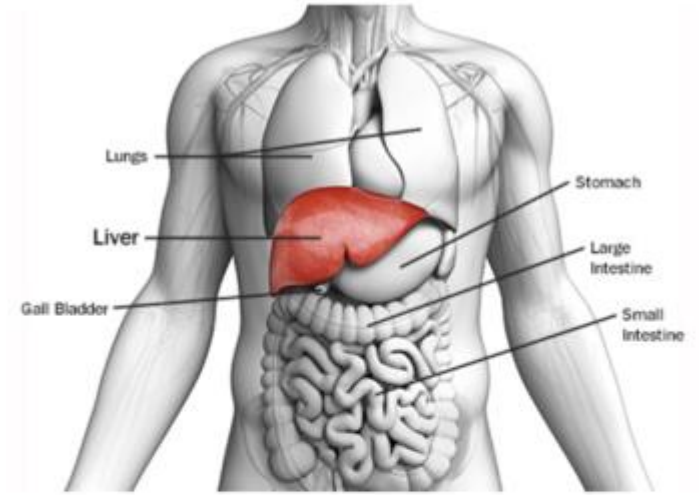


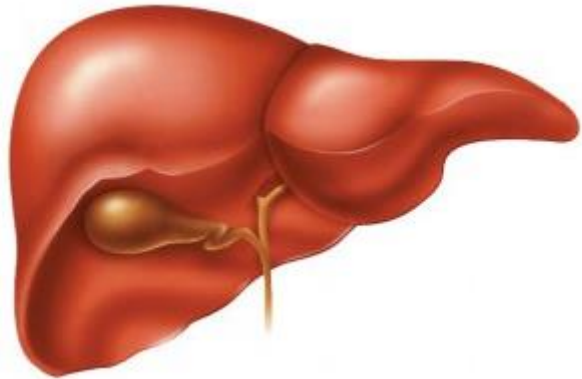
Investigation of liver and biliary tract diseases

Clinical biochemistry, Autumn 2020

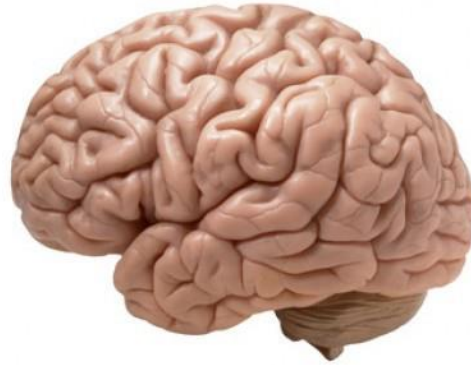


Lenka Gescheidtová, lenka.gescheidtova@mou.cz

Liver is large...



♀ 1200 g – 1400 g
♂ 1400 g – 1800 g



♀ 1100 g – 1200 g
♂ 1300 g – 1400 g

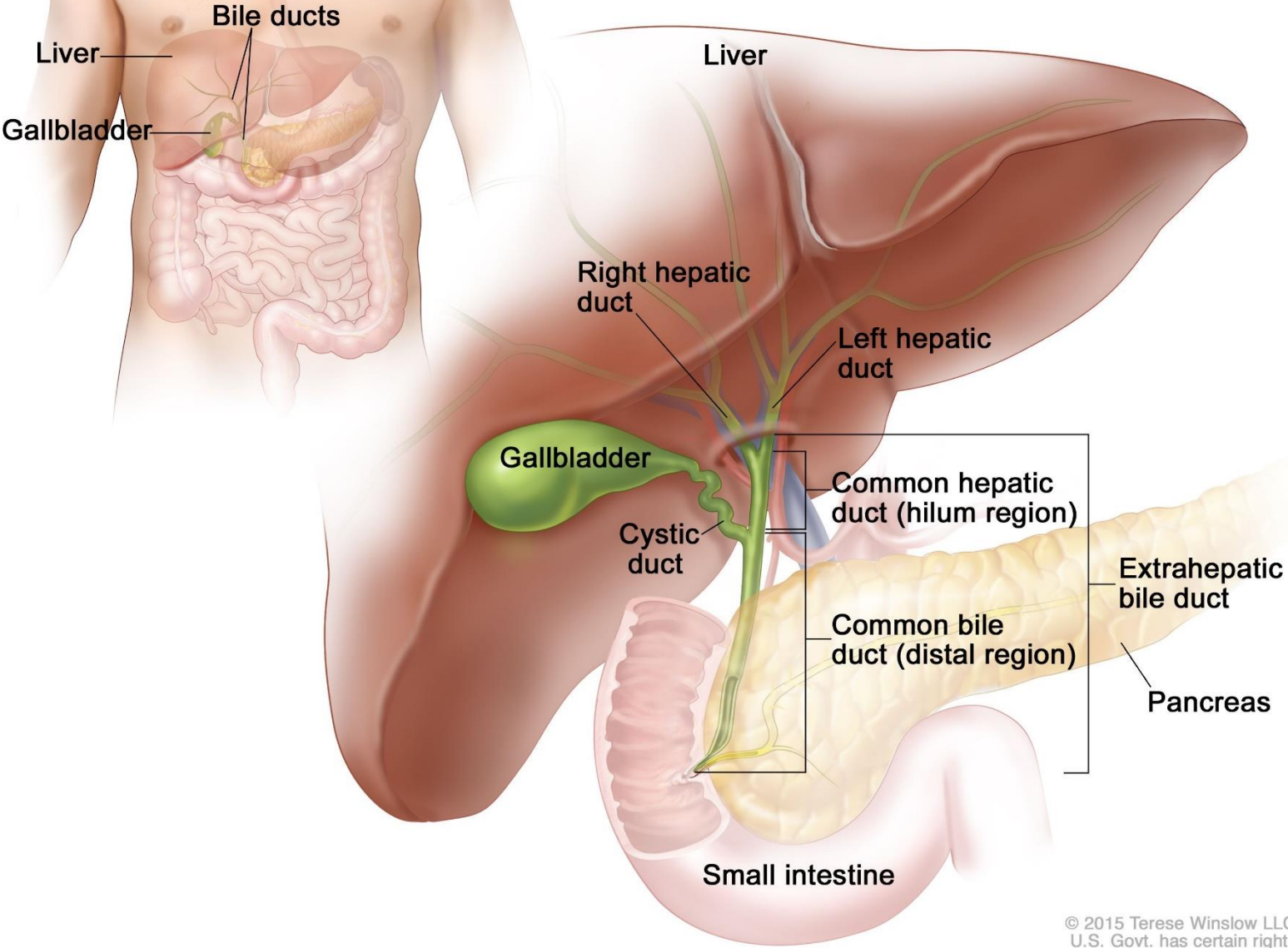


♀ 1000 g – 1500 g
♂ 1500 g – 1900 g

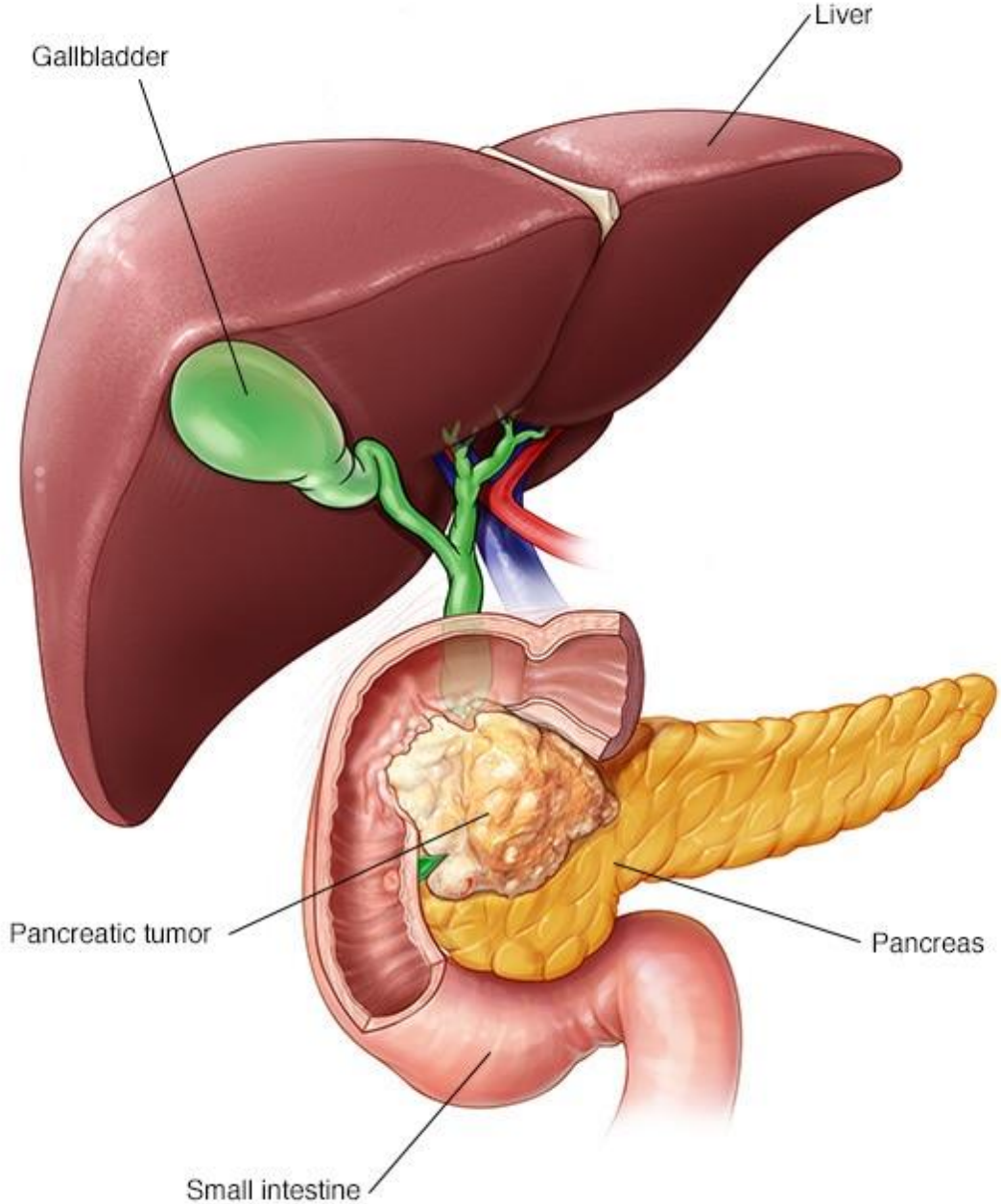
Liver and biliary ducts....

