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MEDICAL SIGNIFICANCE OF NEUROSPICHOPHARMACOLOGY AND THE NECESSITY AND RELEVANCE OF DEVELOPING THIS FIELD

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Abstract. The author demonstrates that since the National Institute of Psychiatry and Neurology was shut down, psychiatry has faced challenges, particularly in Hungary. He examines the key elements impeding psychiatry's advancement. He concludes that without a person's holistic approach, which presupposes the biological, mental, cultural-social, and spiritual approaches, the growth of psychiatry is unthinkable. Perceptual disturbances play specific roles in the development of psychopathological symptoms that derive from nervous system function. Despite being only fifty years old, this fact highlights the significance of the neurological system and neuropsychopharmacology, which we have understood since the dawn of time. He focuses on the psychoactive medication that was popular in prehistoric times. He examines a few of them, some of which were the earliest neuropsychopharmacological drugs. He highlights the dichotomy of psychopathological symptoms, which are dependent on the functioning of the nervous system by all means but are partially objective and partially subjective. His remarks guarantee the biological (neurological), psychological, cultural, and spiritual perpetuity while also establishing a new approach to both the individual and psychiatry. They also facilitate the development of psychiatry, the development of a new type of diagnostic system, and the elimination of differences among the experts who deal with people, including neurologists, psychiatrists, psychologists, sociologists, philosophers, and theologians. The biological, genetic, psychic, cultural-social, and spiritual approaches, as well as the use of nanomedicine that makes it possible to identify the organic neurological underpinnings of psychiatric disorders—all of which are critical for future researchers—as well as for the advancement of neuropsychopharmacology based on nervous system function.

Keywords. Precision medicine, neuropsychiatric conditions, pharmacogenomics, genetics, gene-environment interactions, bipolar illness, schizophrenia, customized care.

Introduction. When a drug is being researched and tested, psychopharmacology tries to identify the various biological elements that affect how a particular drug will affect a person. These include drug interactions, where one medication can significantly change the effects of another; protein binding, which determines the medication's availability to the body; half-life, which

indicates how long the medication is present in the body; and the individual's genetic makeup, which can also have a significant impact on a drug's effectiveness in the body. Neurology and psychiatry, which have developed into separate but closely related sciences, have long placed a strong emphasis on the study of brain abnormalities. Interdisciplinary cooperation is crucial since these specializations frequently have common symptoms, brain pathways, and treatment approaches. Even Nevertheless, there are still few of these kinds of partnerships, especially in clinical settings, research, training, and policy formation. A paradigm shift has been brought about by the rising prevalence of brain illnesses worldwide, highlighting the necessity of collaborative efforts to maintain brain health. Improving patient outcomes and social well-being requires effective interdisciplinary collaborations between neurology and psychiatry, as well as with other partners active in brain health and other medical specialties [1-5]. The multidisciplinary discipline of neuropsychopharmacology combines biology, psychology, and medicine to investigate how pharmaceuticals impact brain architecture and mood and behavior. Therefore, the aim of neuropsychopharmacology is to apply this knowledge of a drug's biological impact on the body to the understanding of neuroscience and to pinpoint the specific brain regions, receptors, or neurochemical processes that are in charge of a given behavior, mental illness, or state of mind. Researchers aim to be able to develop drugs that are highly focused to the region of the brain or the receptor where they are required by separating these neurological influences in this way. This would minimize unpleasant side effects and guarantee that the drug is as successful as feasible. The study of neurotransmitters—chemicals that transport information between neurons in the brain and between the brain and the body—is a crucial component of this research. This area of study looks at the precise parts of the brain that these medications affect, with a special emphasis on those intended to treat mental health conditions like mood disorders, anxiety disorders, and psychotic disorders [6-11]. One of the main objectives of neuropsychopharmacology is to provide tailored treatments that improve the quality of life for people with mental diseases by being effective and having few adverse effects. Neuropsychopharmacology research looks at a number of variables, including medication interactions and genetic makeup, that can affect how a medicine works. It entails a thorough investigation of neurotransmitters, which are essential molecules in the brain that control neuronal communication. Among the common neurotransmitters of interest are GABA, dopamine, and serotonin. Researchers can see how some medications alter mental states and behaviors by using methods like functional MRI and PET scans to observe brain activity. Despite the widespread use of psychotropic drugs like antidepressants and antipsychotics, continuous discussions on their effectiveness underscore the difficulty of treating mental illness. Neuropsychopharmacology seeks to improve treatments that more effectively address the molecular underpinnings of mental illnesses as research progresses [12-18]. In order to produce sensations of serenity and optimism, many psychotropic medications are made to target particular neurotransmitters, either increasing or decreasing their availability in the body. In addition to identifying the specific neurotransmitter causing a mental state, neuropsychopharmacology aims to identify the neurotransmitter's specific location and neural connections. Amino acids, peptides, and monoamines are the three general groups of neurotransmitters. The amino acids GABA and glutamate, the monoamines dopamine and serotonin, and neuropeptides like endorphins and oxytocin are some of the more often studied neurotransmitters in mood and behavior modulation. As researchers work to better understand how neurotransmitters and physical brain structures affect mental illnesses and behavior, psychopharmacology and neuropsychopharmacology research is ongoing and constantly changing. Additionally, the research can assist identify the most successful

