

Verein für
Association pour le
Associazione per il



medizinische Qualitätskontrolle
contrôle de qualité médical
controllo di qualità medico

Report

Differential Blood Smear H3

MQ 2019-3

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



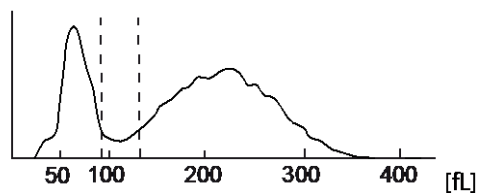
Findings MQ 2019-3 H3A

45 year old woman

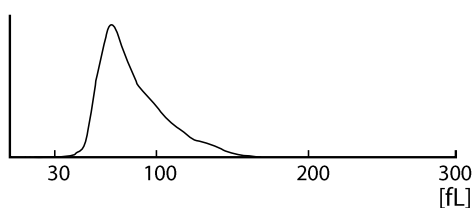
WBC :	9.2	10 ⁹ /L	MCV :	86.0	fL
RBC :	4.43	10 ¹² /L	MCH :	28.9	pg
HGB :	12.8	g/L	MCHC:	33.6	g/L
HCT :	38.1	L/L	RDW :	13.7	%
PLT :	292	10 ⁹ /L	MPV :	8.0	fL
PCT :	0.233	10 ⁻² L/L	PDW :	14.9	%

DIFF:					
%LYM:	27.0	%	#LYM:	2.5	10 ⁹ /L
%MON:	5.4	%	#MON:	0.5	10 ⁹ /L
%GRA:	67.6	%	#GRA:	6.2	10 ⁹ /L

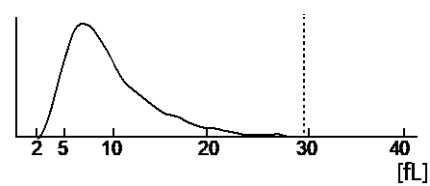
WBC



RBC



PLT

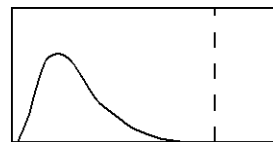
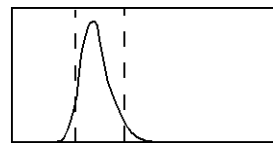
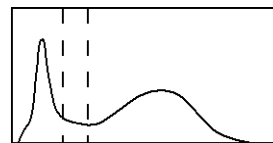


1.2 Mythic



Findings MQ 2019-3 H3A 45 year old woman

WBC	9.3	10 ⁹ /l	3.5 /	10.0
LYM	2.6	10 ⁹ /l	1.2 /	3.2
MON	0.7	10 ⁹ /l	0.1 /	1.0
GRA	6.0	10 ⁹ /l	1.2 /	6.8
LYM%	27.5	%	17.0 /	48.0
MON%	7.5	%	2.0 /	10.0
GRA%	65.0	%	43.0 /	76.0
RBC	4.49	10 ¹² /l	4.00 /	5.70
HGB	136	g/l	120 /	180
HCT	0.388	l/l	0.360 /	0.540
MCV	86.4	fl	80.0 /	100.0
MCH	30.3	pg	26.0 /	34.0
MCHC	351	g/l	310 /	365
RDW	14.7	%	10.0 /	16.0
PLT	266	10 ⁹ /l	150 /	400
MPV	8.9	fl	7.0 /	11.0
PCT	0.237	cl/l	0.100 /	0.500
PDW	14.5	%	10.0 /	18.0



FLAGS :

1.3 Sysmex XP300



Findings MQ 2019-3 H3A
45 year old woman

WBC	9.5	$10^3/\mu\text{L}$	<p>WBC</p>	
RBC	4.40	$10^6/\mu\text{L}$		
HGB	12.8	g/L		
HCT	38.0	%		
MCV	86.4	fL		
MCH	29.1	pg		
MCHC	33.7	g/L		
PLT	280	$10^3/\mu\text{L}$		
LYM%	27.6	%		<p>RBC</p>
MXD%	10.8	%		
NEUT%	61.6	%		
LYM#	2.6	$10^3/\mu\text{L}$		
MXD#	1.0	$10^3/\mu\text{L}$		
NEUT#	5.9	$10^3/\mu\text{L}$	<p>PLT</p>	
RDW_SD	+46.1	fL		
RDW_CV	13.9	%		
PDW	12.5	fL		
MPV	10.0	fL		
P_LCR	24.7	%		
PCT	0.28	%		

