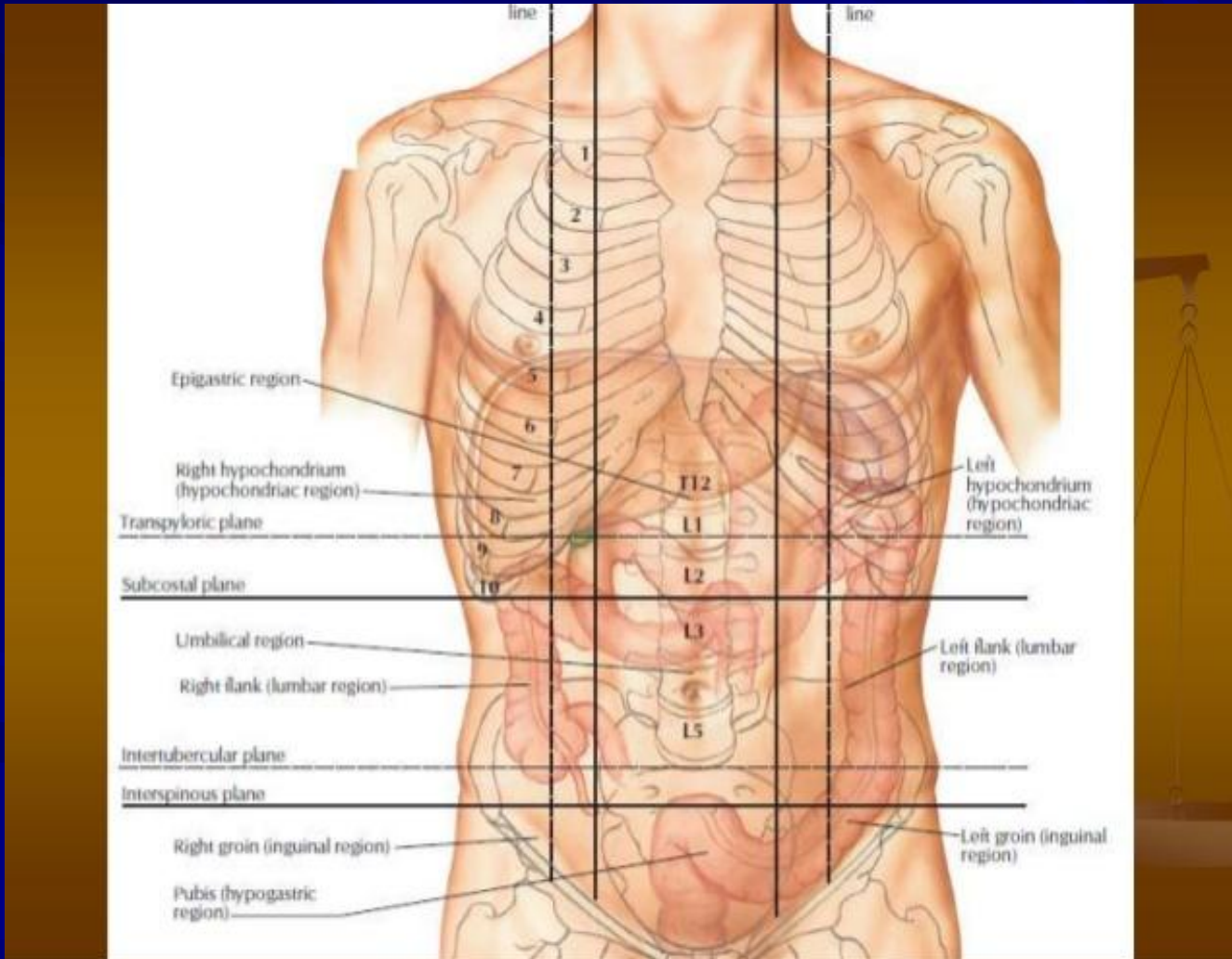


# Examination of patients with liver and gallbladder diseases

# Anatomy of the liver

- **the biggest gland of the body**
- **average weight - 1500 g**
- **can perform around 500 different functions**
- **the only organ that can regenerate completely, it only needs 25% of the original tissue**

# Location - right hipocondrium and epigastric region



# Functions of the liver:

1. **Formation of bile** 800-1000 ml in 24 hours;
2. **Metabolism of proteins** - synthesis of urea, fibrinogen and prothrombin, disamination of aminoacids;

# Functions of the liver:

3. **Metabolism of carbohydrates** - large deposition of glycogen in the liver and processes of glycogenesis);
4. **Metabolism of lipids and phospholipids;**

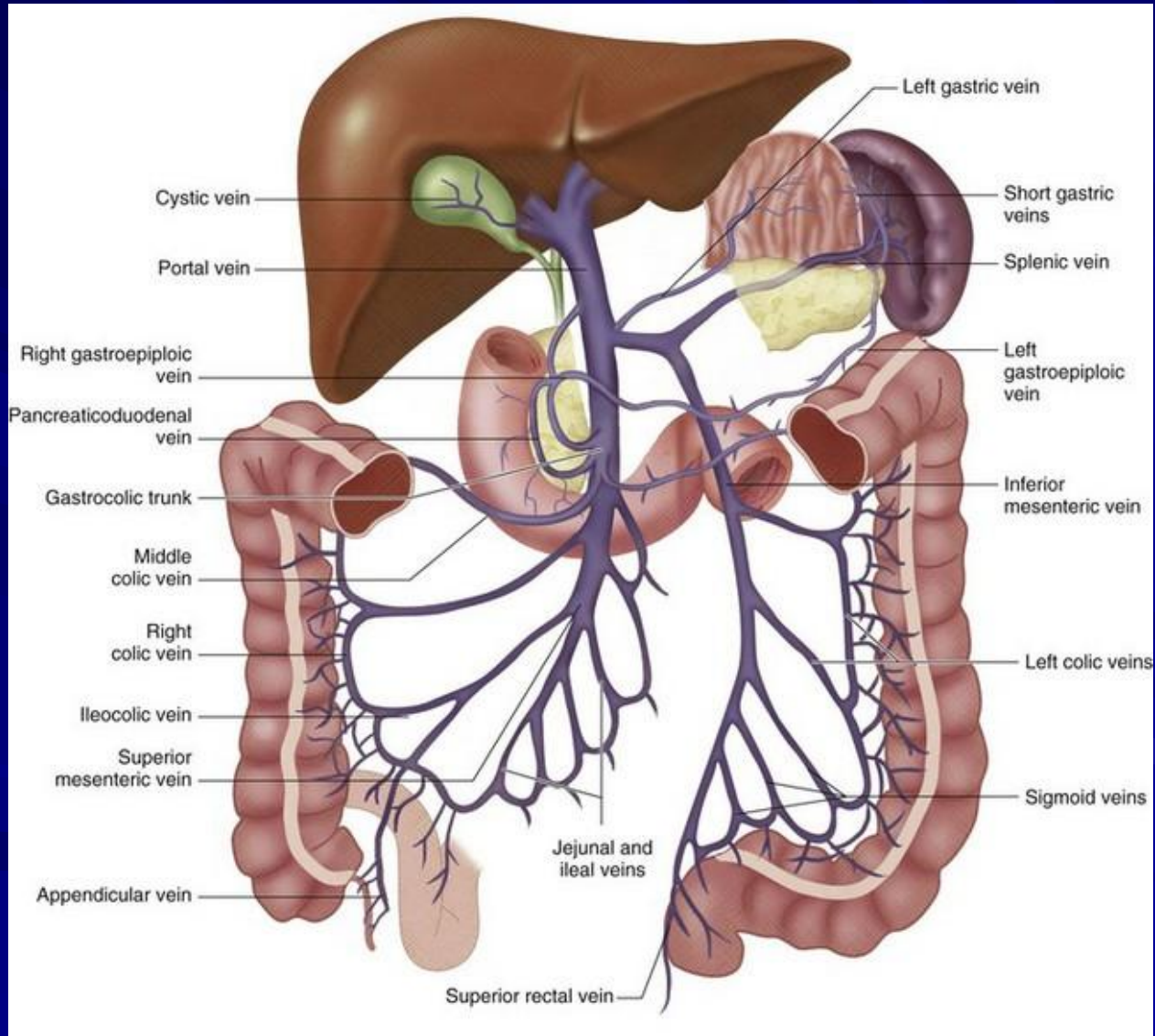
5. **Antitoxic function** - fixation, neutralisation and elimination of toxic substances;

