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## **PREFACE TO THE SECOND EDITION**

In the second edition of the textbook, the structure of the table of contents and the subsequent text outline are significantly modified. A detailed index is included. Both additions will make it easier for readers to find the necessary educational material and help improve its perception and memorization.

A significant additional component of this publication is the clinical workshop, the profile sections of which end each of the ten chapters. The workshop includes:

- 1) test questions;
- 2) information blocks, the material of which contributes to the expansion of the clinical horizons of students, teachers and doctors;
- 3) clinical tasks that are most useful to break down and solve during classroom sessions.

We will be grateful to readers for recommendations and criticisms that will improve the format and content of the textbook.

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## INTRODUCTION

A reasonable diagnosis of the disease allows you to answer the patient's question:

"Doctor, why do I feel so bad, what is happening to me?" The diagnosis helps the doctor to understand the pathogenetic mechanisms underlying the appearance of complaints (symptoms), and to explain the emergence of those objective criteria that are found in further examination. The clinical diagnosis gives confidence in the discussion of the possible risks and benefits of the planned verification diagnostic procedures and allows you to justify in a conversation with the patient the need for interaction in the implementation of the planned treatment.

Without a reasonable diagnosis, the doctor cannot answer the patient's other questions: "Will I have to leave my job due to illness? How long do I have left to live? Can I still drive?" Such questions, difficult to answer even with a definite diagnosis, can cause the doctor to give evasive, unsatisfying answers when the diagnosis remains unclear. Misdiagnosis can lead to the progression of the disease from the stage when it could be cured to the stage when it is no longer possible to get a response to treatment.

If a doctor is ready to help a sick person, he must keep in mind the answers to three fundamental questions asked by patients: "What am I sick with? What will happen to me? What can I do to get well?"

# Chapter 1

## DIAGNOSIS

### 1.1. BASIC PRINCIPLES OF DIAGNOSTIC EXAMINATION

The doctrine of methods of recognition of diseases is called **diagnostics** (from the Greek *diagnostikos* — able to recognize). *Diagnostics* is a branch of medical science that sets out the methods and course of the process of examining the patient, observing and reasoning by the doctor to recognize the disease and assess the patient's condition in order to prescribe the necessary treatment and preventive measures. Recognition of the disease is based on the examination of the patient and the study of the manifestations (symptoms) of the disease. The result of the diagnostic study is the determination of the diagnosis of the disease.

**Diagnostics** as a scientific discipline consists of three main sections:

- ▶ diagnostic techniques (methods of observation and examination of the patient);
- ▶ semiotics (the study of the diagnostic significance of symptoms and signs);
- ▶ the actual method of constructing a diagnosis.

In accordance with the basic provisions of clinical thinking, it is necessary to strive in each case to consider a diagnostic study as a prerequisite for treatment.

The attitude of the doctor to the patient is largely determined by the **diagnosis**. Through the prism of the diagnosis, the doctor evaluates the prognosis of the disease and treatment tactics in relation to this patient. The diagnosis is formed in the process of diagnosis, which is the primary section of clinical medicine. The content of the diagnosis covers both the process of recognizing the disease and the assessment of the individual biological and social characteristics of the sick person.

Diagnosis as a doctor's activity includes:

- ▶ targeted medical examination;
- ▶ interpretation of the identified symptoms, syndromes, laboratory, instrumental and morphological signs;
- ▶ generalization of the data obtained in the form of an established diagnosis.

Therefore, the content of the diagnosis is 3 sections:

- ▶ semiotics;
- ▶ diagnostic technique (methods of diagnostic examination of the patient);
- ▶ theory and methods of diagnostics (methodology of diagnostics).

**Semiotics, semiology** (from the Greek *sema, semion* — sign), or symptomatics, symptomatology, — the process of acquisition, identifying and evaluating the manifestations, signs, symptoms of various diseases or disease states. The content of semiotics consists of symptoms established as a result of interview, direct observation, systematic examination, palpation, percussion, auscultation of the patient; direct examination of secretions, laboratory tests, instrumental, morphological and radiation research methods.

