DEVELOPMENT OF NEUROCHEMICAL RESEARCH IN THE UKRAINE

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Development of Ukraine nerve system biochemistry (neurochemistry), as well as biochemistry generally, should be conventionally subdivided into two periods: the first one being the second half of the 19th century up to 1916, the second, being the period after 1916. The first period was characterized by advancing biochemical research on some problem items of nerve system, muscular tissues and other organ biochemistry, as well as nutrition biochemistry. For a period of time (1885–1892) biochemical research in Kharkov was headed by a former graduate of Kharkov University Medical Faculty, Alexander Yakovlevich Danilevsky (1838–1923), who had previously worked in the towns of Kazan and St. Petersburg, and abroad.

A.Ya. Danilevsky’s works and his scientific school topics (1–3) were chiefly dedicated to tissue proteins, their chemical classification, structural organization, metabolic transformation in the organism, to determining the participation of some enzymes in metabolic processes, and the role of proteins in some physiological functions of organs. Tissue nucleid components, their localization in different cerebral structures, role of lecithins, phosphor and iron in the cell functions were investigated as well.

As a consequence of A.Ya. Danilevsky’s departure for St. Petersburg (1892), as well as V.S. Gulevich’s departure for Moscow later on (1901), the intensity of biochemical (including the neurochemical) investigations in Kharkov significantly decreased.

Research suddenly expanded after 1916, when a young scientist from St. Petersburg Alexander Vladimirovich Palladin (1885–1972) came to Kharkov. It was there, that he developed intensive scientific-research work as well as scientific schooling (during the more than 60 years of his creative activity he trained over 150 Dsc-s and Ph.D-s). The second period of Ukraine neurochemistry advance is in its totality connected with the name of A.V. Palladin: he is seen as the founder of functional biochemistry and functional neurochemistry in the Ukraine (4–7). In 1921 A.V. Palladin founded a Scientific-Research Department in the Medical Institute, and in 1925 in the same place the Ukrainian Biochemical Institute (presently the A.V. Palladin Institute of Biochemistry of Ukraine National Academy of Sciences), which became and continues to be the centre of bio-
chemical research work in the Ukraine generally and neurochemical research especially. As early as 1926 the Institute started to publish the country’s first periodical on biochemistry “Naukovi Zapisky Ukrains’kogo Biohimichnogo Institutu” (Scientific Notes of the Ukrainian Biochemical Institute) (presently — “The Ukrainian Biochemical Journal”).

Development of neurochemical research in the Ukraine took place in two main directions: 1) setting up a chemical topography of nerve tissue and 2) solving the problems of functional neurochemistry. In the first direction the task was determination of chemical components, localization and content in the central and peripheric nerve systems and morphologically and functionally different structures. As for the second direction, it was aimed at determining the biochemical bases and interpretation of physiologic functions, molecular mechanisms (including the specific ones) and the pathologic processes of these structures.

Initially these investigations were carried out in three Ukraine University Centres — Kharkov, Kiev, Odessa and later on, when some new departments of biochemistry were established, they were continued in Dnepropetrovsk, L’vov, Donetsk, Ivano-Frankovsk, Uzhgorod, Belaya Tserkov and other cities. As an organizing and managing centre for this research always served the Institute of Biochemistry, which moved from Kharkov to Kiev in 1931, and was headed by the recognized founder of functional neurochemistry: A.V. Palladin.

Long-term investigations into the chemical topography of nerve tissue provided a conclusion about variations of metabolism in the nerve system structures, differing in their chemical composition and physiological functions and they also made it possible to establish some interrelations between the nerve system’s developmental processes in phylo- and ontogenesis and its chemical differentiation, and later on to identify the chemical composition alterations in the nerve tissue structures under the effect of different functional states of the organism. Consequently these conclusions laid the foundation for advancing the comparative and evolitional neurochemistry, as well as functional neurochemistry.

In A.V. Palladin’s laboratory the existence of interrelations between the intensity of biochemical processes and some specific functions of the nerve tissue structures (cerebral cortex visual and audio centers) was already established for the first time in 1926–1929. Analogic connections search was required in order to find out the biochemical foundations of specific cerebral functions and to decode the nerve system activity disturbance pathogenesis, as well as to identify the possible ways of their correction. Therefore, long-term investigation (8–18) was done into the peculiarities of tissue structures, chemical composition and carbohydrate, nucleic acid and protein metabolism in functional and pathological states like rest and activity, excitement and inhibition, sleep and narcosis, hibernation and artificial awakening, hypo- and avitaminsoses, complete and partial starvation, hypoad hyperhormonism, nerves degeneration and regeneration, under normal and various pathological conditions. The effect of psychotropics and other drug agents was studied, as were experimental allergic encephalomyelitis and many other organism states and substance effects. The enzymatic systems of proteolysis, ion membrane transport and their peculiarities in the ontogenesis were also studied.

In the Ukraine the biochemistry of catecholamines was studied, as well their regional distribution was decoded, the ways and mechanisms of their transformations at various functional, extremal and pathological states of the organism were investigated (Kharkov) and also the effect of serotonin and some psychotropics on the metabolism in the brain (Kiev). Investigation was done into nitrogen metabolism in the nerve tissue structures under the influence of toxic agents (Kharkov). Firstly, the topography and dynamics of content in the organism of 18 micro-elements (Donets, Ivano-Frankovsk) were