

# NEUROSCIENCE AS A PERSPECTIVE APPROACH OF INTEGRATION OF DOMAINS SUCH AS: BIOCHEMISTRY, PHYSIOLOGY, PSYCHOLOGY

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## NEUROȘTIINȚA CA ABORDARE ÎN PERSPECTIVĂ A INTEGRĂRII UNOR DOMENII PRECUM: BIOCHIMIE, FIZIOLOGIE, PSIHOLOGIE

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**Rezumat.** Neuroștiința este un concept „umbrelă” care încorporează mai multe domenii științifice care permit realizarea unui studiu transdisciplinar la răscrucea dintre biochimie, fiziologie și psihologie. Studiul teoretic se concentrează pe analiza mai multor puncte de vedere științifice și cercetarea principalilor 3 hormoni/neurotransmițători, care definesc caracteristicile personalității umane situate în creier și măduva spinării, serotonina, dopamina și norepinefrina. Hormonii/neurotransmițătorii menționați mai sus au fost studiați prin prisma biochimiei și fiziologiei, mai puțin prin cea a psihologiei. Mai multe studii au dovedit legătura directă dintre variația personalității unui individ și nivelurile de neurotransmițători prezente în sistem. Faptele enunțate anterior evidențiază necesitatea aprofundării acestui studiu, mai ales în domeniul corelației dintre abundența/absența unui anumit hormon/neurotransmițător în corpul uman și trăsăturile de personalitate.

**Cuvinte-cheie:** neuroștiință, hormoni, personalitate

**Abstract.** Neuroscience is an “umbrella” concept which incorporates more scientific domains that permit the accomplishment of transdisciplinary study at the crossroads of biochemistry, physiology, and psychology. The theoretical study concentrates on the analysis of several scientific point of views and research of the main 3 hormones/neurotransmitters, which define the characteristics of human personality situated in the brain and the spinal cord, serotonin, dopamine, and norepinephrine. The above-mentioned hormones/neurotransmitters have been studied through the prism of biochemistry and physiology, however, much less through that of psychology. More studies have proven the direct connection between the variation of an individual’s personality and the levels of neurotransmitters present in the system. The previously stated facts highlight the necessity of deepening this study, especially in the domain of correlation between the abundance/absence of a certain hormone/neurotransmitter in the human body and the traits of personality.

**Keywords:** Neuroscience; hormones; personality

### Introduction

The pace of development of society today is increasing and has an exponential character, being also stimulated by technological progress. Correspondingly, the volume of scientific studies and research evolves thanks to socio-economic requirements and human curiosity, which contributes to the rapid and intense progress of scientific fields. It is irrational to blindly approach some topics/themes from a one-sided perspective, ignoring other important, crucial factors or contexts that have a bearing on what is studied and its applications in everyday life. Thus, we find the need for a more complex and deep study of some processes, phenomena, beings from a more integrated, inter- and transdisciplinary perspective.

A „pioneer” science that approaches an object from several fields and various points of view is neuroscience. This makes the connection between psychology, biochemistry, physiology, psychoendocrinology, informatics, etc.

The attempt to study a subject from the perspective of various aspects allows a more complex understanding of it, subsequently the discoveries made allow their implementation in several socio-economic branches/branches with the aim of simplifying human life. A good example would be identifying the link between hormones and an individual's personality type. Even if this topic of study appeared as early as the time of the Greek philosophers, who tried to contrast the internal fluids of the body with the human personality, it succeeded only theoretically. Today, we have the opportunity to delve into this study with the help of state-of-the-art technologies and methods.

Hormones have been studied mostly through the biochemical and physiological prism, and the psychological side being neglected for a long time, their influence on the emotional state still remaining a mystery. An important role in shaping personality traits is played by 3 hormones-neurotransmitters: serotonin, norepinephrine, and dopamine, which are located in the brain and spinal cord - the central nervous system [3]. Some researchers (R. Cloninger, M. Konstandi, etc.) believe that the three have the greatest ability to influence the human personality. At the same time, in the view of other scientists (Tory A. Eisenlohr-Moul, Sarah A. Owens, etc.) hormones such as testosterone, estrogen and cortisol are the main components in determining personality traits. The purpose of the theoretical study carried out is to identify the contradictory scientific positions and establish the perspectives of the research in view of the impact of hormones on the personality system through the biochemical, physiological, and psychological prism.