therapeutic interventions as well as the potential for completely isolating the biological or genetic roots of mental diseases [19-24].

The main purpose of the presented manuscript is to provide a brief analysis of the medical significance of neurospichopharmacology and the necessity and relevance of developing this field based on the results of prestigious scientific works.

A historical viewpoint. origins of psychiatry and neurology. The study of the brain and its problems is closely linked to the fields of neurology and psychiatry, which are now frequently seen as separate disciplines. This section examines the historical development of brain disorder studies, the rise and evolution of neurology and psychiatry, and the factors that led to their separation—essential components for comprehending the changing relationship between these two fields—though a thorough historical overview is outside the purview of this article. Brain illnesses were connected to both physical and psychological causes, according to ancient texts such as the Edwin Smith Papyrus and the writings of Hippocrates and Galen. For example, Galen linked mental diseases to interruptions in reasoning functions, whereas Hippocrates recognized the brain as the seat of intelligence and emotions. The 19th century saw the emergence of neurology as a separate medical specialty as clinical techniques for identifying and treating nervous system problems were developed. Many people consider French physician Jean-Martin Charcot to be the father of modern neurology [5-12]. Having received training as a pathologist, he correlated clinical observations with autopsy results to determine the critical relationships between anatomical and clinical findings. Charcot was also able to identify how psychosocial variables and neurological diseases are connected, as well as how stress contributes to the formation of "dynamic lesions" that cause "hysterical paralysis."The work of British and French physicians John Hughlings Jackson and Paul Broca, whose contributions established the groundwork for clinical neurophysiology, epilepsy research, neurolinguistics, and the study of cerebral localization of brain functions, also relied heavily on the same methodical approach, attention to clinico-anatomical associations, and correlations with psychological factors [16-26].

Modern Views: Moving Toward Integration. The necessity for an integrated strategy that connects neurological and psychiatric viewpoints has been increasingly apparent in recent decades. The artificial distinction between neurology and psychiatry is actually being challenged by developments in neuroimaging, neurotechnology, genetics, and molecular biology that have demonstrated the intricate interactions between brain shape, function, behavior, and psychosocial factors. The idea of comparable underlying pathways is further supported by the growing discovery of similar clinical trajectories between neurological and mental disorders. In addition to defining the circuit-level mechanisms behind pharmacological and psychotherapy therapies in psychiatry, compelling evidence has also connected mental diseases to brain substrates. Additionally, by using a neurological approach of careful examination and recording, cross-fertilization with neurology may have a good effect on the standardization of diagnosis and treatment of mental disorders [11-21]. By emphasizing that the brain and mind are ultimately one interrelated entity and promoting greater knowledge and equity in the treatment of psychiatric ailments, this connection may also aid in the de-stigmatization of mental illnesses. However, neurology has increasingly acknowledged the psychological aspects of disorders that were previously thought to be exclusively neurological, highlighting the necessity of effective treatment in these situations. Psychosocial variables, premorbid personality features, and mental comorbidities in neurological diseases are linked to more severe presentations and greater rates of morbidity and mortality, according to mounting data. For instance, post-stroke depression is linked to a higher death rate in stroke patients, and affective disorders and psychotic symptoms are prevalent in Parkinson's disease, exacerbating motor

symptoms and making therapy more difficult. Additionally, compared to persons without epilepsy, those with epilepsy have a markedly higher risk of developing psychiatric illnesses. As a result, neurologists must take a more complete strategy that includes early identification of mental problems and all-encompassing patient care. Lastly, there are a number of risk factors that are common to both neurological and mental diseases. These include inadequate sleep, exposure to heavy metals and air pollution, poor nutrition, genetic predisposition, and decreased social interaction. In order to provide the best care possible, an integrated approach to various illnesses is necessary, especially when it comes to preventative medicine, as explained below [22-28].

