

Description for the general public

The human body is an extremely complicated mechanism. How all parts of the human body communicate to each other is still a very active research topic.

All information between cells, tissues and organs are transferred through nerve connections. The nerve conduction is one of the most complicated ways of communication and is not fully understood until today. It is known that nerve cells transfer chemical species between one another. Those chemical species, due to their peculiar properties, can induce characteristic reactions in the cells which receive the signal.

Despite the great difficulty and complexity of the problem the research on the cells, responsible for transfer of information in body, called neurotransmitters, is carried out. The control of the different concentrations in the human body is very important. Too low concentration of them can indicate serious and mortal diseases like Parkinson disease or schizophrenia, which early detected can be successfully treated. Hence there is a big need for determination of even very low concentrations of neurotransmitters in the human body. Moreover, it is known that after stimulation e.g. outside stimulus in the body, more than the only one type of neurotransmitters is secreted in different concentration levels. Part of those neurotransmitters are enhancing or reducing the impact of the other. To fully understand the relation between those substances it is necessary to selectively determine the correlation between them.

In the proposed project we will perform a series of selective determination of neurotransmitters with usage of different electrode modifications for electrochemical methods. In the next step we will use a new, promising electrochemical, hydrodynamic method rotating droplet for determination of chosen group of neurotransmitters. The objective of that task is to minimize the limit of detection and limit of determination for chosen group of neurotransmitters, so that the method can be used in tests in the psychological samples. The obtained methods and modifications will be used to studies on determination of neurotransmitters in cell cultures, where nerve cells will be stimulated to secrete them. Performed tests and methods can find application as the alternative for present medical tests in order to determine neurotransmitters levels.