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## The historical research of neuroses in psychology and physiology

The article presents a historical analysis of the neuroses study in psychology and physiology. Neurosis — a disease which is caused by the impact of severe psychotraumatic circumstances. This disease has a psychogenic origin and functional character (reversible, without organic lesions of the brain). The fundamental theoretical works of the scientists in the field of interest, the results of practical studies of prominent national and foreign authors, articles and reviews in specialized and periodical publications are considered. The formation of a neurosis as a nosological unit is paid attention to, based on the established etiology and pathogenesis and a characteristic of clinico-morphological picture. The physiological features of the clinical picture for various forms of neuroses are examined. The role of stress as a special mental state, which is related to our physical and mental health, is assigned in the work. Excessive stress loads can often lead to neurotic personality. At the same time, as in the case of stress, mental trauma does not play a major role in the onset of the disease, but the individual's attitude toward the traumatic situation as pathogenic and the functioning of the mechanisms of personal psychological defense is of decisive importance. The article also considers neurotic mechanisms and the emergence on this basis of a number of internal diseases.

*Keywords:* neurosis, symptom, diagnosis, neurasthenia, stress, neurotic development, mental illness, limbic-reticular complex.

Modern ideas about the neurosis as a mental illness were finally formed by 1990, but the study of the etiology, symptoms, and clinics of neuroses was established over the course of more than one century.

The first mention of neuroses occurs in the most ancient papyri of Egypt around 1900 AD, in which the symptoms of a hysterical neurosis are described in sufficient detail [1].

M. Montaigne in the XVI century described the panic fear of the Greeks, which, in his opinion, arises for no apparent reason, but «is felt by us with more acuity than the rest of the misfortunes.» In addition, fear does not in some measure depend on the «imperfection» of man's intellectual abilities, and can encompass entire nations, leading people to suicide, demonstrating that fear itself «is more unbearable and unbearable than death itself» [2].

By the end of the 16th century Felix Platter described psychoses and obsessive-compulsive disorder, observing the mentally ill [3]. At present, the disorder belongs to the obsessive-compulsive disorder group. He also owns the first classification of mental disorders, which included 23 types of mental illness, divided into four groups. The classification was based on the characteristics of a violation of intelligence, emotions and physical condition. He came to the conclusion that the disturbance of the psyche is due to heredity, head injuries, drug poisoning, etc.

Only in 1776 the Scottish physician W. Cullen proposed as an independent term «Neurosis», which was introduced into medical terminology in the XVIII century [4]. Cullen meant by this term an abnormal irritability or a chronic strain of the nervous system. This term includes all mental disorders, including those currently attributed to neuroses (hysteria, fears, and hypochondria).

The discovery of neurosis in the 18th century is gaining immense popularity — the diagnosis was a great success in the aristocratic environment because of the «frail personality with fragility with the psyche»[5]. The incidence curve swiftly crawled upwards, and physicians ascertained physical hypersensitivity in patients. A theory about the classification of the origin of neuroses had been emerged. People with a subtle psychic organization are more prone to neuroses than people of the lower classes. Only by the end of the XIX century this group of diseases had been actively studied.

The American neurologist G. Beard first described 50 symptoms, and in later studies — 75, subsequently included in scientific terminology as neurasthenia, and earlier called «American neurosis.» G. Beard's postulate was that «American neurosis is a product of American civilization» [6], due to the growth of cultural and technological evolution. Neurasthenia, in his opinion, is nothing but a reflection of certain conditions of the American way of life: the struggle for status in society, the pursuit of achievements, discoveries, rapid enrichment. All this creates intolerable mental and physical overstrain for physiology, which leads to

nervous exhaustion, since under such circumstances the requirements to the nervous system exceed the level of its resources.

Somewhat later, the symptoms of a hysterical neurosis were described by J. Charcot in France, who considered this type of neurosis as a functional disorder, without regard for psychological causes, imitating a variety of organic diseases. In the emergence of hysterical symptoms stressed the role of emotions and suggestion.

At the turn of the 19th and 20th centuries, under the influence of rapidly developing natural sciences and technological progress, the concepts of neurosis were also revised. The logical quintessence of this time was the recognition of the leading role of psychological factors in the formation of neuroses: the study of phobias and their varieties G. Westphal (1871), isolated as an independent nosological unit of «psychasthenia» P. Janet (1911), replaced the term «neurosis» with «psychoneurosis» P. Dubois (1912). For a long time it was used by many researchers, since the etymologically term referred to the functional, inorganic causes of neuroses.

