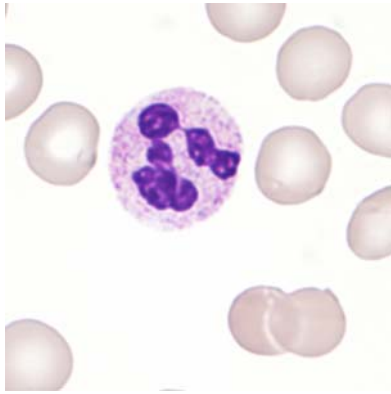


Abb 1. Neutrophil (Seg)

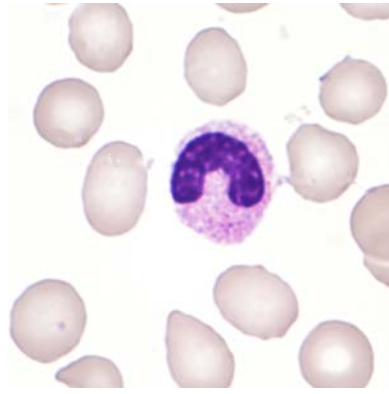


Abb 2. Neutrophil (Band)

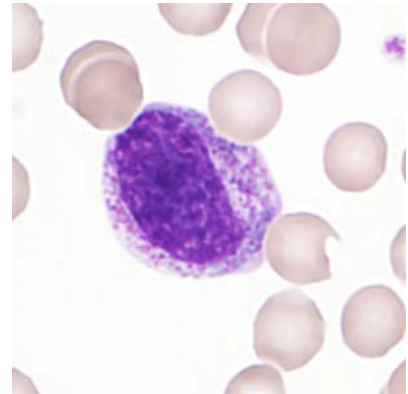


Abb 3. Myelocyte

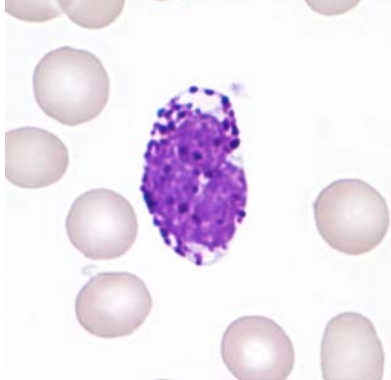


Abb 4. Basophile

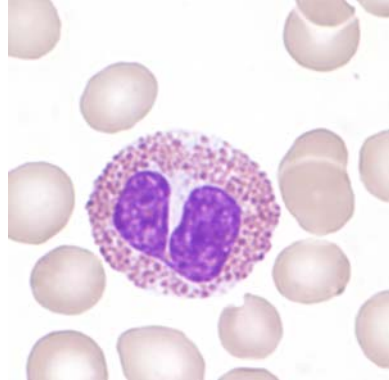


Abb 5. Eosinophile

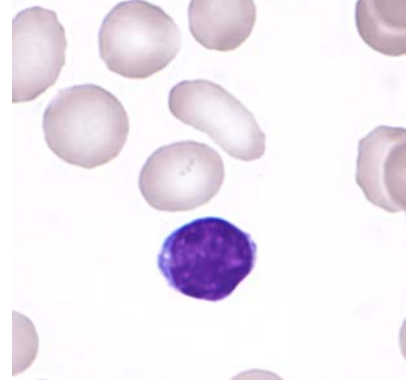


Abb 6. Lymphocyte (small, normal)

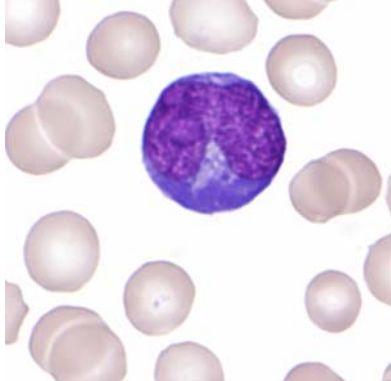


Abb 7. Lymphocyte (neoplastic)

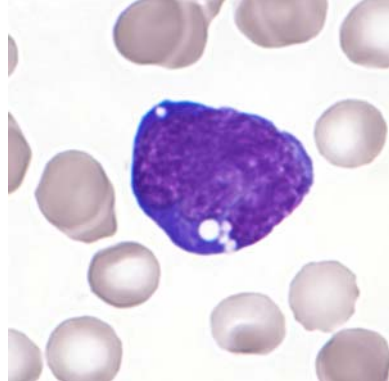


Abb 8. Lymphocyte (neoplastic)

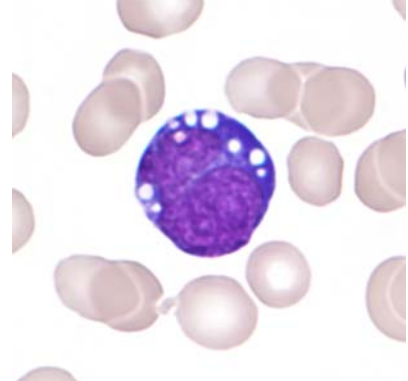


Abb 9. Lymphocyte (neoplastic)

