

PATHOPHYSIOLOGY: GENERAL NOSOLOGY

Tutorial
Training manual



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PATHOPHYSIOLOGY: GENERAL NOSOLOGY

Tutorial

Training manual

*Рекомендовано Координационным советом по области образования
«Здравоохранение и медицинские науки» в качестве учебного пособия
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The manual was prepared in accordance with the requirements of FSES and
modern programs on the pathophysiology of medical universities.

The manual contains materials on the subject, goals and objectives of
pathophysiology, its significance and place in educational training of students. A
modern interpretation of general nosology and its categories is given (health, norm,
pre-disease, disease, pathological process, typical pathological process, etc.). The role
of reactivity, resistance and constitution of the organism, their positive and negative
sides in pathology are considered. The manual is illustrated (drawings, tables), sufficient
in volume for the development of the basis of the competence of the doctor to solve
their professional problems. The manual is intended for students of medical schools,
may be useful to interns, residents, graduate students and doctors of various specialties.

The tutorial is compiled on "Pathophysiology, clinical pathophysiology" discipline,
in accordance with the requirements of the Federal State Educational Standards and
is intended for students pursuing specialist's programs «General Medicine» as a
study guide for use in educational institutions that implement the main professional
educational programs of higher education at the level of a specialty for the training
program 31.05.01 «General Medicine».

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PREFACE

General nosology is one of the main sections of pathophysiology. Unfortunately, in the latest editions of textbooks on our discipline, this section is not fully disclosed, sometimes thesisally. This makes it difficult for students to master a number of fundamental categories of general pathology and medicine.

The purpose of this manual was a broader, based on modern material, discussion of the provisions of nosology and their significance for clinical medicine.

The presentation of the material begins with the chapter “Introduction to the subject”, which shows the goals and objectives of pathophysiology, its sections, research methods. A detailed description of the stages of the pathophysiological experiment is given. The subsequent sections of the manual (5 chapters) are devoted directly to general nosology.

The chapter “General doctrine of the disease” discusses the characteristics of the main categories of medicine – “disease”, “health” and the main criteria for their assessment. Attention is drawn to the concepts of “norm”, “pre-illness”, their significance for the doctor’s activity is noted. Such nosology concepts as “pathological process”, “typical pathological process”, “pathological condition”, etc. are also presented, their properties and role in pathology are noted.

The chapter “General etiology” introduces theories of causality in pathology (previous and modern), the main groups of causes and conditions of the onset of diseases and the nature of their interaction with the body. The principles of etiologic prevention and therapy are considered.

The issues of general pathogenesis are discussed in the fourth chapter, which describes the characteristics of pathological changes (“breakdown”) in the mechanisms of disease development, as well as protective and adaptive reactions of the body aimed at recovery (mechanisms of sanogenesis). The principles of pathogenetic prophylaxis and therapy are presented.

The content of the fifth chapter “The role of the reactivity and resistance of the organism in pathology” includes a description of the concepts of “reactivity” and “resistance” of the organism, their types and forms. Emphasis is placed on the similarities and differences between them. The relative pathogenicity of reactivity mechanisms (protective and adaptive reactions) is emphasized.

The significance of the constitution of an organism in pathology is described in the last chapter, which presents various classifications of constitutional types with a detailed description of them. It is emphasized that the relationship between constitutional types can be traced not only with certain diseases, but also with professional inclinations.

For each chapter (section), a graphological structure and tasks for self-monitoring with response standards have been developed

Level of training – specialty, areas: medical business, pediatrics, medical and preventive care, dentistry, medical biochemistry, pharmacy.

As a result of studying the discipline of pathophysiology, students should:

to know – the basic concepts of general nosology, the role of causes and conditions in the emergence of typical pathological processes (clinical syndromes), diseases; the role of reactivity, resistance and constitution of the body in pathology; typical pathological processes (main clinical syndromes), causes and mechanisms of their development, outcomes; principles of etiotropic and pathogenetic prevention, diagnosis, treatment.

to be able to – conduct a pathophysiological analysis between various typical pathological processes (clinical syndromes), taking into account the results of laboratory and instrumental data and the symptoms of their manifestation in the clinic; substantiate pathogenetically correct principles of diagnosis, etiotropic and pathogenetically justified methods of prevention, therapy and rehabilitation.

to own – modern methods of assessing laboratory and instrumental methods of research in the clinic, the basics of medical thinking

CHAPTER 1

INTRODUCTION TO THE SUBJECT

1.1. THE DEFINITION OF “PATHOPHYSIOLOGY”

“Pathophysiology arose as an experimental science in connection with the need for an accurate, natural-scientific study of the mechanisms of the emergence, development, and elimination of pathological processes” (Kryzhanovsky G.N., 1997). Currently, it is one of the fundamental, integrating disciplines in higher medical school. Pathophysiology is the theoretical basis of the doctor’s training system, the formation of the foundations of his clinical thinking. **“Pathophysiology – the basis of professional medical intelligence”** (experts of WHO(World Health Organization)).