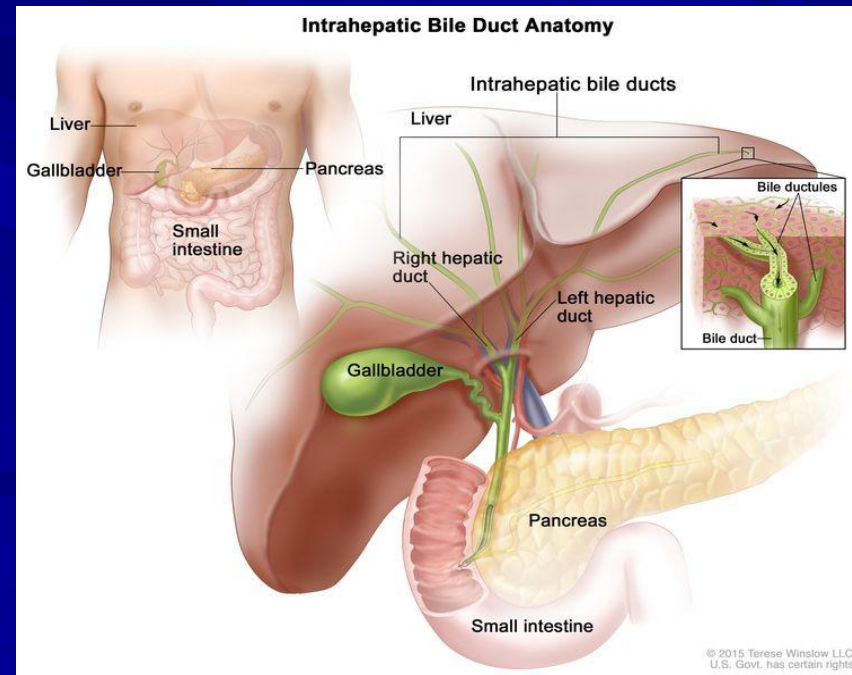
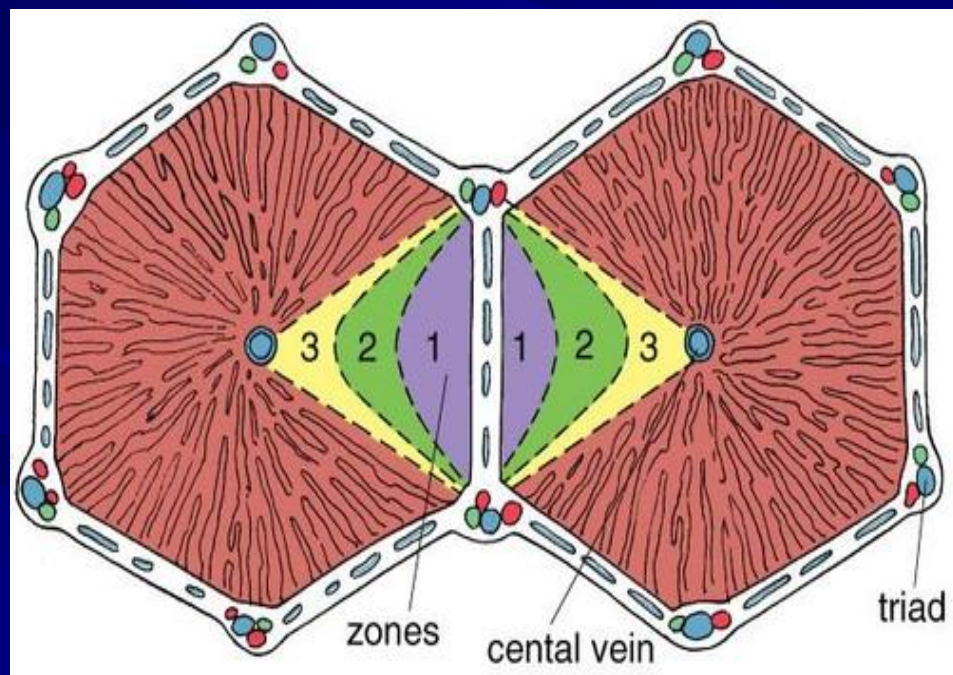
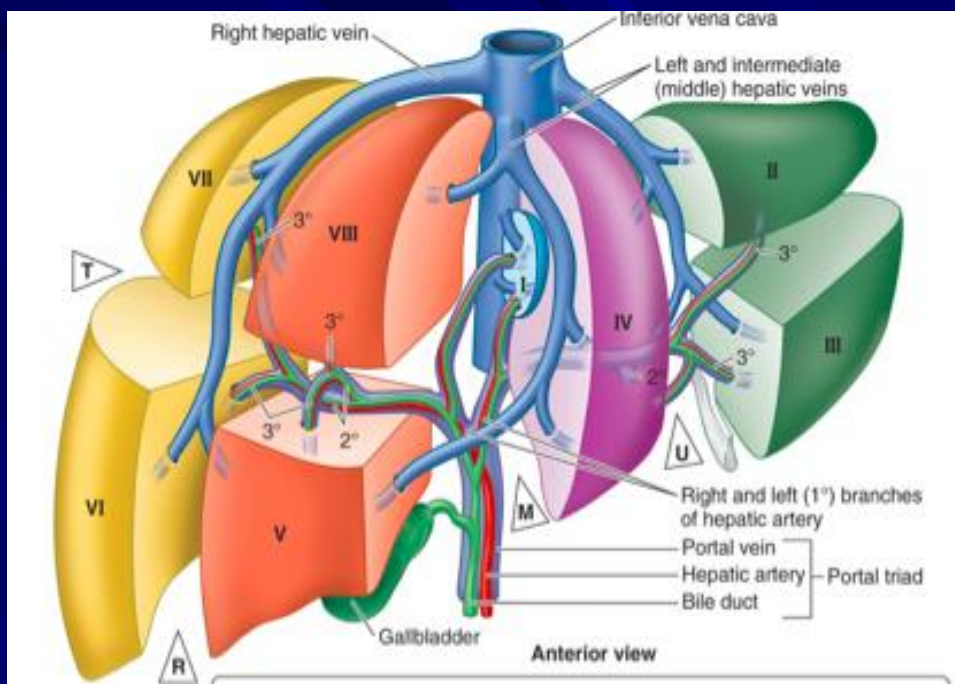
6. **Hematopoietic function**;

7. **Metabolism of microelements and vitamins.**

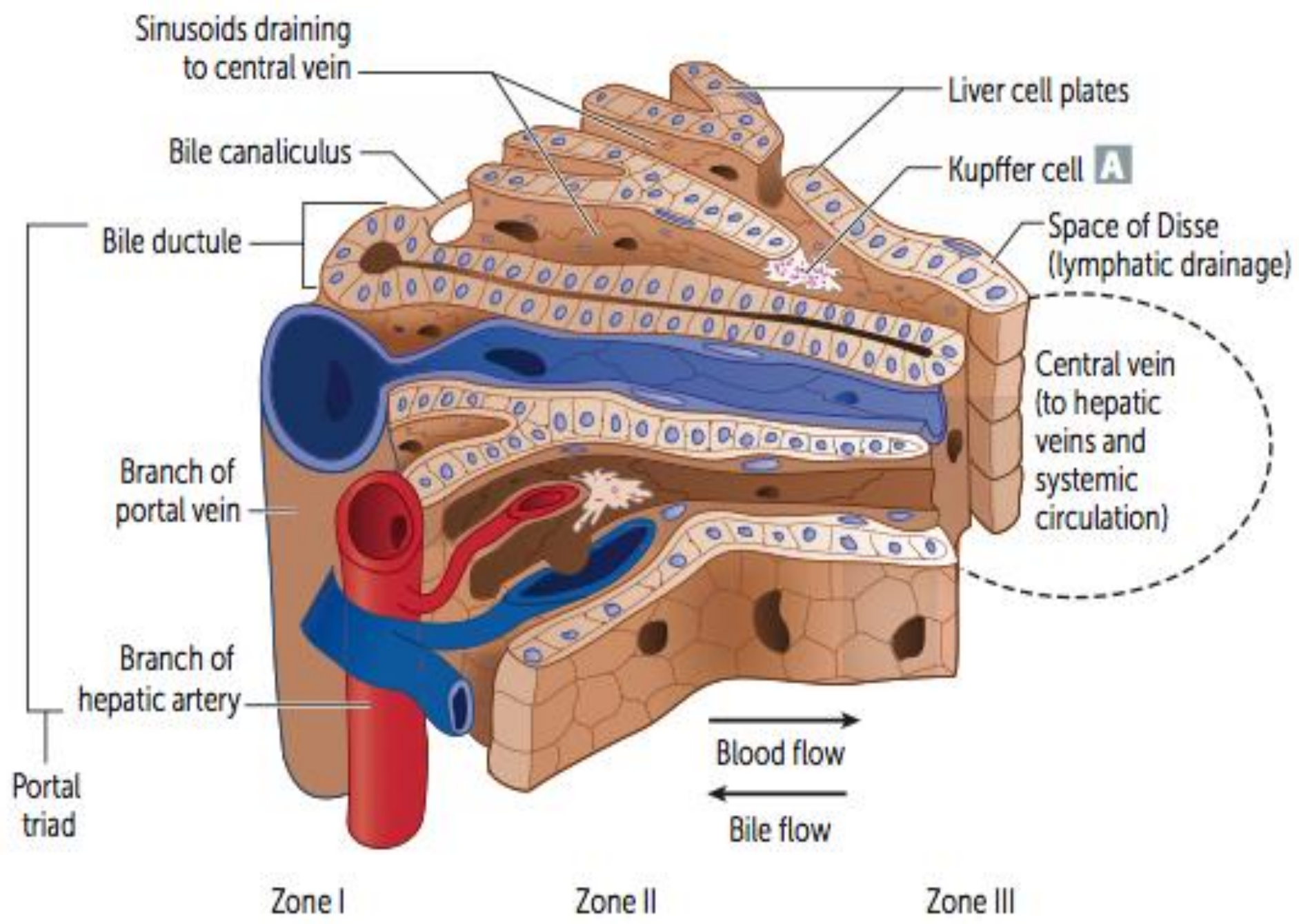
8. **Immune function**

# The portal vein system









Sinusoids draining to central vein

Bile canaliculus

Bile ductule

Branch of portal vein

Branch of hepatic artery

Portal triad

Liver cell plates

Kupffer cell **A**

Space of Disse (lymphatic drainage)

Central vein (to hepatic veins and systemic circulation)

