

Verein für  
Association pour le  
Associazione per il



medizinische Qualitätskontrolle  
contrôle de qualité médical  
controllo di qualità medico

Report

# Differential Blood Smear H3

MQ 2019-1

## 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](http://www.haematologie.usz.ch)

For information regarding all analyses offered by the University Hospital of Zurich, see:

[www.uzl.usz.ch](http://www.uzl.usz.ch)

(c) 2017 Verein für medizinische Qualitätskontrolle

# Index

<b>1</b>	<b>SAMPLE A</b>	<b>4</b>
1.1	ABX Microsemi CRP	4
1.2	Mythic	5
1.3	Sysmex XP300	6
1.4	Sysmex XE-5000	7
1.5	ADVIA 2120	9
1.6	Differential Blood Smear	11
1.7	Summary of participant results	13
1.8	Qualab Codes	14
<b>2</b>	<b>SAMPLE B</b>	<b>15</b>
2.1	ABX Microsemi CRP	15
2.2	Mythic	16
2.3	Sysmex XP300	17
2.4	Sysmex XE-5000	18
2.5	ADVIA 2120	20
2.6	Differential Blood Smear	22
2.7	Summary of participant results	24
2.8	Qualab Codes	25

# 1 Sample A

## 1.1 ABX Microsemi CRP



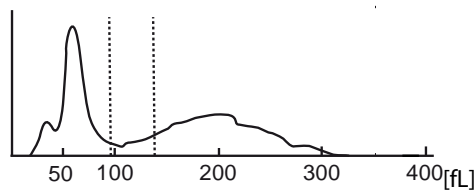
### Findings MQ 2019-1 H3A

29 year old man

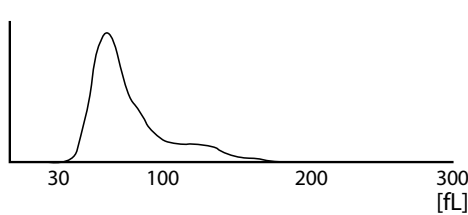
WBC :	6.7	10 <sup>9</sup> /L	MCV :	83.0	fL
RBC :	6.05	H 10 <sup>12</sup> /L	MCH :	27.7	pg
HGB :	16.8	H g/L	MCHC:	33.4	g/L
HCT :	50.2	H L/L	RDW :	12.0	%
PLT :	178	10 <sup>9</sup> /L	MPV :	8.2	fL
PCT :	0.145	10 <sup>-2</sup> L/L	PDW :	16.8	%

DIFF:					
%LYM:	41.7	%	#LYM:	2.8	10 <sup>9</sup> /L
%MON:	6.9	%	#MON:	0.5	10 <sup>9</sup> /L
%GRA:	51.4	%	#GRA:	3.4	10 <sup>9</sup> /L

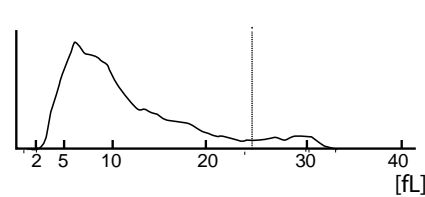
WBC



RBC



PLT

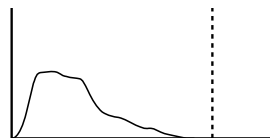
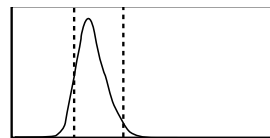
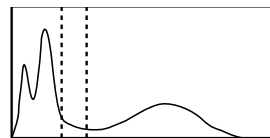


## 1.2 Mythic



### Findings MQ 2019-1 H3A 29 year old man

WBC	7.5	10 <sup>9</sup> /l	3.5 /	10.0
LYM	3.2	10 <sup>9</sup> /l	1.2 /	3.2
MON	0.5	10 <sup>9</sup> /l	0.1 /	1.0
GRA	3.9	10 <sup>9</sup> /l	1.2 /	6.8
LYM%	42.1	%	17.0 /	48.0
MON%	6.4	%	2.0 /	10.0
GRA%	51.5	%	43.0 /	76.0
RBC	5.67	10 <sup>12</sup> /l	4.00 /	5.70
HGB	166	g/l	140 /	180
HCT	0.465	l/l	0.420 /	0.540
MCV	82.0	fl	80.0 /	100.0
MCH	29.3	pg	26.0 /	34.0
MCHC	357	g/l	310 /	365
RDW	15.7	%	10.0 /	16.0
PLT	151	10 <sup>9</sup> /l	150 /	400
MPV	9.6	fl	7.0 /	11.0
PCT	0.145	cl/l	0.100 /	0.500
PDW	13.2	%	10.0 /	18.0

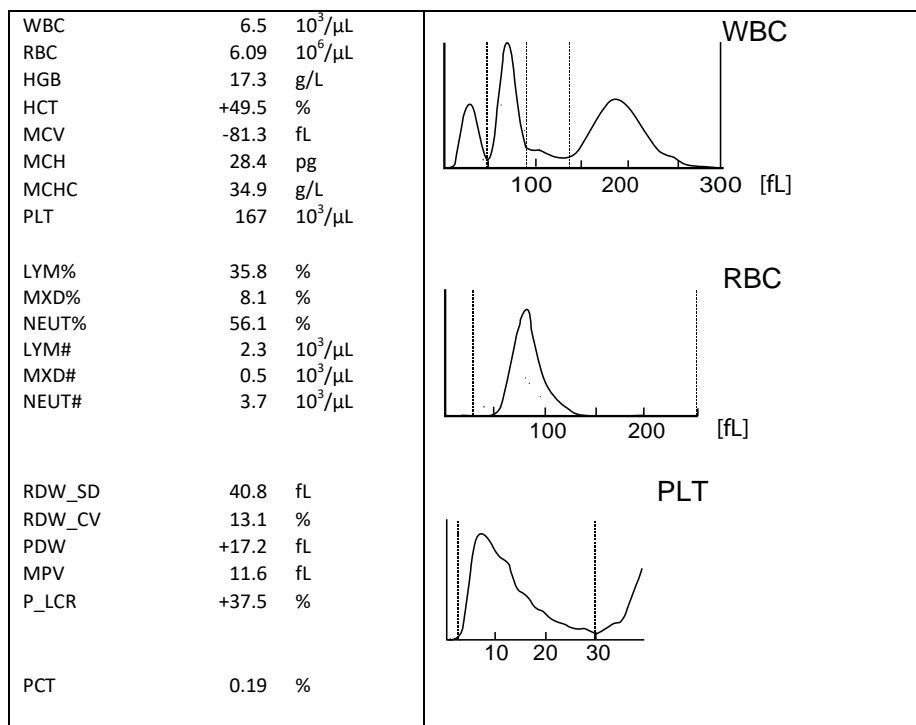


FLAGS :