1.4 Sysmex XN-20

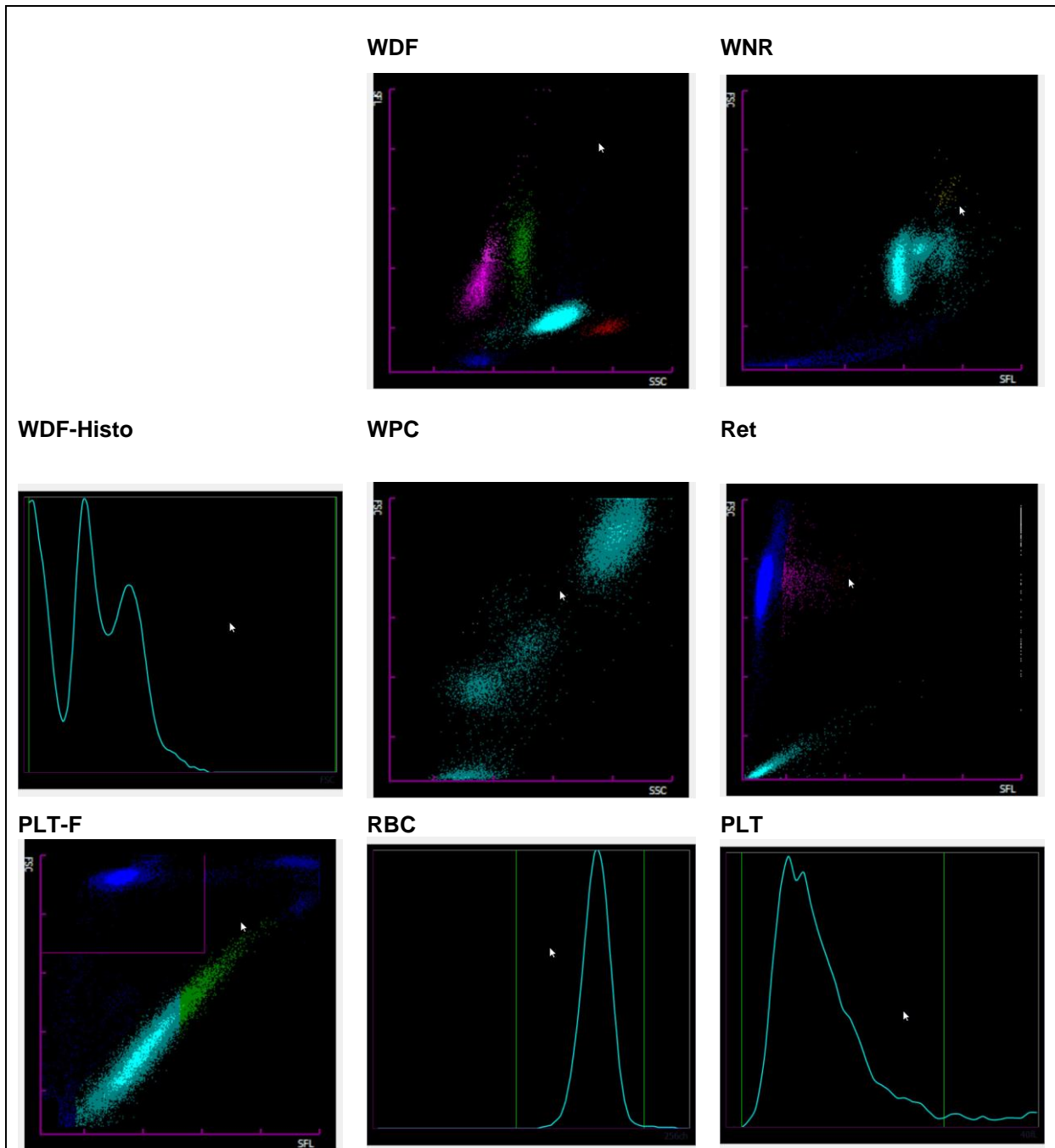


Findings MQ 2019-3 H3A

45 year old woman

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	128	g/l	117-153
<u>Hematocrit</u>	0.391	l/l	0.35-0.46
Erythrocytes	4.52	T/l	3.9-5.2
MCV	86.5	fl	80-100
MCH	28.3	pg	26-34
MCHC	327	g/l	310-360
Mikrocytes	14.2	%	11.0-14.8
<u>Thrombocytes</u>	276	G/l	143-400
<u>Leucocytes</u>	9.59	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	5.91	G/l	1.40 – 8.00
Monocytes	0.73	G/l	0.16 – 0.95
Eosinophils	0.23	G/l	0.00 – 0.70
Basophils	0.05	G/l	0.00-0.15
Lymphocytes	2.67	G/l	1.50 - 4.00
IG abs.	0.03	G/l	0.00 – 0.03
IG %	0.3	%	0.0 – 0.05
NRBC abs.	0.00	G/l	
NRBC	0.0	/100 Lc	