Blood flow

Bile flow

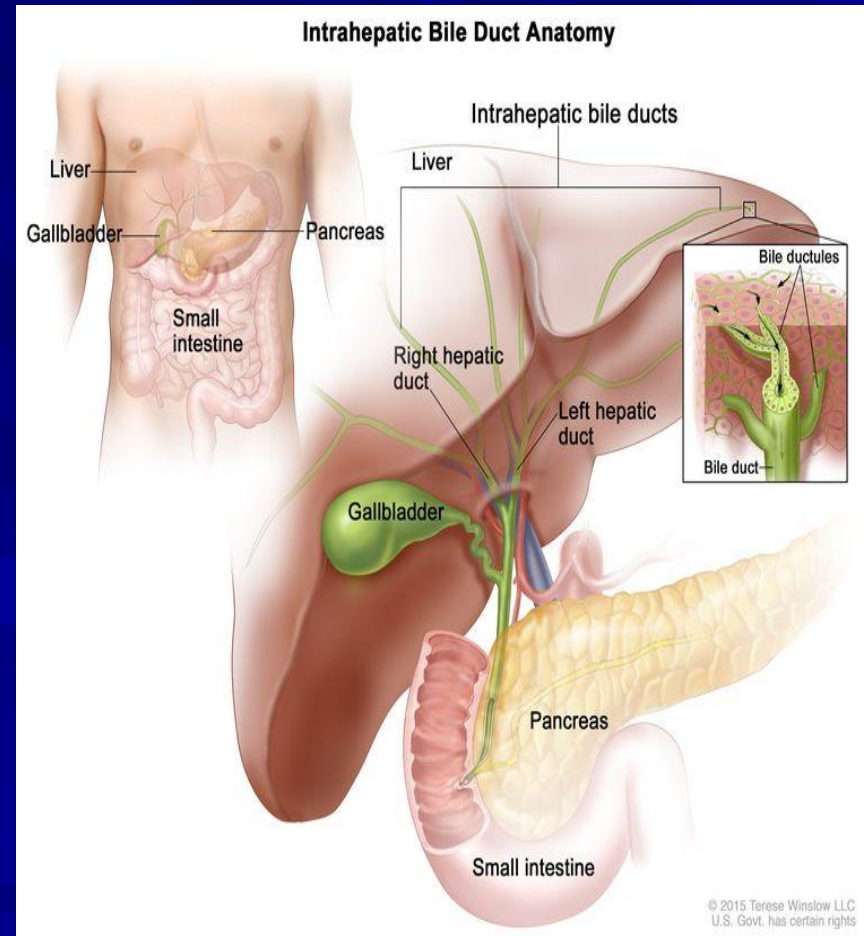
Zone I

Zone II

Zone III

# Gall bladder

- Gall bladder represents a reservoir for accumulation of bile.
- It is situated on the visceral surface of the liver, in gall bladder fossa.



# Gall bladder

The bottom of gall bladder is blank, stays out from the inferior margin of the liver at the level of the joint of VIII and IX right costal cartilages, which is the intersection of right abdominal rect muscle margin and right costal arch.

# Complaints

■ **Pain** in right hypochondriac is one of the main complaints. Pain is permanent, pestering, caused by dilation or an inflammatory process in the Glisson capsule in such diseases like congestion of the liver, hepatitis.

in inflammation of peritoneum, covering the liver, the pain is very severe.

# Pain in biliary colic

- spastic contractions of the gall bladder and bile ducts, frequently given by migration of stones.
- the pain is extremely severe, sometimes can lead to pain shock.

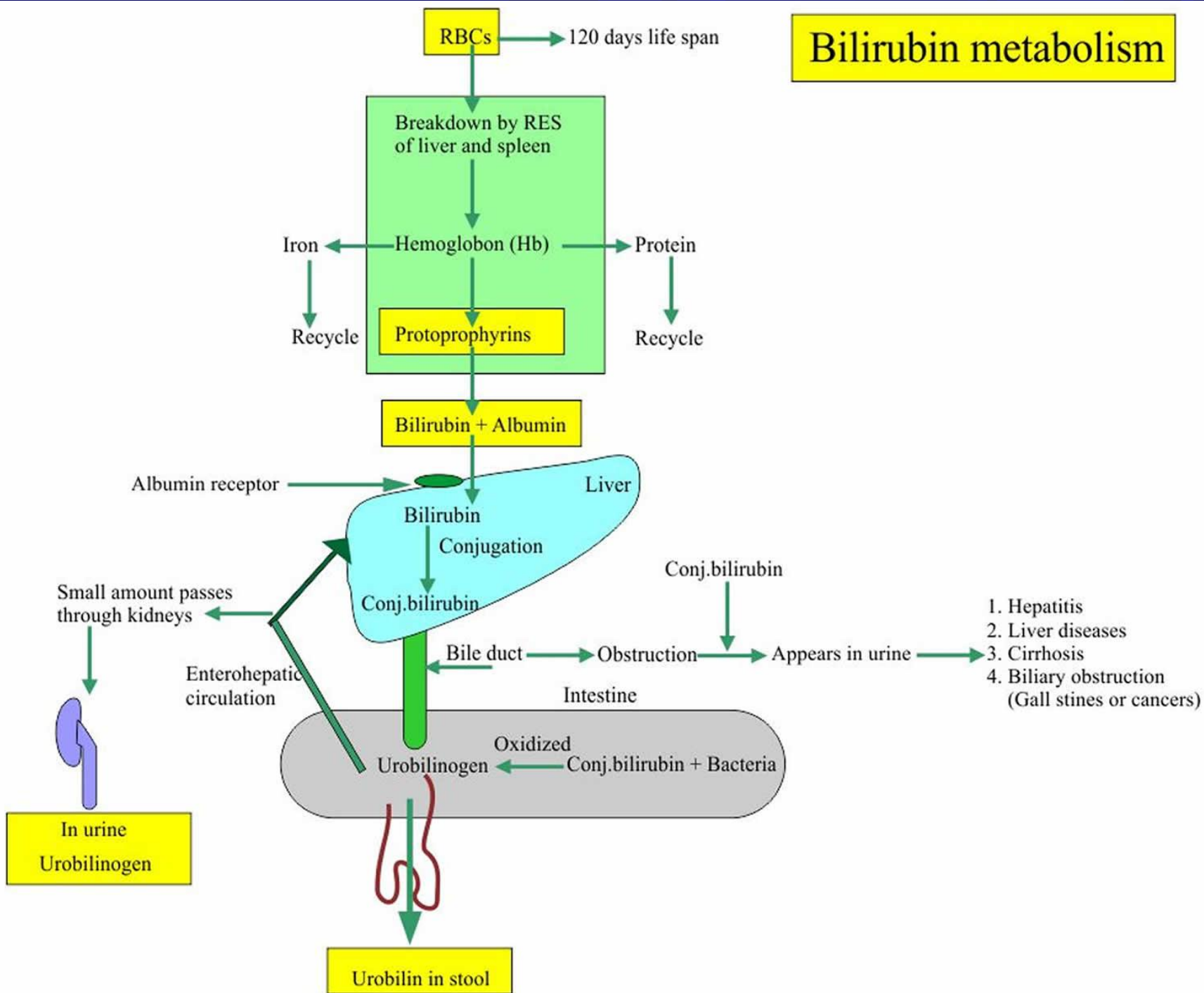
# Pain in biliary colic

- The onset of the pain is usually acute.
- Frequently associated with vomiting and fever.
- the pain irradiates to the right shoulder, right scapula and interscapular region, to the place of insertion of m. sternocleidomastoideus.

# Jaundice

yellow coloration of sclera, skin, visible mucosa, as a result of excessive accumulation of bilirubin in blood and tissues.