Proceeding from the above that the leitmotif of this period are the prerequisites for singling out within the framework of the «neurosis», three main types — hysteria, neurasthenia, psychasthenia, which in itself allowed further differentiation of these nosological units.

At the beginning of the XX century it was described the main forms of neuroses, however, the process of delineation continued. The author of the existential direction in psychiatry Karl Jaspers (1913) was the first to distinguish between fear and anxiety. His position is this: fear has a certain direction and acts as a positive emotion, activating a person to gaining his identity, preserving his identity. Anxiety is distinguished by non-objectivity and maintains a long sense of danger [7].

A significant contribution to the understanding of the etiology of neuroses was made by S. Freud, who isolated from the neurasthenia group an «anxious neurosis», followed by obsessions and phobias [8]. His concept was based on the search for the etiology of neuroses, in which childhood with its sexual complexes is important.

A. Adler, Z. Freud's student, denied the etiology of neuroses the role of sexuality, drawing attention to irregular forms of education in early childhood [9].

K. Jung explained neurosis as a weak or strong intrusion into the sphere of consciousness of archetypes, which are predisposing factors of various complexes, the causes of the latter can be various traumatic situations [10].

Synchronously with the advent of work in the field of analytical psychology (psychoanalysis) revealing the essence of the concept of «neurosis» begins the era of studying the clinical and physiological manifestations of neuroses. The basic thesis of the pathophysiology of neuroses was investigated by I.P. Pavlov [11] who concluded that both signal systems are interrelated and consist of continuous interaction. Neurosis in animals is determined by overexertion of the main nervous processes — irritant or inhibitory, or overvoltage of the mobility of these processes. In connection with this, a «breakdown» of higher nervous activity occurs, and, the weaker the nervous system in an animal, the stronger the disorder. Although it is known that neuroses can also occur in a healthy, balanced nervous system, as it is indicated by V.N. Myasishchev, T.A. Emelyantseva [12], A.M. Svyadoshch [13].

An enormous role in understanding the pathogenesis of neuroses was introduced by the concept of stress developed in 1936 by the Canadian scientist G. Selye [14], which was based on the biochemical reactions of the organism to a particular effect whose strength exceeds the limits of the person's adaptive capacity. As a stressor, G. Selye pointed to physiological (extreme stress, temperature, pain, somatic diseases) and mental (fear, traumatic situation, etc.) factors. The effect of stressors is stress as a reaction to the protection of the body, an attempt to restore homeostatic equilibrium. Moreover, the physiological stress intensity is much weaker in a state of calmness, but it is never equal to zero.

One of the first who made the attempts to differentiate physiological and psychological understanding of stress was R. Lazarus [15]. Studying the phenomenon of stress, he put forward his own cognitive theory of stress, which states that physiological stress is a direct reaction of the organism in response to a real stimulus with «pronounced physiological changes» of the whole organism, i.e. reactions are typical. With mental (emotional) stress, the reactions are strictly individual and depend on a person's life experience, which makes it possible to assess a particular situation as dangerous. An example is the following: on aggression, everyone reacts differently — one person with anger, the other with fear, the third with neutrality, i.e. reactions cannot be predicted. In the register of diseases associated with stress, neuroses dominate, and therefore, R. Lazarus's theory most fully reflects the existence of interrelated coordinates between stress and neurosis.

In psychology, the study of neuroses continues. At the center of K. Horney's scientific interests is his own theory of neurosis, which differs radically from the already existing theories of Freud, A. Adler and K. Jung. The theory was based on the violation of the functioning of the personality between «I'm perfect» and «I'm real». Conflict between Me — ideal and real, K. Horney identified as «basal», because it is the source of fear and anxiety [16], and neurosis is a protective reaction of the psyche from adverse factors. She delineated the neurotic needs into three categories, according to which she singled out three types of neurotic personality — helpless, hostile and detached.

In the Soviet era, since the 30s of the last century, the typological differentiation of personality disorders has been popular, in particular, neurotic reactions have been singled out in two polar versions — short-lived and protracted. Short-term ones are short-lived, appearing in response to extremely strong extreme stimuli, rapidly disappearing, with a tendency to appear again: situational ones — P.B. Gannushkin (1933), neurotic — G.K. Ushakov (1987), psychoactive — D. Langen (1969). Prolonged reactions are a significant complication of the clinic and the appearance of pathocharacter changes, which are manifested in the violation of behavior: with the identification of obsessions — P.B. Gannushkin (1933), neurotic personality development (unlike the protracted neurosis is persistent and irreversible) — N.D. Lakosina, M.M. Trunova (1994), D. Langen, (1969), intrapersonal conflict development — H. Binder (1967).