Findings HAD MQ 2019-3 H3A

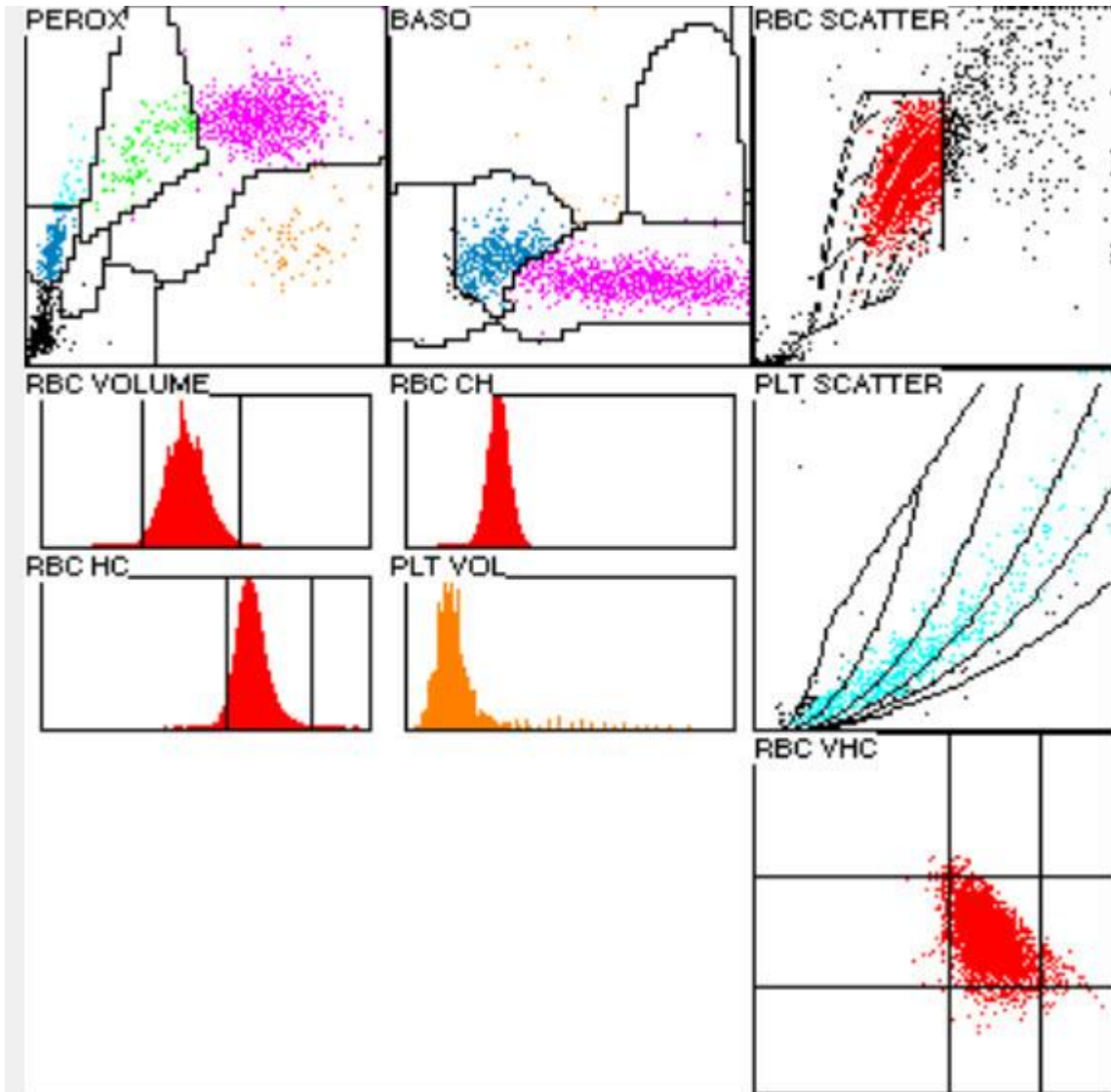


1.5 ADVIA 2120



Findings HAD MQ 2019-3 H3A 45 year old woman

Analysis	Result	Unit	Reference value
Blood Count			
<u>Hemoglobin</u>	129	g/l	117-153
<u>Hematocrit</u>	0.402	l/l	0.35-0.46
Erythrocytes	4.59	T/l	3.9-5.2
MCV	87.6	fl	80-100
MCH	28.2	pg	26-34
MCHC	322	g/l	310-360
Mikrocytes	0.7	%	0-2.0
Macrocytes	0.3	%	0-2.0
Hypochromic Ec	* 2.8	%	0-2.0
Hyperchromic Ec	0.3	%	0-2.0
RDW	13.7	%	11.0-14.8
<u>Thrombocytes</u>	282	G/l	143-400
Vd. L-SHIFT	0	+	Keine (0)
<u>Leucocytes</u>	* 9.70	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	6.16	G/l	1.40-8.00
Monocytes	0.56	G/l	0.16-0.95
Eosinophils	0.23	G/l	0.00-0.70
Basophile	0.04	G/l	0.00-0.15
Lymphocytes	2.57	G/l	1.50-4.00
LUC	0.13	%	0.0-4.0



1.6 Differential Blood Smear

Findings HAD MQ 2019-3 H3A

45 year old woman

Analysis	Result	Unit	Reference value
Neutrophils total	5.82	G/l	1.40-8.00
Monocytes	0.63	G/l	0.16-0.95
Eosinophils	0.39	G/l	0.00-0.70
Basophils	0.15	G/l	0.00-0.15
Lymphocytes	2.72	G/l	1.50-4.00
Neutrophils total	60.0	%	40.0-74.0
Neutrophils Band	1.5	%	0.0-20.0
Neutrophils Segmented	* 58.5	%	30.0-50.0
Monocytes	6.5	%	3.4-9.0
Eosinophils	4.0	%	0.0-7.0
Basophils	1.5	%	0.0-1.5
Lymphocytes	28.0	%	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	%	

Commentary

Red blood cell count normochromic, normocytic. Neutrophilic granulocytes with fine cytoplasmic granulation. Few lymphocytes slightly reactively altered. Slight anisocytosis of the thrombocytes..

Dr.J.-D. Studt/ Dr. S. Balabanov

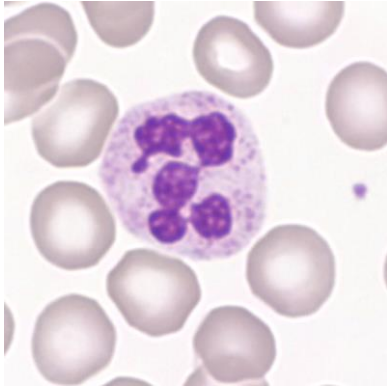


Abb 1. Neutrophile (Seg)

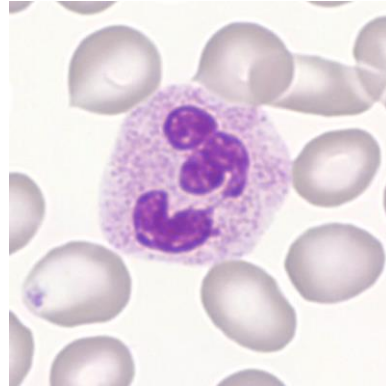


Abb 2. Neutrophile (seg)

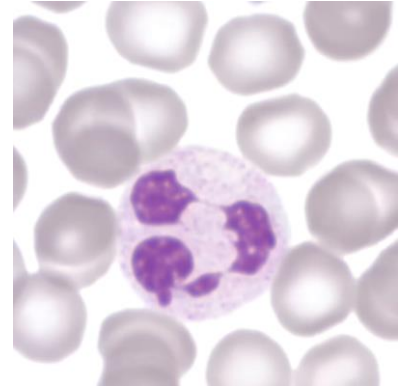


Abb 3. Neutrophile (seg)

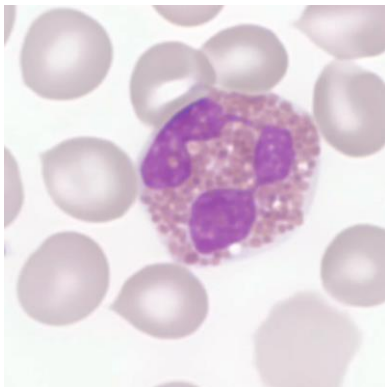


Abb 4. Eosinophile

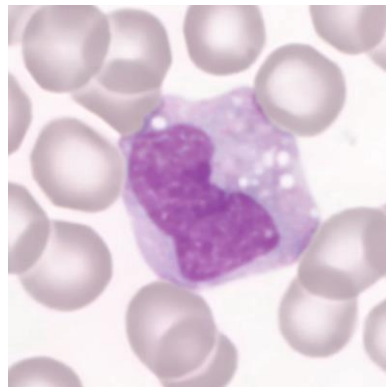


Abb 5. Monocyte

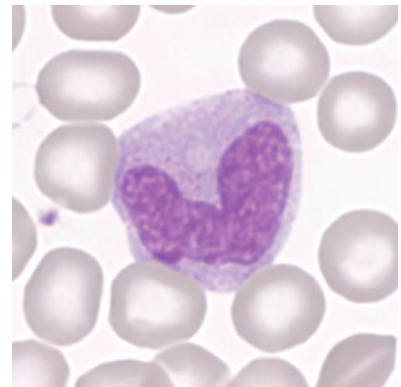


Abb 6. Monocyte

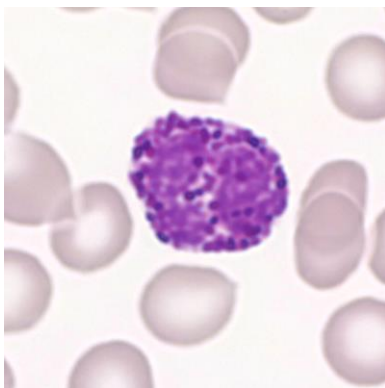


Abb 7. Lymphocyte

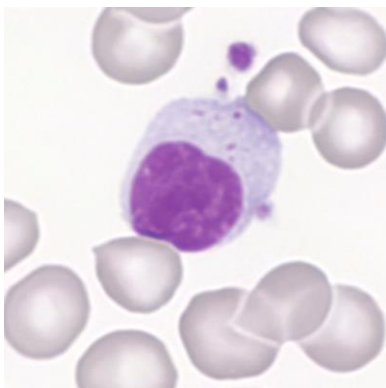


Abb 8. Lymphocyte (LGL)