# Bilirubin metabolism

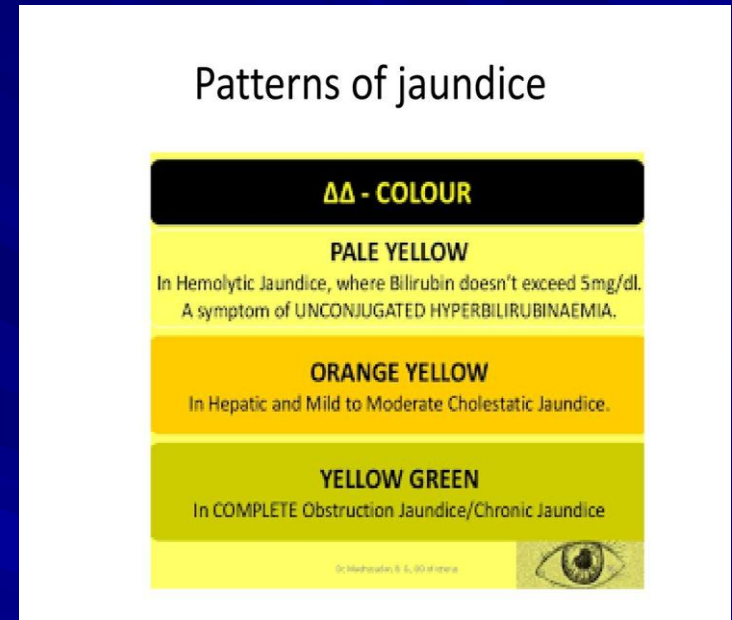




# Colour of the skin and urine in jaundice

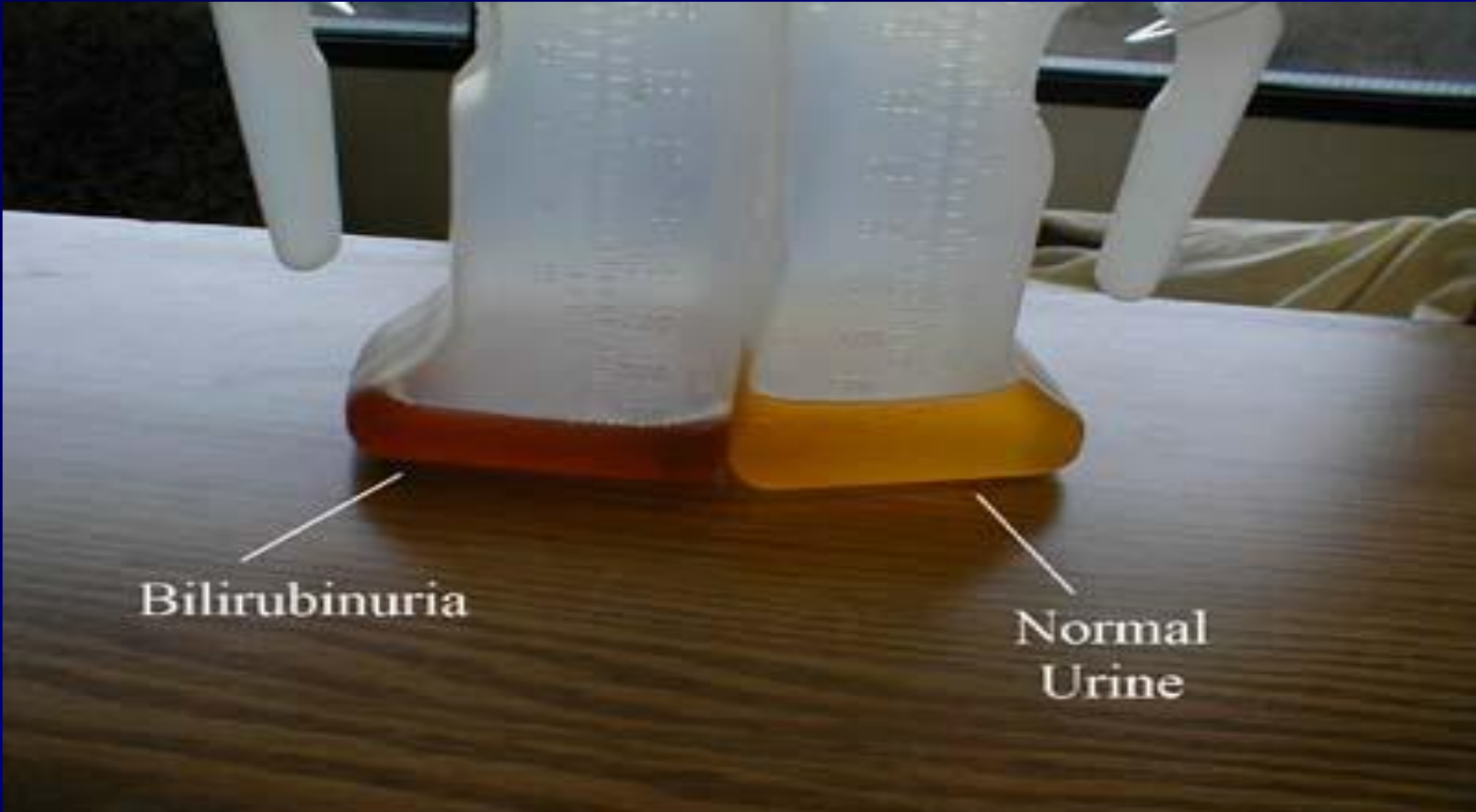
- **Light yellow** in haemolytic jaundice,
- **Red yellow** in parenchymatous jaundice
- **Green yellow** in mechanical jaundice

Elimination of bilirubin with urine in mechanic and parenchymatous jaundice colours the urine in dark brown.



## Table of diagnostic tests

Function test	Pre-hepatic Jaundice	Hepatic Jaundice	Post-hepatic Jaundice
Total bilirubin	Normal / Increased	Increased	
Conjugated bilirubin	Normal	Increased	Increased
Unconjugated bilirubin	Normal / Increased	Increased	Normal
Urobilinogen	Normal / Increased	Increased	Decreased / Negative
Urine Color	Normal	Dark (urobilinogen + conjugated bilirubin)	Dark (conjugated bilirubin)
Stool Color	Normal	Normal/Pale	Pale
Alkaline phosphatase levels	Normal	Increased	
Alanine transferase and Aspartate transferase levels		Increased	
Conjugated Bilirubin in Urine	Not Present	Present	
Splenomegaly	Present	Present	Absent



**Bilirubinuria**

**Normal  
Urine**



## Itching

Frequently found  
in mechanical  
jaundice due to  
accumulation in  
the blood of a  
big amount of  
bile acids



# Dyspeptic complaints

- Loss of appetite,
- Nausea, eructation,
- Meteorism, diarrhoea or constipation,
- Bitter taste.

due to decreased secretion of bile and diminished disintoxication function.

## Other complaints

- fatigue,
- reduced ability to work,
- weight loss.

These complaints depend on disturbance of vitamin and protein metabolism and antitoxic function of the liver.

# Fever

Found in:

- Acute hepatitis,
- Inflammatory processes in bile ducts,
- Hepatic abscess (extremely high values, associated with chills)

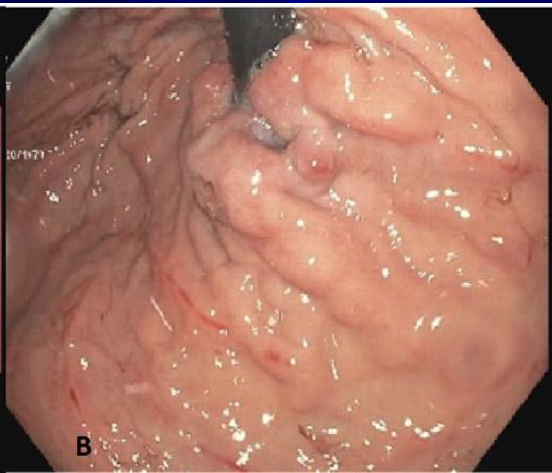
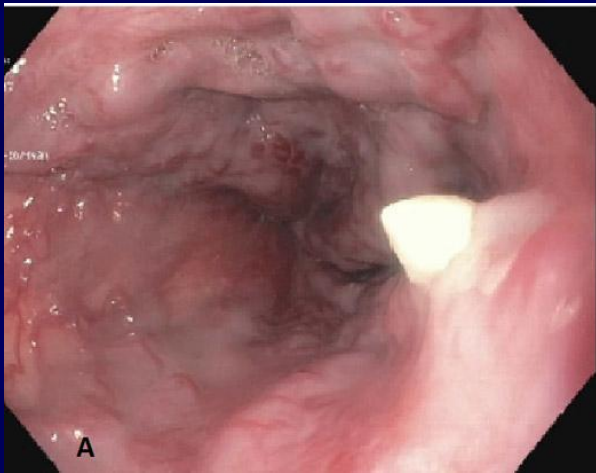


# Symptoms of haemorrhagic diathesis:

- epistaxis,
- gingivorrhagias,
- haemorrhages from oesophageal varicose veins

consequence of decreased production of coagulation factors in the liver and portal hypertension.

rupture of haemorrhoidal plexus anastomoses lead to profuse haemorrhages.