The term “pathological physiology” was first used in the 17th century by J. Varandes, according to other sources – Galiot, who in 1819 published a textbook entitled “General Pathology and Pathological Physiology”.

One of the founders of Russian *pathological physiology* as a science and academic discipline is **Viktor Vasilyevich Pashutin**. He created the first department of pathological physiology at Kazan University in Russia **in 1874**.

In modern literature, both in scientific and in educational, *instead of* the phrase **“pathological physiology”** it is customary **to use** the term **“pathophysiology”**(from Greek “pathos” – suffering; “physis” – nature, essence; “logos” – teaching, science), and relatively recently – **“pathophysiology, clinical pathophysiology”** (see below).

This terminology is a priority in Russia. In the West, in particular in French-speaking countries, “clinical physiology” is more often used, and in English-speaking countries it is a “general pathology”.

What is pathophysiology, what kind of science is it, what does it study? Despite some discrepancy in terminology, the issues that are addressed by this science, regardless of the nationality of scientists, are one.

Pathophysiology is a science that studies the most general patterns of the occurrence, development, and outcomes of pathological processes, typical pathological processes and diseases. If translated literally – this is the science of the vital activity of a sick organism. But this does not at all follow that a healthy organism is out of sight of pathophysiologists.

Such important pathophysiological concepts as **resistance, constitution, stress, diathesis** and a number of others belong to a healthy body. N.N. Anichkov once said: “... *that normal mechanisms can be known only when they become dependent on abnormal reactions.*” Under the influence of various pathogenic factors, making maximum use of its adaptive mechanisms, a healthy organism reveals its own genetically determined capabilities more fully, functions outside the narrow ranges inherent in a quiet existence.

The definition of the concept of “pathophysiology” can be approached on the other hand. Each organism has a peculiar program of life, which has developed in the process of evolution and is encoded in the genetic apparatus. According to this program, the nucleation, development and manifestations of various forms of activity of the body occur. Therefore, all the activities of the body, the optimal characteristics of its functioning are genetically determined. **A.M. Ugolev** defined **physiology as the science of the technology of living systems**, implying by this a way to solve a particular problem by various body systems. So the technological task of the external respiration system is the optimal oxygen saturation of red blood cells with a minimum expenditure of energy, urinary – removal of various metabolic products and the preservation of substances useful for the body, etc. Based on this, pathophysiology can be **“defined as the science of technological errors and technological defects in the functioning of living systems, a kind of biological defectology”** (Churilov L.P., 2015).

1.2. THE SUBJECT, PURPOSE AND OBJECTIVES OF PATHOPHYSIOLOGY

Science, in contrast to “not science,” according to J.J. Thomson, should have a subject and method of research. **The subject (object)** of the study of pathophysiology **is, sadly, a human disease. The main goal of pathophysiology is to establish the most general patterns by which a pathological process, a disease develops.**

In accordance with the goal, **the objectives of our science are:**

- study of the general laws of specific mechanisms (underlying the body's resistance) of the occurrence, development and completion of pathological processes and diseases;

- study of typical pathological processes (stereotypical combinations of phenomena), a different combination of which determines the clinical picture of human diseases;
- study of typical forms of violation and restoration of functions of individual organs and systems of the body;
- study of transition states between health and illness (pre-illness);
- systematization and analytical-synthetic processing of factual material;
- the creation of new methods for modeling pathological processes and diseases;
- on the basis of theoretical and applied knowledge to contribute to the formation of the clinical thinking of the doctor, i.e. not only to transmit modern knowledge to the student, but also to teach them how to find and use them in order to be able to build a chain of the phenomena studied in their future practical activity into a logical system.

1.3. THE STRUCTURE (CONTENT) OF PATHOPHYSIOLOGY

Pathophysiology, as a science and academic discipline, consists of three main sections with several subsections:

I. General nosology (nosos-disease + logos-teaching)

1. General doctrine of the disease:

- a) the basic concepts and categories of pathology;
- b) classification and nomenclature of diseases;
- c) social aspects of pathology.

2. General etiology (aithia-cause):

- a) the general properties of pathogenic factors;
- b) the main categories of pathogenic factors;
- c) the importance of conditions in the occurrence of diseases;
- d) the principles of etiotropic prevention and therapy.

3. General pathogenesis (pathos + genesis – origin):

- a) mechanisms of the body's resistance to pathogenic factors;
- b) general mechanisms of disease development;
- c) mechanisms of recovery;
- d) mechanisms of dying;
- e) the principles of pathogenetic prophylaxis and therapy.

4. The doctrine of reactivity, resistance and constitution of organism

II. The study of typical pathological processes: pathology of the cell, peripheral blood circulation and microcirculation, hypoxia, inflammation, tumor growth, allergies, metabolic disorders, etc. those processes that are often found in various combinations for many diseases.