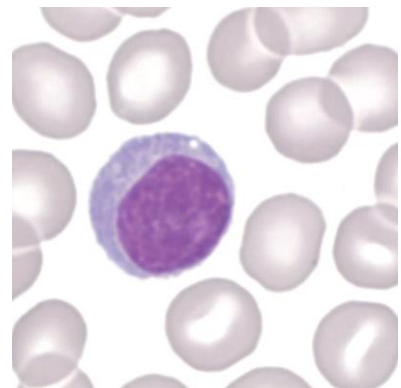


Abb 9. Lymphocyte

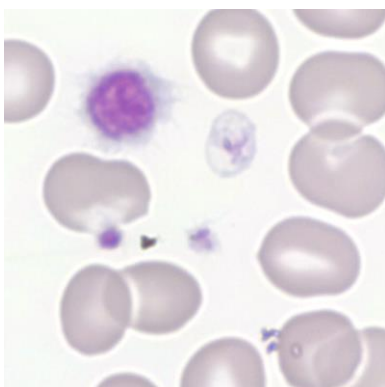


Abb 10. Platelets (anisocytosis)

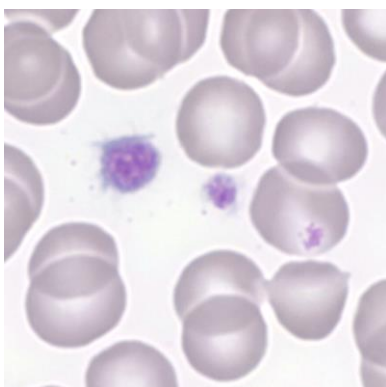


Abb 11. Platelets

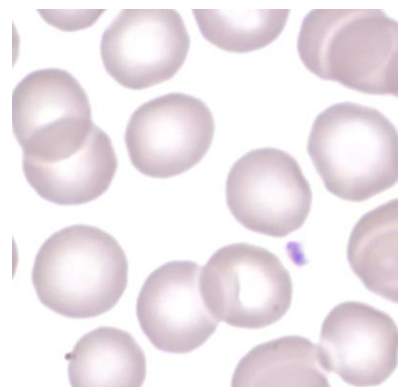


Abb 12. Erythrocytes

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>	18	141	56	13	5				2		
<i>Neutrophils Segmented.</i>			1	1	1	5	17	117	92	1	
<i>Eosinophils</i>	21	201	12	1							
<i>Basophile</i>	105	130									
<i>Monocytes</i>	13	90	126	6							
<i>Lymphocytes</i>			1	3	104	117	10				
<i>Plasmacells</i>	224	9	2								
<i>Blasts</i>	232	2	1								
<i>Promyelocytes</i>	232	3									
<i>Myelocytes</i>	229	5	1								
<i>Metamyelozyten</i>	231	4									
<i>Erythrocytes Nucleated</i>	234	1									
<i>Unknown</i>	229	5	1								
<i>Smudge cells</i>	221	10	4								

Evaluation H3-A

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	44	11	1	<i>Hypochromic Ec</i>	42	14	1
<i>Pelger-Hüet Anomaly</i>	2	1		<i>Polychromatic Ec</i>	9	2	
<i>Coarse Granulation</i>	68	23	1	<i>Anisocytes</i>	96	10	2
<i>Basophilic Stripling</i>	4	2		<i>Mikrocytes</i>	30	4	1
<i>Vacuoles</i>	30	2		<i>Makrocytes</i>	24	3	1
<i>Reaktive Lymphocytes</i>	49	13		<i>Megalocytes</i>	6	1	
<i>Atypical Lymphocytes</i>	4	1		<i>Poikilocytosis</i>	44	1	
<i>Others</i>	5	2		<i>Ovalocytes</i>	39	5	
				<i>Target Cells</i>	16		
				<i>Akanthocytes</i>	8	1	
<i>Anisocytosis</i>	92	21	4	<i>Echinocytes</i>	10		
<i>Megakaryocyte Nucleaus</i>	11	2		<i>Sickle Cells</i>			
<i>Granulation</i>	13	2		<i>Fragmentocytes</i>	5		
<i>Others</i>	3			<i>Spherocytes</i>	3	3	
				<i>Stomatocytes</i>	40	9	1
				<i>Basophilic Stripling</i>	3		
				<i>Howell-Jolly Bodies</i>	1		
				<i>Pappenheim Bodies</i>			
				<i>Others</i>	1	1	1

Commentary

The smear comes from a healthy donor.

1.8 Qualab Codes

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

Code	Text	Number
29	Normal findings	168
1	Neutrophils, hypersegmentation of nucleus	47
5	Atypical lymphocytes, probably reactive	34
9	Macrothrombocytes	33
30	Pathologic findings, refer to expert	33
4	Neutrophils, Toxic Changes	23
14	Hypochromic Erythrocytes	21
31	Pathologic findings	21
18	Stomatocytes	20
16	Poikilocytosis	17
12	Microcytes	15
13	Macrocytes	11
22	Rouleaux	11
11	Thrombocytes, others	10
17	Elliptocytes/Ovalocytes	10
10	Thrombocyte aggregates	8
19	Targetcells	8
2	Neutrophils, left shift	6
21	Spherocytes	4
27	Erythrocytes, other	4
8	Leucocytes other:	3
6	Atypical lymphocytes, probably neoplastic	2
15	Polychromatophilic Red Cells	2
20	Fragmentocytes	2
25	Basophilic strippling	2
26	Teardrops	2
99	Total	236

