

Pathophysiology lab questions

Reference laboratory values

These data apply to adults only.

The students must be able to report the following reference values on the exam.

Hematology

red blood cell count (RBC)	female: 3.8–5.2 T/l
	male: 4.4–5.5 T/l
hemoglobin (HGB)	female: 120–165 g/l
	male: 135–170 g/l
hematocrit (PCV)	female: 0.37–0.47 l/l
	male: 0.40–0.54 l/l
mean corpuscular volume (MCV)	80–95 fl
mean corpuscular hemoglobin (MCH)	28–33 pg
mean corpuscular hemoglobin concentration (MCHC)	320–360 g/l
erythrocyte sedimentation rate (ESR, Westergren)	<20 mm/h
reticulocyte count (relative to RBC)	0.5–2.0 %
platelet count (PLT)	150–400 G/l
white blood cell count (WBC)	4–10 G/l
Differential blood count:	
neutrophil, juvenile (metamyelocyte)	0–1 %
neutrophil, band	3–5 %
neutrophil, segment	50–70 %
eosinophil	2–4 %
basophil	0–1 %
monocyte	2–6 %
lymphocyte	20–40 %
Hemostasis parameters:	
bleeding time	4–6 min
prothrombin time (PT, INR)	0.8–1.2
aPTT (activated partial thromboplastin time)	35–45 s
thrombin time	20–22 s
fibrinogen	1.5–4.0 g/l

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Inorganic components in serum/plasma

sodium		135–145 mmol/l
potassium		3.5–5.0 mmol/l
calcium		2.2–2.6 mmol/l
chloride		95–105 mmol/l
iron	female:	11–30 µmol/l
	male:	12–36 µmol/l
TIBC (total iron binding capacity)	female:	45–70 µmol/l
	male:	50–80 µmol/l

Metabolites in serum/plasma

bilirubin total		< 17 µmol/l
direct reacting		< 5 µmol/l
glucose (fasting)		3.0–6.0 mmol/l
uric acid		150–400 µmol/l
carbamid		3.5–7.0 mmol/l
creatinin		40–130 µmol/l
cholesterol (total)		3.6–5.2 mmol/l
HDL-cholesterol		1.0–1.6 mmol/l
triglycerides		0.8–2.3 mmol/l

Proteins in serum/plasma

total protein		60–80 g/l
albumin		35–50 g/l
A/G (albumin/globulin quotient)		1.25–2.5
CRP (C-reactive protein)		1–8 mg/l

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Enzyme activities in serum/plasma (the values depend a lot on the measurement method!)

α -amilase	< 180 U/l
ALAT (alanin-aminotransferase, GPT)	< 45 U/l
ASAT (aspartate-aminotransferase, GOT)	< 45 U/l
ALP (alkaline phosphatase)	< 150 U/l
CK (creatinkinase)	< 200 U/l
GGT (gamma-glutamyl-transpeptidase)	< 60 U/l
LDH (lactatedehydrogenase)	< 160 U/l

Acid–base parameters and blood gases (arterialized capillary blood)

pH	7.35–7.45
pCO ₂	35–45 mmHg
standard bicarbonate (st HCO ₃ ⁻)	21–26 mmol/l
BE (base excess)	0±3 mmol/l
pO ₂	80–105 mmHg
O ₂ Sat	95–98 %

Renal function and urinalysis

creatinine-clearance (for 1.73 m ² body surface)	120–125 ml/min
urine volume	1000–1500 ml/24 h
pH	4.5–8.0
“specific gravity” (density)	1.010–1.035 kg/l
osmolar concentration	600–1200 mosm/kg
urinary sediment (per field)	<1–3 RBC, <3–5 WBC

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ECG

usual chart speed	25 mm/s
	1 mm ~ 0,04s
AV conduction time (PR interval)	0.12–0.2 s
width of the QRS complex	0.06–0.1 s
pathological Q wave:	
width:	≥ 0.04 s
amplitude:	> 0.4 mV or > 25% of the R amplitude

Table of the most important SI prefixes

Sign	How to read	Value
P	peta	10^{15}
T	tera	10^{12}
G	giga	10^9
M	mega	10^6
k	kilo	10^3
m	milli	10^{-3}
μ	micro	10^{-6}
n	nano	10^{-9}
p	pico	10^{-12}
f	femto	10^{-15}