A New Perspective on Brain Health at the Interface of Psychiatry and Neurology. Since brain problems, including neurological and mental disorders, inflict a significant financial and health burden on societies and necessitate a multidisciplinary and cooperative approach between neurology and psychiatry, brain health has become a critical priority in both Switzerland and Europe. According to recent data from the Global Burden of Disease (GBD) Consortium, psychiatric diseases involved 12.5% of the world's population in 2019, whereas neurological disorders affected 43.1% in 2021. Increased direct and indirect health expenses are also linked to the rising incidence of mental illnesses. In actuality, these disorders can cause varied degrees of impairment and disability, impacting speech, movement, and cognitive function in addition to raising mortality. In addition to putting a heavy strain on caregivers, families, healthcare systems, and economies around the world, they can cause emotional pain, shame, social isolation, and prejudice for those who are impacted. With a notable decrease in DALYs for diseases including tetanus, meningitis, and stroke, the 2021 GBD evaluation also demonstrated that neurological disorders can be avoided by increased knowledge, immunization, and worldwide preventative initiatives. In a similar vein, early interventions have been successful in preventing mental health illnesses and fostering wellbeing [2-11]. These interventions include caring surroundings, parental programs, and social support. A paradigm shift has occurred on several levels as a result of the prevalence of brain illnesses, the need to prevent them, and the promotion of brain health. The development of platforms that unite clinical specialist societies, patient organizations, public health professionals, institutions, regional health ministries, and business partners is necessary to advance brain health at the institutional level. Psychiatrists and neurologists are undergoing a Copernican revolution in the clinical setting. For many years, their primary training has been in the diagnosis and treatment of illnesses rather than in the promotion of brain health. As a result of this change, specialized clinicians will also be crucial in increasing public knowledge of brain health and the prevalence of brain illnesses. Additionally, they should work with other specialties that share similar risk factors and comprehend how social and environmental issues affect their patients. Additionally, they require specialized training in order to interact with legislators to promote brain health and explain concerns to healthy populations. Restructuring and implementing specialized training in neurology and psychiatry is necessary to do this. This paradigm change also necessitates reconsidering our care paradigms and finding innovative, effective integrated care strategies. In order to better manage risk in healthy populations, it is necessary to create novel techniques that can identify brain illnesses in their early stages and offer efficient therapies with little side effects. Furthermore, accurate measures of brain health are required to track the effectiveness of these treatments. The increasing synergies aimed at resolving these rising difficulties across the many levels mentioned above, as well as important areas of development, will be discussed in the sections that follow [14-25].

Final Thoughts and Prospects. The complexity and interdependence of brain illnesses have been highlighted by the development of neurology and psychiatry. Through developments in

neuroimaging, genetics, and neuropharmacology, these hitherto separate sciences have increasingly shown their overlap. In addition to being advantageous to both fields, neurology and psychiatry's cross-fertilization and interactions with other medical specialties are crucial for advancing clinical practice and research in order to meet the challenges of the twenty-first century. The actual application of interdisciplinary techniques is still limited despite significant advancements, underscoring the need for more coherent approaches in clinical practice, policy creation, and training. The significance of fostering brain health through cooperative interdisciplinary efforts has been highlighted by the increasing incidence and impact of brain illnesses [3-9]. Recent WHO definitions highlight the growing understanding of brain health as a multifaceted term, which emphasizes the need for a cohesive strategy that cuts over conventional disciplinary lines. This strategy may result in better patient outcomes and more efficient use of medical resources. A growing awareness of the importance of a holistic approach to brain health is reflected in the development of neuropsychiatry and the push for comprehensive training in brain health. Future medical professionals will be better equipped to handle the complexity of brain illnesses and enhance diagnosis and treatment procedures by combining information from several fields. Research evaluating the best programs, frameworks, and tactics for accomplishing this integration is, nevertheless, lacking. Finding programs that produce the best clinical and educational results and are scalable at the European level requires filling this research gap. In addition, overcoming institutional and cultural hurdles, encouraging teamwork, and resolving the issues with existing training methods are all necessary for real integration [12-19]. Alongside the idea of brain health, new training requirements are also emerging, most notably the requirement to broaden the skill sets of psychiatrists and neurologists outside their conventional specialties. This covers instruction in leadership, communication, advocacy, and public and global health. Equipping specialists with these skills will empower them to advocate for brain health promotion at institutional levels and engage the general public through awareness initiatives and effective leadership. Successful examples of interdisciplinary collaboration, such as the Lancet Commission on Dementia Prevention, demonstrate the potential for significant advancements when multiple specialties work together. These collaborations have led to actionable strategies for dementia prevention and exemplify how shared knowledge can enhance patient care and inform policy.