Ann Hepatol. 2007;6:181-4



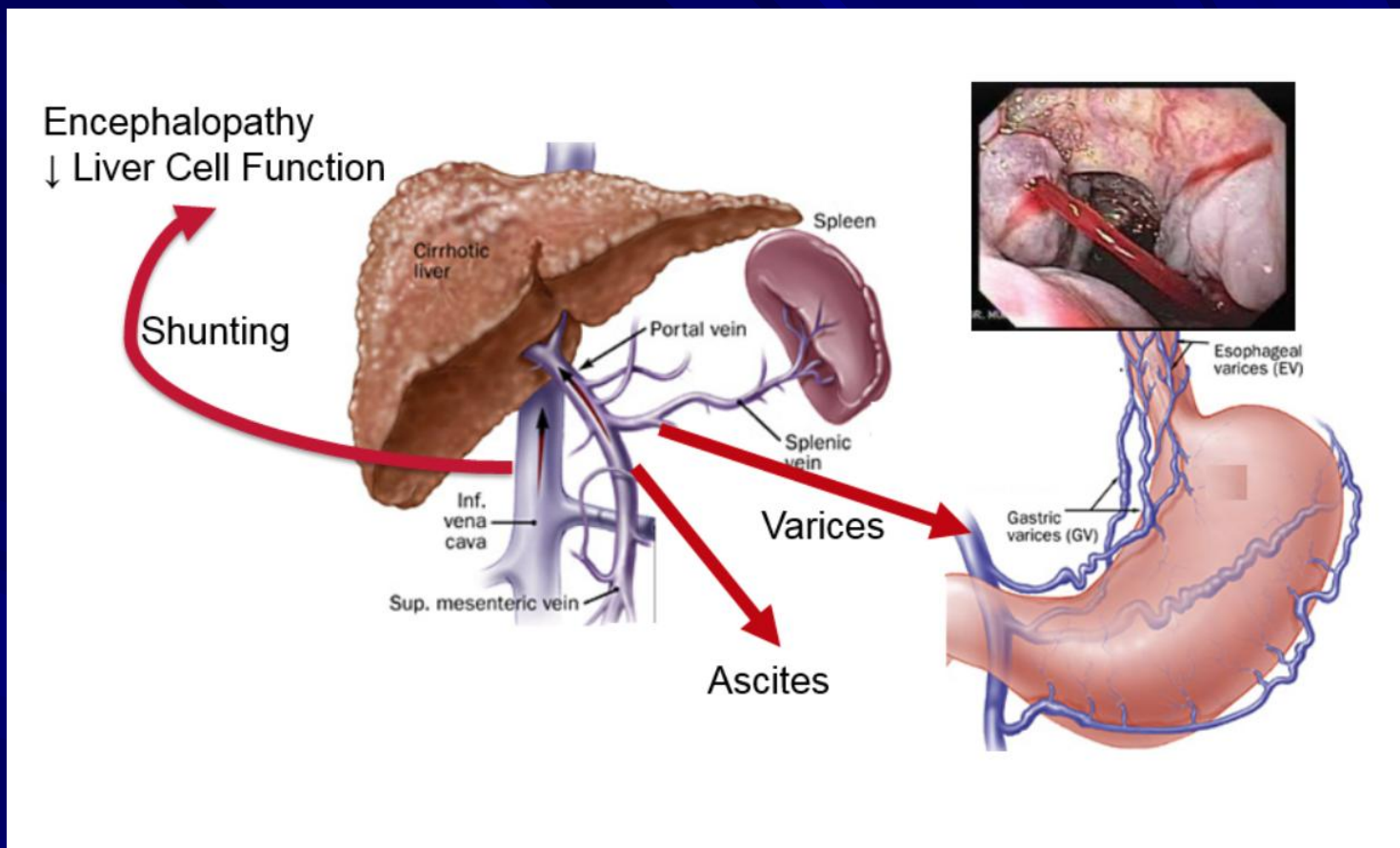
Petechiae



Caput medusae



Purpura

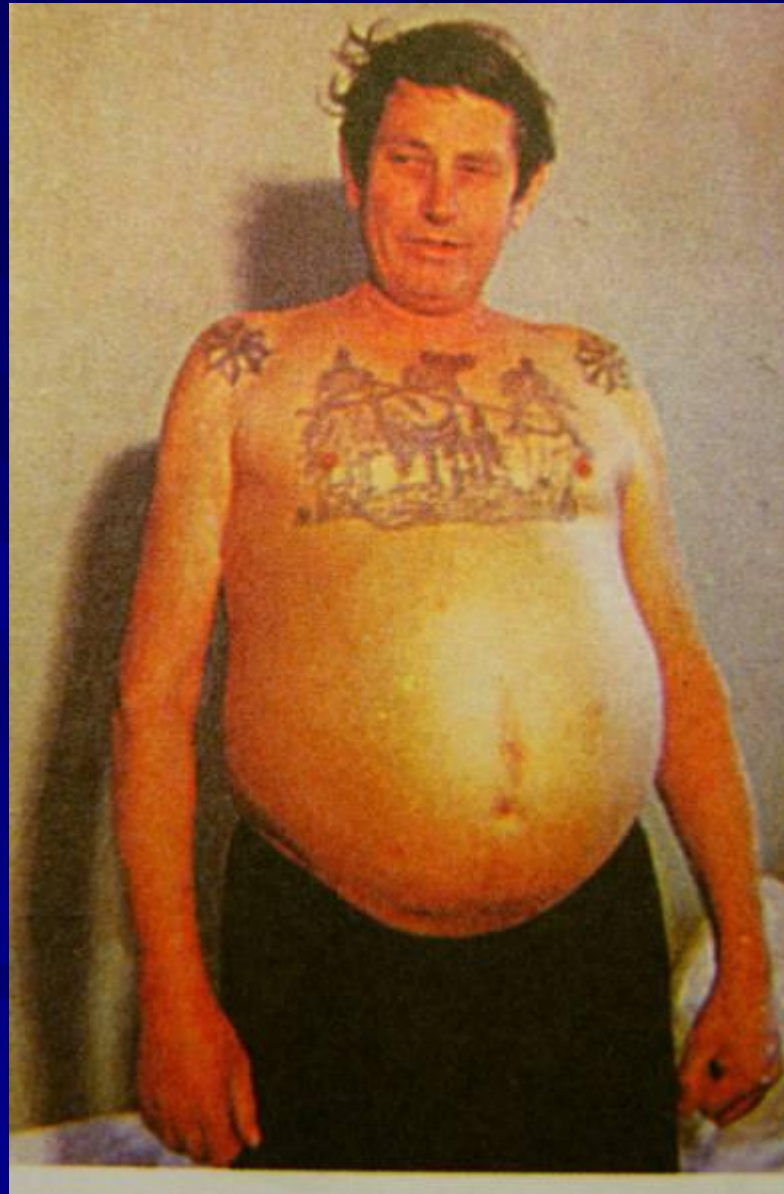


**Increased pressure in the portal vein system occurs most often as a consequence of prolonged disturbance of circulation in hepatic parenchyma with further formation of connective tissue (cirrhosis), compressing the interhepatic ramifications of portal vein.**

# Ascites

Increased pressure (marked and long-term) in the portal vein system leads to exudation of liquid in abdominal cavity (**ascitis**) and the patient will complain on increased volume of abdomen

# Ascitis



# Causes of oedema in hepatic diseases

- Mechanical compression of vena cava inferior in case of a big amount of liquid in abdominal cavity can lead to appearance of oedema on the lower extremities;
- Decreased amount of albumins in the blood (decreased oncotic pressure).

## *Central nervous system changes:*

insomnia,  
asthenia,  
agitation,  
deliria,  
coma.

# History

- History of the disease - for appreciating the onset and evolution of the disease;
- History of patient's life - for appreciating of the aetiology of the disease.



## Moments to be observed:

- Long-term deficiency of protein and vitamin products in alimentation, as well as disturbances of their absorption in intestine in case of its lesion.
- Hygienic habits during alimentation (not washed fruits and vegetables or not proper drinking water supply), can favourise infection with type A hepatitis virus.

- **Some toxic chemical substances** (chloroform, carbon tetrachloride, phosphor, arsenium etc.) and toxins of vegetal origin (mushrooms) can also cause severe liver dysfunction.
- **Alcoholism** represents a major factor in production of chronic hepatopathies: chronic hepatitis, liver cirrhosis.

# Previous disease

- 1) **viral hepatitis**, evolving to chronic hepatitis (in several years) and finally to liver cirrhosis;
- 2) **hepatobiliary diseases** (cholecystitis, biliary lithiasis);
- 3) **infectious diseases, acute** (dysentery, septicaemia) and **chronic** (tuberculosis, syphilis, brucellosis, malaria) which affect the liver;

- 4) **cardiac diseases** (particularly right heart failure, which due to long-term congestion in the liver, can determine appearance of liver cirrhosis);
- 5) **metabolic diseases**, such as diabetes mellitus can affect the liver.
- 6) **hepatotoxic drugs** and administration of different parenteral treatments (transfusions, injections, vaccines, surgery) as a possibility of transmitting of type B , C virus hepatitis.

# Heredocollateral anamnesis

Hereditary predisposition for some hepatic diseases, but mostly gall bladder diseases.

# General inspection

- Patient's general condition could be from satisfactory to extremely severe.
- Consciousness - from clear to coma.
- Position of the patient - from active to passive in hepatic coma.
- In chronic hepatitis and liver cirrhosis on the face there could be varicosities and spiders at the level of the cheeks.

## Skin and visible mucosa:

- a) pale skin (digestive haemorrhages due to rupture of oesophageal varices in cirrhosis);
- b) haemorrhagic petechiae;



c) subjaundice or jaundice with red or green shade;