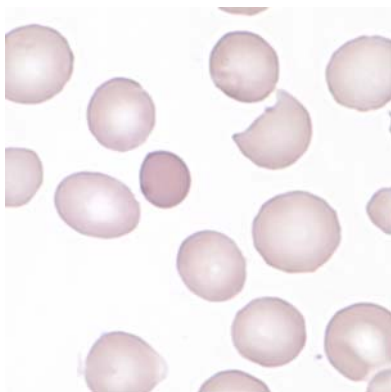


Abb 10. Spherocyte

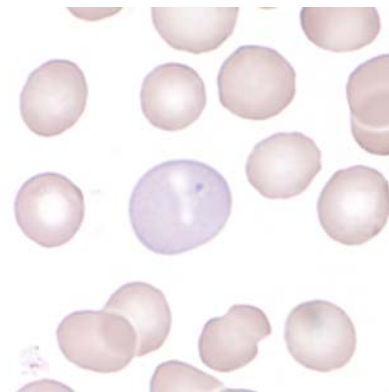


Abb 11. Polychromasia

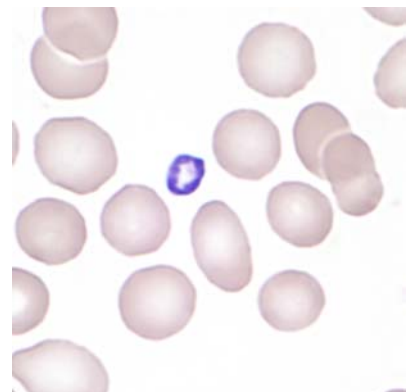


Abb 12. Thrombocyte (agranular)

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>	2	29	134	116	4		1				
<i>Neutrophils Segmented.</i>	6	102	143	35							
<i>Eosinophils</i>	36	200	48	2							
<i>Basophile</i>	198	86		1						1	
<i>Monocytes</i>	60	170	50	3		1				1	1
<i>Lymphocytes</i>	9	18	68	84	16	6	3	5	12	30	35
<i>Plasmacells</i>	262	17	2	3					2		
<i>Blasts</i>	108	8	3	7	4	4	18	34	66	28	6
<i>Promyelocytes</i>	219	53	6	3	2	2	1				
<i>Myelocytes</i>	160	99	11	7	3				3	2	1
<i>Metamyelozyten</i>	163	104	11	6	2						
<i>Erythrocytes Nucleated</i>	168	110	4	3						1	
<i>Unknown</i>	237	10	5	3	3		1	7	13	3	4
<i>Smudge cells</i>	252	25	8						1		

Evaluation H3-B

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	6	1	2	<i>Hypochromic Ec</i>	69	40	11
<i>Pelger-Hüet Anomaly</i>	2	2	1	<i>Polychromatic Ec</i>	117	9	1
<i>Coarse Granulation</i>	62	29	11	<i>Anisocytes</i>	103	86	10
<i>Basophilic Stripling</i>	22	6	1	<i>Mikrocytes</i>	95	54	11
<i>Vacuoles</i>	29	36	17	<i>Makrocytes</i>	28	6	1
<i>Atypical Lymph, reactive</i>	17	15	28	<i>Megalocytes</i>	4		
<i>Atypical Lymph, neoplastic</i>	3	4	14	<i>Poikilocytosis</i>	107	19	1
<i>Others</i>	9	7	37	<i>Ovalocytes</i>	55	9	
				<i>Target Cells</i>	9	2	
				<i>Akanthocytes</i>	29	4	
<i>Anisocytosis</i>	55	17	4	<i>Echinocytes</i>	31	2	1
<i>Megakaryocyte Nucleaus</i>	5	2		<i>Sickle Cells</i>	2		
<i>Granulation</i>	16	11	4	<i>Fragmentocytes</i>	87	11	2
<i>Others</i>				<i>Spherocytes</i>	28	8	
				<i>Stomatocytes</i>	5		
				<i>Basophilic Stripling</i>	45		
				<i>Howell-Jolly Bodies</i>	6		
				<i>Pappenheim Bodies</i>	1		
				<i>Others</i>	4	1	

Commentary

Smear H3-B comes from a patient with Burkitt-lymphoma. 62% of the white blood cells were neoplastic lymphocytes. We accepted "lymphocytes" and "blasts".

2.8 Qualab Codes

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

Code	Text	Number
30	Pathologic findings, refer to expert	252
12	Microcytes	66
6	Atypical lymphocytes, probably neoplastic	64
8	Leucocytes other:	64
20	Fragmentocytes	48
5	Atypical lymphocytes, probably reactive	45
14	Hypochromic Erythrocytes	45
4	Neutrophils, Toxic Changes	44
16	Poikilocytosis	42
15	Polychromatophilic Red Cells	38
31	Pathologic findings	35
11	Thrombocytes, others	33
2	Neutrophils, left shift	26
27	Erythrocytes, other	17
21	Spherocytes	15
22	Rouleaux	15
25	Basophilic strippling	13
13	Macrocytes	9
17	Elliptocytes/Ovalocytes	9
1	Neutrophils, hypersegmentation of nucleus	5
9	Macrothrombocytes	4
19	Targetcells	3
26	Teardrops	3
3	Pelger Hüet Anomaly	2
7	Auer rods	2
10	Thrombocyte aggregates	2
18	Stomatocytes	2
28	Parasites	2
24	Howell-Jolly bodies	1
29	Normal findings	1
99	Total	283