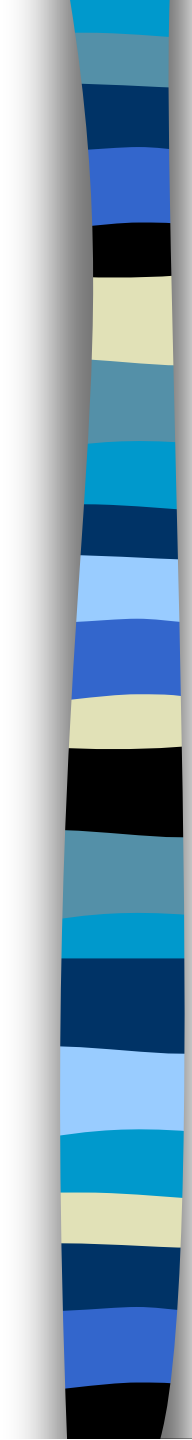


Leukocytosis

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2nd Department of Paediatrics
Semmelweis University



My first day at work in 1997

3y ♂ with fever, cough

Is this bronchitis, pneumonia, pharyngitis, sinusitis, else?

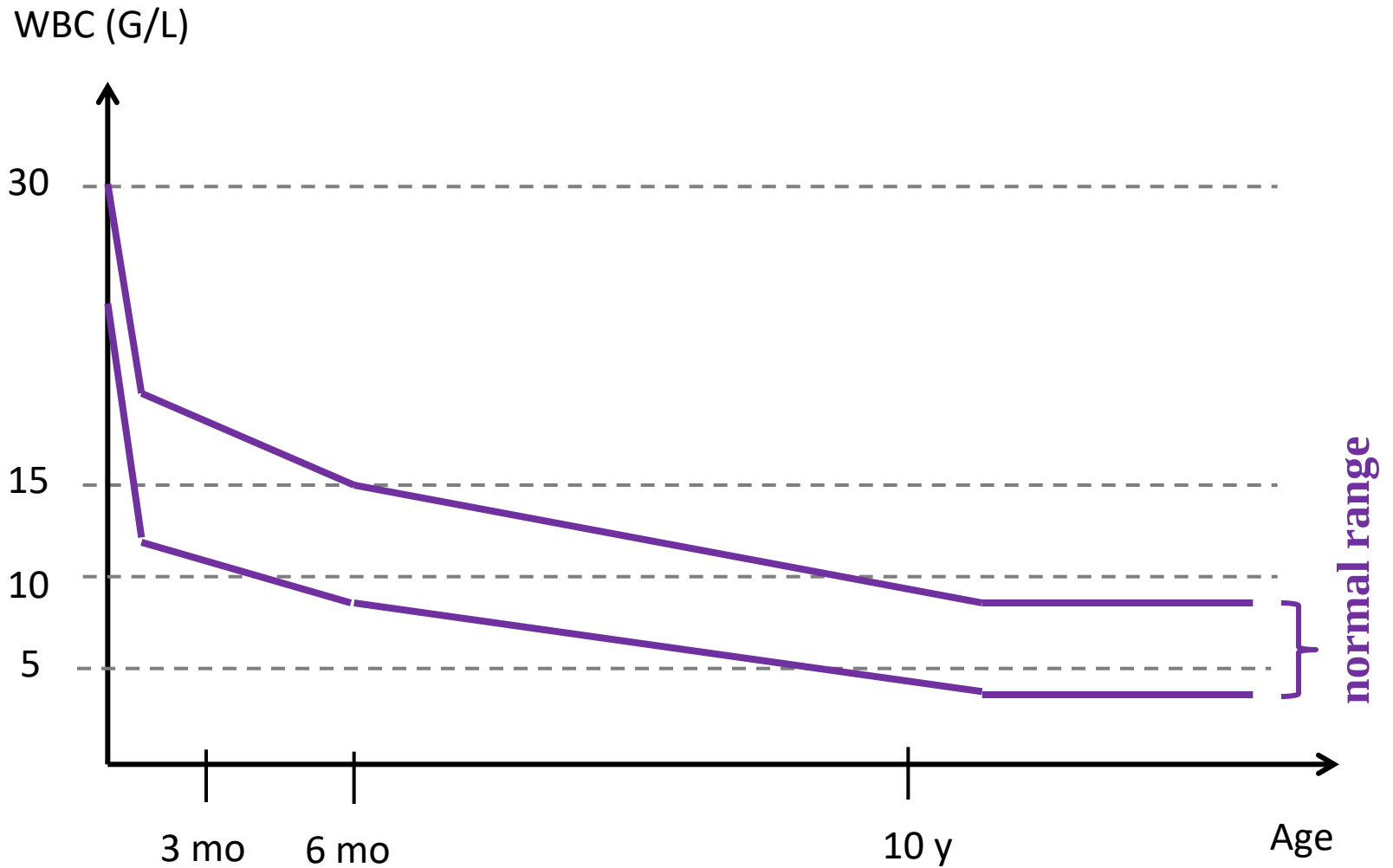
Is this severe, needing admission?