2 Sample B

2.1 ABX Microsemi CRP



Findings MQ 2019-3 H3B

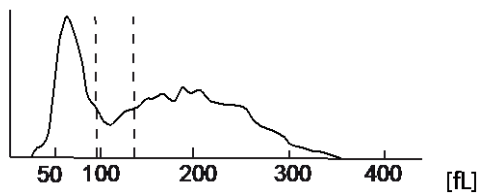
82 year old man

WBC :	5.5	10 ⁹ /L	MCV :	93.7	fL
RBC :	4.15	10 ¹² /L	MCH :	31.7	pg
HGB :	13.2	g/L	MCHC:	33.9	g/L
HCT :	38.9	L/L	RDW :	12.9	%
PLT :	208	10 ⁹ /L	MPV :	7.9	fL
PCT :	0.164	10 ⁻² /L	PDW :	15.7	%

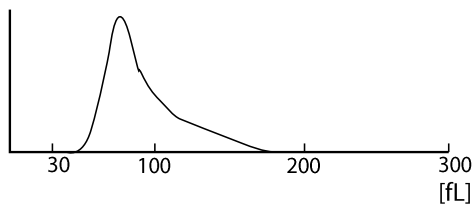
WBC FLAGS: G1

%LYM:	30.6	%	#LYM:	1.7	10 ⁹ /L
%MON:	11.0	H %	#MON:	0.6	10 ⁹ /L
%GRA:	58.4	%	#GRA:	3.2	10 ⁹ /L

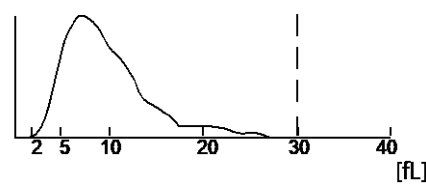
WBC



RBC



PLT



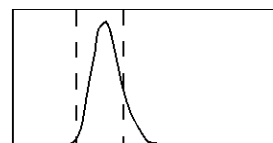
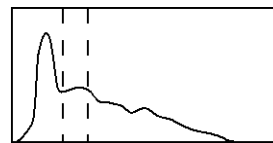
2.2 Mythic



Findings MQ 2019-3 H3B

82 year old man

WBC	5.6	$10^9/l$	3.5 /	10.0
LYM	1.8	$10^9/l$	1.2 /	3.2
MON	1.0	$10^9/l$	0.1 /	1.0
GRA	2.8	$10^9/l$	1.2 /	6.8
LYM%	32.4	%	17.0 /	48.0
MON%	18.1	H %	2.0 /	10.0
GRA%	49.5	%	43.0 /	76.0
RBC	4.29	$10^{12}/l$	4.00 /	5.70
HGB	142	g/l	120 /	180
HCT	0.145	l/l	0.360 /	0.540
MCV	96.7	fl	80.0 /	100.0
MCH	33.1	pg	26.0 /	34.0
MCHC	342	g/l	310 /	365
RDW	14.0	%	10.0 /	16.0
PLT	240	$10^9/l$	150 /	400
MPV	8.5	fl	7.0 /	11.0
PCT	0.204	cl/l	0.100 /	0.500
PDW	15.6	%	10.0 /	18.0



FLAGS:

2.3 Sysmex XP300



Findings MQ 2019-3 H3B 82 year old man

WBC		5.7	$10^3/\mu\text{L}$	
RBC	-	4.18	$10^6/\mu\text{L}$	
HGB		13.5	g/dL	
HCT		39.6	%	
MCV		94.7	fL	
MCH		32.3	pg	
MCHC		34.1	g/dL	
PLT		218	$10^3/\mu\text{L}$	
LYM%		31.3	%	
MXD%	+	25.8	%	
NEUT%	-	42.9	%	
LYM#		1.8	$10^3/\mu\text{L}$	
MXD#	+	1.5	$10^3/\mu\text{L}$	
NEUT#		2.4	$10^3/\mu\text{L}$	
RDW_SD	+	50.7	fL	
RDW_CV		13.8	%	
PDW		13.3	fL	
MPV		10.3	fL	
P_LCR		29.5	%	
PCT		0.22	%	