### 1.3 Sysmex XP300



**Findings MQ 2019-1 H3A**  
29 year old man



## 1.4 Sysmex XE-5000

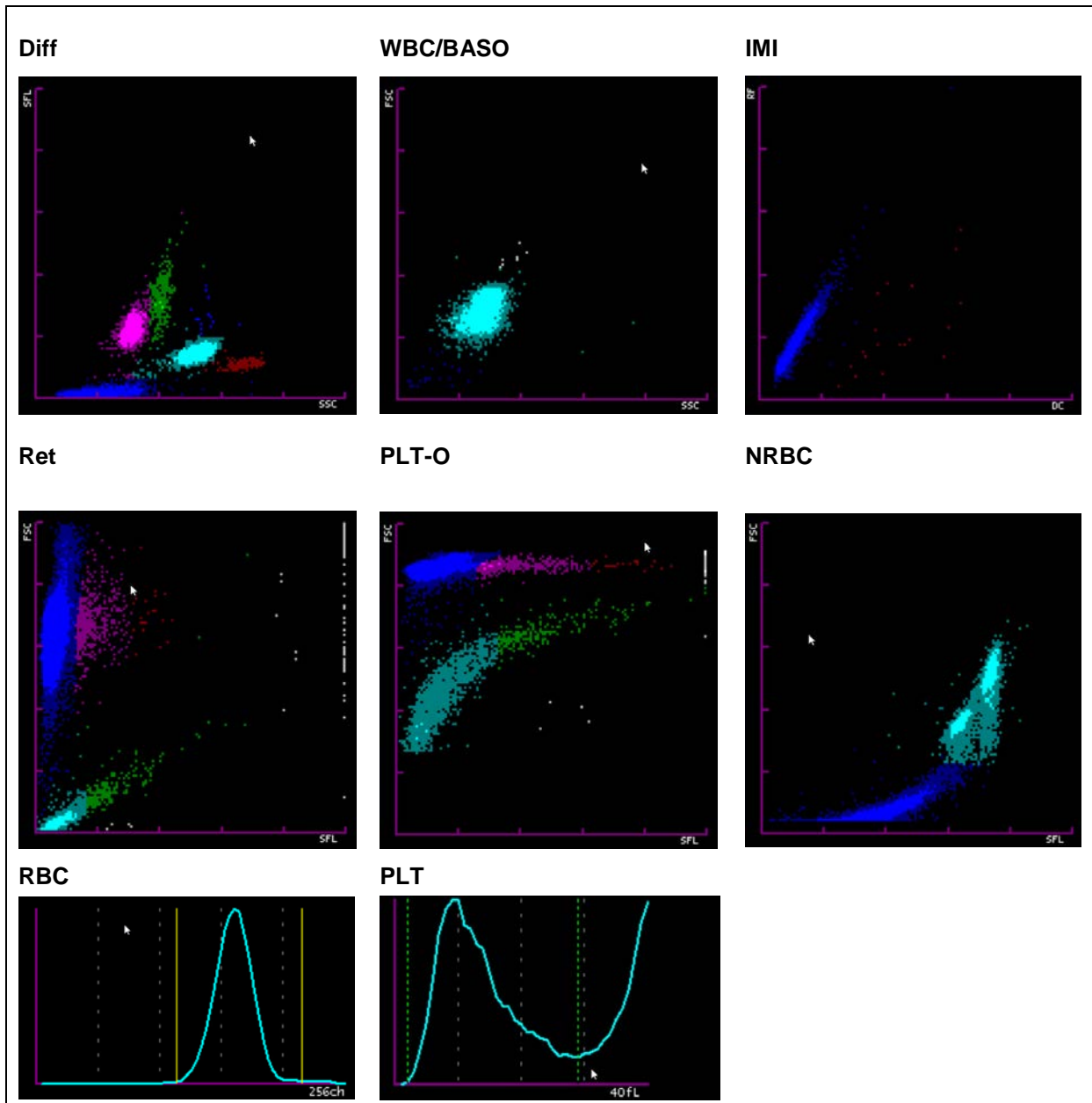


### Findings MQ 2019-1 H3A

29 year old man

Analysis	Result	Unit	Reference value
<b>Blood Count</b>			
<u>Hemoglobin</u>	173	g/l	
<u>Hematocrit</u>	0.509	l/l	
Erythrocytes	6.16	T/l	
MCV	82.6	fl	80-100
MCH	28.1	pg	26-34
MCHC	340	g/l	310-360
Mikrocytes	13.2	%	11.0-14.8
<u>Thrombocytes</u>	160	G/l	143-400
<u>Leucocytes</u>	6.42	G/l	3.0-9.6
<b>Leucocyte Differentiation</b>			
Neutrophils	3.37	G/l	1.40 – 8.00
Monocytes	0.46	G/l	0.16 – 0.95
Eosinophils	0.16	G/l	0.00 – 0.70
Basophils	0.01	G/l	0.00-0.15
Lymphocytes	2.42	G/l	1.50 - 4.00
IG abs.	0.02	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 2019-1 H3A