According to V.A. Gylyarovsky, neurotic development was the basis of neurosis with the phenomenon of persistent personality changes, similar to psychopathic with the presence of somatic components characteristic of neurosis. Neurosis attributed to psychogenic diseases, but not every mental trauma, as V.A. Gylyarovsky thought, leads to a neurosis. He asserted that neurosis only arises when a psychic event is significant for an individual, and therefore always associated with a reactive personality change [17]. In addition to the provisions on neurosis, he investigated logoneurosis (stammering) in children. He found that the logoneurosis manifests itself at an early age in the presence of a mental trauma, usually a fright. Gylyarovsky's V.A. scientific points was shared by V.N. Myasishchev, who saw in the emergence of a neurosis a psychogenic nature. The various relationships under consideration, namely various contradictions, allowed V.N. Myasishchev to characterize three types of basic neurotic conflicts (neurasthenic, hysterical, obsessive-psychasthenic) [18]. Having distinguished three types of conflict, V.N. Myasishchev nevertheless believed that sticking to one of them and building on this clinical picture is a delusion, since in each specific case we have a combination of various pathogenic situations that can change. In this regard, it is appropriate to talk about a mixed type of conflict. In addition, to explaining the origin of neurosis, V.N. Myasishchev justified and successfully applied pathogenetic psychotherapy in the treatment of neuroses, which showed itself as a highly effective treatment method in comparison with drug treatment.

The time of the Great Patriotic War is characterized by individual works in the field of neuroscience, most likely, it can be explained by the extremely low appeal to specialists, and this cannot fully reflect the incidence. In addition, during the Second World War there was an acute shortage of qualified specialists in this field, and there were no corresponding medical institutions [19]. Meanwhile, the need for a special study of wartime neurosis is not in doubt, since not only the army, but also the civilian population of the deep rear, including children and sick people with a weakened nervous system, is widely exposed to military traumatism. In addition, the presence of local military conflicts in the recent past and present (Yugoslavia, Georgia, Chechnya, South Ossetia, Kyrgyzstan, Ukraine), leading to super-violent traumatic effects cannot but affect the psychosomatic changes in the younger generation.

V.E. Galenko (1946), E.M. Zalkind (1946, 1947), M.V. Solovyeva (1946), and S.N. Davydenkov worked on the problem of military neuroses after the war (1963), and others.

The increased interest in the present to this problem arose in connection with military conflicts in the modern world. A study of NATO soldiers participating for four months in the war zone in Afghanistan found that intense stress causes changes in the brains of soldiers, namely, increases the amygdala, affects the neural network that is centered on the amygdala. The authors found that the revealed changes are reversible, and at the same time, the experiences obtained permanently alter the regulation of the anxiety center in the brain [20].

In today's war, France-Press Agency from March 13, 2015 reports that the war in Syria has led to an increase in the number of people with mental disorders. Due to civil, full-scale war lasting over four years, the number of cases of depression and post-traumatic stress, with its stress, anxiety and nightmares increased by 30 % [21].

P.K. Anokhin made an important contribution to the understanding of neuroses, which, without refuting I.P. Pavlov's theory about the neurotic breakdown as a result of the struggle of excitation and inhibition, believed that an important condition for the development of a neurosis is the conflict of two excitations. Due to

prolonged excitation in the cerebral cortex, stagnant excitation in the reticular formation is created [22]. Chronic stagnant increased excitation promotes over-excitation in those systems that have long been in a conflicting mutually reinforcing state, which leads to an increase in the excitability of the cerebral cortex to such degree, that any external stimuli form and maintain a neurotic state.

V.T. Bakhur [23] found an increase in the secretion of hormones (epinephrine, norepinephrine, corticosteroids, thyroxine and growth hormone) in the patients with neuroses and a decrease in the secretion of anabolic hormones (estrogens, androgens, insulin). Later V.M. Kolygin, as well as V.T. Bakhur established endocrine changes in neuroses, but concluded that the hormonal background feature in neuroses is secondary and nonspecific, depends not so much on the nosological affiliation of the disease as on the stage or phase of its course and prevailing syndrome. Nevertheless, the authors point out that, despite the fact that changes in the hormonal background are secondary; these indices can be an essential link in the understanding of the pathogenetic mechanisms of the development and course of neuroses.

