

LESSON № 4

Topic: INFLAMMATION. PHAGOCYTOSIS. PROLIFERATION AND REGENERATION

Aim of the lesson: to study proliferate and regenerative process in inflammation area, systemic manifestations of inflammation, local inflammation signs, outcomes, categorization and biological role of inflammation.

QUESTIONS:

1. Phagocytosis. Stages:
 - a) chemotaxis;
 - b) adherence to bacteria, opsonins;
 - c) absorption (phagosome formation);
 - d) digestion (phagolysosome formation);
2. Mechanisms of bacterial killing. Frustrated phagocytosis.
3. Pus. Composition.
4. Proliferation and regeneration.
5. Types to regenerations.
6. Categorization of inflammation:
 - on velocities of development (sharp, subsharp, chronic),
 - on dominating stage (alterative, exudative, proliferate),
 - on the exudate type (serous, festering, fibrinous, hemorrhagic and others.).
7. Local signs of inflammation and mechanisms of development.
8. General features of acute and chronic inflammation (fever, leukocytosis, increase growing of settling of red blood cells and others).
9. Outcomes of inflammation. Factors, influencing the inflammation outcome. Chronic inflammation.
10. Significance of inflammation.

LABORATORY WORKS

Laboratory work 1. *Main clinical symptoms of inflammation on the rabbit ear*

Description of the work: The main clinical symptoms of inflammation occur on the rabbit ear after 5-30 min of ksyolol application. The students watch the redness (rubor), eodema (tumor), heat (calor), painless (dolor) and disfunction (functio laesa) development on the rabbit's ear, analyze, draw and make conclusions.

Laboratory work 2. *Microscopy of smears with phagocytosis*

Description of the work: 5 ml of 10% peptone solution should be administrated intraperitoneusly to rat of peritonitis induction. After 24-48 hr bird's red blood cells should be administrated intraperitoneusly too. 1-3 days later the peritoneal fluid should be taken for smear preparation. The students watch the stages of phagocytosis, draw and make conclusions.

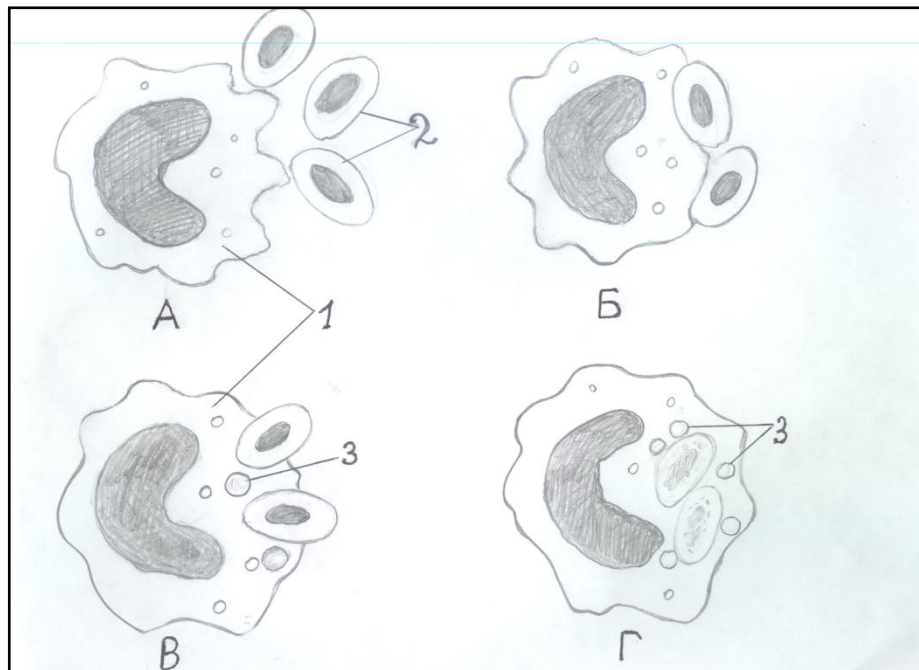


Fig. 4.1. – The stages of phagocytosis (approach (A), adhesion (Б), absorption (В), digestion (Г))
1 – macrophages of guinea pig;
2 – red blood cells of pегion;
3 – macrophage lysosomes