Viral or bacterial? Needing antibiotics?

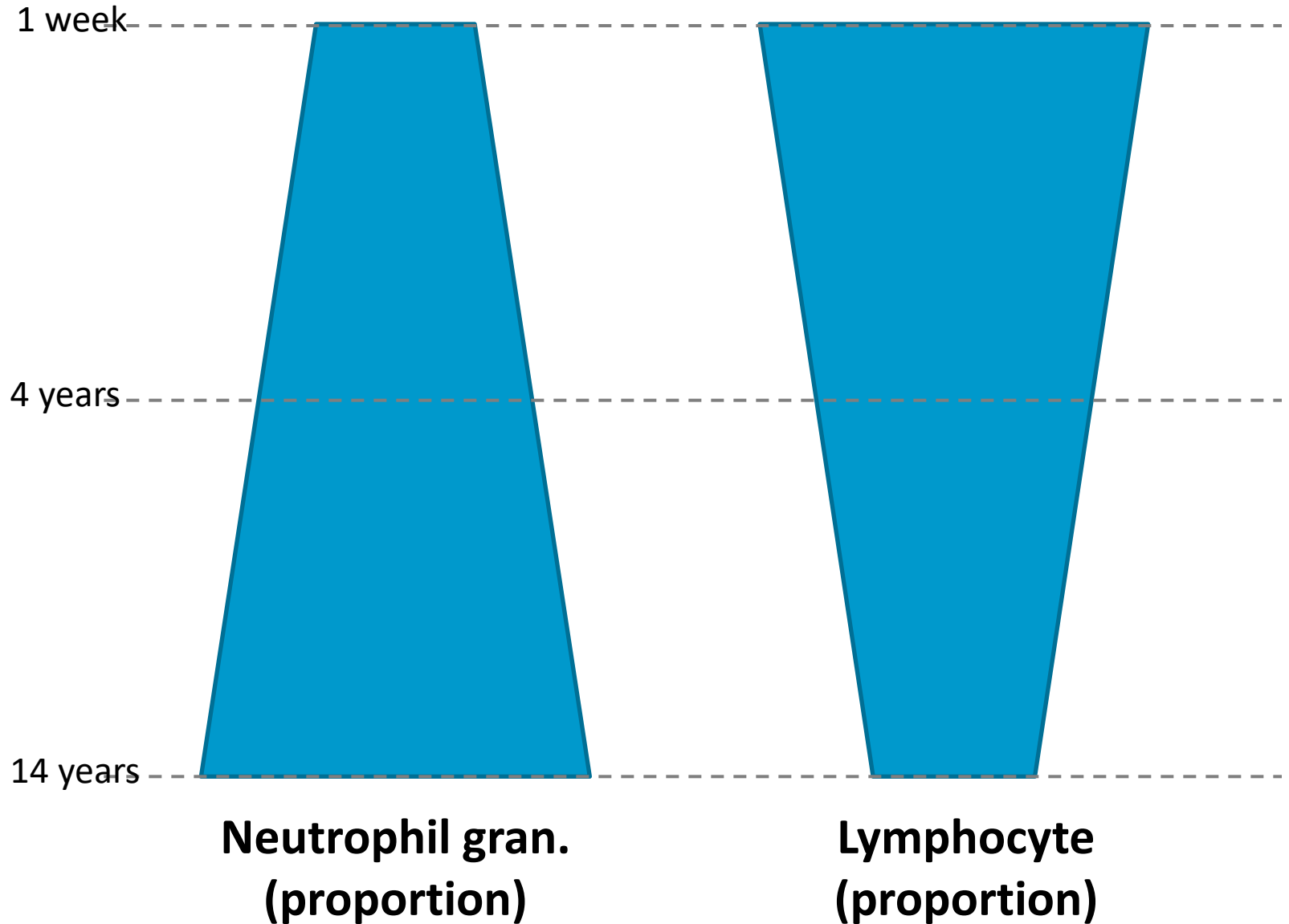
Do I need lab diagnostics, CXR or am I supposed to make the diagnosis using history and physical examination?