....one functional unit

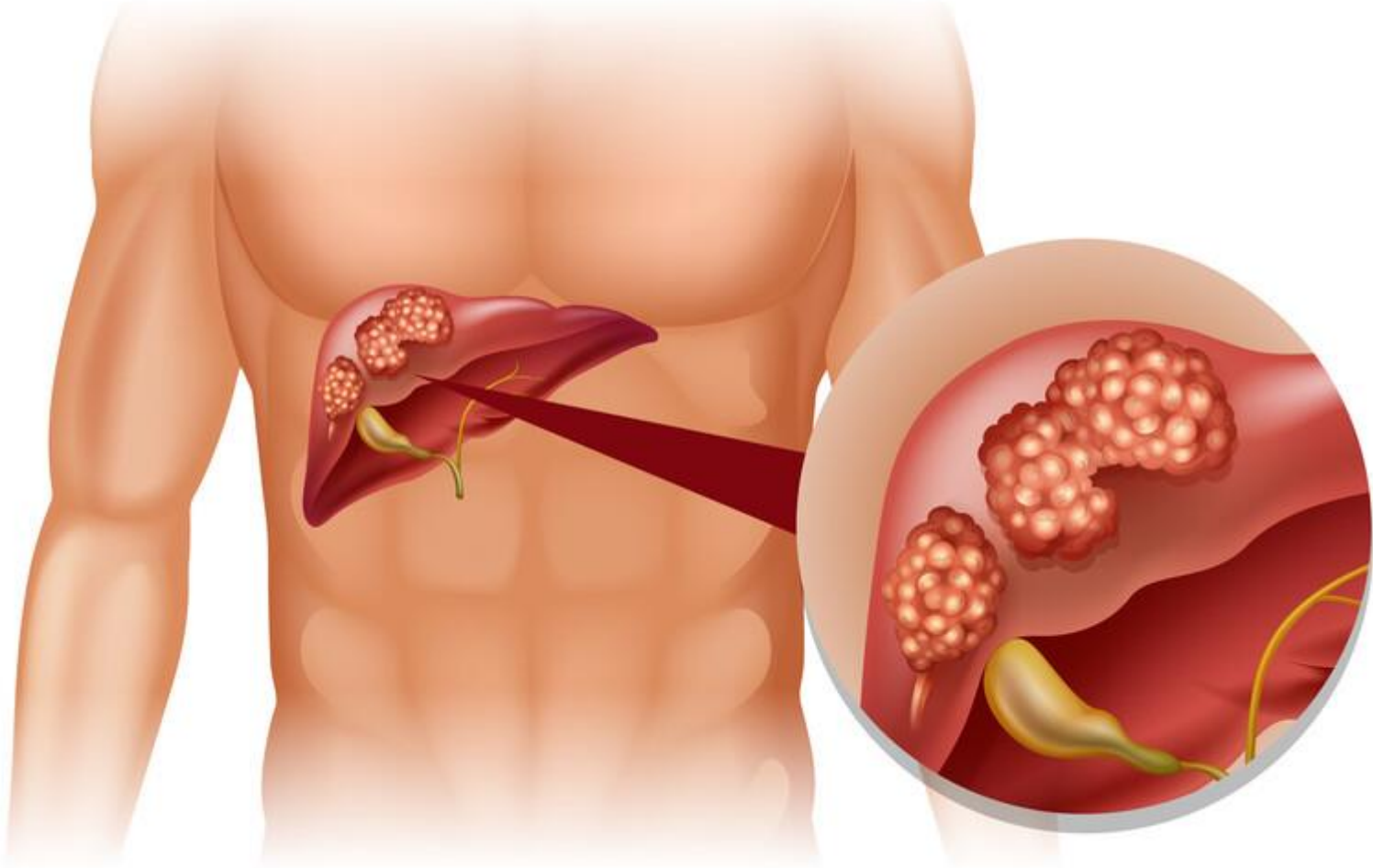
Hepatobiliary system



Extrahepatic obstruction

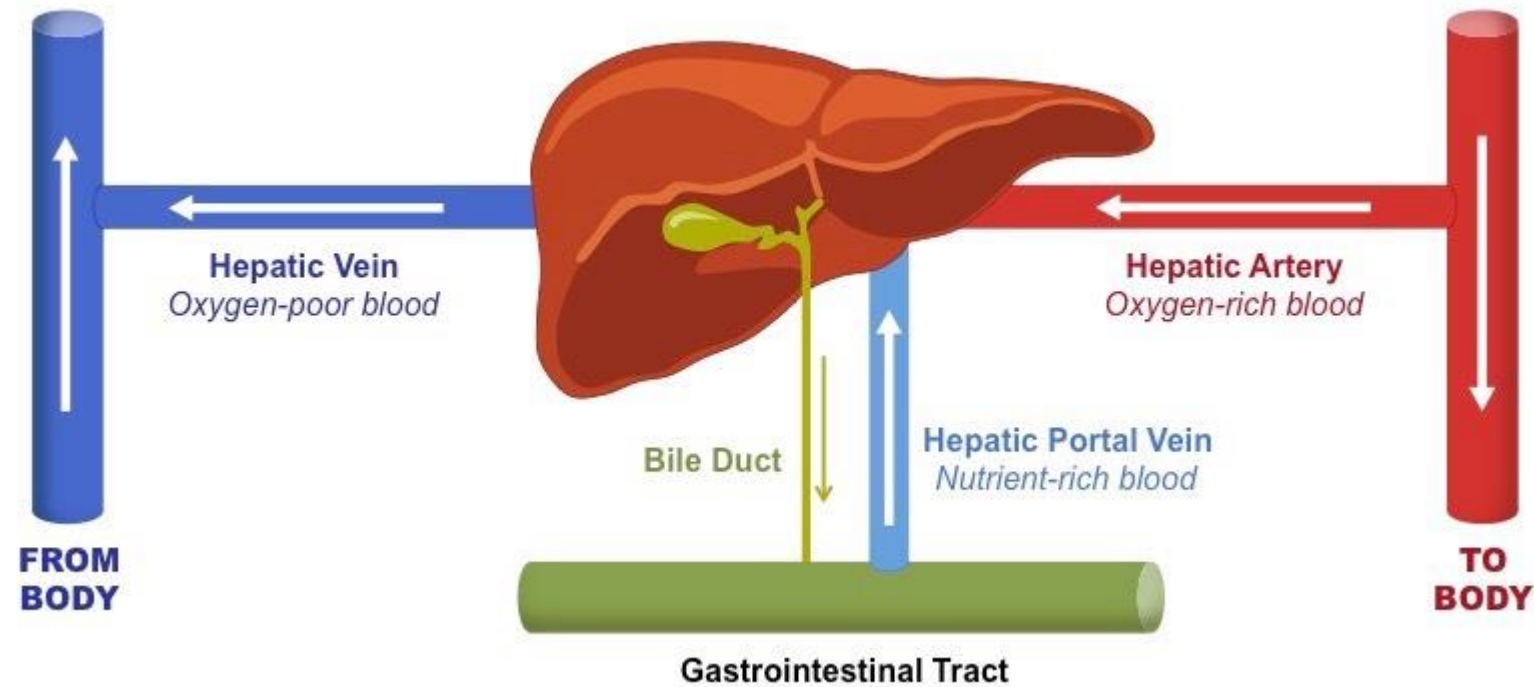


Intrahepatic obstruction



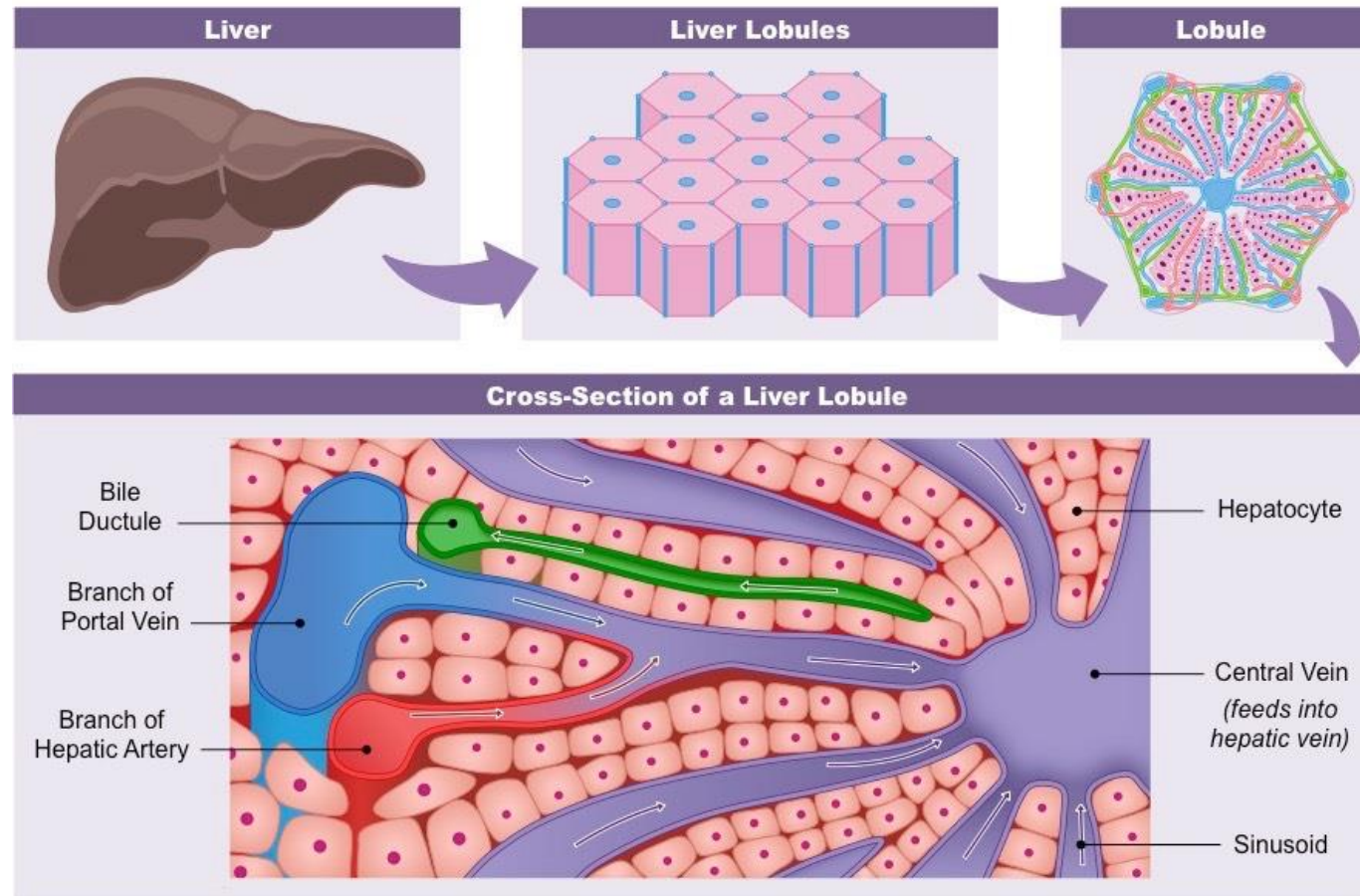
<https://drmagaziner.com/wp-content/uploads/2020/03/liver.jpg>

Hepatic circulation - macrocirculation

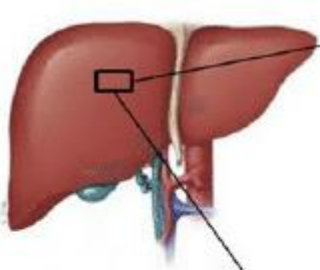


<https://ib.bioninja.com.au/options/option-d-human-physiology/d3-functions-of-the-liver/liver-blood-flow.html>

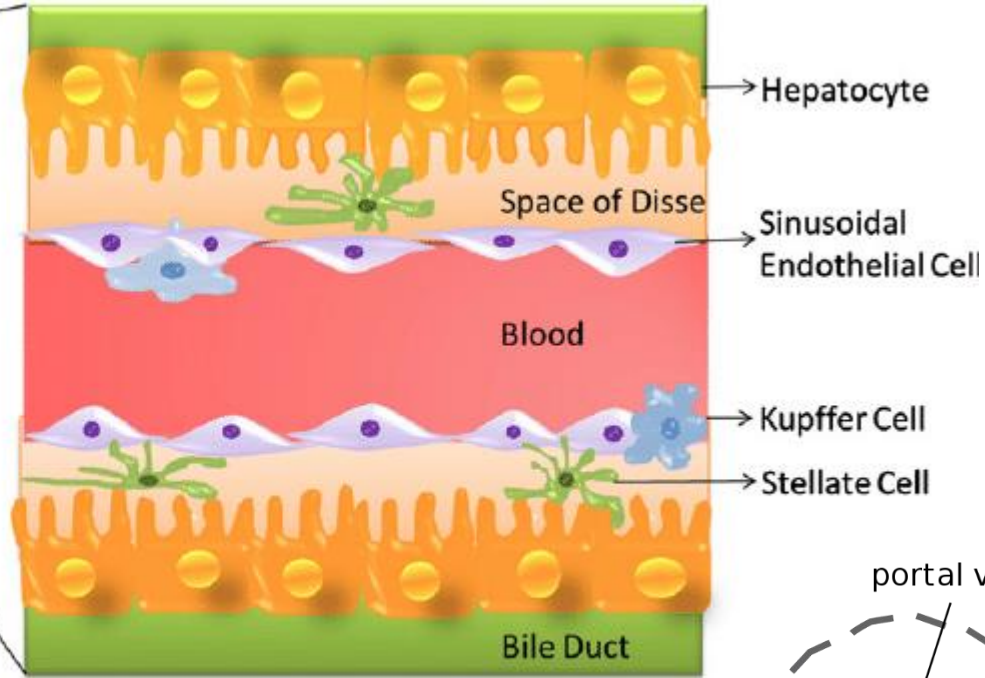
Functional unit - lobule



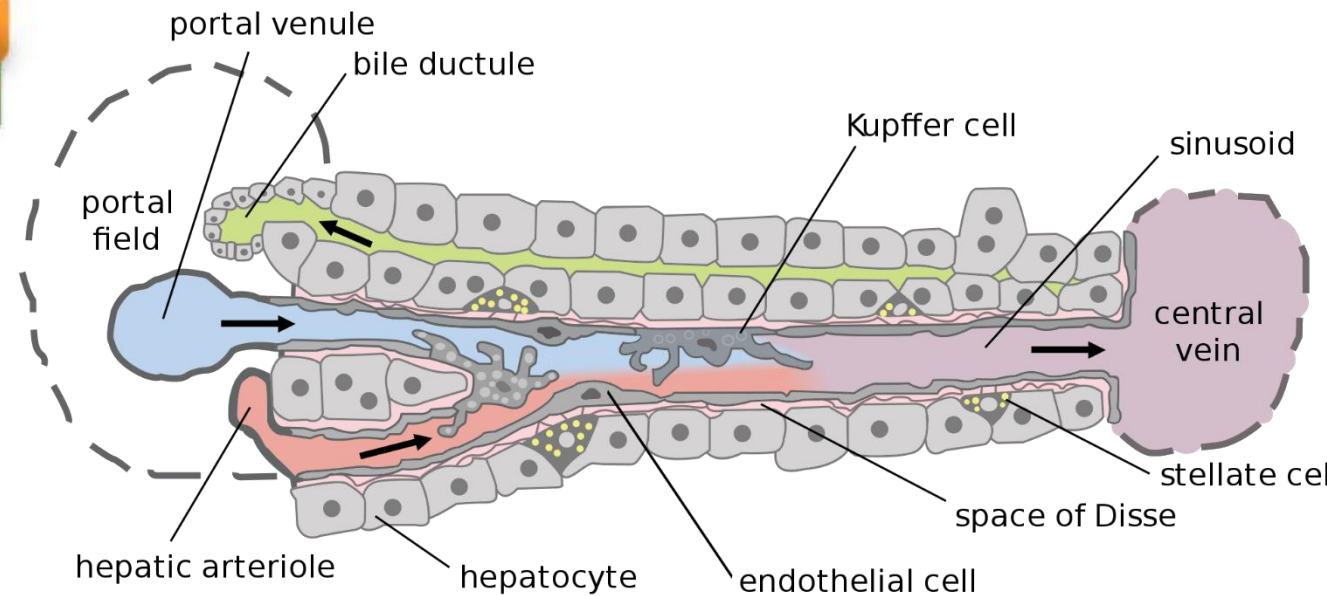
Hepatic lobule microcirculation



Liver



Liver Sinusoidal Functional Unit



Liver function:

- metabolism of all nutrients
- proteosynthesis
- energy storage
- vitamins, micronutrients and iron storage
- blood reservoir
- extramedullary hematopoiesis
- detoxication function – xenobiotics, mainly metabolic waste = urea synthesis, **bilirubin** secretion
- bile production (digestive and detox function)

Základní laboratorní vyšetření hepatobilárního systému:

Biochemický ústav LF MU – 2020 2/12

Charakteristika testu	Analyt
Testy odrážející integritu hepatocytů	ALT, AST
Testy odrážející poruchy na úrovni žlučvodů a kanikulárního pólu jaterní buňky	ALP, GGT
Testy měřící proteosyntetickou kapacitu jater	albumin , prealbumin, cholinesterasa, koagulační faktory – měří se nepřímo pomocí koagulačních časů /hlavně INR /
Laboratorní diagnostika žloutenek	bilirubin (celkový, konjugovaný, nekonjugovaný), žlučové kyseliny
Testy na specifické jaterní choroby	S-Fe, transferrin, ferritin (hemochromatóza), S-Cu, ceruloplazmin (Wilsonova nemoc), U-porfobilinogen, U-ALA (porfyrie)
Testy na hodnocení vážnosti jaterní fibrózy	S-kyselina hyaluronová, PIIINP, TIMP1