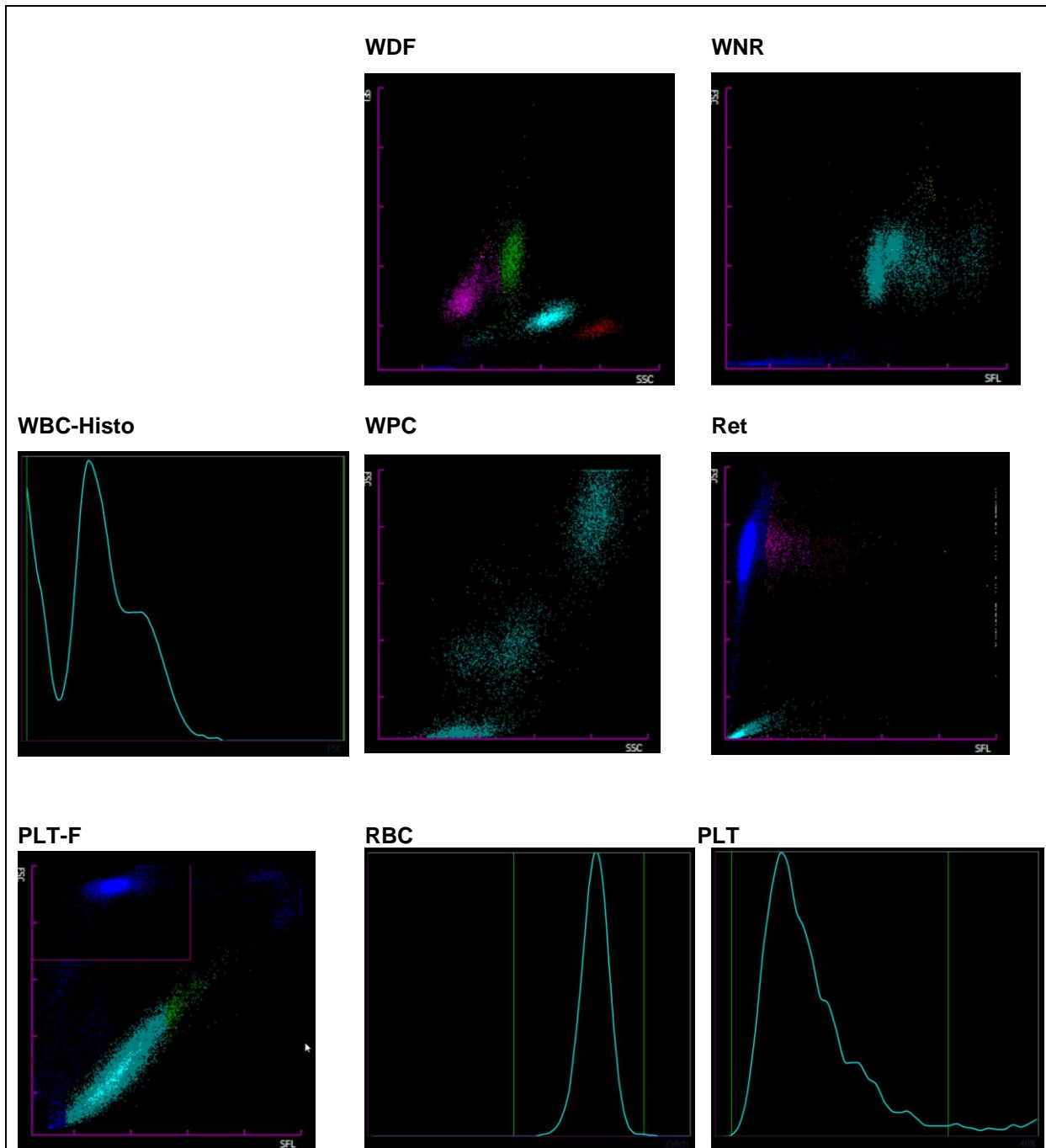
2.4 Sysmex XN-20



Findings MQ 2019-3 H3B 82 year old man

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	137	g/l	117-153
Hematocrit	0.410	l/l	0.35-0.46
Erythrocytes	4.40	T/l	3.9-5.2
MCV	93.2	fl	80-100
MCH	31.1	pg	26-34
MCHC	334	g/l	310-360
Thrombocytes	179	G/l	143-400
Leucocytes	5.88	G/l	3.0-9.6
Leucocyte Differentiation			
Neutrophils	2.47	G/l	1.40-8.00
Monocytes	* 1.19	G/l	0.16-0.95
Eosinophils	0.31	G/l	0.00-0.70
Basophils	0.05	G/l	0.00-0.15
Lymphocytes	1.86	G/l	1.50-4.00
IG abs.	0.02	G/l	0.00-0.03
IG %	0.3	%	0.0-0.5
NRBC abs.	0.01	G/l	
NRBC	0.2	/100 Lc	