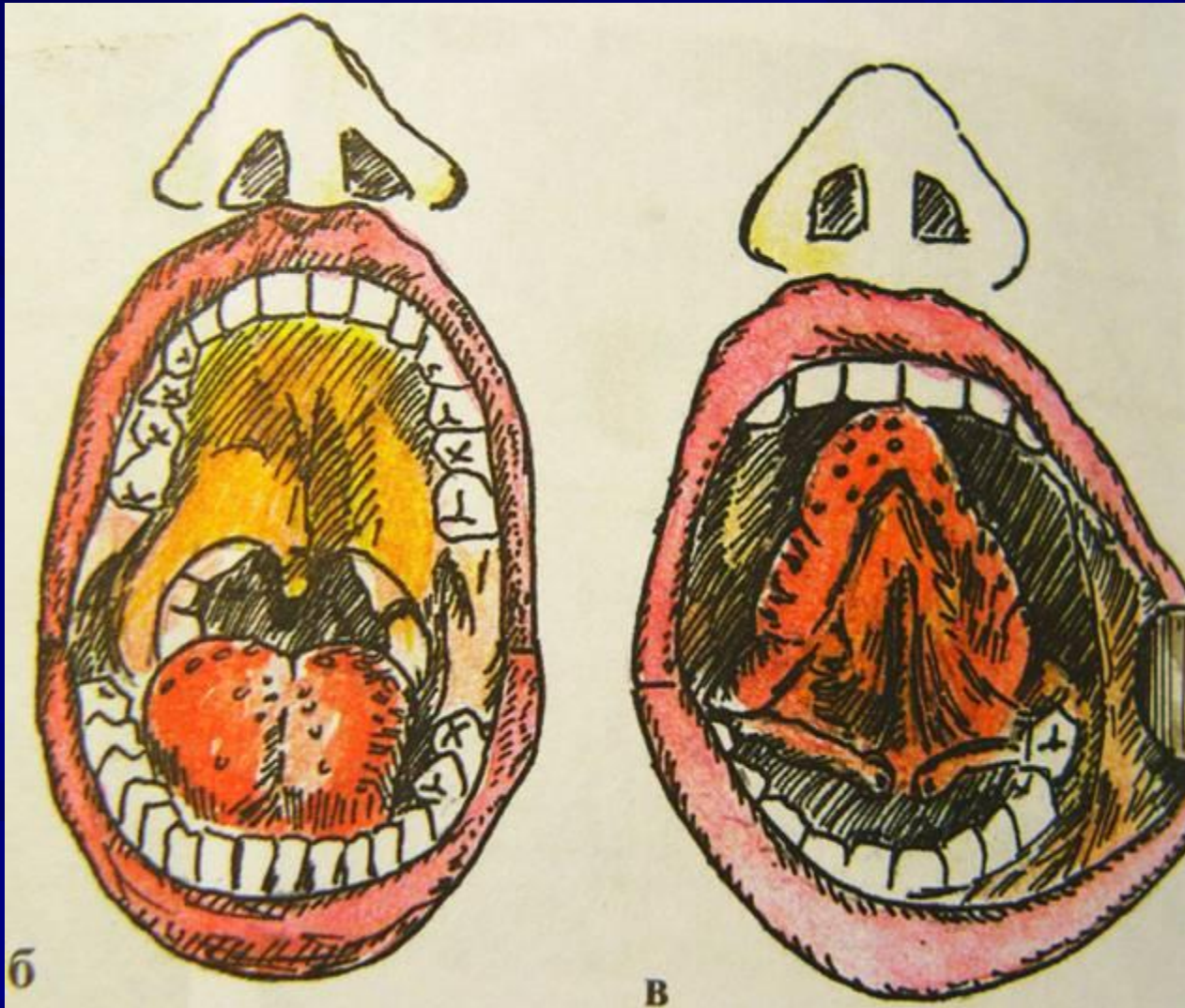




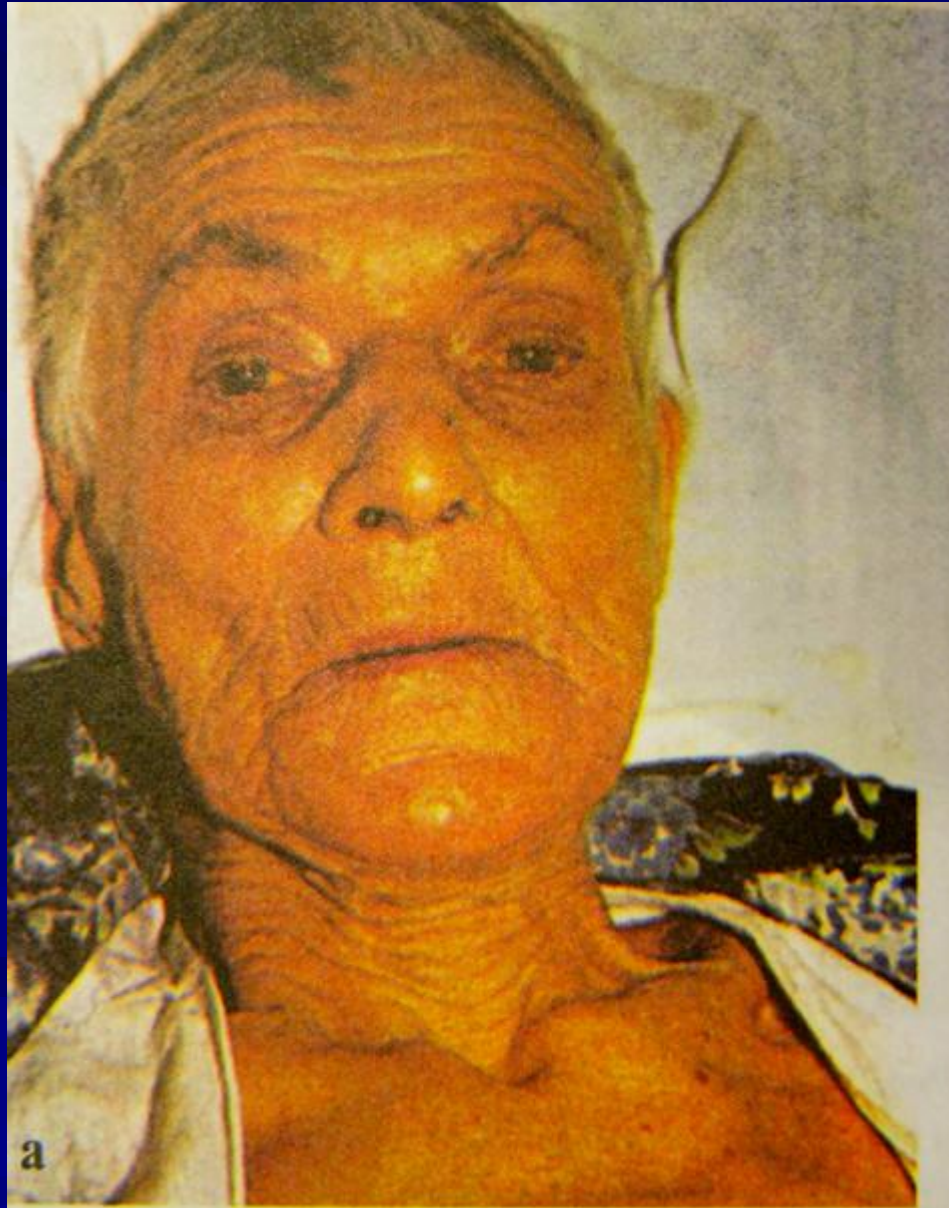
# Icterus



# Jaundice of oral mucosa, under the tongue



# Mechanical jaundice



d) „Spiders“, mostly seen on the neck, face, shoulders, arms.



e) if cholesterol metabolism is disturbed, one can find white to yellow depositions of it on the eyelids (xantelasma ) or sometimes in other parts of the body (xantoma);



f) gynecomasty (increase of mammary glands) in men;



# g) palmar and plantar erythema





h) diminishing of axillary and pubic pilosity (in women) and of pectoral pilosity (in men);

# i) Peripheral oedema



- **Other changes** - thin and fragile hair; white and fragile nails with transversal and longitudinal striation.
- **Subcutaneous fat tissue** is decreased especially in liver cirrhosis, this could be noticed mostly on the face and extremities, being in contrast with big abdomen.
- **Clubbing of the fingers** in patients with chronic pathologies of the liver.

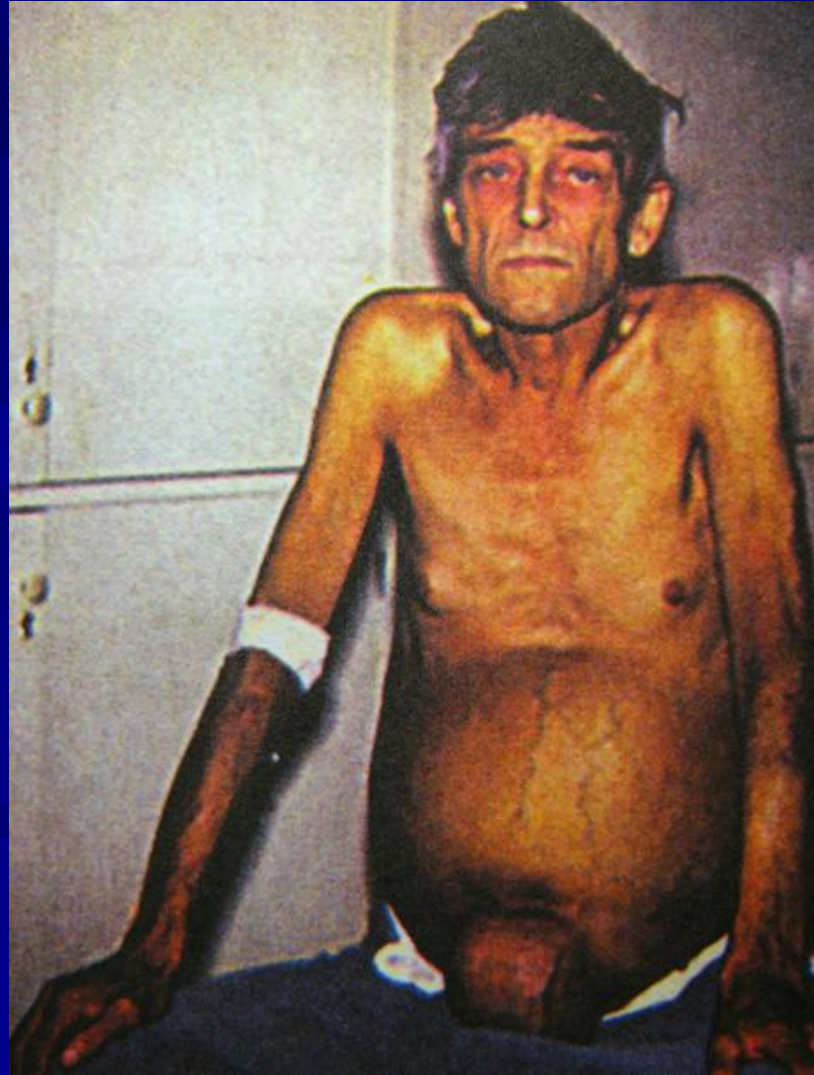
# Inspection of oral cavity

- inflammation of oral mucosa and in the region of angles of mouth due to long-term disturbance of vitamin metabolism, especially from group B.
- tongue - purple.

# Inspection of the abdomen

- in liver diseases, associated with portal hypertension, one can notice increased volume of abdomen (due to meteorism and accumulation of ascitic liquid);
- the skin above the abdomen is smooth, stretched, the umbilicus is prominent.

Liver cirrhosis - ascitis, gynecomasty,  
petechiae, caput Medusae, umbilical  
hernia



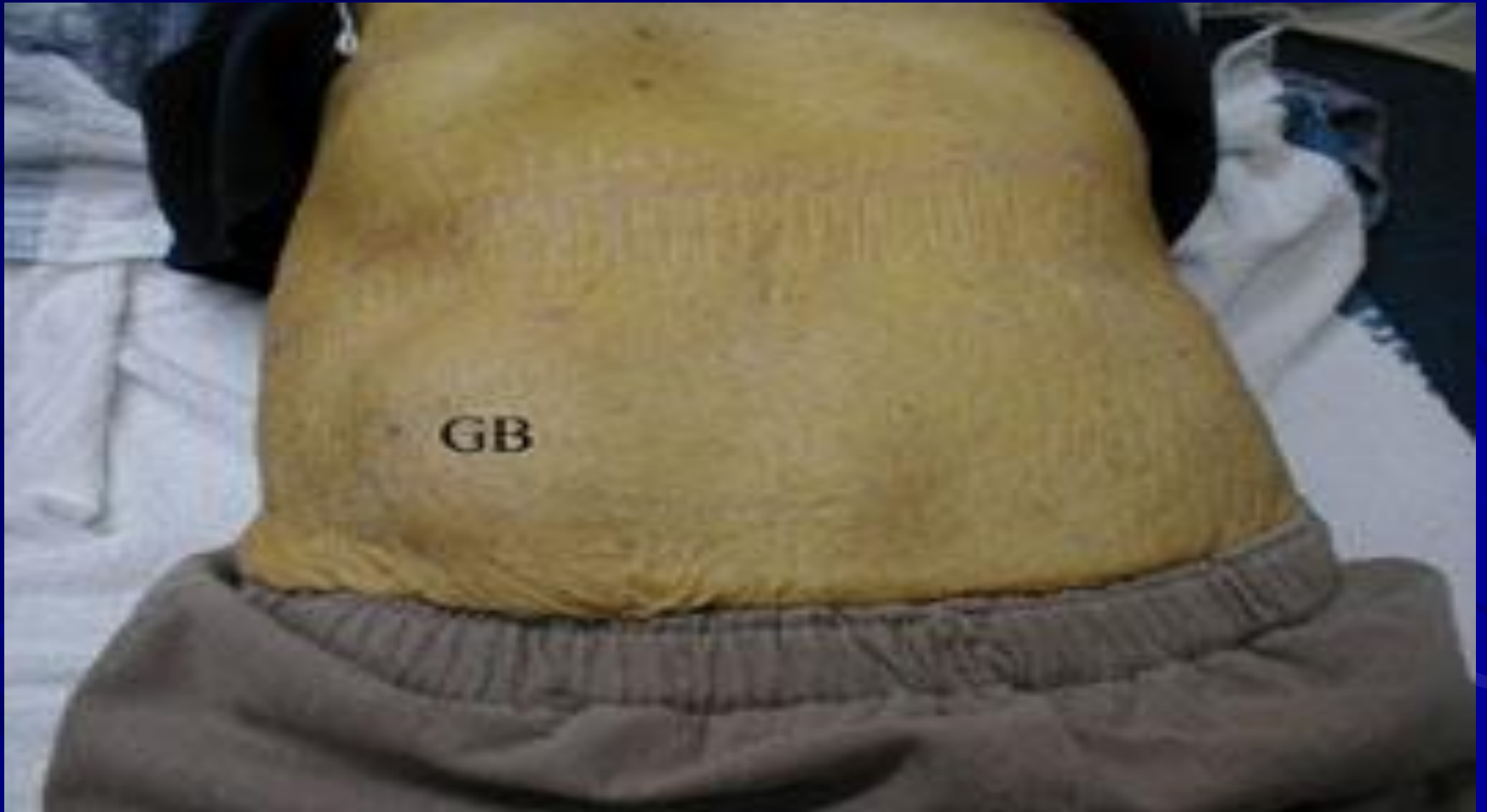
- Sometimes during inspection of the abdomen excessive abdominal volume is given by increased dimensions of some organ (ex. liver and spleen), or by umbilical hernia.
- in such cases the abdomen is asymmetric.