Základní biochemická vyšetření
= součást vstupního vyšetření pacienta

Specializovaná vyšetření, vyšetřují se za specifických podmínek

Laboratory tests of hepatobiliary system - overview

Department of Biochemistry, MUNI – 2020 2/12

Characteristics	Parameters
Tests indicative of hepatocyte integrity	ALT, AST
Tests indicative of disorders at the level of bile duct system and the canalicular pole of hepatocytes	ALP, GGT
Tests measuring protein synthesis by the liver	albumin , prealbumin, cholinesterase, coagulation factors – indirect measurement by coagulation time /PT-ratio (INR)/
Differential diagnostics of jaundice	bilirubin : total, conjugated (=direct), unconjugated, bile acids
Laboratory tests for the diagnosis of specific hepatic diseases	S-Fe, transferrin, ferritin (hemochromatosis), S-Cu, ceruloplasmin (Wilson's diseases), U-porphobilinogen, U-ALA (porphyria)
Tests indicative the severity of hepatic fibrosis	S-tissue inhibitor of metalloproteinases 1 (TIMP-1), amino-terminal propeptide of type III procollagen (PIIINP) and hyaluronic acid (HA)

Basic laboratory tests - statim

Specialized tests

Male, *1946 (74 years)

Current disease: coming to the surgical clinic for gradually worsening abdominal pain for about 7 days, loss of appetite, lethargy, jaundice, is subfebrile, no vomiting.

Baseline lab test

Parameter	Unit	Ref. range	Value
CREATININ	umol/l	65 - 108	124
eGFR _{epi}	ml/s	1,1 - 2	0.82
UREA	mmol/l	up 8,9	10.4
ALBUMIN	g/l	39 - 49	31
TOTAL PROTEIN	g/l	70 - 86	69
GLUCOSE	mmol/l	4,6 - 6,1	8.3
Na ⁺	mmol/l	137 - 145	132
K ⁺	mmol/l	3,5 - 5,1	3.8
CL ⁻	mmol/l	100 - 108	94
AST	ukat/l	0,29 - 0,72	3.69
ALT	ukat/l	0,22 - 1,09	5.64
ALP	ukat/l	0,67 - 1,64	2.71
GGT	ukat/l	0,27 - 1,56	7.27
BILIRUBIN-total	umol/l	up 22	132
BILIRUBIN-direct	umol/l	up to 5	
CRP	mg/l	up 11	293.6

What value would you expect, if the patient had jaundice ??

BILIRUBIN-total	umol/l	do 22	132
BILIRUBIN-direct	umol/l	do 5	

What value would you expect, if the patient had jaundice
??

- a) 4 umol/l
- b) 151 umol/l
- c) 109 umol/l

BILIRUBIN-celk.	umol/l	do 22	132
BILIRUBIN-přímý	umol/l	do 5	

What value would you expect, if the patient had jaundice
??

- a) 4 umol/l
- b) 151 umol/l
- c) ✓ 109 umol/l**

Baseline lab tests

Parameter	Unit	Ref. range	Value
CREATININ	umol/l	65 - 108	124
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CRP	mg/l	up 11	293.6

What is the diagnosis ??

What is the diagnosis ??

RES: The patient has biliary obstruction. Due to the high CRP and clinical symptoms with cholangitis.



What caused the obstruction followed by cholangitis?



Male, *1946 (74 years)

CC: coming to the surgical clinic for gradually worsening abdominal pain for about 7 days, loss of appetite, lethargy, jaundice, is subfebrile, no vomiting.

Anamnesis

The patient was treated for carcinoma of ductus choledochus (dg. 2018), the radical surgery was not possible, he was treated by radiotherapy and received the stent into ductus choledochus. The disease has been in remission. The last oncological examination was before 3 months.

Others: hypertension, benign prostate hyperplasia, DM II, stroke 2012, chronic atrial fibrillation

Chronic pharmacotherapy: Verospiron 25 1x1, Solifenacin 10 1x1, Omnic 0,4 1x1, Rivodaron 200 1x1, Concor cor 5 1/2-0-0, Metformin 500 1-0-1

What caused the obstruction followed by cholangitis?

Biliary carcinoma progression. That was confirmed by CT of the abdomen.



Icterus = jaundice

- clinical sign, it manifests as skin and sclera yellowing - it appears, when bilirubinaemia is approx. $50 \mu\text{mol/l}$ or higher
- cave !!! evaluation of jaundice is subjective, depending on the lighting in the room and the phototype of the patient

Terminology:

icterus = jaundice

hepatitis = inflammation of liver

infectious hepatitis = infectious jaundice

Not every hyperbilirubinaemia is manifested as
jaundice



Not every hepatitis has jaundice

Icteric serum

- Serum icterity is caused by high bilirubinaemia
- Icteric serum interferes with many analytical methods, but this interference is usually negligible
- Substantial interference - bilirubin $> 200 \mu\text{mol/l}$ \rightarrow influenced parameters: uric acid, creatinine, cholesterol, triacylglycerols, amylase



HYPERBILIRUBINEMIA

Hyperbilirubinemia		Pathogenesis	Bilirubin		Urobilinogen
			Serum	Urine	Urine
predominantly unconjugated	premicrosomal	unconjugated bilirubin overproduction (hemolytic)	↑ unconj.	-	↑
	microsomal	bilirubin conjugation disorders (Gilbert's sy, Crigler-Najjar sy)	↑ unconj.	-	-
predominantly conjugated	microsomal	conjugated bilirubin secretion disorders (Dubin's sy, Rotor's sy)	↑ conj.	↑	-
		cholestasis	↑ conj.	↑	-
combined hyperbilirubinemia (conjugated + unconjugated)		multiple mechanisms	↑ unconj. ↑ conj.	↑	↑ / -

Causes of jaundice

- Exceeding the conjugation capacity of the liver in case of excessive hemolysis
- Inflammation
- Tumor
- Acute liver failure (intoxication)
- Inherited impairment of bilirubin excretion
- Mechanical obstruction
 - intrahepatal
 - extrahepatal

UNCONJUGATED
HYPERBILIRUBINEMIA

COMBINED
HYPERBILIRUBINEMIA

CHOLESTASIS

The patient is coming to you,
because he suddenly turned
yellow

What is your
next step ?



The patient is coming to you,
because he suddenly turned
yellow

Lab tests ?



**That is not
definitely
your first
step**

The first step is anamnesis...

Have it occurred
first time?

How long the
jaundice lasts?

Did preceded
abdominal
pain?



Other symptoms?
Vomiting, diarrhea,
dark urine?

Other symptoms?
Fatigue, weight loss,
anorexia?

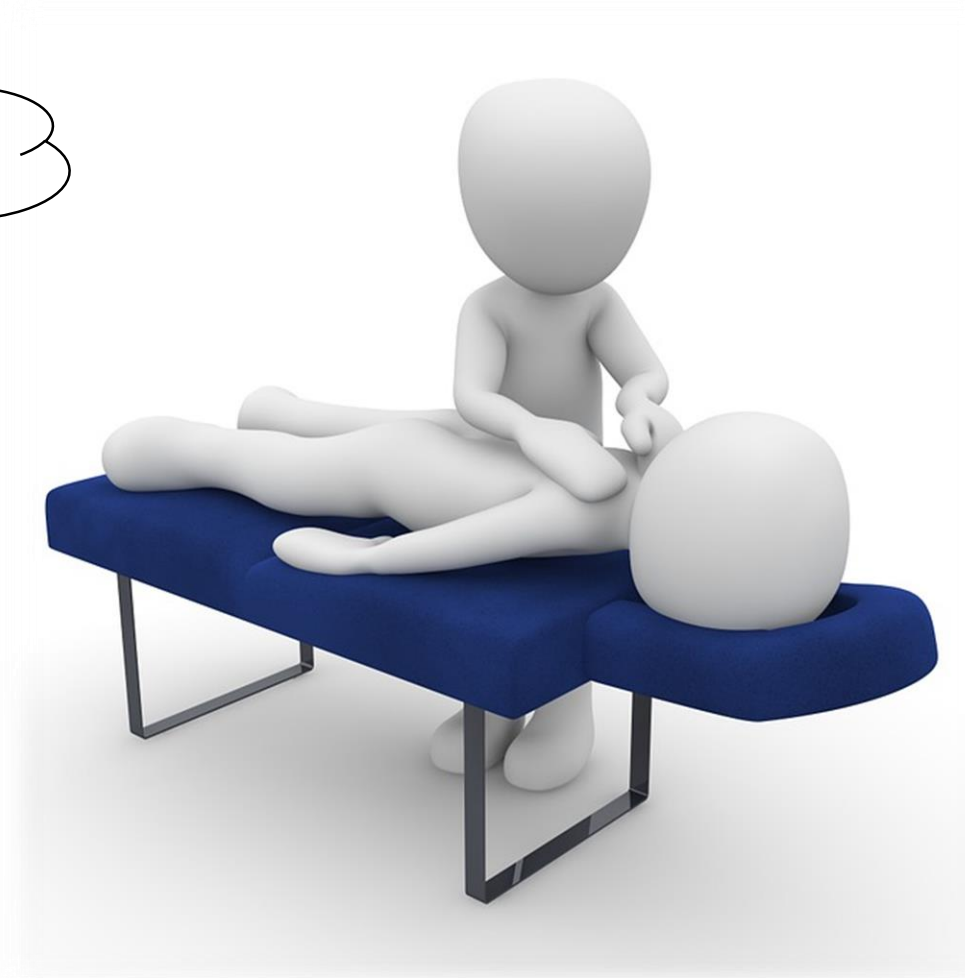
Which medication
does the patient
take?