Hippocrates sought to identify signs of the disease when examining the patient “... the circumstances from which we form a judgment of them are, by attending to the general nature of all, and the peculiar nature of each individual, to the disease, the patient, and the applications, to the person who applies them, as that makes a difference for better or for worse, to the whole constitution of the season, and particularly to the state of the heavens, and the nature of each country — to the patient’s habits, regimen, and pursuits; to his conversation, manners, taciturnity, thoughts, sleep, or absence of sleep, and sometimes his dreams, what and when they occur; to his picking and scratching; to his tears; to the alvine discharges, urine, sputa, and vomitings”. Hippocrates, the father of medicine (c. 460–377 BC), evaluated the morbid manifestations in their development: “...changes of diseases from the one into the other; to the deposits, whether of a deadly or critical character; to the sweat, coldness, rigor, cough, sneezing, hiccup, respiration, eructation, flatulence, whether passed silently or with a noise; to hemorrhages and hemorrhoids; from these, and their consequences, we must form our judgment”.

The concept of “**symptom**” was introduced at the beginning of a new era by the Greek physician Soranus of Ephesus. He systematized knowledge of semiotics. Symptom (from the Greek *symptoma* — coincidence) is a characteristic sign, a manifestation of a disease or disease condition.

Individual indicative (pathognomonic) symptoms determine the correct direction during this disease process and the changes that arise in its outcome. Existing symptoms also determine the treatment of this disease to a very large extent. Consequently, semiotics is crucial for recognition, prediction and treatment, and therefore in the order of clinical interview and examination is in the first place.

The number of known and described symptoms is very large, but probably an equal number have not been described, because out of hundreds and even thousands of patients suffering from the same and very characteristic disease, each person goes through disease differently. With a thorough examination and especially when interview patients, in very many cases, symptoms are found that are not described anywhere and are not found even by a very experienced and attentive clinician. That is why when examining patients in each individual case, each symptom must be verified, qualified and compared with others, so that its origin and significance for the diagnosis, prognosis and choice of treatment methods can be interpreted.

A higher stage of the diagnostic process is considered to be the isolation of syndrome in the total set of signs of the disease. **The syndrome** is a group of symptoms and signs that is reproducible from one clinical case to another, united by a common pathogenesis. The syndrome acts as an important link in the pathogenesis of the disease, or as its essential manifestation, or as the origin of the disease.

The syndrome reflects the body’s ability to respond with a limited number of typical reactions to numerous irritants. That is why the diagnosis of the syndrome is the most important step to the diagnosis, as well as the basis for the prescription of pathogenetic therapy even before the final clinical diagnosis is obtained.

**Diagnostic technique** (methods of diagnostic examination of the patient) includes the art of medical observation and examination of the patient, as well as the development and application of special methods for studying morphological and functional changes in the patient’s body.

Hippocrates represented in his works the experience of many generations of doctors of Ancient Greece. He considered observation at the bedside of the patient as a proper

medical method of research. According to Hippocrates, it is necessary to study the patient. “It’s the business of the physician to know, in the first place, things similar and things dissimilar; those connected with things most important, most easily known, and in anywise known; which are to be seen, touched, and heard; which are to be perceived in the sight, and the touch, and the hearing, and the nose, and the tongue, and the understanding; which are to be known by all the means we know other things... and if the manifestations of the disease are not clear enough, then it is necessary to assist nature” by prescribing an emetic or laxative, moving the patient, succussion splash (*succusio Hippocratis*), using a probe for examining the uterus, uterine speculum, rectal speculum.

The ancient Roman physician Galen (II century AD) urged doctors to know human anatomy as a necessary condition for skillful diagnosis (anatomical principle of diagnosis). Ibn Sina (Avicenna, XI century AD) in his “Canon of Medicine” developed the ideas of Hippocrates; he also emphasized the great importance of direct observation at the bedside of the patient for a correct diagnosis. He, in particular, described a large number of features of the nature of the pulse, and by the color, smell, texture, taste and sediment of urine he judged the disease, its course, the nature of the patient’s diet.