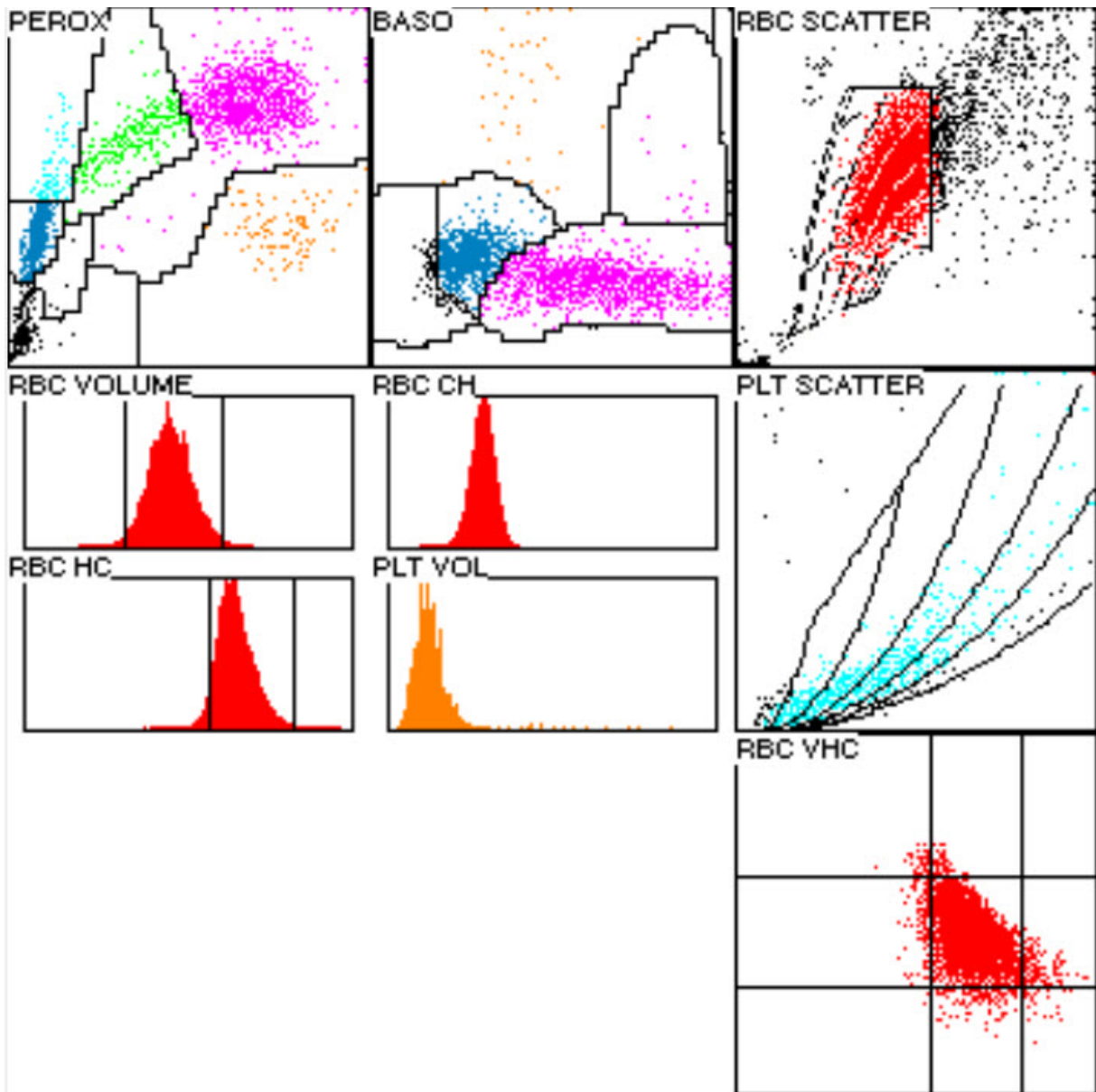


## 1.5 ADVIA 2120



### Findings HAD MQ 2019-1 H3A 29 year old man

Analysis	Result	Unit	Reference value
<b>Blood Count</b>			
<u>Hemoglobin</u>	171	g/l	
<u>Hematocrit</u>	0.517	l/l	
Erythrocytes	6.21	T/l	
MCV	83.1	fl	80-100
MCH	27.4	pg	26-34
MCHC	330	g/l	310-360
Mikrocytes	1.2	%	0-2.0
Macrocytes	0.1	%	0-2.0
Hypochromic Ec	0.6	%	0-2.0
Hyperchromic Ec	0.7	%	0-2.0
RDW	12.9	%	11.0-14.8
<u>Thrombocytes</u>	183	G/l	143-400
Vd. L-SHIFT	0	+	Keine (0)
<u>Leucocytes</u>	6.59	G/l	3.0-9.6
<b>Leucocyte Differentiation</b>			
Neutrophils	3.60	G/l	1.40-8.00
Monocytes	0.30	G/l	0.16-0.95
Eosinophils	0.18	G/l	0.00-0.70
Basophile	0.01	G/l	0.00-0.15
Lymphocytes	2.36	G/l	1.50-4.00
LUC	0.14	%	0.0-4.0



## 1.6 Differential Blood Smear

### Findings HAD MQ 2019-1 H3A

29 year old man

Analysis	Result	Unit	Reference value
Neutrophils total	3.49	G/l	1.40-8.00
Monocytes	0.36	G/l	0.16-0.95
Eosinophils	0.26	G/l	0.00-0.70
Basophils	0.03	G/l	0.00-0.15
Lymphocytes	2.44	G/l	1.50-4.00
Neutrophils total	53.0	%	40.0-74.0
Neutrophils Band	6.0	%	0.0-20.0
Neutrophils Segmented	47.0	%	30.0-50.0
Monocytes	5.5	%	3.4-9.0
Eosinophils	4.0	%	0.0-7.0
Basophils	0.5	%	0.0-1.5
Lymphocytes	37.0	%	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. Lymphocytes predominantly small, with round core, narrow-cytoplasmatic with dense chromatin structure. Distinct anisocytosis of the thrombocytes, few hypogranular forms detectable. Single giant platelets during the review.

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

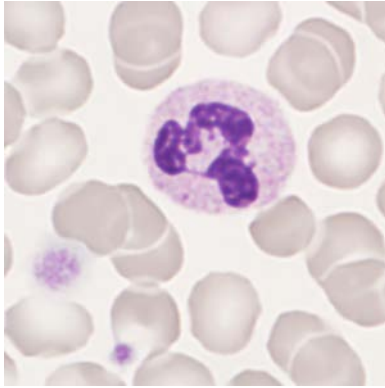


Abb 1. Neutrophile (Seg)

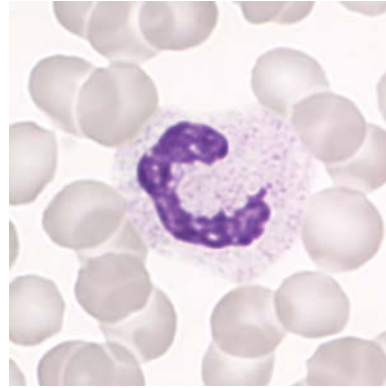


Abb 2. Neutrophile (band)

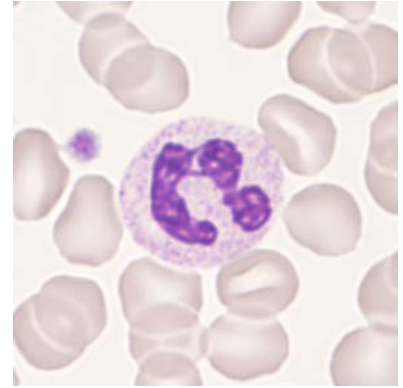


Abb 3. Neutrophile (Seg)