Findings HAD MQ 2019-2 H3B

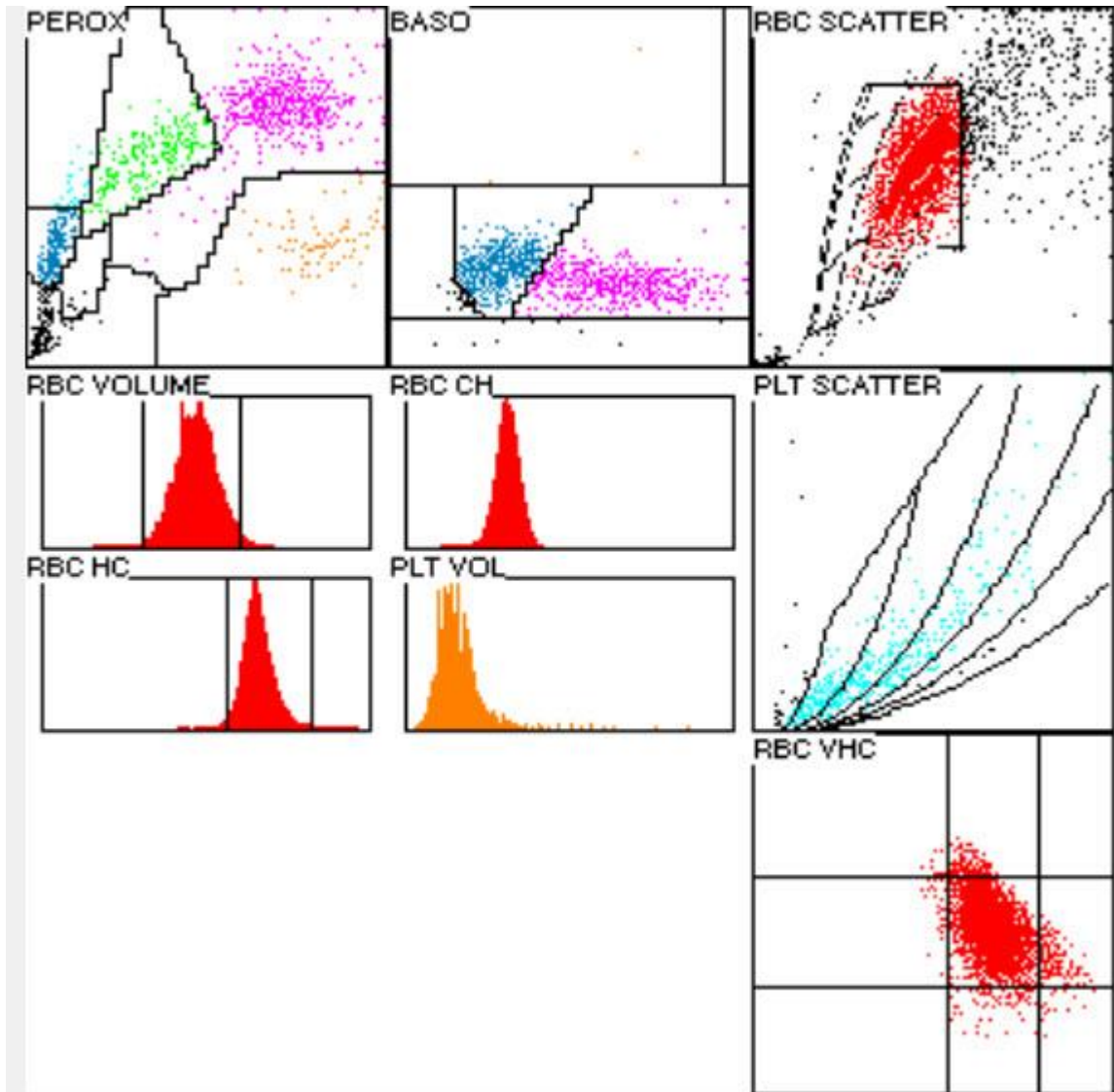


2.5 ADVIA 2120



Findings HAD MQ 2019-3 H3B 82 year old man

Analysis	Result	Unit	Reference value
Blood Count			
Hemoglobin	136	g/l	117-153
Hematocrit	0.413	l/l	0.35-0.46
Erythrocytes	4.41	T/l	3.9-5.2
MCV	93.8	fl	80-100
MCH	30.9	pg	26-34
MCHC	330	g/l	310-360
Mikrocytes	0.6	%	0-2.0
Makrocytes	1.7	%	0-2.0
Hypochromic Ec	1.2	%	0-2.0
Hyerchromic Ec	0.6	%	0-2.0
RDW	13.8	%	11.0-0-14.8
Thrombocytes	187	G/l	143-400
Leukocytes	6.13		G/l
Leucocytes Differentiation			
Neutrophils	2.72	G/l	1.40-8.00
Monocytes	* 1.06	G/l	0.16-0.95
Eosinophils	0.32	G/l	0.00-0.70
Basophils	0.03	G/l	0.00-0.15
Lymphocytes	1.85	G/l	1.50-4.00
LUC	0.16	%	0.0-4.0



2.6 Differential Blood Smear

Findings MQ 2019-3 H3B

82 year old man

Analysis	Result	Unit	Reference value
Leucocytes Differentiation			
Neutrophils total	2.79	G/l	1.40-8.00
Monocytes	* 1.07	G/l	0.16-0.95
Eosinophils	0.31	G/l	0.00-0.70
Basophils	0.06	G/l	0.00-0.15
Lymphocytes	1.90	G/l	1.50-4.00
Neutrophils total	45.5	%	40.0-74.0
Neutrophils Band	8.0	%	0.0-20.0
Neutrophils Segmented	37.5	%	30.0-50.0
Monocytes	* 17.5	%	3.4-9.0
Eosinophils	5.0	%	0.0-7.0
Basophils	1.0	%	0.0-1.5
Lymphocytes	31.0	%	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
Others/ damaged cells	0.0	%	0

Commentary

Red blood cell count normochromic, normocytic. Slight formation of money rolls. Neutrophilic granulocytes with fine cytoplasmic granulation. Few lymphocytes are reactive, few lymphoplasmocytoid altered. Slight anisocytosis of the thrombocytes.

K. Schreiber / PD. Dr. St. Balabanov



Abb 1. Neutrophil (Seg)

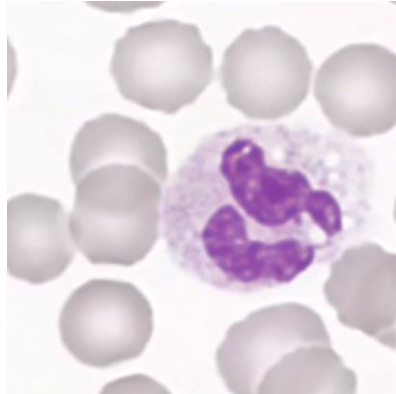


Abb 2. Neutrophil (Seg)

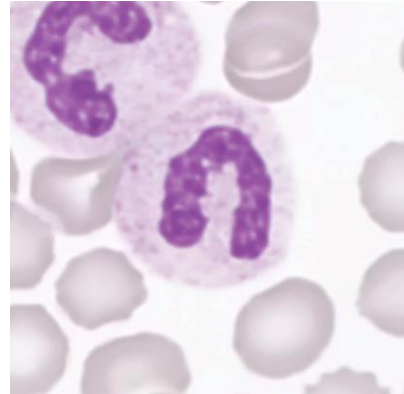


Abb 3. Neutrophil (band)