The second step is physical examination...

Hepatomegaly?

Kachexia?

Bruises?

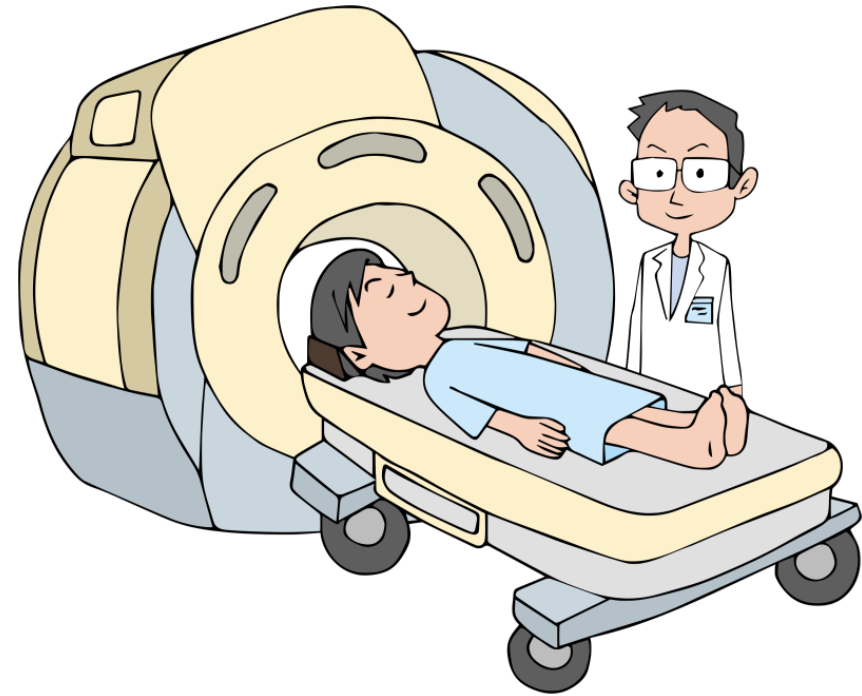
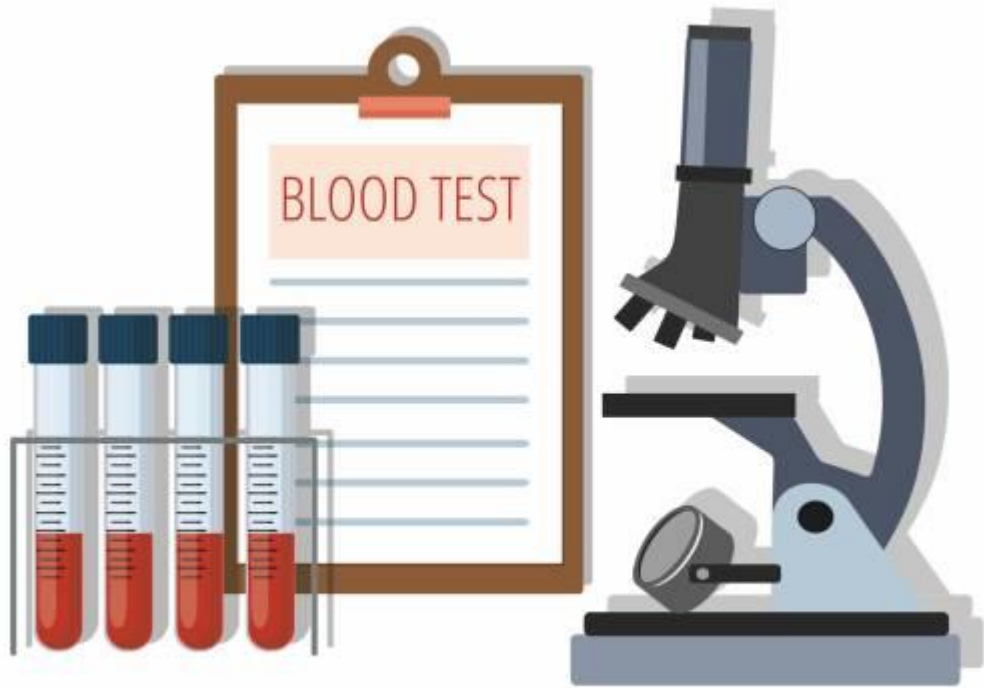


Splenomegaly?

Foetor hepaticus?

Gynecomastia?

The third step are lab tests and imaging



Case report II - female, 58 years

Anamnesis:

PMH: hypothyreosis, appendectomy in childhood

- 3/2017 dg. Adenocarcinoma of gall bladder, pT2 pN0 (0/1) M0,P1, G2, clin. st. II.
 - surgery – resection jaterního lůžka žlučníku, histologicky bez známek reziduální malignity
 - adjuvant CTx and RTx 12/2017
 - remission (= no disease signs), regular oncological examination every 6 months

Medication: Letrox 75 mcg 1-0-0

SocHx: secretary, married

GynHx: gravidity 2x, parturition 2x, menopause at 52 years

Allergy: 0

CC: 7/2020 – routine oncological examination, no subjective symptoms, no weight loss, physical examination with no pathology, **labs - substantial elevation of liver parameters**

Case report II - female, 58 years

Parameter	UNIT	Reference range	7/2019	1/2020	7/2020
CREATININE	umol/l	65-108	74	78	68
eGFR _{epi}	ml/s	1,1-2	1.29	1.2	1.41
UREA	mmol/l	do 8,9	5.2	6	4.8
ALBUMIN	g/l	39-49	44	45	43
TOTAL PROTEIN	g/l	70-86	73	72	75
GLUCOSE	mmol/l	4,6-6,1	5.6	6	5.6
Na ⁺	mmol/l	137-145	143	142	139
K ⁺	mmol/l	3,5-5,1	4.7	4.2	4.3
CL ⁻	mmol/l	100-108	107	104	103
AST	ukat/l	0,29-0,72	0.32	0.27	10.49
ALT	ukat/l	0,22-1,09	0.41	0.35	19.2
ALP	ukat/l	0,67-1,64	1.21	1.29	7.61
GGT	ukat/l	0,27-1,56	1.04	1.01	14.46
LDH	ukat/l	2,1-3,59	2.76	2.72	8.07
BILIRUBIN-tot.	umol/l	do 22	6	5	28
CA19-9	kU/l	do 40	2.4	1.9	2.5
CEA	ug/l	do 4.6	2.1	1.9	2.6

The patient has no symptoms,
no clinical signs of the liver disease (no jaundice, no
hepatomegaly)

**What is your next
step?**



Serological
hepatitis tests?



Suspected
alcoholism?



Control
laboratory per
month?

Case report II - female, 58 years

- You perform the CT examination of the abdomen and see this report:

In the vicinity of the clamps after surgery in the hilum of the liver, there is a newly visible infiltrate of size 32x22mm, which acts as a local recurrence of the tumor. Bladder dilatation is also newly seen. pathways mainly centrally, choledochus 13 mm wide at the level of the hilum, further extrahepatically suppressed by the infiltrate described above.

Conclusion: relapse of oncological disease.



Case report III - female, 24 years

CC: sore throat 3 days, subfebrile about 37 ° CC, fatigue, anorexia, abdominal pain

PMHx: sideropenic anemia in puberty, otherwise healthy

Medication: sine

Abusus: non-smoker, alcohol – vine 2dl 3x per week

Female, *1995 (24 years)

Physical examination:

Temp. 37.1°C BP 118/75 PF 88/min. BMI 21,5

Head and neck – throat redness, tonsils through an arch with white coatings and several pins, foetor ex ore - picture of streptococcal tonsillitis,

pale conjunctiva, paler skin color, palpable occipital and sternocleidomastoideal lymph nodes

Thorax – clear breathing, full and bright percussion, regular heart rate

Abdomen – liver enlargement (exceeding 2 cm over the costal arch), feeling pain during palpation, palpable lymph nodes in both groins