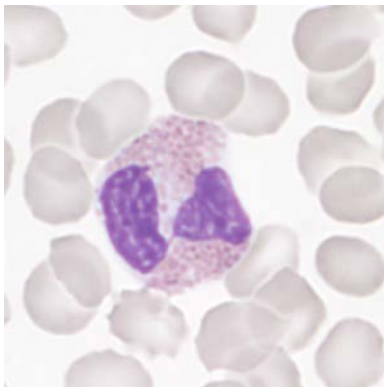


Abb 4. Eosinophile

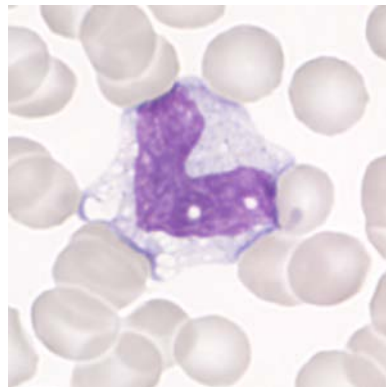


Abb 5. Monocyte

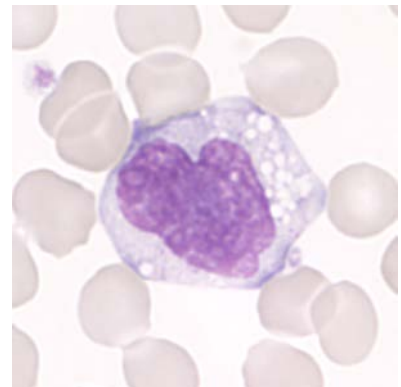


Abb 6. Monocyte

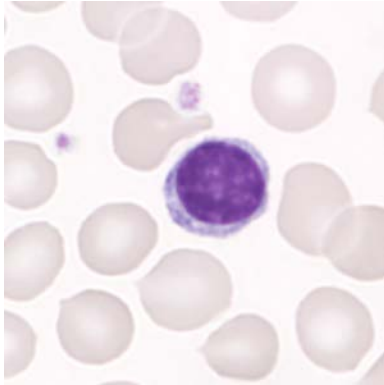


Abb 7. Lymphocyte

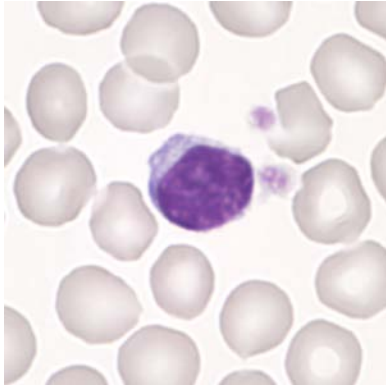


Abb 8. Lymphocyte

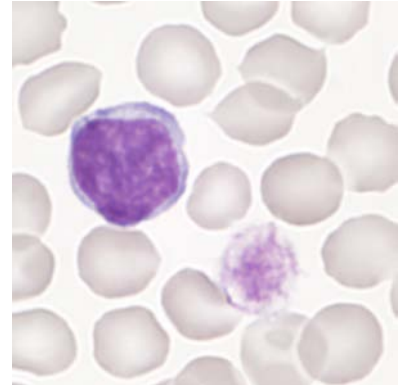


Abb 9. Lymphocyte

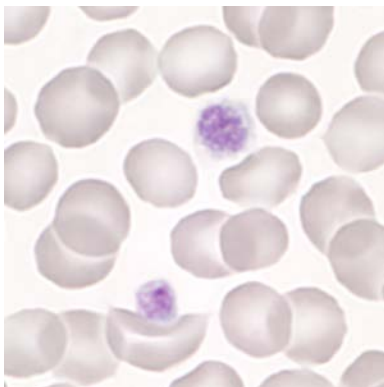


Abb 10. Platelets

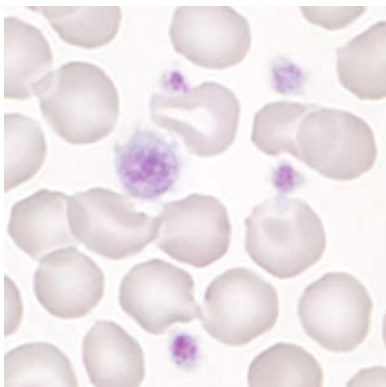


Abb 11. Platelets

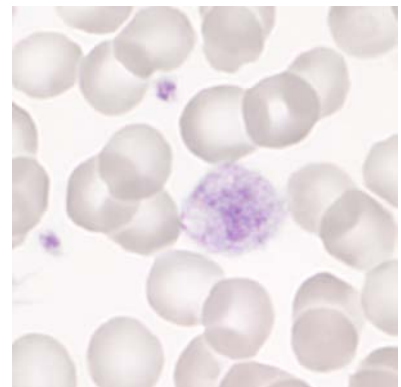


Abb 12. Platelets

## 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>	6	59	107	62	5	1		1	1		
<i>Neutrophils Segmented.</i>				3	2	40	140	53	4		
<i>Eosinophils</i>	19	213	9	1							
<i>Basophile</i>	207	35									
<i>Monocytes</i>	12	116	105	8	1						
<i>Lymphocytes</i>				3	15	119	96	7	2		
<i>Plasmacells</i>	234	6	1	1							
<i>Blasts</i>	238	2	2								
<i>Promyelocytes</i>	240	2									
<i>Myelocytes</i>	242										
<i>Metamyelocyten</i>	241	1									
<i>Erythrocytes Nucleated</i>	242										
<i>Unknown</i>	234	5	3								
<i>Smudge cells</i>	217	17	6	2							

### Evaluation H3-A

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	19	4	1	<i>Hypochromic Ec</i>	14	2	1
<i>Pelger-Hüet Anomaly</i>		1		<i>Polychromatic Ec</i>	27	1	
<i>Coarse Granulation</i>	53	6	1	<i>Anisocytes</i>	90	11	
<i>Basophilic Stripling</i>	5	1		<i>Mikrocytes</i>	38	6	
<i>Vacuoles</i>	24	2		<i>Makrocytes</i>	16	2	
<i>Reaktive Lymphocytes</i>	75	37	8	<i>Megalocytes</i>	3		
<i>Atypical Lymphocytes</i>	6	4		<i>Poikilocytosis</i>	38	2	
<i>Others</i>	3	1		<i>Ovalocytes</i>	20		
				<i>Target Cells</i>	4	1	
				<i>Akanthocytes</i>	16		
<i>Anisocytosis</i>	51	94	27	<i>Echinocytes</i>	22	8	
<i>Megakaryocyte Nucleaus</i>	17	14	3	<i>Sickle Cells</i>	1		
<i>Granulation</i>	25	10	3	<i>Fragmentocytes</i>	6		
<i>Others</i>	5	1	1	<i>Spherocytes</i>	7		
				<i>Stomatocytes</i>	4		
				<i>Basophilic Stripling</i>	3		
				<i>Howell-Jolly Bodies</i>	2		
				<i>Pappenheim Bodies</i>			
				<i>Others</i>	2		

### Commentary

The smear is from a healthy man. Because of the platelet anisocytosis we accepted "pathologic" as evaluation.