Work in the field of neurophysiology made it possible to reveal electrical brain activity in neurotic states. V.V. Bobkova (1970) [24] studied EEG-approach with patients with neurosis of various origins. Subsequent deep analysis of the EEG showed that in all patients with neuroses, there is instability and irregularity of cortical rhythm, uncharacteristic expression of alpha activity in the frontal cortical areas. The presence of sharp fluctuations and alpha-like emissions in a large number has been revealed, as well as the presence of polymorphic slow waves. Meanwhile, despite the prevailing alpha rhythm in patients with various forms of neurosis, there are still differences, which allow one to judge various variants of violations of cortical-subcortical interaction.

P.V. Simonov's research focuses attention on violations of the interaction of limbic structures. Emotional activity is associated with the functioning of the limbic-reticular complex, in this regard, according to P.V. Simonov, excessive emotional tension leads to a decrease in the rate of cerebral blood flow, which leads to brain hypoxia, and this, in turn, leads to the pathological functioning of limbic structures. Specific disturbances in the work of the limbic-reticular complex on animals made it possible to indicate the type of neuroses. For example, damage to the system of «frontal cortex — hypothalamus» forms hysterical or neurosis obsessive states; pathology of the «hippocampus — tonsil» system causes neurasthenia; violations in the system «amygdala — anterior cortex» leads to an anxiety-phobic personality disorder [25].

Thus, research in the field of neurophysiology, indicated by the authors above, made it possible to establish disorders of integrative brain systems in neuroses, including disorders of the cerebral cortex and subcortical structures and local dysfunction of the limbic-reticular complex.

Comparatively recent studies have made it possible to determine ultrastructural changes in neurons and neuroglial elements of the cerebral cortex and hippocampus. A.V. Khovryakov (2002) observed under experimental stress in animals, ultrastructural rearrangements, similar in many respects to changes in hypoxia and aging. In the case of prolonged and intensive exposure of stressors to these functionally overloaded cells, adaptation reserves are depleted, which subsequently leads to their death by necrosis / apoptosis. An idea has been expressed about the possibility of participation of cerebral hypoxia in the pathogenesis of neuroses [26].

The results of biochemical studies in neuroses, in particular the sympathetic adrenal system, which reacts to stress by a cascade of metabolic changes should be paid attention in the context of this work. Fundamental research in this field is reflected in the works of Levi (1970), M.V. Tabararina (1973), V.V. Suvorova (1975), I.K. Shvakhbatskaya (1977), O.M. Avakian (1977), G.N. Kassil (1978), Yu.M. Gubacheva, E.M. Stabrovsky (1981), L.E. Panin (1983), etc., where the interrelation between the functional activity of the sympathetic adrenal system and the variety of changes in physiological and metabolic processes are described.

Under the influence of various stressors, the work of the sympathoadrenal system is enhanced, resulting in an increase in the blood of catecholamines. Catecholamines realize the humoral transmission of nerve influences at the hypothalamus level, which leads to activation of the cortical and medulla of the adrenal glands [27]. The quantitative change of catecholamines (epinephrine, norepinephrine, and dopamine) under stress characterizes the hormonal and mediator link of the sympathoadrenal system.

Analysis of the scientific literature indicates changes in the neuroses of mediator exchange to a greater degree of adrenaline and norepinephrine and to a lesser extent — some of their metabolites and their predecessors.

V.S. Chugunov's and V.S. Vasilyeva's (1984) research on the specificity of the sympathetic-adrenal with neuroses made it possible to distinguish three biological types of patients: adrenal (with daily hyperadrenalinemia), noradrenal (with daily hypernoradrenalinuria) and mixed. Researchers found that

among people with neuroses dominant are patients with adrenal type. In addition, a decrease in the excision of dopamine and 3, 4 dioxiphenylalanine was observed in patients with neuroses [28].