Case report III - Female, 24 years, laboratory - biochemistry

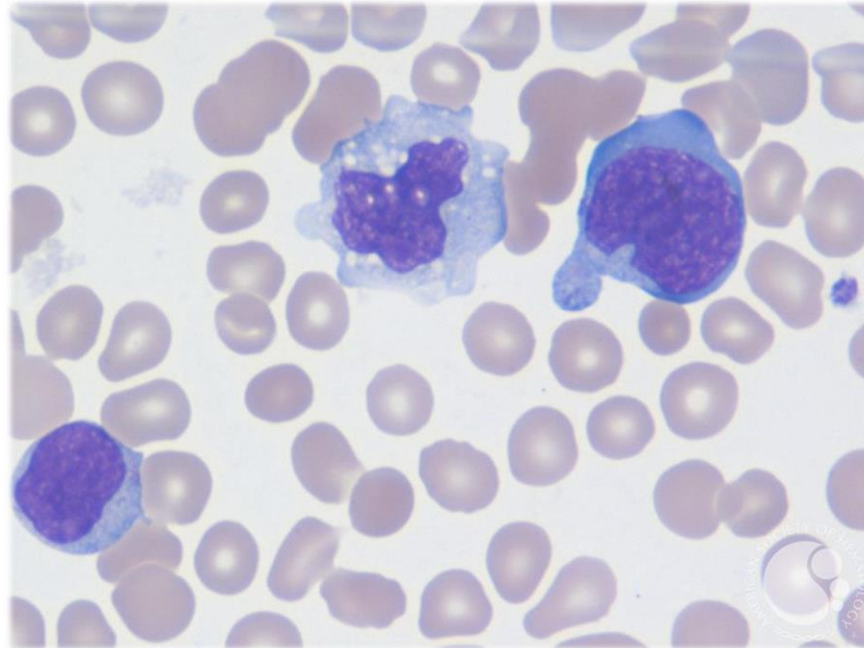
Parameter	Unit	Reference range	4.4.2019
CREATININE	umol/l	65-108	68
eGFR _{epi}	ml/s	1.1-2	1.81
UREA	mmol/l	do 8.9	2.5
ALBUMIN	g/l	39-49	42
TOTAL PROTEIN	g/l	70-86	77
GLUCOSE	mmol/l	4.6-6.1	4.5
Na ⁺	mmol/l	137-145	138
K ⁺	mmol/l	3.5-5.1	3.7
CL ⁻	mmol/l	100-108	101
AST	ukat/l	0.29-0.72	3.33
ALT	ukat/l	0.22-1.09	5.41
ALP	ukat/l	0.67-1.64	3.62
GGT	ukat/l	0.27-1.56	4.87
BILIRUBIN-tot.	umol/l	do 22	6
CRP	mg/l	do 11	23.7

Case report III - Female, 24 years, laboratory - hematology

Parameter	Jednotka	Referenční rozmezí	4.4.2019
RED blood cells	x 10 ¹² /l	3.8 - 5.2	4.52
WHITE blood cells	x 10 ⁹ /l	4 - 10	38.43 !!!
HEMOGLOBIN	g/l	120 - 160	130
HEMATOCRIT		0.35 – 0.47	0.383
PLATELETS	x 10 ⁹ /l	150 - 400	208
NEUTROPHILS		0.45 - 0.70	0.145
EOSINOPHILS		0.00 - 0.05	0.001
BASOPHILS		0.00 - 0.02	0.002
LYMPHOCYTES		0.20 - 0.45	<i>nelze</i>
MONOCYTES		0.02 - 0.12	<i>nelze</i>
NEUTRO-count	x 10 ⁹ /l	2 - 7	5.53
EOSINO-count	x 10 ⁹ /l	0.0 - 0.5	0.04
BASO-count	x 10 ⁹ /l	0.0 - 0.2	0.09
MONO-count	x 10 ⁹ /l	0.08 -1.20	<i>nelze</i>
LYMPHO-count	x 10 ⁹ /l	0.80 - 4.00	<i>nelze</i>
IMMATURE GRAN.		0.000 - 0.006	0.5
IMMATURE GRAN-count	x 10 ⁹ /l	0.00 - 0.04	0.18

Case report III - Female, 24 years, laboratory - microscopy

- blood smear layer - atypical lymphocytes - the cells are large with fine chromitne, high N/C rate, prominent nucleoli → look like blasts









What is the diagnosis ??

Leukemia ??

Infection??

Leukemia - signs and symptoms

current patient

Fatigue	
Dyspnea	
Bleeding, bruises	
Palor skin	
Weight loss	
Fever	
Prolonged infections	
Abdominal pain (hepatomegaly and/or splenomegaly)	
Enlarged lymph nodes	

Nevertheless, it is clear from the laboratory examination that it is not leukemia...



Case report III - Female, 24 years, laboratory - microscopy

Parametr	Jednotka	Referenční rozmezí	4.4.2019
ERYTHROCYTES	x 10 ¹² /l	3.8 - 5.2	4.52
LEUKOCYTES	x 10 ⁹ /l	4 - 10	38.43 !!!
HEMOGLOBIN	g/l	120 - 160	130
HEMATOCRITE		0.35 - 0.47	0.383
TROMBOCYTES	x 10 ⁹ /l	150 - 400	208
NEUTROPHIL-ratio		0.45 - 0.70	0.145
EOSINOPHIL-ratio		0.00 - 0.05	0.001
BASOPHIL-ratio		0.00 - 0.02	0.002
LYMPHOCYTE-ratio		0.20 - 0.45	<i>nelze</i>
MONOCYTE-ratio		0.02 - 0.12	<i>nelze</i>
NEUTROPHIL-abs.	x 10 ⁹ /l	2 - 7	5.53
EOSINOPHIL-abs.	x 10 ⁹ /l	0.0 - 0.5	0.04
BASOPHIL-abs.	x 10 ⁹ /l	0.0 - 0.2	0.09
MONOCYTE-abs.	x 10 ⁹ /l	0.08 - 1.20	<i>nelze</i>
LYMPHOCYTE-abs.	x 10 ⁹ /l	0.80 - 4.00	<i>nelze</i>
IMMATURE GRAN.		0.000 - 0.006	0.5
IMMATURE GRAN.-abs.	x 10 ⁹ /l	0.00 - 0.04	0.18

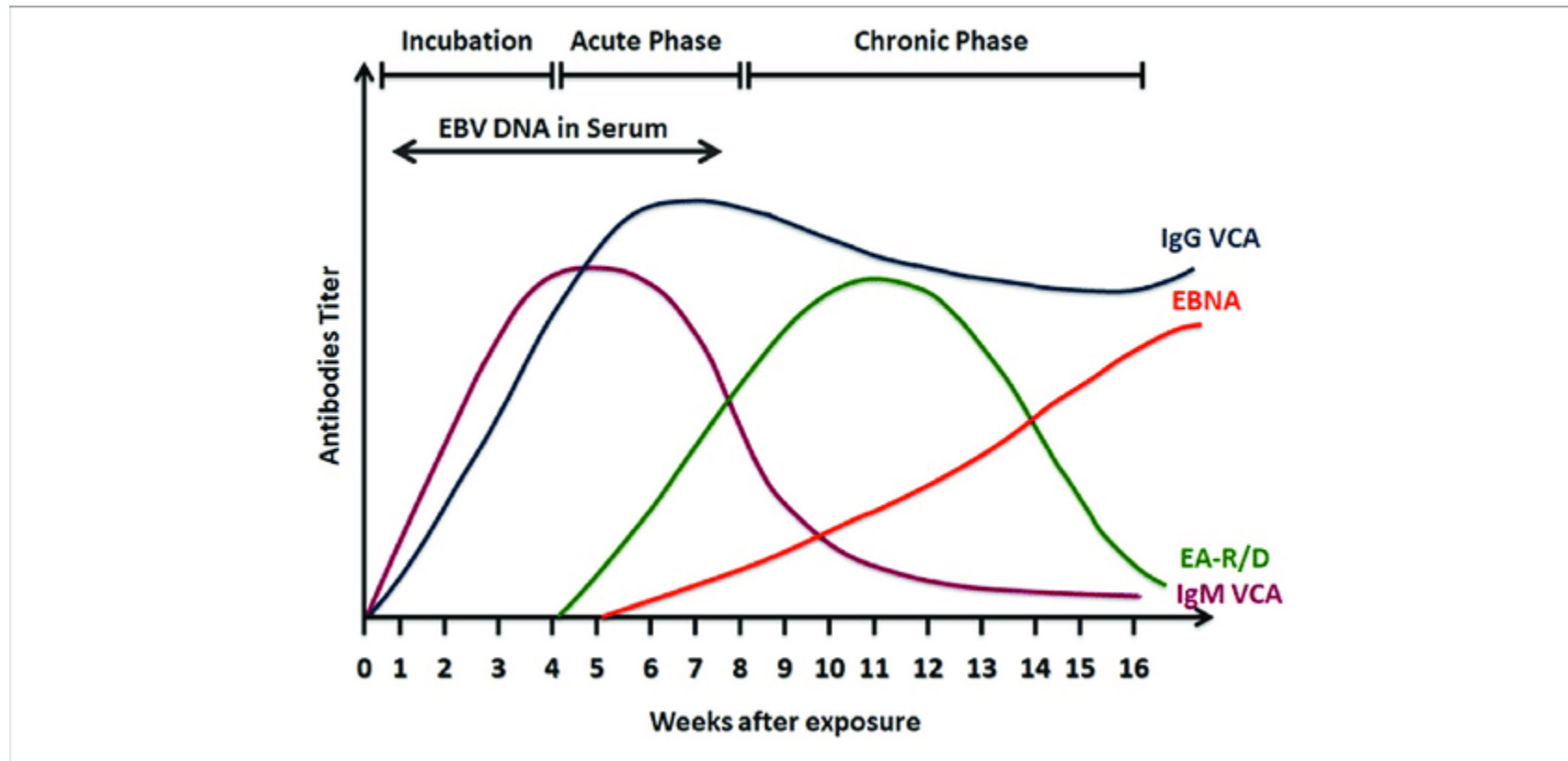
It is highly unlikely that hemoglobin, trombocytes and neutrophils would be normal in acute leukemia