# Cirrhosis





# Jaundice



# Umbilical hernia



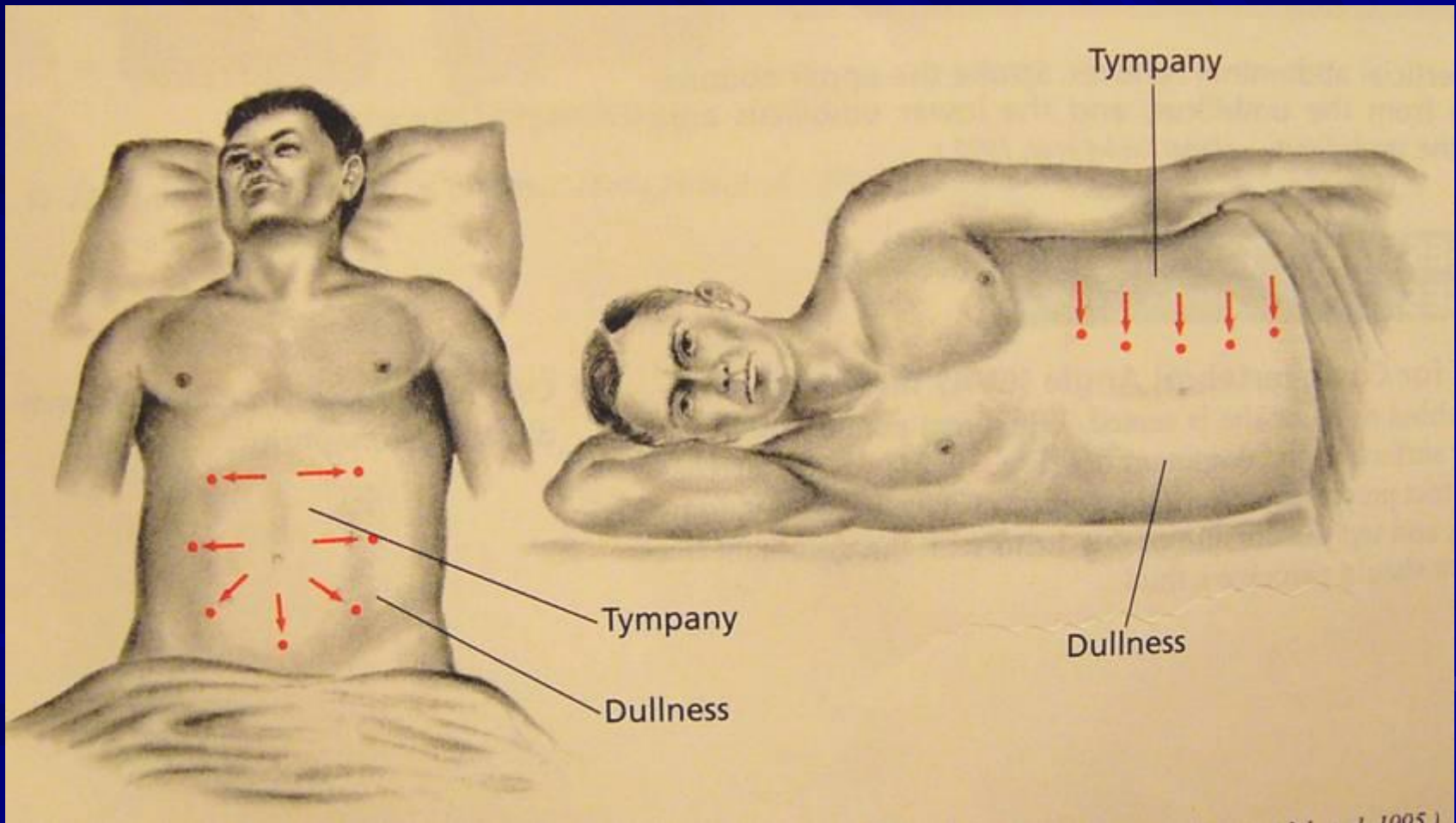
On the anterior wall of the abdomen  
there could be a pronounced venous  
network



# Percussion of the abdomen for appreciating of liquid in abdominal cavity.

- With patient laying on his back apply a superficial percussion from umbilicus to lateral sectors of the abdomen. If there is liquid in abdominal cavity, it goes down.
- As a result, in the central part of the abdomen (in umbilical region) there is a tympanic sound, and in flanks there is dullness.

# percussion of the abdomen



when moving the patient in lateral position the liquid is going down again, and in the upper part, above the opposite flank, the dull sound turns to tympanic.

- One can also percute the abdomen with the patient in standing position from up to down on the median line.
- If there is liquid, in the inferior part of the abdomen there is a dull sound by percussion.

## Fluctuation test (wave sign).

- The left hand is put on the lateral surface, and the fingers of the right hand apply brief, knocking movement to the opposite abdominal wall.
- These shocks produce oscillations of liquid, which are transmitted to the opposite side and are felt by left hand like a wave sign.



in order to be sure that the fluctuation is transmitted through the liquid, but not through abdominal wall, it is recommended to the assistant to place his hand on the medial anterior line in umbilical region (to block the transmission of the wave through abdominal wall).



# Percussion of the liver

the most simple method of appreciation of liver borders is Curlov's method.

Proceed as following:

# I Moment

- Appreciating of the upper border of the liver on the right medioclavicular line.

The plessimeter is placed parallel to the upper border of the liver and percussion is made from up to down until the sound changes to subdull (this is point 1 - usually IV-V intercostal space).

## II Moment

- Appreciating of the lower border of the liver on the right medioclavicular line.

The plessimeter is placed parallel to the lower border of the liver at the level of umbilicus and percussion is made from down to up until the sound changes to dull (**this is point 2** - usually at the level of the lower margin of costal arch).

# III Moment

Appreciating of the upper border of the liver on the medial anterior line.

This is impossible to do by percussion as here the liver is near the heart, which also gives a dull sound during percussion.

The border is determined conventionally, tracing a horizontal line from the **point 1** to median anterior line. This is the upper border of the liver on the medial anterior line (**point 3**).

# IV Moment

Appreciating of the lower border of the liver on the medial anterior line.

- percussion is done from down to up from the level of umbilicus or lower on the medial anterior line until the sound changes to dull. (this is point 4 - usually at the border of the upper and medium third of the distance between umbilicus and xyfoid process.

# V Moment

- Appreciating of the lower border of the liver on the left costal arch. The plessimeter is placed perpendicular to the left costal arch at the level of IX rib and percussion is made right on the margin of the left costal arch to the **point 3** until the sound changes to dull (**this is point 5** - usually at the level of VII-VIII rib).