Evaluating lab and X-ray results was difficult, too.

Total white blood count (WBC)

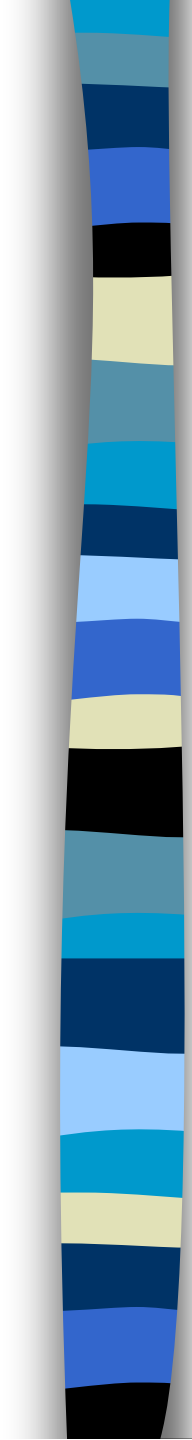


Qualitative blood count



Blood count normal values

Age	WBC (G/L)	Neutrophil granulocyte (G/L)	Lymphocyte (G/L)	Monocyte (average) (G/L)	Eosinophil (average) (G/L)
1st day	9.0-38.0	6.0-28.0	2.0-11.0	1.2	0.5
1 month	5.0-19.0	1.0-9.5	2.5-16.5	0.7	0.3
1 year	6.0-17.0	1.5-8.5	4.0-10.0	0.6	0.3
3 years	5.5-16.0	1.5-8.5	2.5-9.0	0.5	0.3
6 years	5.0-14.5	1.5-8.0	1.5-7.0	0.4	0.2
10 years	4.5-13.5	1.8-8.0	1.5-6.5	0.4	0.2
Adult	4.5-11.0	1.8-7.7	1.0-4.8	0.3	0.2



Most frequent cause of leukocytosis:

Granulocytosis –

Lymphocytosis –

Monocytosis –

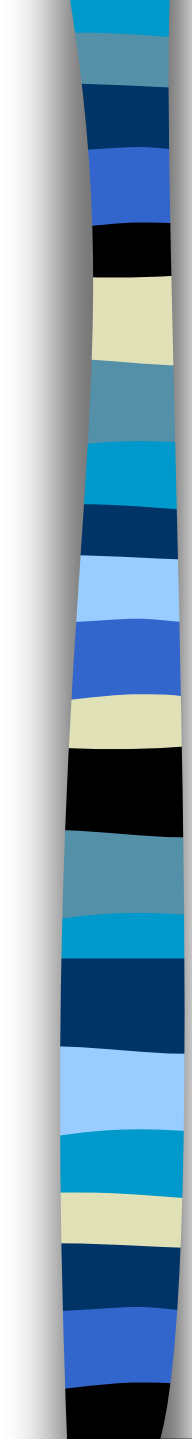
Eosinophilia –

Lot more rarely:

Inflammatory lab parameters

	Normal	Víral infections	Bacterial infections	Invasive fungal infections	Delay (1st symptoms to peak)
CRP (mg/L)	< 10	< 50	40-300	200-500	1-1.5 day
ESR (mm/h)	< 20	< 50	40-200		~ 5 days
PCT (µg/L)	< 0.1	< 0.5	1-50	< 0.5	6-12 hrs

No lab test will be 100% reliable for the differential diagnosis!



Upper airway tract infections – bacterial or viral?

