THETA RHYTHM IN SLEEP AND WAKEFULNESS

Summary

Implementation of complex cognitive functions of the brain is directly associated with the process of coordination of activity of many neurons located in different brain areas. The mechanism of this process is based on the rhythms of the brain (oscillations), which form the basis of coordination and interlinking of the activity of individual nerve cell assemblies. One of the most characteristic, and at the same time fascinating, rhythms of the brain is theta rhythm. A distinctive and intriguing feature of this rhythm is its presence in two very different forms of activity — wakefulness and paradoxical sleep (REM) both in humans and animals. In this work an attempt is made to summarize the results of research on the function of theta activity associated with the wake/sleep activity in humans and animals.

Theta rhythm in humans as well as in animals is a dynamic state of the neuronal theta rhythm assembles. Research on theta rhythm in animals suggests a functional relationship between synchronous oscillations in the theta band and the processes of spatial cognition and memory, as well as movement execution and motor reactions associated with the exploration of the environment. Studies conducted in humans suggest a similar function of these oscillations in learning as well as in spatial and episodic memory processes.

The final answer to questions about the importance of theta rhythm in the animal and human behavior, and its function in wakefulness and during sleep has not been formulated. Despite decades of research on this phenomenon in different experimental setups, using the rich variety of bioelectrical brain activity registration techniques, theta rhythm still hides many secrets.