## 1.8 Qualab Codes

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

Code	Text	Number
<b>9</b>	<b>Macrothrombocytes</b>	<b>132</b>
<b>29</b>	<b>Normal findings</b>	<b>124</b>
5	Atypical lymphocytes, probably reactive	102
<b>30</b>	<b>Pathologic findings, refer to expert</b>	<b>61</b>
<b>31</b>	<b>Pathologic findings</b>	<b>53</b>
12	Microcytes	17
1	Neutrophils, hypersegmentation of nucleus	15
22	Rouleaux	14
11	Thrombocytes, others	13
4	Neutrophils, Toxic Changes	12
15	Polychromatophilic Red Cells	12
27	Erythrocytes, other	9
13	Macrocytes	8
16	Poikilocytosis	8
2	Neutrophils, left shift	7
6	Atypical lymphocytes, probably neoplastic	7
8	Leucocytes other:	7
10	Thrombocyte aggregates	6
14	Hypochromic Erythrocytes	6
17	Elliptocytes/Ovalocytes	6
20	Fragmentocytes	4
21	Spherocytes	3
26	Teardrops	3
18	Stomatocytes	2
19	Targetcells	2
25	Basophilic strippling	2
3	Pelger Hüet Anomaly	1
23	Erythrocytes agglutination	1
99	Total	255

## 2 Sample B

### 2.1 ABX Microsemi CRP



#### Findings MQ 2019-1 H3B

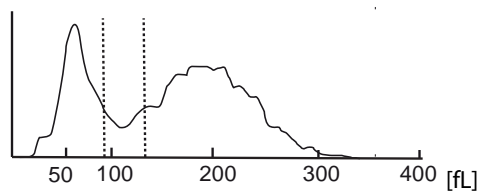
38 year old woman

WBC :	3.3	L	10 <sup>9</sup> /L	MCV :	82.6	fL
RBC :	3.45	L	10 <sup>12</sup> /L	MCH :	28.4	pg
HGB :	9.8	L	g/L	MCHC:	34.3	g/L
HCT :	28.5	L	L/L	RDW :	13.8	%
PLT :	194		10 <sup>9</sup> /L	MPV :	8.4	fL
PCT :	0.162		10 <sup>2</sup> L/L	PDW :	15.2	%

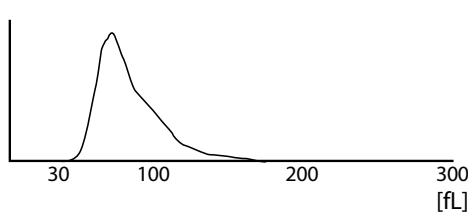
#### WBC FLAGS: L1 M2 G1

%LYM:	28.8	%	#LYM:	1.0	L	10 <sup>9</sup> /L
%MON:	9.8	%	#MON:	0.3		10 <sup>9</sup> /L
%GRA:	61.4	%	#GRA:	2.0		10 <sup>9</sup> /L

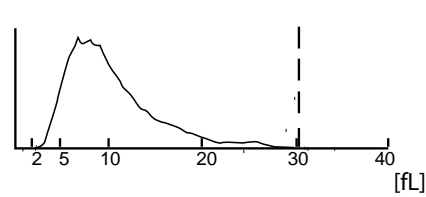
#### WBC



#### RBC



#### PLT



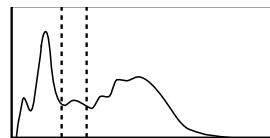
## 2.2 Mythic



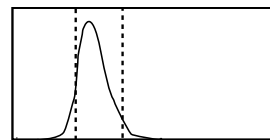
### Findings MQ 2019-1 H3B

38 year old woman

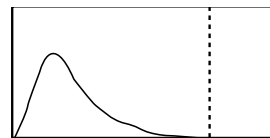
WBC	3.8	10 <sup>9</sup> /l	3.5 /	10.0
LYM	1.1	10 <sup>9</sup> /l	1.2 /	3.2
MON	0.4	10 <sup>9</sup> /l	0.1 /	1.0
GRA	2.3	10 <sup>9</sup> /l	1.2 /	6.8
LYM%	29.2	%	17.0 /	48.0
MON%	11.1	%	2.0 /	10.0
GRA%	59.7	%	43.0 /	76.0



RBC	3.40	10 <sup>12</sup> /l	4.00 /	5.70
HGB	99	g/l	120 /	180
HCT	0.203	l/l	0.360 /	0.540
MCV	83.2	fl	80.0 /	100.0
MCH	29.1	pg	26.0 /	34.0
MCHC	350	g/l	310 /	365
RDW	15.3	%	10.0 /	16.0



PLT	188	10 <sup>9</sup> /l	150 /	400
MPV	8.9	fl	7.0 /	11.0
PCT	0.167	cl/l	0.100 /	0.500
PDW	13.8	%	10.0 /	18.0



FLAGS: FL3 LYMPHOPENIA MONOCYTOSIS ANEMIA



### 2.3 Sysmex XP300



#### Findings MQ 2019-1 H3B 38 year old woman

WBC	-3.6	$10^3/\mu\text{L}$	
RBC	-3.56	$10^6/\mu\text{L}$	
HGB	-10.2	g/dL	
HCT	-29.3	%	
MCV	-82.3	fL	
MCH	28.7	pg	
MCHC	34.8	g/dL	
PLT	193	$10^3/\mu\text{L}$	
LYM%	27.0	%	
MXD%	+17.3	%	
NEUT%	55.7	%	
LYM#	1.0	$10^3/\mu\text{L}$	
MXD#	0.6	$10^3/\mu\text{L}$	
NEUT#	2.0	$10^3/\mu\text{L}$	
RDW_SD	40.1	fL	
RDW_CV	12.8	%	
PDW	12.6	fL	
MPV	10.1	fL	
P_LCR	26.8	%	
PCT	0.19	%	