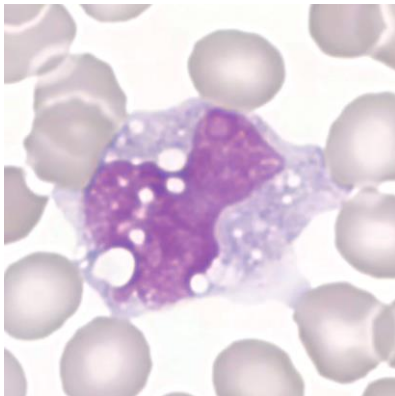


Abb 4. Monocyte

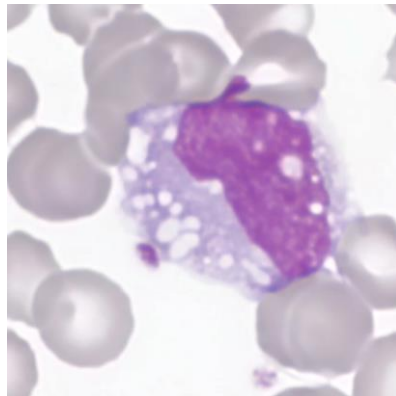


Abb 5. Monocyte

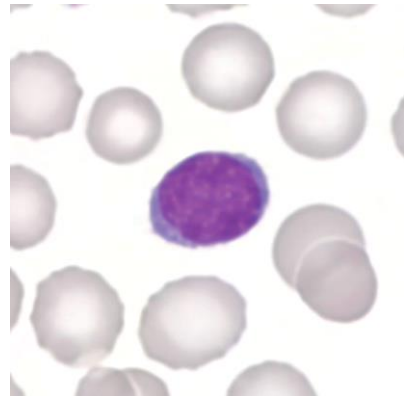


Abb 6. Lymphocyte

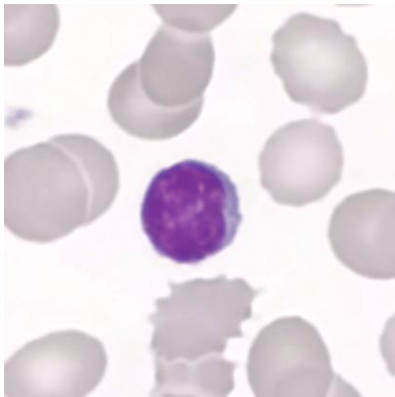


Abb 7. Lymphocyte

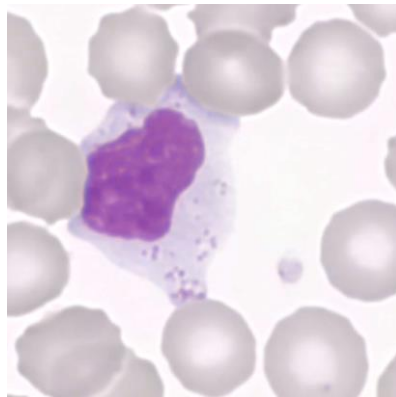


Abb 8. Reactive lymphocyte

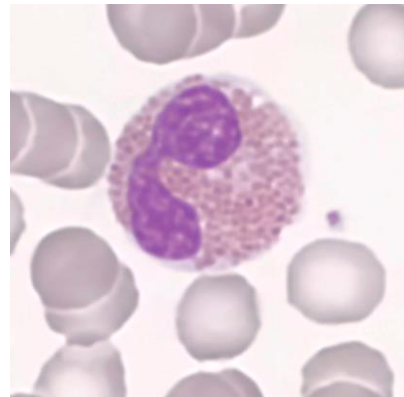


Abb 9. Eosinophil

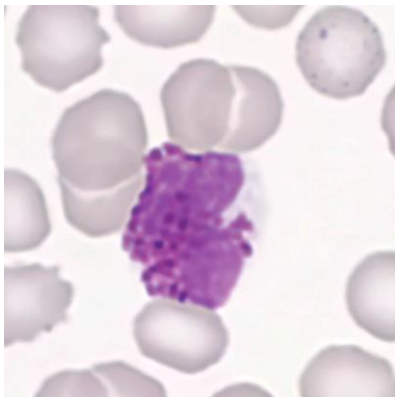


Abb 10. Basophile

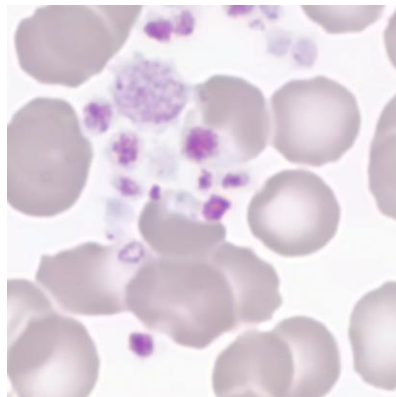


Abb 11. Platelets

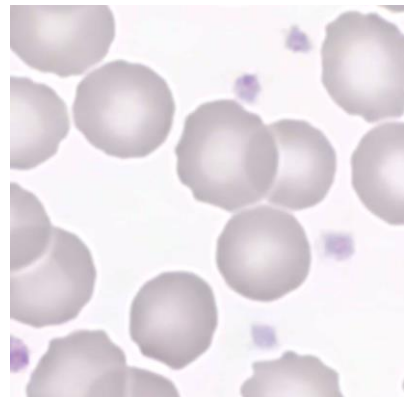


Abb 12. Erythrocytes and Platelets

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>	3	40	81	90	17	2	1				
<i>Neutrophils Segmented.</i>				5	64	126	36	3			
<i>Eosinophils</i>	3	126	101	4							
<i>Basophile</i>	76	158									
<i>Monocytes</i>	6	27	44	104	50	2					1
<i>Lymphocytes</i>			1	2	36	124	59	12			
<i>Plasmacells</i>	225	6	3								
<i>Blasts</i>	224	3	2	4		1					
<i>Promyelocytes</i>	225	8		1							
<i>Myelocytes</i>	220	10	1	3							
<i>Metamyelozyten</i>	226	7	1								
<i>Erythrocytes Nucleated</i>	231	3									
<i>Unknown</i>	215	9	5	5							
<i>Smudge cells</i>	196	25	11	2							

Evaluation H3-B

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	16	5		<i>Hypochromic Ec</i>	26	6	2
<i>Pelger-Hüet Anomaly</i>	2			<i>Polychromatic Ec</i>	31	8	2
<i>Coarse Granulation</i>	46	10		<i>Anisocytes</i>	107	22	3
<i>Basophilic Stripling</i>	12			<i>Mikrocytes</i>	46	5	1
<i>Vacuoles</i>	59	31	4	<i>Makrocytes</i>	29	8	1
<i>Atypical Lymph, reactive</i>	55	17	5	<i>Megalocytes</i>	5	1	
<i>Atypical Lymph, neoplastic</i>	5	2	1	<i>Poikilocytosis</i>	73	19	2
<i>Others</i>	6	7		<i>Ovalocytes</i>	37	4	1
				<i>Target Cells</i>	8	2	
				<i>Akanthocytes</i>	36	26	7
<i>Anisocytosis</i>	83	25	1	<i>Echinocytes</i>	51	54	20
<i>Megakaryocyte Nucleaus</i>	11			<i>Sickle Cells</i>	2		1
<i>Granulation</i>	12	2		<i>Fragmentocytes</i>	49	4	
<i>Others</i>	5			<i>Spherocytes</i>	9	1	
				<i>Stomatocytes</i>	2		
				<i>Basophilic Stripling</i>	30	1	
				<i>Howell-Jolly Bodies</i>	3		
				<i>Pappenheim Bodies</i>	4		
				<i>Others</i>	5	2	

Commentary

The smear comes from a patient with a chronic obstructive pulmonary disease.

2.8 Qualab Codes

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

Code	Text	Number
30	Pathologic findings, refer to expert	122
31	Pathologic findings	65
5	Atypical lymphocytes, probably reactive	58
27	Erythrocytes, other	49
16	Poikilocytosis	47
4	Neutrophils, Toxic Changes	34
20	Fragmentocytes	34
8	Leucocytes other:	27
29	Normal findings	26
1	Neutrophils, hypersegmentation of nucleus	24
12	Microcytes	19
15	Polychromatophilic Red Cells	18
6	Atypical lymphocytes, probably neoplastic	17
9	Macrothrombocytes	15
22	Rouleaux	15
14	Hypochromic Erythrocytes	13
10	Thrombocyte aggregates	11
17	Elliptocytes/Ovalocytes	11
13	Macrocytes	10
2	Neutrophils, left shift	8
25	Basophilic strippling	8
21	Spherocytes	6
11	Thrombocytes, others	4
19	Targetcells	4
26	Teardrops	3
24	Howell-Jolly bodies	2
18	Stomatocytes	1
99	Total	235