The Austrian physician L. Auenbrugger (1722–1809) made an outstanding discovery in 1761 — he developed the method of percussion. J. Corvisart (1755–1821), the founder of the French scientific school of therapists, paved the way for L. Auenbrugger’s percussion method into clinical practice. The French physician R. Laennec (1781–1826), a student of J. Corvisart, made an outstanding discovery in 1816 — he invented the stethoscope and the method of auscultation.

In Russia, a great contribution to the development of the method of systematic interview of the patient was made by M.Y. Mudrov (1776–1831), G.A. Zakharyin (1829–1897), A.A. Ostroumov (1844–1908). The great surgeon N.I. Pirogov (1810–1881), as a result of painstaking work with cuts of frozen human corpses, created an atlas that allowed for spatial perception of organs and tissues with their mediocre and distant environment. This served as a scientific basis for the further development of the technique of physical methods of following the patient. The methods of percussion, auscultation, palpation were brilliantly mastered by the founder of Russian scientific medicine S.P. Botkin (1832–1889). V.P. Obratsov (1849–1920), a student of S.P. Botkin and the founder of the Kiev school of therapists, made a great contribution to the further development of the method of deep sliding palpation of the abdominal organs.

L. Traube (1818–1876, German physician, founder of experimental pathology) developed and introduced into clinical practice the method of thermometry. L.Ch. Malassez, 1842–1909, French histologist and anatomist) introduced the counting of blood cells. P. Ehrlich (1854–1915, German physician, immunologist, hematologist, infectious disease specialist) and Russian physician D.L. Romanovsky (1861–1921) developed a method for staining peripheral blood smears (1878–1891). We owe the development and clinical application of endoscopy methods to A. Kussmaul (esophagoscopy, gastric tube, 1867), J. Mikulicz-Radecki (1850–1905, Polish surgeon, developed models of esophagoscope and gastroscope, 1881), M. Nitze (1848–1906, German urologist, developed methods of cystoscopy, urethroscopy, rectoscopy), G. Killian (1860–1921, German laryngologist, proposed the method of bronchoscopy in 1897). The German physicist W.C. Röntgen in 1895 developed and implemented the X-ray method of investigation, for which he was awarded

the Nobel Prize. The Dutch physiologist W. Einthoven (1903) developed a string galvanometer for recording bioelectric potential and created the foundations for the electrocardiographic method of studying the heart. The Russian physician N.S. Korotkov (1905) discovered vascular tones (Korotkov sounds) and developed the auscultatory method of blood pressure (BP) measurement.

This short review of the past gives a clear idea that the main set of methods for diagnostic examination of the patient, which every doctor constantly resorts to in modern clinical practice, was created by the beginning of the 20th century. At the same time, work on the creation and improvement of diagnostic equipment, once begun (Assyria, Ancient Egypt, Ancient Greece, Ancient China), does not stop and to this day — the improvement of radioisotope investigation methods, molecular biological and molecular genetic methods, visual diagnostics — computed tomography (CT), magnetic resonance imaging (MRI).

**The theory and methods of diagnosis** (diagnostic methodology) are based on the provisions of the general theory of knowledge. The doctor must have a large amount of historically established knowledge, constantly specify them in the process of daily observation and accumulation of their own clinical experience. **Clinical practice** requires the ability to compare specific and generalized medical observations, classify symptoms and signs, and reveal the connection between them. **Medical thinking** is formed in a repetitive process of justification, verification and final acceptance of the diagnostic hypothesis, that is, the actual clinical diagnosis.

**The object of clinical examination** is a patient who is complex both in structure and function, and in connections and interaction with the environment. The theory of diagnosis is in constant interference with the general theory of pathology. That is why the historical development of diagnosis and the improvement of diagnosis as a form and method of clinical cognition are refracted through the main provisions of the theory of pathology.

In clinical practice, the recognition of the disease often occurs through non-specific (that is, inherent in many diseases) and mild symptoms. That is why a significant part of the diagnostic process is a kind of “weighing” of symptoms, that is, finding out the probability of a suspected disease through these signs. The doctor often has to make a diagnostic decision not on the data of very direct and accurate, but potentially dangerous diagnostic methods for the patient, but on the basis of a variety of indirect and, therefore, less accurate indicators. This increases the role in the diagnostic process of medical inferences, the so-called clinical thinking.