Onset

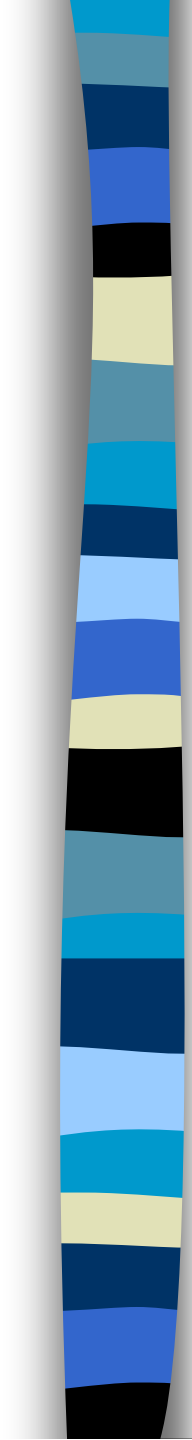
High fever

General state

Inflammation

Lymph nodes

Possible
further



Case 1

**1y♂ worsening cough, dispnoea,
low grade fever for 2½ days**

Pneumonia or viral induced wheeze?

WBC: 13 G/L

Hb: 105 g/L

Neut: 15 %

Plt: 560 G/L

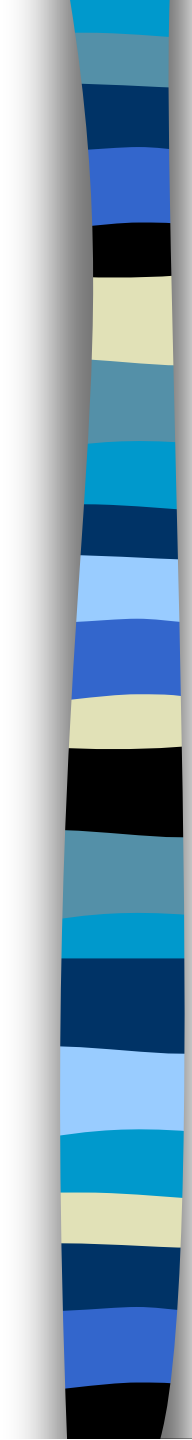
Mono: 12 %

Eos: 1 %

CRP: 21 mg/L

Bas: 0 %

Lymph: 82 %



Case 2

**1y♂ worsening cough, dispnoea,
low grade fever for 2½ days**

Pneumonia or viral induced wheeze?

WBC: 18 G/L

Hb: 138 g/L

Neut: 81 %

Plt: 240 G/L

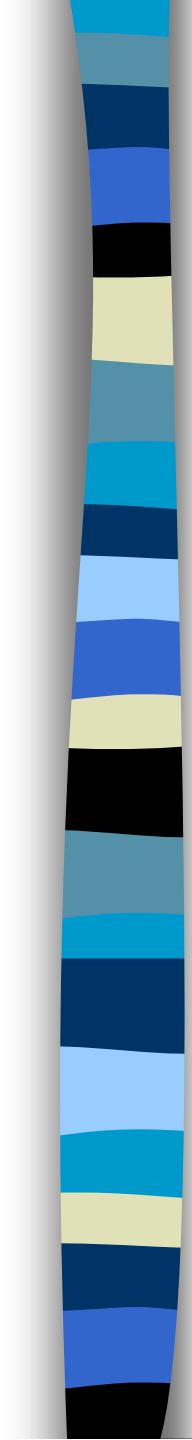
Mono: 4 %

Eos: 2 %

CRP: 79 mg/L

Bas: 0 %

Lymph: 13 %



Case 3

**2.5y♀, sore throat, fever, malaise
started ½ day back, vomit x1**

Is it a bacterial or viral infection?