## 2.4 Sysmex XE-5000

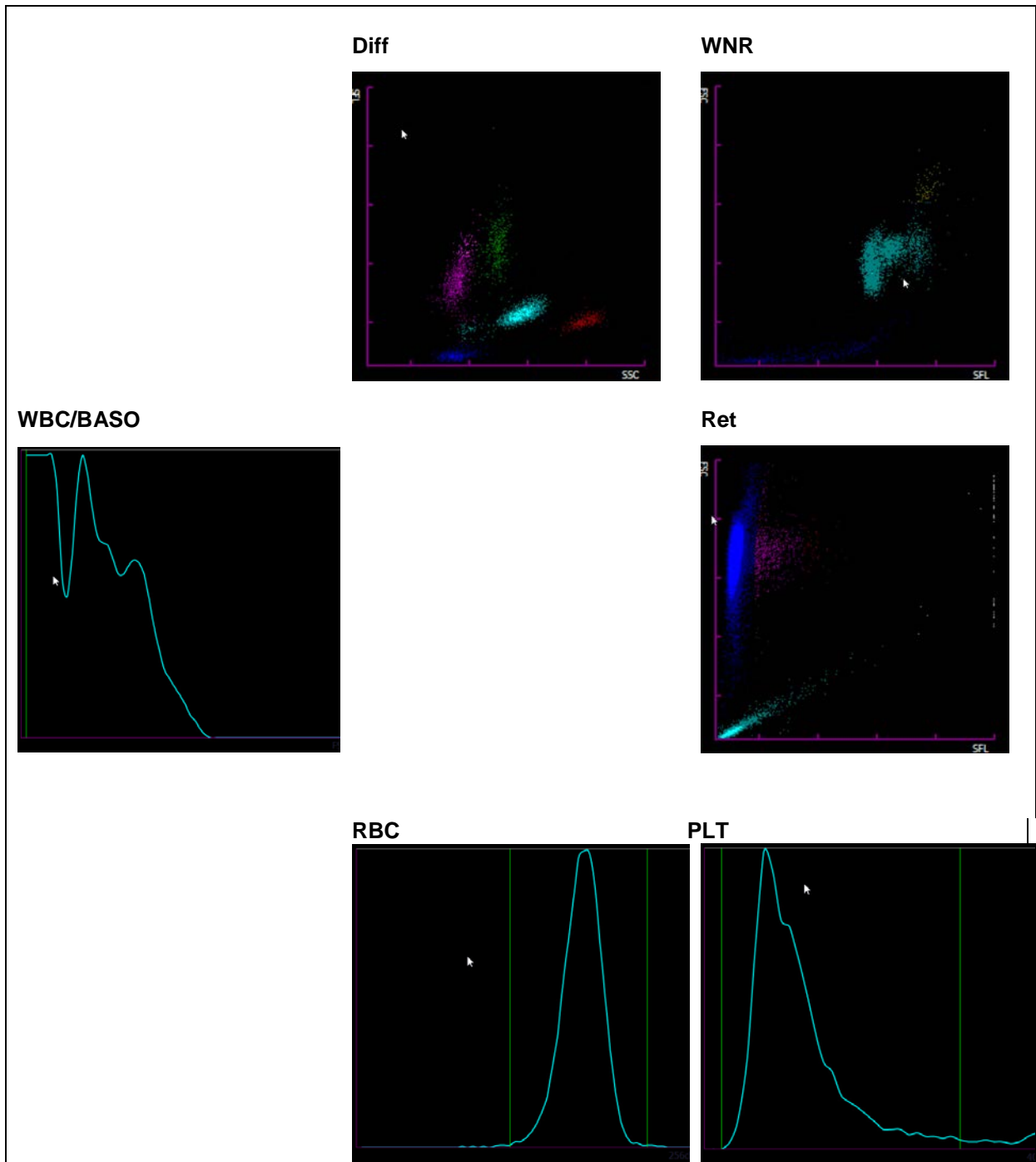


### Findings MQ 2019-1 H3B

38 year old woman

Analysis	Result	Unit	Reference value
<b>Blood Count</b>			
Hemoglobin	99	g/l	134-170
Hematocrit	0.303	l/l	0.400-0.500
Erythrocytes	3.59	T/l	4.2-5.7
MCV	84.4	fl	80-100
MCH	27.6	pg	26-34
MCHC	327	g/l	310-360
Thrombocytes	193	G/l	143-400
Leucocytes	3.49	G/l	3.0-9.6
<b>Leucocyte Differentiation</b>			
Neutrophils	53.8	G/l	1.40-8.00
Monocytes	9.5	G/l	0.16-0.95
Eosinophils	9.2	G/l	0.00-0.70
Basophils	2.0	G/l	0.00-0.15
Lymphocytes	25.5	G/l	1.50-4.00
IG abs.		G/l	0.00-0.03
IG %		%	0.0-0.5

