**HYPERTROPHY**

In patient N., 60 years old, which suffer for 30 years - arterial hypertension, the echocardiographic examination revealed an increase in myocardial mass and thickening of the left ventricular wall.
 Microscopic examination: left ventricle - diffuse proliferation of connective tissue; cardiomyocytes enlarged in volume, with a large nucleus. Electron microscopy shows an increase in the number and size of cellular organelles (mitochondria, endoplasmic reticulum, ribosomes, Golgi apparatus).

**Questions:**

1. What are the pathogenic mechanisms of hypertrophy under conditions of cardiac overload?
2. What are the triggers for genome modification that activate the anabolic process at the cardiomyocyte level?
3. What are the common and distinctive signs of physiological and pathological hypertrophy of the myocardium?
4. What is the difference between hypertrophy and hyperplasia in the regenerative process?
5. What are the types of pathological hypertrophy? Examples.
6. What are the types of physiological hypertrophy? Examples.

**ATROPHY**

Patient R., 45 years old, was admitted to the endocrinology department with the diagnosis of "secondary hypothyroidism," presenting the following complaints: fatigue, drowsiness, memory loss, hair loss, brittle nails, and weight gain.

For diagnostic purposes, a thyroid gland biopsy was performed. Microscopic examination revealed a reduction in the number and size of follicles.

**Questions:**

1. What typical pathological process in the thyroid gland has developed in this patient? Provide arguments.
2. What pathogenic factors contribute to the decrease in the number, size, and function of the thyroid gland in this patient?
3. What is the relationship between the intensity of the anabolic and catabolic processes in the pathogenesis of atrophy?
4. What is the pathogenetic role of ubiquitin-proteasome pathway activation in this pathological process?
5. What types of pathological atrophy do you know? Mechanisms of pathological atrophy. Examples.
6. What types of physiological atrophy do you know? Examples.

**SCLEROSIS**

A 55-year-old man with a 20-year history of chronic viral hepatitis C presents to the doctor with symptoms of persistent fatigue, moderate jaundice, and abdominal enlargement.
**Abdominal ultrasound:** confirms a nodular structure of the liver and ascites.
**Liver biopsy:** indicates excessive deposition of connective tissue in the liver parenchyma, macronodules, and signs of inflammation.

**Questions:**

1. What is the typical pathological tissue process in the liver observed in this patient?
2. What etiological factors contribute to the development of hepatic cirrhosis?
3. What is the role of chronic inflammation in the pathogenesis of sclerosis?
4. What are the sources of sclerosis?
5. What is collagenogenesis and collagenolysis and what is the balance of these processes (collagenogenesis and collagenolysis) in this patient?
6. Which type of macrophages, M1 or M2 (classically or alternatively activated), activate fibroblasts and subsequently lead to excessive extracellular matrix deposition?
7. Which cytokines are important fibrogenic factors, and what is their role?
8. What conditions would be necessary for physiological regeneration in the liver?

**Hyperplasia**

Patient X, 40 years old, was admitted to the gynaecology department with the following complaints: metrorrhagia lasting 8 days, moderate pain in the suprapubic region, and general weakness.
**Laboratory analysis:** hyperestrogenism.
**Physical examination:** pallor, BP = 90/60, pulse = 105, abdomen bloated, soft, painful in the suprapubic region.
**Ultrasound:** endometrium is heterogeneous in structure, thickened.
**Histological examination:** complex endometrial hyperplasia without nuclear atypia.

**Questions:**

1. What is endometrial hyperplasia?
2. What is the mechanism by which estrogens induce the hyperplasia process?
3. Which tissues undergo exclusively hyperplastic processes and why?
4. Which tissues undergo exclusively hypertrophic processes and why?
5. What is the difference between hyperplasia and metaplasia?