Infectious mononucleosis

- disease caused by primary infection with Epstein-Barr virus (EBV)
- clinically similar to streptococcal angina, manifested by fever, sore throat, lymphadenopathy
- other signs: hepatosplenomegaly, petechiae on the palate (Holz's symptom), swelling of the eyelids (Bass's symptom), rhinolalia, foetor ex ore, loss of appetite, general weakness
- blood count: leukocytosis with lymphocytosis and monocytosis, large atypical lymphocytes, mild neutropenia or thrombocytopenia are possible
- liver tests: elevation of liver enzymes and LD (usually 2–3×, but also 10× or more)
- specific confirmation of the diagnosis - EBV serology

Ebstein-Barr Virus antibodies

- serology = detection of specific antibodies against antigens: **VCA** (Viral Capsid Antigen), **EA** (Early Antigen), **EBNA** (Ebstein Baar Nuclear Antigen)



Case report III - Female, 24 years, laboratory – biochemistry, control

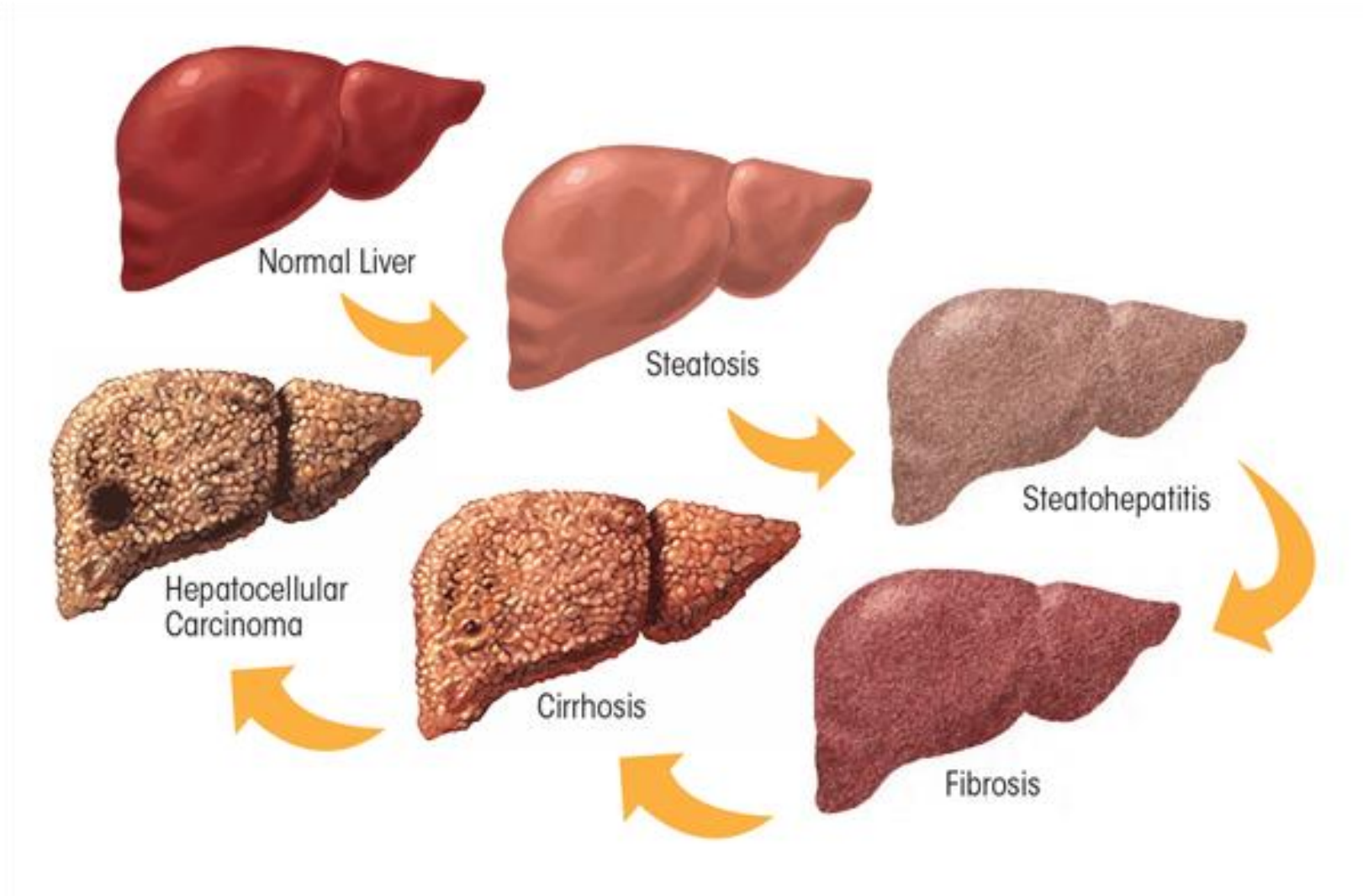
Parameter	Unit	Reference range	4.4.2019	11.4.2019	13.5.2019	10.7.2019
CREATININE	umol/l	65-108	68	69	86	
eGFR _{epi}	ml/s	1.1-2	1.81	1.78	1.36	
UREA	mmol/l	do 8.9	2.5	5.1	4.6	
ALBUMIN	g/l	39-49	42	38	42	
TOTAL PROTEIN	g/l	70-86	77	82	76	
GLUCOSE	mmol/l	4.6-6.1	4.5			
Na ⁺	mmol/l	137-145	138	137	139	
K ⁺	mmol/l	3.5-5.1	3.7	4	3.6	
CL ⁻	mmol/l	100-108	101	101	102	
AST	ukat/l	0.29-0.72	3.33	0.79	0.33	0.32
ALT	ukat/l	0.22-1.09	5.41	1.35	0.28	0.28
ALP	ukat/l	0.67-1.64	3.62	2.14	0.77	
GGT	ukat/l	0.27-1.56	4.87	2.69	0.59	0.34
BILIRUBIN-tot.	umol/l	do 22	6	3	6	7
CRP	mg/l	do 11	23.7	74.1	9.3	17

Case report III - Female, 24 years, laboratory – hematology, control

Parameter	Jednotka	Referenční rozmezí	4.4.2019	11.4.2019	13.5.2019	10.7.2019
RED blood cells	x 10 ¹² /l	3.8 - 5.2	4.52	4.57	4.39	4.43
WHITE blood cells	x 10 ⁹ /l	4 - 10	38.43 !!!	15.3	9.48	8.27
HEMOGLOBIN	g/l	120 - 160	130	130	127	129
HEMATOCRIT		0.35 – 0.47	0.383	0.385	0.37	0.373
PLATELETS	x 10 ⁹ /l	150 - 400	208	306	273	266
NEUTROPHILS		0.45 - 0.70	0.145	0.213	0.432	0.46
EOSINOPHILS		0.00 - 0.05	0.001	0.007	0.034	0.046
BASOPHILS		0.00 - 0.02	0.002	0.012	0.006	0.006
LYMPHOCYTES		0.20 - 0.45	<i>nelze</i>	0.661	0.437	0.4
MONOCYTES		0.02 - 0.12	<i>nelze</i>	0.107	0.091	0.088
NEUTRO-count	x 10 ⁹ /l	2 - 7	5.53	3.26	4.1	3.8
EOSINO-count	x 10 ⁹ /l	0.0 - 0.5	0.04	0.11	0.32	0.38
BASO-count	x 10 ⁹ /l	0.0 - 0.2	0.09	0.18	0.06	0.05
MONO-count	x 10 ⁹ /l	0.08 -1.20	<i>nelze</i>	1.63	0.86	0.73
LYMPHO-count	x 10 ⁹ /l	0.80 - 4.00	<i>nelze</i>	10.12	4.14	3.31
IMMATURE GRAN.		0.000 - 0.006	0.5	0.3	0.2	0.1
IMMATURE GRAN-count	x 10 ⁹ /l	0.00 - 0.04	0.18	0.04	0.02	0.01

Chronic liver disease





<https://www.arcr.niaaa.nih.gov/arcr382/images/article11-02.png>

Case report IV - female, 64 years

CC: comes to the hospital for elective surgery- metastazectomy of the solitary metastasis in the liver

HPI: adenocarcinoma col. desc., dg. 3 years ago - hemicolectomy was performed, adjuvant chemotherapy - remission for 3 years, last month solitary metastasis in liver has occurred

PMH: hypertension, DM II

smoker, alcohol - wine 2dl/week

SocHX: married, designer

Case report IV - female, 64 years

 operation

Parameter	UNIT	Reference range	09.06.	30.06.	01.07.	02.07.	03.07.	04.07.	06.07.
CREATININE	umol/l	65-108	53					40	
eGFR _{epi}	ml/s	1,1-2	1.61					1.77	
ALBUMIN	g/l	39-49	42						
TOTAL PROTEIN	g/l	70-86	83						
GLUCOSE	mmol/l	4,6-6,1	6.6	8.1	5.5	7.6	6.4	5.8	
Na ⁺	mmol/l	137-145	134	135	136	135	136	135	134
K ⁺	mmol/l	3,5-5,1	4.5	3.4	3.9	3.9	3.7	4.1	4.2
CL ⁻	mmol/l	100-108	96	101	103	100	101	101	97
AST	ukat/l	0,29-0,72	0.47		10.49	8.86	4.82	2.74	1.29
ALT	ukat/l	0,22-1,09	0.33		10.44	11.59	9.27	7.13	4.43
ALP	ukat/l	0,67-1,64	2.19		1.78	2.01	2.27	2.78	4.03
GGT	ukat/l	0,27-1,56	0.41		0.50	0.54	0.73	1.23	3.11
BILIRUBIN-tot.	umol/l	do 22	7		6	4	4	4	3