The diagnostic experience of the doctor is crucial in the diagnosis, as it develops the ability to quickly recognize pathological changes based on the similarity of the identified complex of clinical symptoms with the previously observed by doctor. Such similarities do not always lend themselves to an accurate formal description, and the doctor, rather, feels the correctness of the chosen concept. Subsequently, on the basis of additional data, this inner feeling, that is, medical intuition, receives clinical confirmation.

In his diagnostic work, the doctor uses **3 main approaches**:

- ▶ nosological;
- ▶ syndromic;
- ▶ diagnostic.

Based on the **nosological** approach, the doctor makes a diagnosis by identifying the coincidence of all existing clinical symptoms of the disease with the manifesta-

tions of this nosological form known and described in textbooks and manuals. With the **syndromic** approach, the identification of the leading clinical syndrome that determines the prognosis of the disease is an intermediate stage on the way to the formation of a detailed diagnosis. **The diagnostic** algorithm is a multi-step process of mentally or practically excluding less likely diagnoses to justify the most likely one. This approach is most widely used in **differential diagnosis**. There is a well-defined set of rules that the doctor must constantly remember, and which helps in diagnostic work.

- ▶ The diagnosis should be based on existing symptoms (syndromes).
- ▶ The diagnosis should not conflict with any of the existing symptoms.
- ▶ The diagnosis should act as a generalizing conclusion: this conclusion should be tested by newly identified symptoms and signs, including those that contradict the initial diagnosis.
- ▶ Preference should be given to a diagnosis in which the whole variety of symptoms covers the smallest number of nosological forms included in the diagnosis.
- ▶ Of the two equally satisfying diagnoses, choose the one that is more simple.

**Diagnosis** (from the Greek *diagnosis*) means a medical statement about an existing disease (injury) or the cause of death.

In medicine, there are 4 types of diagnosis:

- ▶ clinical (*in vivo*);
- ▶ pathoanatomical;
- ▶ forensic;
- ▶ epidemiological.

Diagnosis is a brief medical opinion about the nature of the disease and the patient's condition, expressed in terms of modern medical science.

There are 2 types:

- ▶ *diagnosis morbi* — the designation of the disease according to the accepted classification;
- ▶ *diagnosis aegroti* — determination of the individual characteristics of the patient's body.

The disease can have the origin of:

- ▶ monocausal (one cause of illness and death);
- ▶ bicausal (two causes);
- ▶ multicausal (several factors).

With **monocausal** genesis, the structure of the diagnosis includes:

- ▶ underlying disease;
- ▶ complication (complications) of the underlying disease;
- ▶ concomitant diseases (**Table 1.1**).

In **bicausal** genesis, the structure of the diagnosis is complicated, since the combined underlying disease must reflect the two-factor pathogenetic component of the disease. Introduce concepts such as competing, combined, background and combined underlying diseases.

Isolation of the underlying disease is often not an easy task. A disease that by itself or through its complication acts as a reason for seeking medical help, and/or as a cause of hospitalization, and/or as a cause of death.

**Table 1.1.** Structure of the diagnosis

Genesis of illness and death		
Monocausal	Bicausal	Multicausal
Primary disease	Combined underlying disease: <ul style="list-style-type: none"> <li>• competing primary diseases;</li> <li>• primary and underlying diseases;</li> <li>• two combined primary diseases</li> </ul>	Polypathies: <ul style="list-style-type: none"> <li>• etiologically and pathogenetically related diseases (family of diseases);</li> <li>• random combination of several diseases (association of diseases)</li> </ul>
Complication (complications)	Complications	Complications
Direct cause of death	Direct cause of death	Direct cause of death
Concomitant diseases	Concomitant diseases	—

A **complication of the underlying disease** is a pathological process that is pathologically related to the underlying disease and appears in the form of a syndrome clinically different from the main manifestations of the underlying disease. The presence of **competing underlying diseases** is indicated when two or three simultaneous diseases are detected in patients, each of which separately can be the cause of death. **Background disease** is of great importance in the etiology and pathogenesis of the underlying disease. **Background disease causes** a special severity of the underlying disease and contributes to the occurrence and unfavorable course of its complications. **Combined main diseases** include those, each of which mutually aggravates the course of the other. Concomitant diseases are not associated with the main either etiologically or pathogenetically.

