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**Lokalizacja i kodowanie chemiczne neureguliny-1 w neuronach śródściennych jelita  
cienkiego w modelu zwierzęcym**

**Localization and chemical coding of neuregulin-1 in the small intestine neurons in the  
animal model**

**Summary**

The enteric nervous system is a complex anatomical structure made up of millions of cells, participating in the regulation of the gastrointestinal tract. Previous studies have shown that the detailed anatomical structure is different in different animal species and in humans. Similar variability has been observed in the localization of numerous neuromodulators, molecules present in nerve cells. Their special activity and mutual relations between numerous neuromodulators determine the activity of neurons in the field of stimulation or inhibition of particular physiological processes. So far, the activity of several dozen neuromodulators also active in gastrointestinal neurons has been described.

Neuregulin-1 is an adhesive protein glycoprotein, acting through the ErbB family receptors. It occurs in numerous isoforms showing tissue specificity. Studies on its activity in the gastrointestinal tract prove its key activity in developmental processes, combining disorders in the expression of the gene encoding neuregulin-1 with the occurrence of diseases based on impairment of the nervous system structure in selected parts of the intestines. It was also confirmed that by activating EGFR receptors and thus showing growth factor activity, it influences the development of colorectal cancer cells.

Knowledge of the physiological activity of neuroregulation-1 in the intestinal nervous system is limited. Numerous studies on its function in the central nervous system, proving significant physiological function and the influence of disorders of the occurrence on the development of CNS diseases, suggest a potentially important role in the activity of the specific nervous system present in the intestines.

The possibility of using animal models for the study of neurological activity of the neuroregulin-1 is limited. Many years of research on the activity of the intestinal nervous system carried out on rodents have proven, among others, significant anatomical and neurochemical differences in relation to humans. The development of an appropriate animal model for the study of the possibilities of using neuregulin-1 for the treatment of gastrointestinal diseases is extremely important.

The proposed animal model is widely used for physiological studies and, showing significant anatomical similarity to humans, it is also used in areas related to the need for serious surgical procedures, such as transplantology and neurosurgery.

The results for the first time describe the localization of neuregulin-1 in neurons located in the small intestine, which are part of the pig's intestinal system. They indicate some similarities with other models and images observed in humans.

In addition, the determination of chemical coding and co-occurrence of better known neuromodulators allows a preliminary assessment of the activity of neuregulin-1 as a neuromodulator in the intestinal nervous system. The presence of NRG-1 did not affect the localization of nNOS, but a consistent correlation of VIP and NRG-1, and a reverse relationship to GAL and NRG-1 was demonstrated. This may indicate some similarities in the action of NRG-1 and VIP, no interactions with nitric oxide, and an opposite effect in the case of GAL.