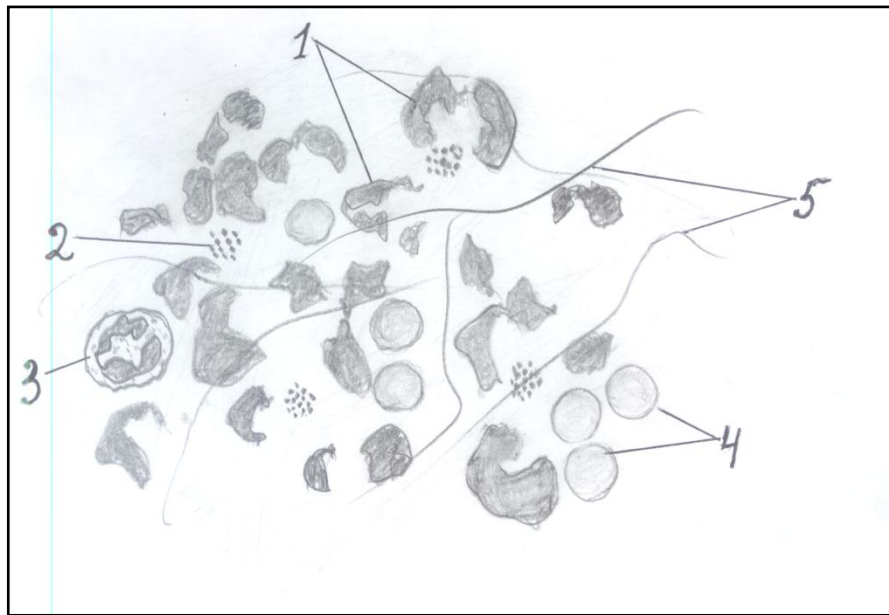


Fig. 4.2 – Components of purulent exudate:

- 1 – pyocytes;
- 2 – staphylococcus;
- 3 – neutrophil;
- 4 – red blood cells;
- 5 – collagen fibers

Laboratory work 3. *Calculation of white blood cell (WBC) account in the rabbit blood during inflammation*

Description of the work: The inflammation should be induced in a rabbit by ksylol administration. The rabbit blood should be dissolved 20 times by 3% solution of acetic acid. After 5 min of exposition the suspension should be put to Goryaev camera. The students perform calculation of WBC in 100 big non-shade quadrants. The sum of WBC should be added to the formula:

$$X = \frac{A \times 20 \times 4000}{1600} \times 10^6, \text{ where}$$

X – WBC amount per 1 liter of the blood,

A – sum of WBC in 100 big non-shade quadrants,

20 – dissolving degree,

4000 – total level of small quadrants in Goryaev camera.

1600 – sum of small quadrants in 100 big non-shade quadrants.

The students calculate WBC amount in the rabbit blood and make conclusions.

Tasks

1

A 50-year-old patient B. suffers from gastric ulcer. He has been admitted an emergency into the surgery department with a preliminary diagnosis of gastric perforation. On admission: acute pain in the epigastric region, rigid abdomen, tenderness, signs of peritoneal irritation; body temperature 38,5°C; the absence of bowel sounds; marked leukocytosis; an increased erythrocyte sedimentation rate. Analysis of the aspirated fluid (400 ml of opalescent fluid was evacuated during the needle drainage of the abdomen) showed the presence of a large amount of leukocytes, protein – 4%, various types of bacteria including anaerobic. A plain radiograph of the abdomen demonstrated the presence of air under the diaphragm. The patient was transported to the operation room.

- Define the type of pathological process in the patient on admission.
- What are the causes and mechanisms of the symptoms presented by the patient?
- Define the type of the fluid evacuated from the patient's abdominal cavity and explain the mechanisms of its formation.

LITERATURE:

1. Lecture material.
2. General and clinical pathophysiology / ed. by A.V. Kubyshkin. – Vinnytsa: Nova Knyha Publishers. – 2011. – P. 202-209.
3. Litvitsky P.F., Pirozhkov S.V., Tezikov E.B. Pathophysiology: Concise Lectures, test, clinic-pathophysiological situations and clinic-laboratory problems. Students manual / Moscow «Geotar-Media», 2012. – P. 33-36.
4. Pathology / ed. by E. Rubin and J.L. Farber. 2nd ed. – 1994. – P. 55-66, 70-95.
5. General and systematic pathology / ed. by J.C.E. Underwood. 2nd ed. – 1996. – P. 221-245.

