

LESSON № 7

Topic: ALLERGY

Aim of lesson: to study causes and mechanisms of allergic reactions of different types, to take opinion of the sensibilization and desensibilization.

QUESTIONS:

1. Allergy.
2. Allergens, their categorization and description. Pathways of introduction.
3. Sensibilization. Experimental model of anaphylactic shock in guinea pigs.
4. Types of allergic reactions.
5. Pathogenesis of allergic reactions of different types. Stages:
 - immunological stage;
 - pathochemical stage. Allergic mediators;
 - pathophysiological stage clinical manifestations.
6. Anaphylactic (I) type of allergy. Clinical examples of the IgE-mediated diseases. Systemic and local anaphylaxis.
7. Type II hypersensitivity. Complement-dependent reactions and antibody-dependent cell-mediated cytotoxicity.
8. Type III hypersensitivity. Immune complex disease.
9. Type IV hypersensitivity.
10. Description of allergic disorders (allergic rhinitis (pollinosis), bronchial asthma, e.g.).
11. Desensibilization (hyposensibilization). Types.
12. Autoimmune diseases.
13. Principles of diagnostics and therapy of allergic diseases.

Laboratory work 1. *Anaphylactic reactions on the frog peritoneum*

Description of the work:

1. Sensibilization. The horse serum 0,3 ml was administrated in frog lymphatic sack twice with 2-3 day interval.
2. Sensibilized frog is fixated on the laboratory table. The peritoneum should be isolated. Students analyze normal blood flow in the peritoneal vessels. Then experimenter adds 1-2 drops of horse serum and students watch the changes in the blood circulation in peritoneum

(vasodilatation, emigration of WBC, red blood cells (RBC) aggregation and other.

Students analyze, draw and make conclusions.



Fig. 7.1. – Technique of subcutaneous injections

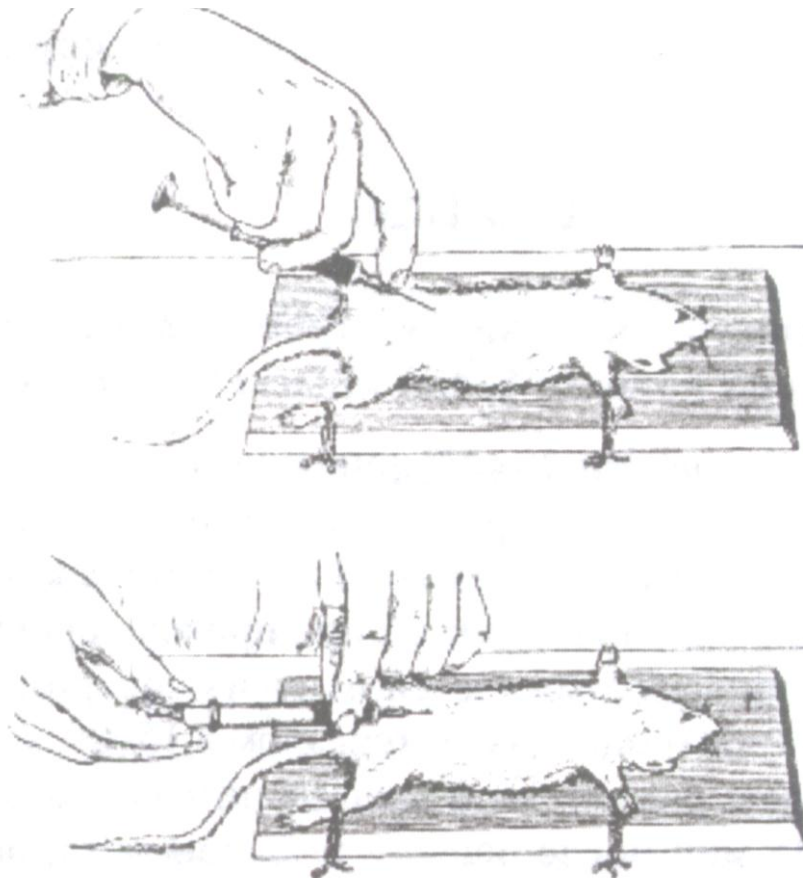


Fig. 7.2. – Technique of intraperitoneal injection

Laboratory work 2. *The allergic slide-show*

Tasks

1

After spending an hour and a half in the countryside a 30-year-old

man noticed that his eyelids became red and swollen, lacrimation and nasal secretions appeared, the voice became hoarse. He had a feeling of tightness in his chest. When he returned home, the intensity of these symptoms decreased but they were still present.

- Define the type of pathological process developed in the patient. Substantiate your opinion.
- What methods can be used to determine the cause of this pathological process?
- What are the main components of the mechanism of the given process?
- What treatment approaches and preventive procedures can be used in?