#### **Analysis of scientific studies**

Only recently have scientific investigations begun to explore the functions and mechanisms of hormones in the expression of personality differences. In trying to connect body-made and drug-induced hormone levels with the personality system, researchers' interest shifted to the questions: whether genetic and/or environmental influences were the responsible factors; what is the central nervous mechanism's way of transforming experiences into signals for transmitter release; what the subsequent changes in hormone levels are [1].

Robert Cloninger (1987) made the greatest contribution to the realization of the theory regarding the biological bases of personality, in many scientific publications the model that explains personality variation according to neurotransmitters is often called Cloninger's model [3]. The researcher highlights 3 neurotransmitters that are the basis of his model: dopamine, serotonin, and norepinephrine.

Cloninger mentions that people characterized by a high degree of dopamine in the central nervous system can be qualified as having the dominant personality trait of pleasure seekers and excitability.

Serotonin, in turn, is a neurohormone responsible for inhibiting the transmission of punishment-specific signals. Individuals who have a low level of this substance will tend to avoid suffering and vice versa.

Cloninger finds that norepinephrine inhibits the specific impulses of conditioned reward, it is linked to personality characteristics where the behavior associated with pleasure dominates. People with high levels of this neurohormone do not show addiction to reward.

In research conducted by Maria Konstandi and her colleagues, hormone/neurotransmitter levels were measured in mice and rats following sessions of exposure to external stressors. This study aimed to clarify potential differences between mice and rats in their response to psychological stress at the level of the central nervous system. Data showed that restraint/restraint stress altered central neurotransmission in both mice and rats. However, this change was not always consistent in the two animal species tested. In general, it has been found that there is a tendency to suppress some neurotransmitters in several subregions of the brain in animals

exposed to stress [1]. Following these experiments, the hypothesis of the direct connection between the external stress factor (trigger) and the instantaneous response of the nervous system was proven. In accordance with the previously mentioned, we find that by analogy we can also perform experiments on human beings, with the aim of expanding some scientific data that we have at the moment in order to identify the connection between the human endocrine system and its psyche.

At the same time, in the analysis carried out by Tory A. Eisenlohr-Moul and Sarah A. Owens, some successes in contemporary research are highlighted by identifying some links between hormones, such as cortisol, and the level of neuroticism of the subject, such as DeSoto's work, M. C. and Salinas who analyzed the links between neuroticism in people with cortisol levels divided by sex [4], but also the gaps in modern psychoendocrinology, such as the contradiction of some studies on the same chosen theme (Oswald 2006) and (Laceulle 2014; Schommer 1999; Wirtz 2007) [5], [6], [7], [8], and the need to continuously carry out studies in this field, since several similar researches oppose each other, and scientists usually do not take into account several crucial factors such as the sex of the individual, the individual characteristics of the subject, the time of day when the research is carried out due to the continuous dynamics of hormones throughout the day, such as: the level of cortisol in the body registers the highest increase at beginning of the day, approximately 30 minutes after the individual wakes up, with the goal of preparing the individual to engage in the day's anticipated activities, and tapering toward the end of the day. As a result of ignoring these factors, many researches are contradictory or have insignificant results, minor details have a very high weight [2].

### Conclusions

Following the analysis of the scientific literature on a theoretical-practical level, we find that from the perspective of neuroscience, and especially from that of psychoendocrinology, there is a lack of deeper and vast research with reference to the connection between the personality of the subject and his hormonal levels. In the same way, due to the complexity of the subject addressed but also the many contradictions between certain similar studies, there is a need to carry out research with a larger number of individuals taking into account factors such as: sex, age, diet, individual characteristics of the participants, And so on The potential results obtained from the studies carried out will allow a deeper understanding of human consciousness in relation to the hormone levels present in the body. New discoveries could have irreplaceable applications in the fields of medicine, economics, etc.

I believe that when conducting studies in neuroscience, we should not limit ourselves to just one set of hormones, such as norepinephrine, dopamine, or serotonin, but look at the human body in complexity/assemblage, integrating other hormones/neurotransmitters that have and they have an impact in the studies we carry out, for the reason that looking at the whole of several neurohormones could broaden our view of the relationship between these compounds and the connection of these compounds and the type of personality, because maybe even that hormone that we ignore all the time during our research, could have a significant impact on the results and fundamental scientific findings. The human body has been studied so far only through the prism of concrete fields, other sciences (e.g. psychology) have been ignored in most cases, in conclusion the integrated approach of several fields will allow us to understand more deeply the human being and human nature.

In the same way, we could also establish different causes of a certain behavior manifested by an individual, just by studying his hormonal levels during the performance of that gesture.

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