The complexity of brain health necessitates the development of comprehensive, multidimensional assessment tools that capture its full scope. While no single metric currently exists, ongoing research and the advancement of multidisciplinary studies are crucial for identifying risk and protective factors, elucidating pathophysiological mechanisms, and tailoring interventions to individual needs [21-27].

Discussion. By offering sensitive indicators of the illness state and the consequences of therapeutic intervention, neuroimaging techniques can play an increasingly significant part in a very complicated drug development process. In the context of clinical applications and the growing dependence on personalized medicine, neuroimaging techniques can help guide the development of drugs with high specificity and sensitivity by illuminating the fundamental mechanisms of a disease through the functional mapping of the anatomical specificity of drug effects. Magnetoencephalography (MEG) is highly applicable to neuropsychopharmacological investigations because it directly reflects synaptic currents, is free of vascular confounds, and its sources can be modeled using increasingly complex algorithms that frequently incorporate complementary imaging modalities. In fact, a number of MEG research have looked at how neuromodulators and drugs of abuse affect spontaneous or task-related brain activity [5-11]. This chapter summarizes the MEG studies that manipulate GABA, acetylcholine, dopamine, glutamate,

and alcohol in healthy cohorts, as well as the study on Parkinson's disease, attention deficit hyperactivity disorder, and anesthesia in epilepsy, with a focus on the spectrum analysis models. These studies can show how pharmacological agents affect oscillatory synchrony in real time and at the level of an interactive multifocal system, and they offer a unique perspective on the spatiotemporal features of these effects on various neurofunctional systems in both health and disease. Understanding the neuropharmacology of psychoactive substances and creating accurate neural models of neuropsychiatric disorders and their susceptibility to pharmacological intervention are two areas in which the MEG is becoming more and more important [13-19]. Cultural, racial, and geographic variations should also be taken into account in this research to guarantee that brain health methods are applicable and successful on a global scale. To make this research impactful and financially sustainable, more funding and teamwork are essential. Furthermore, given the recent emergence of brain medicine as a cohesive area, the creation of thorough training programs in brain health is essential. The historical development of neurology and psychiatry is reviewed, present synergies are examined, and areas for future collaboration—particularly in improving research, education, and shared preventative strategies—are identified. In the end, promoting interdisciplinary cooperation between neurology and psychiatry, as well as other medical disciplines and pertinent partners, will be essential to improving brain health and reducing the prevalence of brain disorders worldwide [22-28].

Conclusions. In conclusion, improving brain health and reducing the worldwide burden of brain illnesses depend heavily on the integration of neurology and psychiatry as well as cooperation from other partners engaged in brain health promotion. We can create more efficient prevention, diagnosis, and treatment plans by encouraging interdisciplinary collaboration, improving training, and funding research. In addition to helping individuals, this all-encompassing strategy will help create more fair and sustainable healthcare systems across the globe.

Finally, by offering a more individualized approach that takes into consideration genetic, environmental, and lifestyle factors, precision medicine has the potential to completely transform the treatment of neuropsychiatric illnesses. Precision medicine, which offers focused treatments that enhance patient outcomes and lessen the burden of these crippling disorders, is probably going to become a crucial component of clinical psychiatry as research in genomes, neurobiology, and gene-environment interactions advances.

Although there are still obstacles to overcome, especially in the areas of genetic complexity, data integration, and ethical issues, neuropsychiatry's future depends on its capacity to use precision medicine to understand the pathophysiology of these disorders. The goal of individualized mental health treatment is achievable with more study and cooperation.

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