The diagnosis according to the method of its formulation is divided into:

- ▶ direct;
- ▶ differential.

A **direct diagnosis** is made on the basis of identifying a typical set of symptoms or by the presence of pathognomonic symptoms (syndromes). **Differential diagnosis** (*diagnosis differentialis*) is carried out to establish differences in the symptoms of the desired and all other suspected diseases.

In practice, 3 parallel methods of differential diagnosis are implemented:

- ▶ *diagnosis per exclusionem*, that is, the exclusion of all alleged consequences possible diseases, except for one, with a targeted diagnostic examination (diagnostic algorithm);
- ▶ *diagnosis ex observatione* — denial of suspected diseases in the process of observation of patients;
- ▶ *diagnosis ex juvantibus* is carried out on the basis of an analysis of the effectiveness of the treatment.

The physician, working on the diagnosis, must be clearly aware of his responsibility in relation to the necessary medical framework in which the correct diagnosis creates the basis for effective treatment. Hence it is important to know the classification of the diagnosis by the time of its formulation.

The following types of diagnosis are distinguished:

- ▶ **early** (*diagnosis praecox*), if it is put in the preclinical (asymptomatic) stage or with the initial manifestations of the disease;
- ▶ **belated** (in the midst of clinical manifestations or at the stage of complications).



A **retrospective diagnosis** is carried out on the basis of an analysis of the course of the disease over a long period. **Postmortem diagnosis** is made on the basis of autopsy data.

Often in their practice, a clinician working with a patient who has not previously been treated in this medical institution moves from a diagnosis of lesser degree of proof to a diagnosis of a higher degree of proof. Differentiate a **preliminary diagnosis** (*diagnosis probabilis*), which the doctor puts in the medical history immediately after initial clinical examination of the patient. In the next 2–3 days, the doctor gets evidence-based clinical information and definite volume in formation from laboratory and instrumental studies. This provides the basis for making a **clinical diagnosis** within the first 3 days, which in turn serves as the basis for further diagnostic and treatment procedures. In a large number of cases, the clinical diagnosis turns out to be the final one. However, in some cases, a long-term observation of the patient and the conduction of complex invasive studies are required to make a final diagnosis. The **pathologic-anatomic diagnosis** represents the outcome of the diagnostic process after the death of a patient. The pathoanatomical diagnosis verifies and refines the clinical (antemortem) diagnosis.

## 1.2. METHODS OF CLINICAL EXAMINATION OF THE PATIENT

A disease can be recognized by knowing its manifestations, by being able to identify changes in the body that are unique to that disease. Various methods are used to detect and study the diverse manifestations of disease, ranging from interviewing the patient, measuring their body temperature, to more complex investigation methods — studying the formed elements of blood under a microscope, chemical analysis of body fluids, X-ray examinations, etc.

A healthy person does not experience discomfort. Pain, nausea, vomiting, fever, enlargement of the spleen occur with a particular disease, which is considered as its manifestations, or symptoms. Some symptoms (for example, an increase in body temperature) indicate a change that has occurred throughout the body, others (for example, diarrhea) indicate a violation of the function of an organ, and others (for example, an enlarged dense liver) indicate changes in the structure of the organ.

Sensations of pain or nausea are referred to as **subjective symptoms**: they are a reflection in the patient's mind of objective changes in his body. Manifestations of diseases detected during the examination of the patient by a doctor (for example, jaundice, enlarged liver) are considered **objective signs** of the disease.

It is very difficult to diagnose a disease based on just one symptom: it is determined by a combination of various symptoms.

The physician must remember that according to the International Classification of Diseases, Injuries and Causes of Death, the underlying disease and the underlying cause of death are considered as identical.

In order for the examination to be comprehensive, it is always carried out according to a certain plan; thus, a **patient examination plan** is developed.

This plan provides for a sequential study of the patient's condition, first with the help of interview, then using methods of examination, palpation, percussion, auscultation.

When **interviewing** a patient, their complaints are first clarified, as their account of the unpleasant sensations they are experiencing is no less important for the recogni-