**Findings HAD MQ 2019-1 H3B**



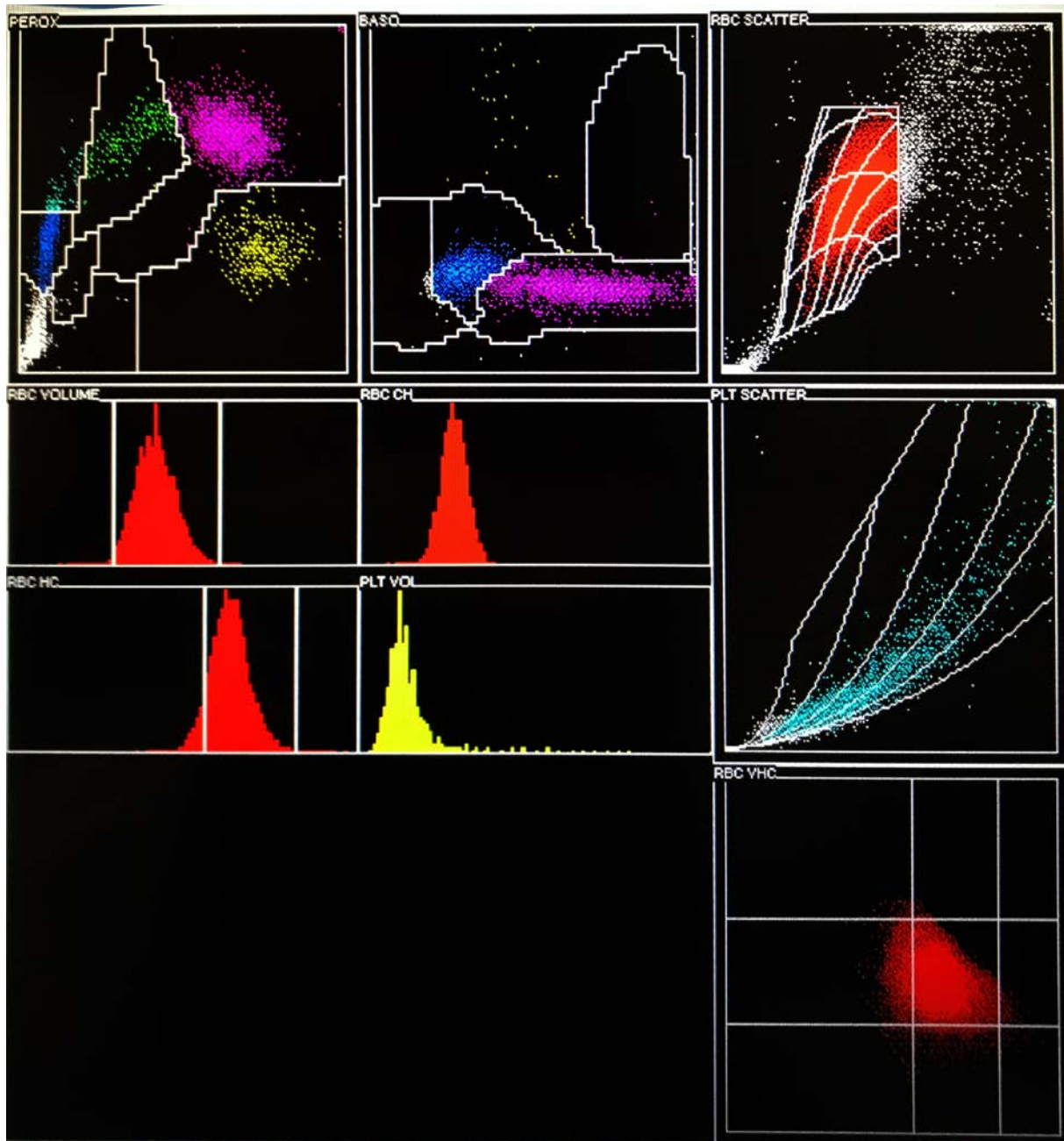
## 2.5 ADVIA 2120



### Findings HAD MQ 2019-1 H3B

38 year old woman

Analysis	Result	Unit	Reference value
<b>Blood Count</b>			
Hemoglobin	97	g/l	134-170
Hematocrit	0.304	l/l	0.400-0.500
Erythrocytes	3.58	T/l	4.2-5.7
MCV	85.0	fl	80-100
MCH	27.1	pg	26-34
MCHC	319	g/l	310-360
Mikrocytes	0.9	%	0-2.0
Makrocytes	0.2	%	0-2.0
Hypochromic Ec	* 7.3	%	0-2.0
Hyerchromic Ec	0.3	%	0-2.0
RDW	13.4	%	11.0-0-14.8
Thrombocytes	194	G/l	143-400
Leukocytes	3.49	G/l	3.0-9.6
<b>Leucocytes Differentiation</b>			
Neutrophils	1.89	G/l	1.40-8.00
Monocytes	5.8	G/l	0.16-0.95
Eosinophils	10.6	G/l	0.00-0.70
Basophils	1.2	G/l	0.00-0.15
Lymphocytes	25.2	G/l	1.50-4.00
LUC	3.0	%	0.0-4.0



## 2.6 Differential Blood Smear

### Findings MQ 2019-1 H3B

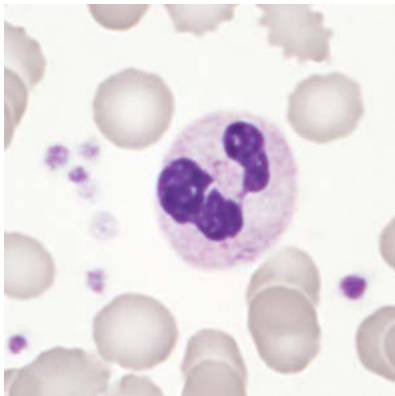
38 year old woman

Analysis	Result	Unit	Reference value
<b>Leucocytes Differentiation</b>			
Neutrophils total	1.95	G/l	1.40-8.00
Monocytes	0.23	G/l	0.16-0.95
Eosinophils	0.47	G/l	0.00-0.70
Basophils	0.07	G/l	0.00-0.15
Lymphocytes	* 0.73	G/l	1.50-4.00
Neutrophils total	56.0	%	40.0-74.0
Neutrophils Band	* 22.0	%	0.0-20.0
Neutrophils Segmented	34.0	%	30.0-50.0
Monocytes	6.5	%	3.4-9.0
Eosinophils	* 13.5	%	0.0-7.0
Basophils	* 2.0	%	0.0-1.5
Lymphocytes	21.0	%	19.0-48.0
Plasmacells	0.0	%	0-0.5
Blasts	0.0	%	0
Promyelocytes	0.0	%	0
Myelocytes	* 0.5	%	0
Metamyelocytes	* 0.5	%	0
Others/ damaged cells	0.0	%	0

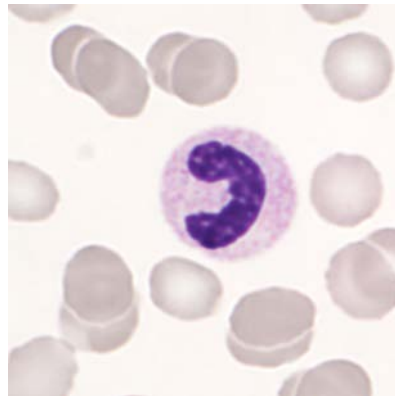
### Commentary

Red blood cell count slightly hypochromic, normocytic. Minor poikilocytosis with few ovalocytes. Minor rouleaux formation. Left shift with washout of single myeloid preliminary stages up to 0.5% myelocytes. Neutrophilic granulocytes with fine cytoplasmatic granulation. Absolute eosinophilia, eosinophils morphologically inconspicuous. Thrombocytes morphologically inconspicuous.