WBC: 14 G/L

Hb: 117 g/L

Neut: 70 %

Plt: 180 G/L

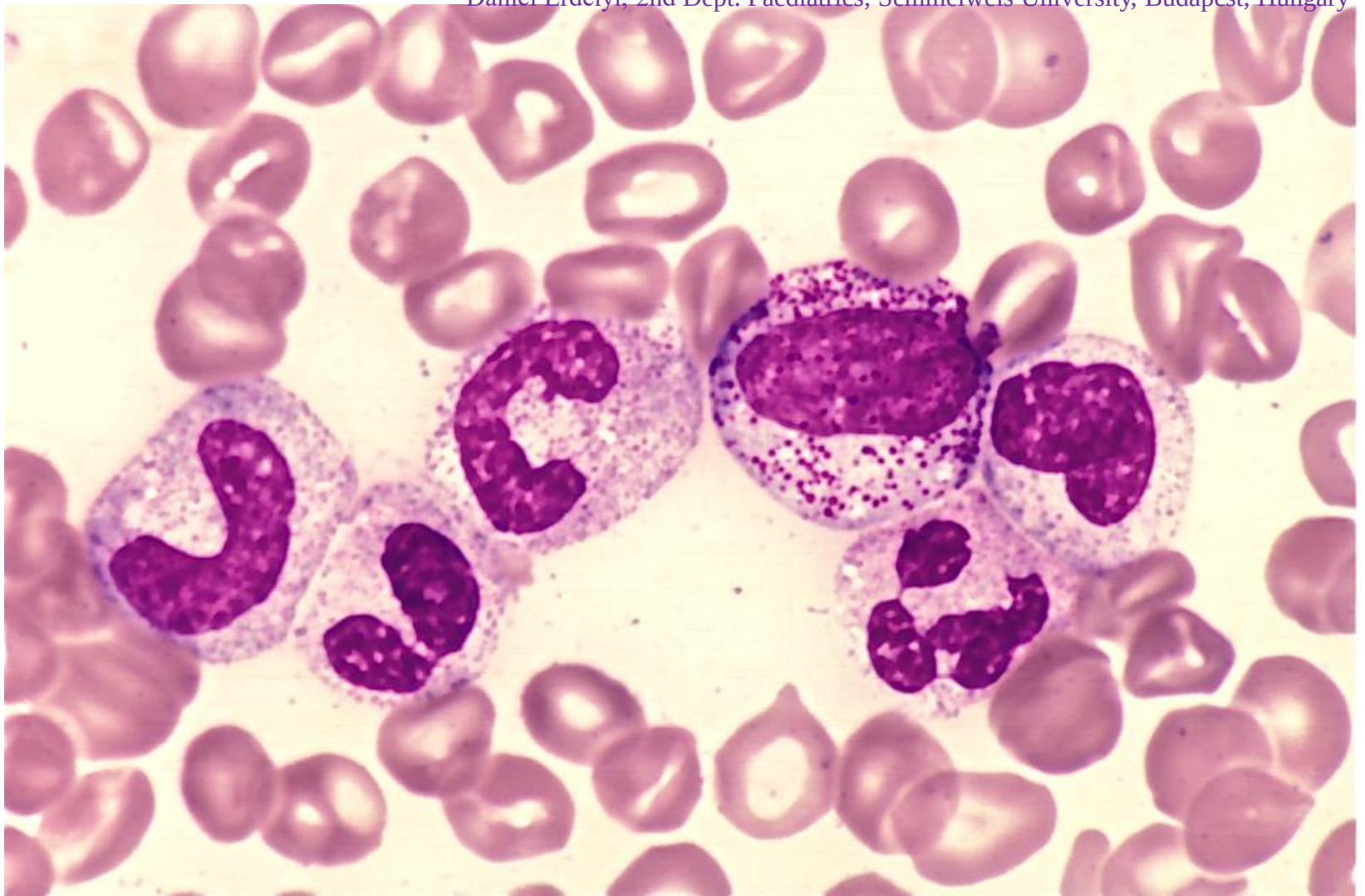
Mono: 5 %

CRP: 19 mg/L

Eos: 3 %

Bas: 1 %

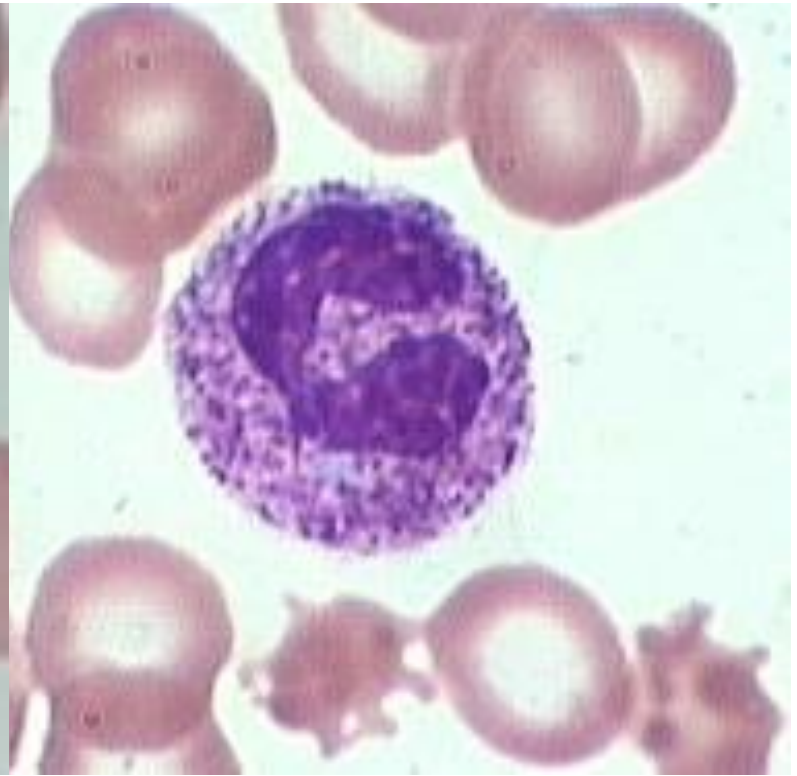
Lymph: 21 %



myelocyte - band neutrophil - neut. segment
left shift



normal neutrophil
segment



toxic granulation in
bacterial infection

<https://www.med-ed.virginia.edu/courses/path/innes/wcd/qualitative.cfm>

Case 4

5y♀, 1½ day disuria, abdo pain

Do you expect any difference in lab results if it's cystitis or pyelonephritis?

typical examples	Cystitis	Pyelonephritis
WBC (G/L)		
Band neut %		
Neut segment %		
CRP (mg/L)		
ESR (mm/hr)		

Case 4

5y♀, 1½ day disuria, abdo pain

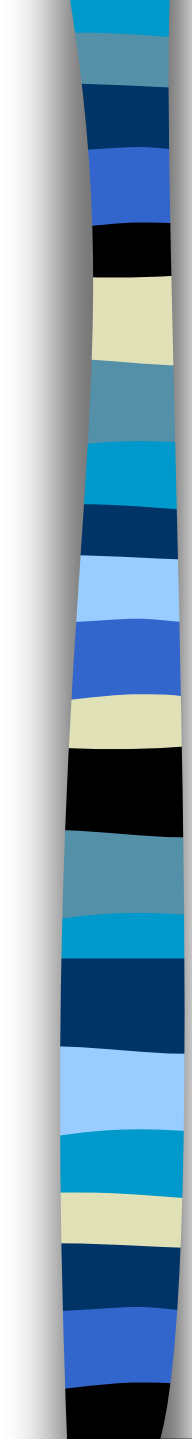
