

New insight on the relationship between the autonomic nervous system and cerebral autoregulation in acute brain injury

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Abstract

Global cerebral circulation is under the control of metabolic factors, cerebral autoregulation, and a mechanism responding to control by the autonomic nervous system. Cerebral vasculature is known to be heavily innervated by both sympathetic and parasympathetic neurons, strongly suggesting a role in the maintenance of brain perfusion. One of the most extensively analysed markers of the autonomic nervous system is baroreceptor sensitivity (BRS), due to their non-invasiveness and ease of application in clinical settings. However, the relationship between BRS and cerebral autoregulation is still unclear. Recent studies have shown that the interrelationship between cerebral autoregulation and the autonomic nervous system is heterogeneous and varies from patient to patient in traumatic brain injury. It is believed that cerebral autoregulation and BRS are complementary to each other and provide a more complex picture of cerebral blood flow regulation. As biomedical signals and time-series parameters derived from signals are mostly non-stationary (their statistical properties change over time) there is a high need to use more advanced methods to track and analyse of correlation between signals. This presentation will discuss the findings about the physiological relationship between ANS and cerebral autoregulation.

About the lecturer

Agnieszka Uryga, PhD Engr is an assistant professor in the Department of Biomedical Engineering at Wrocław University of Science and Technology. Her scientific research focuses on studying cerebral haemodynamics and cerebral autoregulation processes using digital signal processing methods and machine learning algorithms. Currently, she leads a SONATA project entitled *AUTOMATIC: Analysis of the relationship between the autonomic nervous system and cerebral autoregulation using machine learning methods*, funded by the National Science Centre. She collaborates with recognised scientific groups, including the Division of Neurosurgery, Department of Clinical Neuroscience, University of Cambridge. She is a scholarship recipient from the Foundation for Polish Science and Czesław M. Rodkiewicz Scholarship Foundation Scientific Award. Additionally, she is a lecturer in statistics and methods of data analysis in biology and medicine.