

СПАВАЊЕ, ИСХРАНА И ФИЗИЧКА АКТИВНОСТ У РЕГУЛАЦИЈИ МОЖДАНЕ ХИПЕРЕКЦИТАБИЛНОСТИ: ТРАНСЛАЦИОНИ АСПЕКТИ



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SLEEP, NUTRITION AND PHYSICAL ACTIVITY IN REGULATION OF BRAIN HYPEREXCITABILITY: TRANSLATIONAL VIEWPOINT

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In this monograph, the author firstly provided an overview of the basic mechanisms of initiation and propagation of brain hyperexcitability. He pointed to the traditional, but also to many novel concepts of hyperexcitability and stressed the importance of homocysteine to prevail excitatory over inhibitory phenomena in the central nervous system. Namely, brain hyperexcitability underlies the appearance of seizures and epilepsy, one of the leading neurological disorders. Mechanisms of its initiation and propagation are complex and not fully investigated. The same holds true for the modalities of its regulation. Besides the traditional, there are many new concepts of hyperexcitability. In recent years, the importance of homocysteine, sulfur - contained amino acid incurred during the metabolism of methionine, is particularly highlighted for the predominance of excitatory over inhibitory phenomena in the central nervous system. Research in the field of biomedical sciences has many specifics, from methodological approaches to ethical dilemmas, especially when it comes to human subjects, and an integrative approach to the problem is more topical than ever. Therefore, translational research is

gaining in importance, since it represents a combination of basic and applied studies. Or to be more precise, translational research is believed to foster the multidirectional and multidisciplinary integration of basic research, patient-oriented research, and population-based research, with the aim of improving the human health.

A comparative overview of contemporary experimental behavioral and electroencephalographic research techniques was also presented in this monograph. In modern neurophysiology laboratories, hyperexcitability is being studied at the subcellular, cellular and supracellular levels with the ultimate goal to understand the contribution of ion channels, membrane receptors and signaling pathways to the process of hyperexcitability.

In the next part of the monograph, D. Hrnčić discussed the physiological processes: sleep, nutrition and physical activity as factors regulating brain hyperexcitability. He reviewed the results of research on alterations in the sleep architecture and elaborated their impact on the excitability of the central nervous system. The author also provided an overview of different research methods in somnology, primarily those based

on atonia of skeletal muscles as a phenomenon accompanying the paradoxical sleep phase. From the initial viewpoint by which sleep was considered as a passive process, a significant breakthrough has been made in the study of this process, and now, it is quite clear that sleep is an active, precisely regulated and vital physiological process. We should not forget that we are spending a third of our life in sleep.

The concept of neuronutrition, which has been developed keeping in mind the specificities of cerebral circulation and nutritional demands of the brain, was also presented in this monograph. In the center of considerations was a hypermethionine diet, which, due to the increased content of amino acid methionine and sequential development of hyperhomocysteinemia, leads to hyperexcitability. Severe hyperhomocysteinemia is rare, while mild and moderate hyperhomocysteinemia are significantly more spread in different populations and according to a number of epidemiological and experimental studies, are risk factors for the development of numerous cardiovascular, neurological and various other diseases. On the other hand, the ketogenic diet is an excellent example of how the nutritional modulation can reduce hyperexcitability and be part

of the therapeutic approach in the treatment of epilepsy. Neuroprotective effects of caloric restriction may also be of practical importance for the regulation of hyperexcitability.

The author of the monograph provided a concise and critical review of the epidemiological, clinical and basic experimental studies to answer the question of the role of physical activity in regulation of the central nervous system excitability. In doing so, he exposed the advantages and disadvantages of the current paradigm of physical activity in experimental conditions, especially from the standpoint of research in neurophysiology. Regular physical activity creates many beneficial effects on all organ systems, from the well-known cardioprotective effects, favorable effect on the immune and skeletal systems, the prevention of diabetes type 2, the stress release, up to recently displayed beneficial effects on the CNS.

In conclusion, the author emphasized that the results of translational research of fundamental physiological conditions, processes and activities such as sleep, nutrition, and physical exercise are important for creating healthy lifestyles and therapeutic strategies and indicated the directions for further translational and clinical research.

У овој монографији аутор је најпре изнео осврт на базичне механизме настанка и ширења мождане хиперекситабилности која лежи у основи настанка конвулзија и епилепсије, једног од водећих неуролошких обољења, истичући значај хомоцистеина за превагу ексцитаторних над инхибиторним феноменима у централном нервном систему. Систематично су размотрени физиолошки процеси: спавање, исхрана и физичка активност, као фактори регулације мождане хиперекситабилности. Аутор

излаже резултате истраживања о променама у архитектури спавања и њиховом утицају на екситабилност централног нервног система, уз преглед различитих истраживачких метода у сомнологији. У монографији је приказан концепт неуронутриције. У фокусу је хиперметионинска исхрана која доводи до хиперекситабилности. Аутор у монографији износи концизан и критички приказ студија које дају одговор на питање улоге физичке активности у регулацији екситабилности централног нервног система.