Do you expect any difference in lab results if it's cystitis or pyelonephritis?



**WBC norm.
CRP norm.**

**Leukocytosis
Granulocytosis
Left shift
CRP ↑↑**

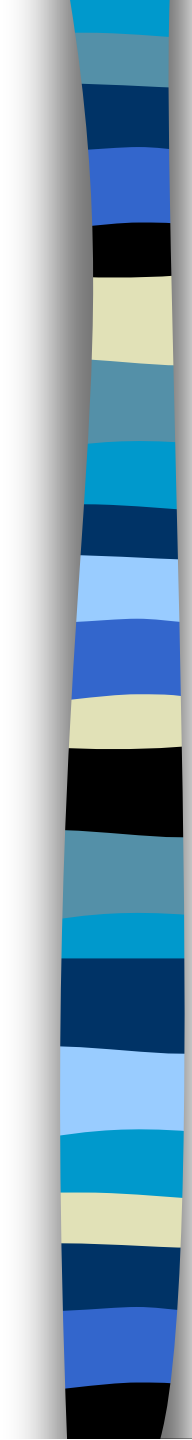
Superficial (and lumen)infections don't cause similar systemic inflammatory reaction like deep tissue infections



Leukocytosis - summary

- **DD: most usually infections**
 - Granulocytosis: bacterial
 - Lymphocytosis: viral
 - Monocytosis, eosinophilia: parasites
 - Rarely other causes
 - Age appropriate normal ranges, clinical signs, time factors make huge difference!
- **Inflammation markers: CRP, PCT, We**
- **Extreme leukocytosis – leukaemia?**





Case 5

9é ♀, WBC 18 G/L, Eos 9 G/L

Any suspicion, what questions to ask?