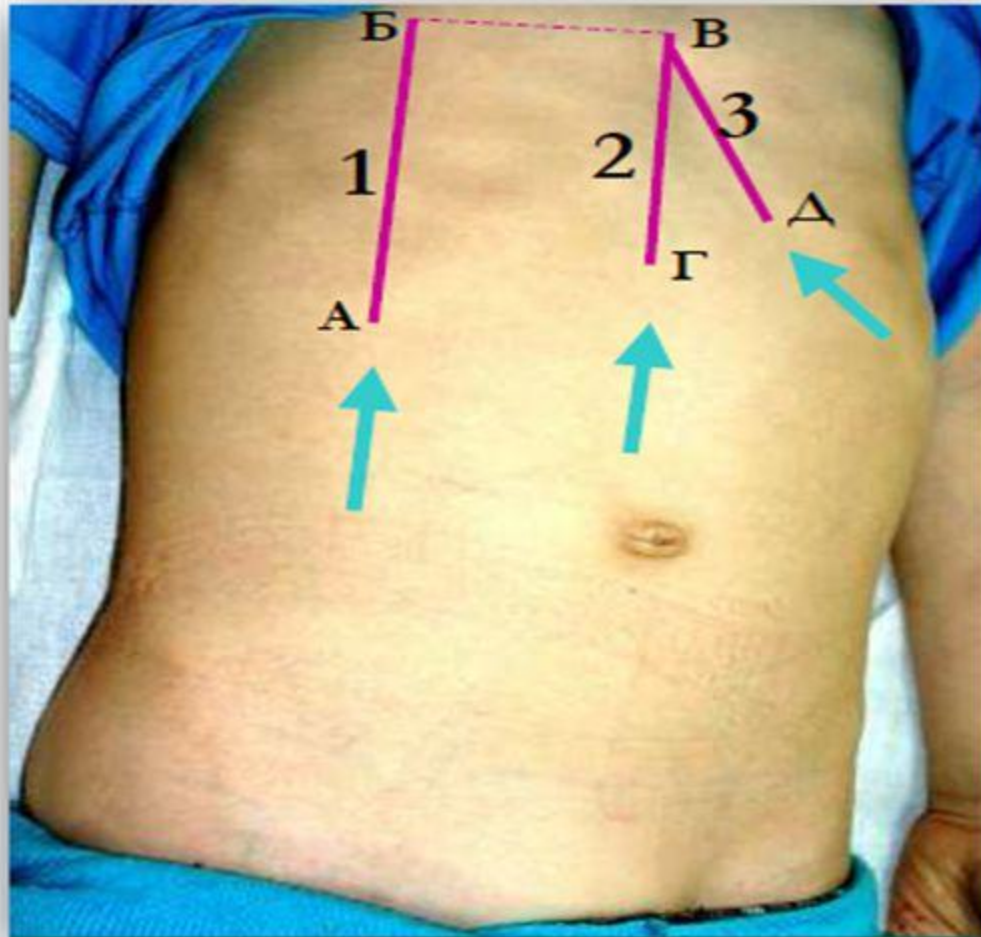
In a healthy adult there should be:

between point 1 and 2 - 9-11 cm.

between point 3 and 4 - 8-10 cm.

between point 3 and 5 - 7-9 cm.

# *Percussion of liver by Kurlov*



# Palpation of the liver - goals

Appreciation of the characteristics of the lower margin of the liver:

- contour (smooth or irregular);
- consistence (hard or soft)
- shape (sharp or rounded)
- presence of pain
- the surface of the organ (smooth or irregular).

In big amount of liquid in abdominal cavity the margin of the liver cannot be appreciated by palpation.

In this case with the fingers of the right hand apply abrupt shocks on the abdominal wall (without taking the fingers off from the anterior wall of the abdomen), moving the hand from down to up.

**When the fingers touch the margin of the liver, there is a feeling of a hard organ, which is moving from and to the fingers (the symptom of "floating ice").**

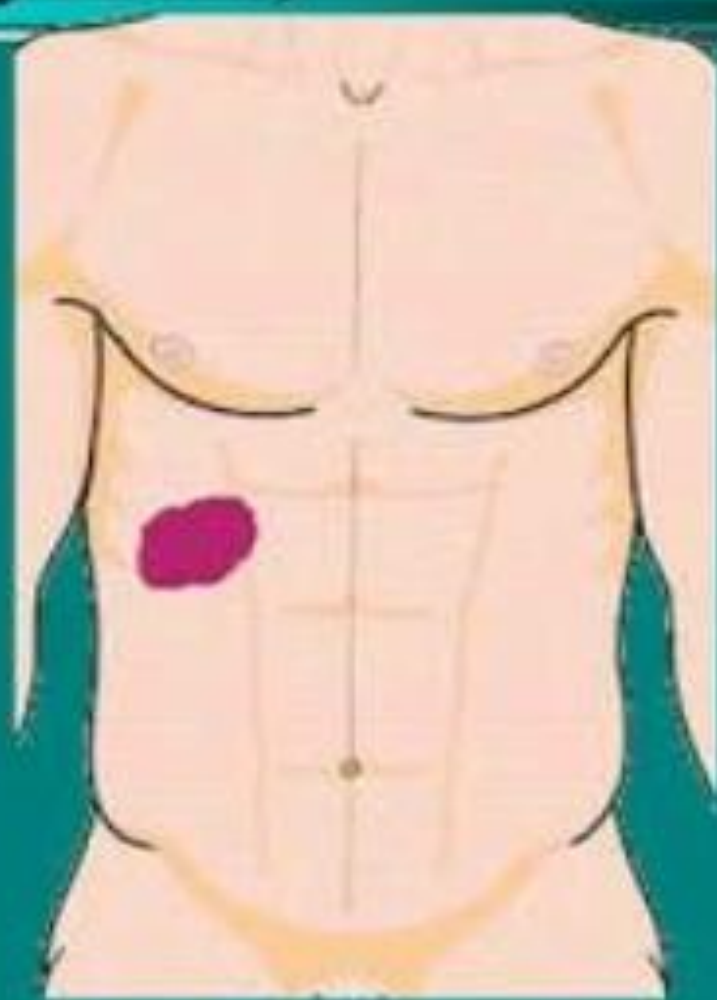


In healthy people gallbladder is not determined by palpation.

During superficial palpation of the abdomen in biliary colic and in inflammatory process there could be tension of the abdominal muscles in the right hypochondria. Also sensitivity and pain could be revealed.

# Murphy's Sign (acute cholecystitis)

- Examiner's hand is at middle inferior border of liver.
- Patient is asked to take deep inspiration.
- If positive patient will experience pain and will stop short of full inspiration



*Hepatitis, subdiaphragmatic  
abscess Cholecystitis*

# Auscultation of the liver

During examination of the liver auscultation is rarely applied

In local peritonitis sometimes there could be heard and even appreciate palpatorily a noise of peritoneal friction under the right hypochondriac region.

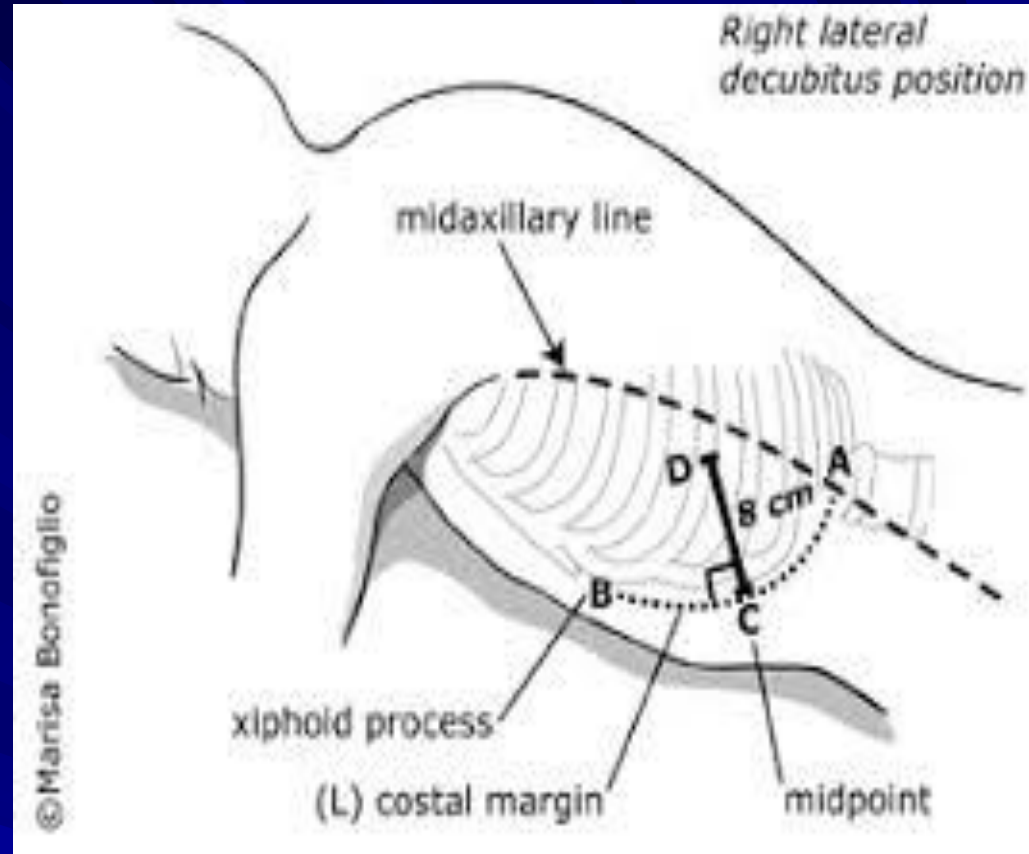


# Percussion of the spleen

- percussion can serve only as a method of orientation for appreciating splenomegaly.

The spleen is situated under the cupola of left diaphragm in the depth of left hypochondria. The X rib divides it in two halves - anterior inferior pole and posterior superior pole; these could be determined by percussion on the X rib.

percussion is better to be performed with patient laying in right lateral position with slightly flexed legs.



# I Moment

The plessimeter is placed at the margin of the left costal arch perpendicular to the X rib.

percussion is made from the margin of the left costal arch directly on the X rib until the sound changes from tympanic to dull.

## II Moment

- The plessimeter is placed perpendicular to the X rib on the posterior axillary line
- Slight percussion is made on the X rib to the first point until the sound changes to dull.

The segment between the first and the second point represents the longitudinal diameter of the spleen. Normally the longitudinal diameter is 6-8 cm

- For appreciation of transversal diameter of the spleen the longitudinal diameter is divided into 2
- percussion is made from the obtained point perpendicular X rib, first up, until the sound changes from clear to dull, and then down until the sound changes from clear to dull.

The segment between these two points represents the transversal diameter of the spleen. Normally the transversal diameter is 4-6 cm.

# Palpation of the spleen

- The goal of palpatory examination of the spleen is to appreciate the inferior margin and its location, consistence, shape and tenderness, the character of the spleen surface.
- The principle is identical with palpation liver.
- During palpation of the spleen the most comfortable position of the patient is in right lateral decubitus with slightly flexed legs.

# Auscultation

in very rare cases at the level of the spleen could be heard peritoneal friction (in infarction of the spleen, as a consequence of local inflammation of peritoneum).



**THANK YOU  
FOR  
YOUR  
ATTENTION!  
ANY QUESTIONS?**