УДК [61+615.1](06)(043.2)
ББК 5+52.81
А 43
ISBN 978-985-21-1569-8

Jain P.

THE ROLE OF NEUROTRANSMITTERS IN REGULATING MOOD, COGNITIVE PROCESSES, AND BEHAVIOR

Tutor: senior lecturer Haikovich Y.V.
Department of Normal Physiology
Belarusian State Medical University, Minsk

Neurotransmitters are chemical messengers that travel throughout the body, carrying, enhancing, and balancing signals between target cells and neurons, also referred to as nerve cells. The intricate interplay between neurotransmitters and their receptors forms the foundation of communication within the central nervous system, influencing a wide array of functions such as mood, cognition, and behavior. Understanding the significance of studying neurotransmitters is essential for unraveling the complexities of brain function and elucidating the mechanisms underlying mental health disorders and neurological conditions. Moreover, the study of neurotransmitters is crucial for understanding the mechanisms underlying cognitive processes such as learning, memory, and decision-making.

The overall objective of this research is to enhance our understanding of how neurotransmitters contribute to the regulation of mood, cognition, and behavior with the aim of potentially identifying new therapeutic targets for mental health disorders.

The neurotransmitters like acetylcholine, glutamate, and GABA play key roles in synaptic transmission and plasticity, shaping neural circuits that underlie cognitive functions. Investigating how neurotransmitters influence cognitive performance can provide valuable information for developing interventions to enhance cognitive abilities and treat cognitive deficits in conditions such as Alzheimer's disease and schizophrenia (Zhenqi Yang et. al. 2023)

The neurotransmitter serotonin plays important role in mood, emotions, and behavior regulation in the brain. It's thought that depressive symptoms like sadness, despair, and low energy might be brought on by low serotonin levels. According to studies published in “JAMA psychiatry” (2018) found that increasing serotonin levels leads to improvement in mood and reduced symptoms of depression.

There was also the research by Hardingham et al., published in the science “Journal of Cambridge university”. Their investigation concentrated on the function of glutamate receptors, particularly N-methyl-D-aspartate receptors (NMDARs), in learning and synaptic plasticity. The study examined the role that NMDARs play in the processes of long-term depression (LTD), which weakens synaptic strength, and long-term potentiation (LTP), which strengthens synaptic strength. These processes are essential for the brain's development of memory and learning. Dopamine is a major modulator of motivation and reinforcement within the brain's reward system and its release has been linked to rewarding experiences and positive reinforcement. Dopamine release and activity in specific brain regions can be influenced by estrogen, a hormone that is more common in women. Estrogen may have an indirect effect on dopamine function through its interactions with other neurotransmitter systems, including serotonin and norepinephrine. (Kollikonda S. et al, 2022) Females' emotional responses and mood control may be impacted by these interactions. Certain food items like walnuts, flaxseeds, and fatty fish, which are rich in omega-3 fatty acid might improve neurotransmitter activity and brain health, which may enhance. Tryptophan-rich foods like chocolates and nuts have been demonstrated to raise serotonin levels and elevate mood. (Zilpha Sheikh et.al, 2023).

Neurotransmitter research is crucial for expanding our knowledge of mental health and brain function, guiding the creation of innovative treatments, and enhancing the prognosis for those with mental illnesses and cognitive disabilities. The understanding of the complicated relationships between neurotransmitter systems and behavior could be advanced to address mental health issues, and cognitive behavior.