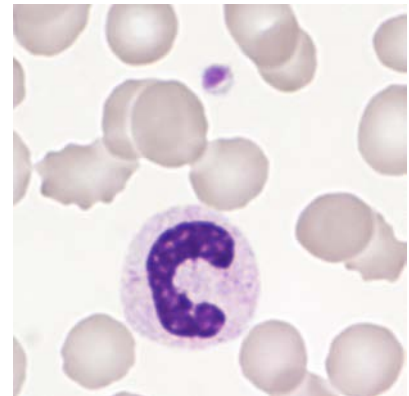
K. Schreiber / PD. Dr. St. Balabanov



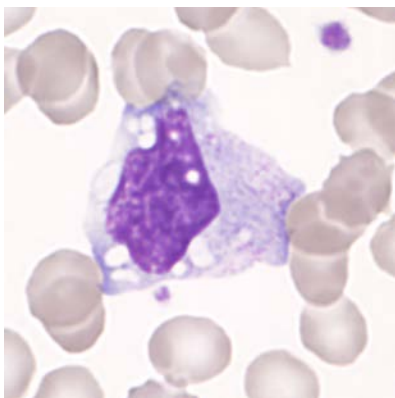
*Abb 1. Neutrophil (Seg)*



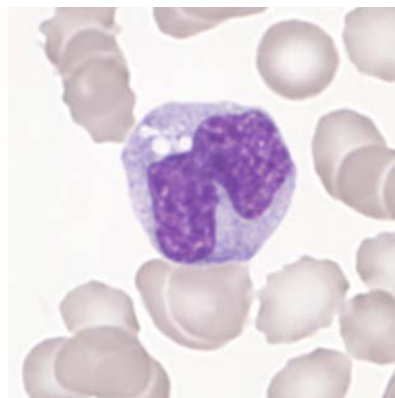
*Abb 2. Neutrophil (Band)*



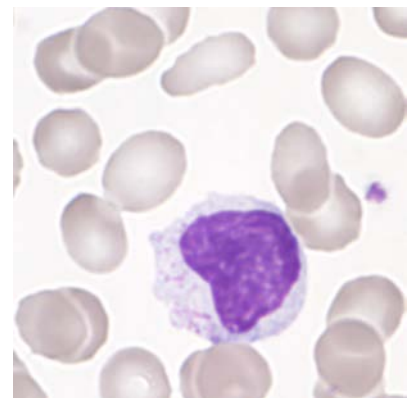
*Abb 3. Neutrophil (Band)*



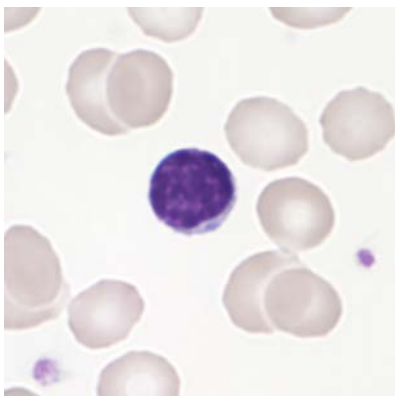
*Abb 4. Monocyte*



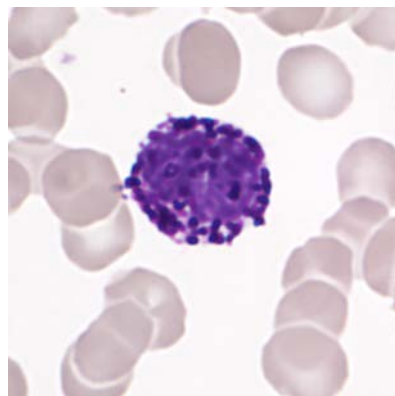
*Abb 5. Monocyte*



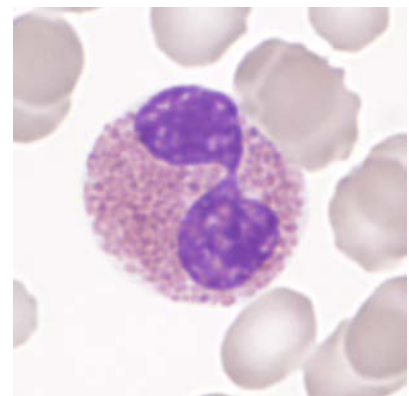
*Abb 6. Lymphocyte*



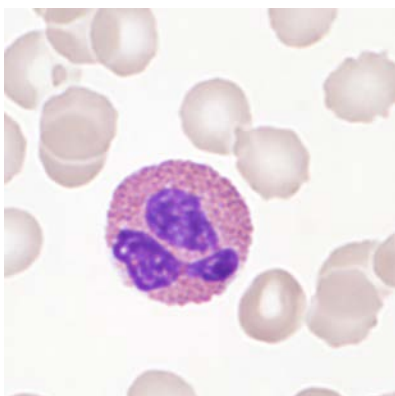
*Abb 7. Lymphocyte*



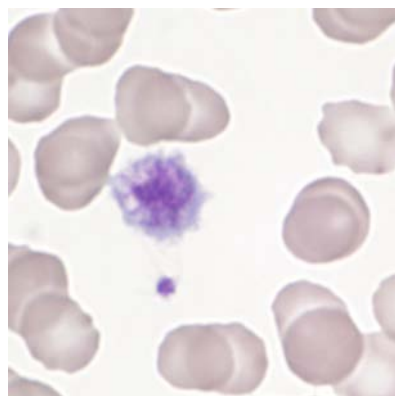
*Abb 8. Basophil*



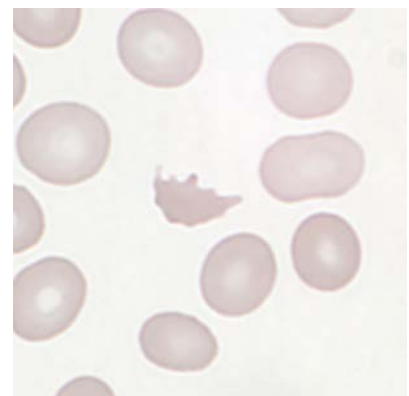
*Abb 9. Eosinophil*



*Abb 10. Platelets*



*Abb 11. Giant platelets*



*Abb 12. Acanthocyte*

## 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	4	45	74	92	16	2			
<i>Neutrophils Segmented.</i>	1		2	47	100	57	27	3			
<i>Eosinophils</i>	3	7	81	144	2						
<i>Basophile</i>	35	193	9								
<i>Monocytes</i>	14	79	133	11							
<i>Lymphocytes</i>			1	17	161	51	5		1		1
<i>Plasmacells</i>	230	7									
<i>Blasts</i>	232	3	2								
<i>Promyelocytes</i>	234	3									
<i>Myelocytes</i>	223	10	3	1							
<i>Metamyelocyten</i>	221	16									
<i>Erythrocytes Nucleated</i>	229	8									
<i>Unknown</i>	225	10		2							
<i>Smudge cells</i>	223	11	3								

### Evaluation H3-B

	light	medium	strong		light	medium	strong
<i>Hypersegmentation</i>	3	1	1	<i>Hypochromic Ec</i>	75	48	2
<i>Pelger-Hüet Anomaly</i>	9	2	1	<i>Polychromatic Ec</i>	32	6	
<i>Coarse Granulation</i>	47	10	1	<i>Anisocytes</i>	109	62	5
<i>Basophilic Stripling</i>	9			<i>Mikrocytes</i>	71	48	2
<i>Vacuoles</i>	29	5	1	<i>Makrocytes</i>	26	8	
<i>Atypical Lymph, reactive</i>	43	6	3	<i>Megalocytes</i>	7		
<i>Atypical Lymph, neoplastic</i>	3	2		<i>Poikilocytosis</i>	92	41	4
<i>Others</i>	9	1		<i>Ovalocytes</i>	115	26	2
				<i>Target Cells</i>	12	1	1
				<i>Akanthocytes</i>	53	28	2
<i>Anisocytosis</i>	90	30	7	<i>Echinocytes</i>	46	58	11
<i>Megakaryocyte Nucleaus</i>	13	3	1	<i>Sickle Cells</i>			1
<i>Granulation</i>	13	4	1	<i>Fragmentocytes</i>	25	1	
<i>Others</i>		1		<i>Spherocytes</i>	12	1	
				<i>Stomatocytes</i>	2		
				<i>Basophilic Stripling</i>	18		
				<i>Howell-Jolly Bodies</i>	1	1	
				<i>Pappenheim Bodies</i>			
				<i>Others</i>	5	1	2

### Commentary

The smear is from a patient with mild eosinophilia.



## 2.8 Qualab Codes

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

Code	Text	Number
<b>30</b>	<b>Pathologic findings, refer to expert</b>	<b>123</b>
<b>2</b>	<b>Neutrophils, left shift</b>	<b>120</b>
<b>31</b>	<b>Pathologic findings</b>	<b>85</b>
<b>16</b>	<b>Poikilocytosis</b>	<b>72</b>
14	Hypochromic Erythrocytes	68
<b>17</b>	<b>Elliptocytes/Ovalocytes</b>	<b>68</b>
12	Microcytes	61
8	Leucocytes other:	38
9	Macrothrombocytes	35
27	Erythrocytes, other	34
5	Atypical lymphocytes, probably reactive	27
22	Rouleaux	16
<b>4</b>	<b>Neutrophils, Toxic Changes</b>	<b>15</b>
15	Polychromatophilic Red Cells	13
13	Macrocytes	11
29	Normal findings	11
6	Atypical lymphocytes, probably neoplastic	9
3	Pelger Hüet Anomaly	7
11	Thrombocytes, others	7
19	Targetcells	6
20	Fragmentocytes	6
26	Teardrops	6
25	Basophilic strippling	5
10	Thrombocyte aggregates	3
1	Neutrophils, hypersegmentation of nucleus	2
21	Spherocytes	2
24	Howell-Jolly bodies	2
18	Stomatocytes	1
99	Total	254