

The practical exam from Pathological physiology

The practical part of the examination will be realized as a discussion with assistant over brief typical case reports and/ or results of investigations and diagnostic tests and answering few related questions.

Example structure of case reports

Brief description of the current clinical state

Laboratory findings and other results (normal values of most examinations will be provided)

Questions related directly to the case report or related to given disorder or investigation method.

Model case studies and their analysis, which taken part of the seminars especially in the second half of the summer term.

Topics of case studies

Topics are related to major illnesses, respectively to their underlying patho-physiological conditions.

Interpretation of diagnostic tests

This will include interpretation of typical results of following methods and findings:

- ECG:

basic description of the ECG recording - rhythm, frequency, direction of the axis, major waves
atrial fibrillation, ventricular fibrillation, AV block, supraventricular and ventricular extrasystoles,
acute myocardial infarction and its localization

- Spirometry: obstructive and restrictive disorders

- Astrup method: basic types of acid-base imbalances, respiratory/ metabolic acidosis/ alkalosis,
assessment of compensation stage of the disorder

Laboratory findings will be discussed in relation to individual syndromes, to seminar topics and to diagnostic procedures

In the discussion of imaging methods, the stress will be put on the student's ability to interpret the findings in relation to pathologic processes. (Examples: the thickening of the left ventricle wall should be interpreted as an adaptation to higher workload of the left ventricle against higher resistance/ pressure, like it is in cases of systemic hypertension or aortal stenosis.)

Example case study (assistant can choose questions that will be discussed):

64-year old man was admitted to hospital for the collapse condition on his way to his general practitioner. He was feeling nauseous, he was feeling about to faint, he saw blackness before his eyes, he was able to sit up without falling and he is not aware of any loss of consciousness. He had neither chest pain, nor palpitations. He did not feel any shortness of breath. About last 2 months he feels shortness of breath during larger physical exertion. Furthermore, he has about last 2 months loss of appetite, aversion to meat, after eating he feels abdominal discomfort, bloating, he does not vomit, he has normal stool and he lost weight, about 12 kg during this period. He has never been treated for any illnesses. He does not use any medication.

Physical findings: BP 150/ 90 mmHg, heart rate 67/ min., respiratory rate 14/ min., SpO2 96 %, no pathology on the ECG: sinus rhythm, HR 61/ min. Axis: semi-vertical, PQ 0.18 sec, QRS 0.10 sec, ST segment without denivelation

Laboratory tests:

Full blood count:

Leu: $3.08 \times 10^9 / L$, norm: [4.10 .. 10.20], Ery: $1.56 \times 10^{12} / L$, norm: [4.19 .. 5.75], HB: 64 g/l, norm: [135 .. 174], HTC: 0.186, norm: [0.390 .. 0.510], MCV 119.6 fl, norm: [82.6 .. 98.4], MCH: 41.2 pg, norm: [28.0 .. 34.6], MCHC 344 g/l. norm: [329 .. 364], RDW: 16.5 %, norm: [12.1 .. 15.0],

Plt: $136 \times 10^9 / L$ norm: [142 .. 327], Reticulocytes: 16.0 %, [5.0 .. 25.0], reticulocytes: $0.039 \times 10^{12} / L$, norm: [0.025 .. 0.075]

Biochemistry:

Fe: $17.2 \mu \text{ mol} / L$ [7.2 .. 29.0], Fe ttl. binding cap.: $42.5 \mu \text{ mol} / L$ [40.8 .. 76.6] Fe-saturation: 0.40 %, Transferrin: 2.03 g / L [2.00 .. 3.60], transferrin saturation: 37.3% [19, 0 .. 49.0], Ferritin: 302, 6 $\mu \text{g} / L$ [22.0 .. 322.0], Vitamin B12: 43 ng / L [191 .. 663], Folic acid: 11.6 $\mu \text{g} / L$ [3.1 .. 17.5] , LD: 73.9 $\mu \text{kat} / L$ [2.2 .. 3.75], Gastrin: 824.0 mIU / L [28.0 .. 115.0]

Immunology:

antibodies against parietal cells (GPCAb) positive

Imaging methods:

Abdominal ultrasound: moderate splenomegaly, otherwise normal

Gastroscopy: achlorhydria

Questions

- 1) What are the pathological findings in the full blood count? According to which parameter you know that the patient might have anemia?
- 2) What type of anemia it is, according to the morphological classification? What are its most common causes?
- 3) What can cause the shortage of vitamin B12?
- 4) According to the results of examinations above, find out, what is the cause of anemia in this patient.
- 5) Why is this anemia macrocytic?
- 6) Why has this patient thrombocytopenia and leukopenia?
- 7) Why has this patient an increased concentration of gastrin?

Questions below are related to case studies and pathological basis of diagnostic procedures. These questions can be used as part of case studies questions.

1. Blood cells examination.
2. Laboratory tests for iron stores and iron availability.
3. Laboratory indicators of hemolysis.
4. Blood tests preceding blood transfusion.
5. Clinical and laboratory tests for bleeding disorders.
6. Laboratory tests for hemocoagulation
7. Clinical and laboratory tests for hyper-coagulation states.
8. Dysproteinaemia, paraproteinaemia.
9. Acute phase proteins.
10. Heart cathetrization.
11. Measurements of the cardiac output. Cardiac index.
12. Blood pressure monitoring.
13. EKG signs of disordered impulse formation or conduction.
14. EKG manifestations of myocardial ischaemia.
15. Ergometry
16. Examination of restrictive and obstructive lung diseases.
17. Lung diffusion capacity, distribution of the lung ventilation and perfusion.
18. Examination of blood gases.
19. Spirometry. Whole body plethysmography.
20. Determination of glomerular filtration rate and renal blood flow.
21. Tests indicating functioning of the renal tubules.
22. Tests for urine concentration
23. Tests for the acid-base balance.
24. Proteinuria.
25. Hematuria. Hemoglobinuria. Hemosiderinuria
26. Urinary casts.
27. Gastroscopy. Gastric secretion. Pancreatic secretion.
28. Tests for intestinal malabsorption.
29. Tests for cholestasis.
30. Tests for necrotic and inflammatory processes in the liver.
31. Indicators of the liver proteosynthesis
32. Tests in endocrinology based on the negative feedback control of hormone secretion.
33. Tests for the secondary arterial hypertension.
34. Tests regarding the adeno- and neurohypophysis.
35. Tests regarding the thyroid gland functioning.
36. Immunological tests regarding the thyroid gland functioning
37. Tests of the parathyroid gland functioning and calcium and phosphates metabolism.
38. Tests regarding the suprarenal cortex and medulla.
39. Tests regarding sex hormones.
40. Tests for muscle hypotension, paralysis or muscle tone disorders.
41. Evaluation of the state of consciousness.
42. Neurological tests regarding the pyramidal system.
43. Neurological tests regarding the extra-pyramidal system and cerebellum.
44. Neurological tests regarding functioning of the vestibular system.
45. Examination of hearing disorders. Audiogram.
46. Examination of vision disorders. Perimeter.