2

A 33-year-old patient L. who had ingested gold-containing drugs according to the doctor's prescription noticed, first singular and then multiple, petechiae on the skin of his forearms, chest, back, and also in the oral cavity mucosa. Minor contusions were accompanied by extensive subcutaneous hemorrhages.

Blood tests showed normal count of erythrocytes, leukocytes, and Hb concentration, but a significant decrease in platelets count, and an increase in the IgG and IgM content. Therapeutic procedures used by the doctor improved the patient's condition, and he continued to take gold-containing drugs since other forms of medication had poor effect.

- Define the type of pathological reaction developed in the patient.
- What was the cause and mechanisms of this reaction?
- What procedures could be used to inhibit such pathological reaction to the gold-containing drugs?

3

A 30-year-old female patient S. visited her dermatologist several times with complaints of the red itching spots on the face, neck and hands appearing in the cold environment, such as windy cold weather. The physician prescribed her the ointment which alleviated these symptoms but did not eliminate them. One day, when she was in a hurry to get to her work, she washed her face with cold water. Thirty

minutes after she had gone outdoors the sites of the skin exposed to cold water turned red, swelled and itching. The patient had to visit her doctor and later was admitted to hospital.

- What pathological process(es) developed in the patient after she had washed her face with cold water?
- What is the mechanism of this process?
- What pathological process should it be distinguished from and what is the key difference between these two processes?
- What groups of medicines can be used to prevent or inhibit this pathological process?

4

A patient with an open lower extremity trauma was repeatedly injected tetanus antitoxin in combination with antihistamines. On the ninth day after the last antiserum injection he presented with a high body temperature (up to 38 °C), severe weakness, swelling and tenderness of the shoulder and knee joints; intensely pruritic disseminated urticarial eruptions, and the enlarged tender popliteal and inguinal lymph nodes.

- What form(s) of pathology may be suspected in this patient?
- What additional data are necessary for a final conclusion about the form of pathology which the patient suffers from?
- Taking into account the given data, outline the possible cause and mechanisms of development of this pathology.
- What approaches can be used to prevent the development of this pathological process?

5

On the sixth week of his stay in hospital after extensive myocardial infarction a successfully recovering patient started to suffer from a dull pain in the chest which was aggravated by deep breathing movements, swallow, and changes in the body position. He also presented with fever (the body temperature 39°C) and a pericardial friction rub. Blood tests showed the presence of eosinophilic leukocytosis and an increased titer of the «antimyocardial» antibodies. The physician made a diagnosis of postmyocardial infarction syndrome (the Dressler's syndrome).

- Taking into account the immunogenic nature of the Dressler's

syndrome, explain the type and origin of antigens causing this disease.

- Define the type of a pathological reaction developed in the patient using the classification system of Gell and Coombs.
- Describe the mechanism of this pathological reaction. To what type of immunoglobulin do the «antimyocardial» antibodies belong?
- Prove (or disprove) the fact that the Dressler's syndrome represents the allergic reaction of the delayed type.

6

A patient with an extensive full-thickness burn of the thigh got i.v. infusion of blood plasma. Soon after this, he presented with hyperemia of the face and neck, psychomotor agitation, restlessness, fear of death, an intense throbbing headache, buzzing in the ears, and nausea. The physician suspected the development of allergic reaction and gave the patient an injection of antihistamine drug. However, the patient's state continued to worsen. He developed choking sensation, acute systemic hypotension (blood pressure 65/45 mm Hg), confusion, pallor, cold sweat, and finally lost his consciousness. Later, seizures and spontaneous urination occurred.

- What pathological process (or reaction) and what type of it developed in the patient after the infusion of blood plasma? Substantiate your answer.
- Name and characterize the main steps of pathogenesis of this pathological process.
- Why did the parenteral injection of the antihistamine drug not improve the patient's condition? What procedures should be performed to prevent this pathological process (reaction)?
- What factors caused the development of respiratory, hemodynamic and psychoneurological disorders? Name these factors and characterize mechanisms of their action.
- What emergency treatment should be employed to help the patient with this pathological process (reaction)?

7

A female, 39 years of age, works as a secretary. For 6 months she has been working with a new copy machine. Over the last three months she has developed a blistering rash on both hands and the rash is now

turned into deep scaling of the skin. There is a mild scaling at the site of both her earrings. The patient has used a bland cream without effect. The dermatologist examines her with patch tests, where solutions of common allergens, chemicals, metals including nickel are placed on her back and occluded with dressings. The next day (24 hours later) the dressings are removed and the exposed areas examined. The examination is repeated 48 hours after the beginning of the exposure. There is a severe rash at the site of the colour powder used in the copy machine, and a mild rash at the nickel spot.

What is the diagnosis? Which therapeutic strategy is recommendable?

LITERATURE:

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