B.D. Karvasarsky's study of enterochromaffin system, an indicator of the activity of which is serotonin, which participates in the responses of the body to external influences, is also one of the important things. The results obtained in patients with neuroses, which are in the usual state, did not differ in serotonin levels from healthy people. When the neuroses were divided in form, a significant increase in the level of serotonin was noted in the obsessive-compulsive state of neurosis. A statistically significant increase in serotonin was observed in patients experiencing severe acute stress [29]. From all the above it follows that the enterochromaffin system is activated only in short-term stress reactions, and with prolonged stress its activity level remains fairly stable. Recent studies indicate changes in stress not only from thyroid hormones — T3 and T4, but also LTG, glucagon, VIP, etc. [30].

At the present stage, as the factors predisposing to the development of the neurosis, both psychological factors (personality characteristics, the conditions for its maturation and upbringing, the development of relationships with the society) are singled out, and biological factors (functional insufficiency of certain neurotransmitter or neurophysiological systems, making the patients vulnerable to certain psychogenic effects). Neuroses are considered as an essential part of psychogenic states and diseases. The cause of a person's neurosis is a psychogenic traumatization of a person in the process of psychoemotional stress (usually negative, repetitive and / or protracted). This leads to both functional abnormalities in the central nervous system and to certain microstructural changes in the brain (destruction of the membranes of the spinule apparatus of dendrites, a decrease in the number of ribosomes in cortical neurons, degeneration of individual hippocampal cells, local disturbance of microcirculation, etc.).

Summarizing the resume of the problem of studying neuroses in psychology, physiology and psychiatry, we note the following: despite the accumulation of a truly huge systematic biochemical, physiological, psychophysiological, clinical and experimental material on the problem of neurosis, some of its aspects have not been sufficiently developed, and others are only outlined for solutions.

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### Физиология мен психологиядағы невроздарды зерттеудің тарихы

Мақалада физиология мен психологиядағы невроздарды зерттеу тарихына саралау жұмысы көрсетілген. Невроз — ауыр психожарқат әсерлерінен пайда болатын ауру. Ол психогенді және функционалды сипаттама алады (қайтатын үдеріс, бас миының органикалық бұзылысы жоқ). Мақалада қарастырылып отырған саланың ірі зерттеушілерінің арнайы және периодикалық әдебиеттерде жарық көрген фундаменталды теориялық және тәжірибелік еңбектеріне шолу жасалынды. Невроздың айқындалған этиология, патогенез бен клиникалық морфологиялық суреттеме негізінде пайда болған нозологиялық бірлік ретінде қалыптасуына ерекше көңіл бөлінеді. Мақалада клиникалық мінездемелердің әртүрлі невроз формаларында физиологиялық ерекшеліктері белгіленген. Жұмыста стрестің физикалық және психикалық денсаулығымызға байланысты ерекше психикалық мемлекет ретіндегі рөлі берілген. Шамадан тыс жүктеме невротикалық тұлғаға жиі әкелуі мүмкін. Бұл жағдайда стресс жарқат жағдайда ретінде ауру тудыратын басты рөл атқарады және шешуші фактор болып табылады.

*Кілт сөздер:* невроз, симптом, диагноз, неврастения, стресс, невротикалық даму, психикалық ауру, лимбикалық-ретикулярлы кешен.

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### Историческое исследование неврозов в психологии и физиологии

В статье представлен исторический анализ изучения неврозов в психологии и физиологии. Невроз — заболевание, вызванное воздействием тяжелых психотравмирующих обстоятельств. Это заболевание имеет психогенное происхождение и функциональный характер (обратимый, без органических поражений головного мозга). В статье рассмотрены фундаментальные теоретические труды крупнейших мыслителей в исследуемой области, результаты практических исследований видных отечественных и зарубежных авторов, статьи и обзоры в специализированных и периодических изданиях. Уделено внимание становлению невроза как нозологической единицы, выделенной на основе установленных этиологии и патогенеза и характерной клинико-морфологической картины. Рассмотрены физиологические особенности клинической картины при различных формах неврозов, роль стресса как особого психического состояния, которое связано с нашим физическим и психическим здоровьем. Чрезмерность стрессовых нагрузок часто может вести к невротизации личности. При этом, как и в случае стресса, психическая травма не играет главной роли в возникновении заболевания, а определяющее значение имеют отношение личности к психотравмирующей ситуации как патогенной и особенности функционирования механизмов личностной психологической защиты. В статье также рассмотрены невротические механизмы и возникновение на этой основе целого ряда внутренних заболеваний.

*Ключевые слова:* невроз, симптом, диагноз, неврастения, стресс, невротическое развитие, психическое заболевание, лимбико-ретикулярный комплекс.

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