Case report V - female, 65 years

CC: anemia, fatigue and weight loss 5 kg / 3 months

Lab. normocytic normochromic anemia

Hgb 99 g/l ↓

MCV 85 fl N

MCH 30 pg N

RBC $3.3 \times 10^{12}/l$ ↓

Platelets $100 \times 10^9/l$ ↓

WBC $5.1 \times 10^9/l$ N

Case report V - female, 65 years

OA: hypertension, DM II, hypercholesterolemia, DM II, dilatated cardiomyopathy, **liver cirrhosis**, sec. splenomegaly, sec. trombocytopenia, right breast carcinoma cured 3 years ago - in remission,

FA: Stadamet 500mg 1-0-1 - dnes nebrala, Omeprazol 20mg 1-0-0, Verospiron 25mg 0-1-0, Kalium chloratum 500mg 2-1-1, Kalnormin 1-0-1, Furon 40mg 1/2-0-0, Sylimarin AL 50mg 1-0-1, Rivotril 0,5mg 0-0-1, Coryol 3,125mg 1-0-0, Torvazin 10mg 0-0-1, Alozex 1mg 1-0-0

Soc.Hx: divorced, living with her daughter, pensioner

Phys. functions: urination without problems, stool is regular, sometimes problems with hemorrhoids (she had once blood on toilet paper)

Case report V - female, 65 years

Clinical examination:

must include *per rectum* to check the hemorrhoids or to detect rectal bleeding (red blood) or gastric bleeding (melena)

Diagnostic-therapeutic plan:

- gastrofibroscopy (esophageal varices? peptic ulcerations?)
- rectoscopy (to reveal the internal hemorrhoids or rectal fissure)
- USG - abdomen, X-ray - lung (metastases of breast carcinoma?)
- colonoscopy (anemia can be caused by colorectal carcinoma)

Case report V - female, 65 years

- gastroscopy and rectoscopy - no pathology
 - **USG abdomen**
 - liver cirrhosis with suspected formation
- CT abdomen → liver tumor infiltration → CT navigated biopsy → histology: Hepatocellular carcinoma grade I

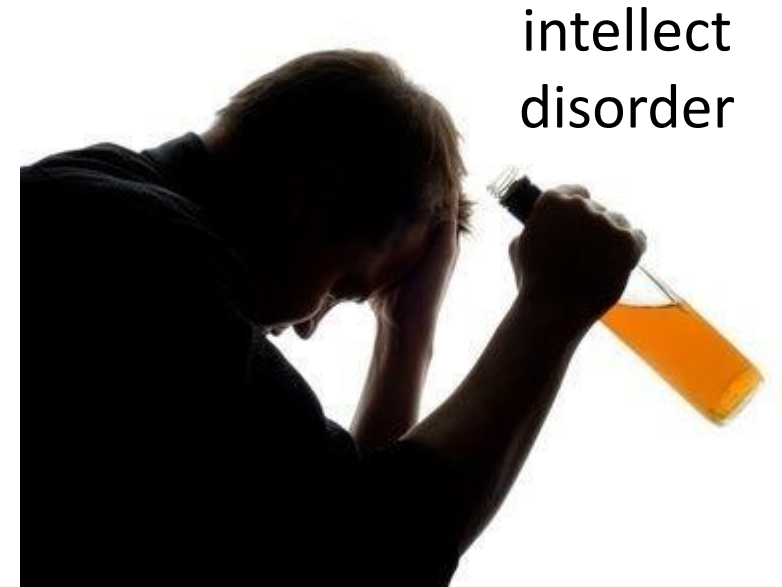
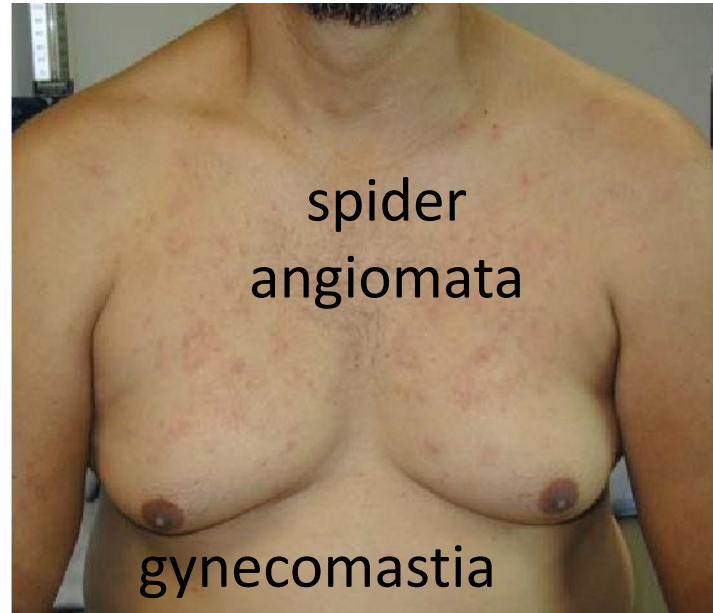
Case report V - female, 65 years

 baseline
  liver biopsy

Parameter	UNIT	Reference range	4.6.2020	1.7.2020	3.7.2020	6.7.2020	7.7.2020
CREATININE	umol/l	65-108	53				
eGFR _{epi}	ml/s	1.1-2	1.61				
UREA	mmol/l	do 8.9	4.3				
ALBUMIN	g/l	39-49	43				
TOTAL PROTEIN	g/l	70-86	83				
GLUCOSE	mmol/l	4.6-6.1	6.5	5.5	6.4	6.7	5.8
Na+	mmol/l	137-145	136	136	136	134	134
K+	mmol/l	3.5-5.1	4.6	3.9	3.7	4.2	4.1
CL-	mmol/l	100-108	98	103	101	97	95
AST	ukat/l	0.29-0.72	0.42	10.49	4.82	1.29	1.01
ALT	ukat/l	0.22-1.09	0.33	10.44	9.27	4.43	3.39
ALP	ukat/l	0.67-1.64	2.14	1.78	2.27	4.03	4.41
GGT	ukat/l	0.27-1.56	0.41	0.5	0.73	3.11	3.73
BILIRUBIN-tot.	umol/l	do 22	5	6	4	3	3
LDH	ukat/l	2,1-3,59	3.32				

Clinical signs of liver cirrhosis

sarcopenia



fatigue and performance loss



„Non-alcoholic“ liver cirrhosis – causes

- Chronic hepatitis - infectious, autoimmune
- Primary biliary cirrhosis, primary sclerosing cholangitis
- Long term biliary obstruction
- Toxic liver damage - poisoning by paracetamol, mushrooms (*Amanita phalloides*) etc.
- Metabolic diseases - Wilson's, hemochromatosis, porphyria, cystic fibrosis, α 1-antitrypsin deficiency
- Unclear etiology - so-called cryptogenic cirrhosis

Child-Pugh classification for liver cirrhosis

Clinical and Lab Criteria	Points*		
	1	2	3
Encephalopathy	None	Mild to moderate (grade 1 or 2)	Severe (grade 3 or 4)
Ascites	None	Mild to moderate (diuretic responsive)	Severe (diuretic refractory)
Bilirubin (mg/dL)	< 2	2-3	>3
Albumin (g/dL)	> 3.5	2.8-3.5	<2.8
Prothrombin time			
Seconds prolonged	<4	4-6	>6
International normalized ratio	<1.7	1.7-2.3	>2.3
Child-Turcotte-Pugh Class obtained by adding score for each parameter (total points) Class A = 5 to 6 points (least severe liver disease) Class B = 7 to 9 points (moderately severe liver disease) Class C = 10 to 15 points (most severe liver disease)			

<https://muggerboard.wordpress.com/2015/11/21/child-pugh-score/>

How to evaluate chronic liver disease?

- histopathological classification via liver biopsy
- biopsy is risky and not always available (cause of related coagulopathy)

Non-invasive scoring:

- **ELF score - tissue inhibitor of metalloproteinases 1 (TIMP-1), amino-terminal propeptide of type III procollagen (PIIINP) and hyaluronic acid (HA)**
- Fibrotest® - combination of 6 biochem. markers
- NAFLD fibrosis score - based on ALT, AST, Alb, platelet count, BMI and age

ELF (Enhanced Liver Fibrosis) score = monitoring of **chronic** liver damage

ELF score guidance

ELF Test Score	Interpretation	Action plan
>9.8	Likely severe fibrosis	Biopsy may not be required for liver fibrosis assessment.
7.7-9.8	Uncertain; may be moderate fibrosis	Biopsy may be recommended.
<7.7	Likely no or mild fibrosis	Biopsy may not be required for liver fibrosis assessment.

https://www.lalpathlabs.com/blog/enhanced-liver-fibrosis/2015-12-29_1060/

CHILD PUGH vs. ELF SCORE

Child Pugh classification

- evaluation of remaining liver functions in patients with cirrhosis
- does not include the histopathological staging

ELF score

- biochemical staging of liver fibrosis, can replace the biopsy (in some cases)
- does not include the liver functions

Thanks for your attention



questions and requests
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ALCOHOL-FREE
IPA 😊

