

## Doctoral School of Information and Biomedical Technologies Polish Academy of Sciences

### Subject

**Assessment of brain physiological parameters using invasive near infrared spectroscopy technique**

### Supervisors, contact, place of research

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### Project Description

The goal of this project is to develop a method that allows invasive measurements using near infrared spectroscopy [1].

The advantage of invasive measurements is the potential to reduce the effect of an influence of extracerebral layers on the measurement results and thus on accuracy in estimation of brain physiological parameters, such as tissue saturation, cerebral autoregulation, changes in hemoglobin concentration. Due to the invasive nature of the measurement, these tests can only be carried out in intensive care units, where invasive probes are used to monitor intracranial pressure [2] or oxygen partial pressure (PtiO<sub>2</sub>). The proposed method assumes the use of existing, clinically certified measuring probes. The work will involve development of the measurement method and then its verification in animal model and in-vivo tests in the intensive care unit of the Queen Elizabeth Hospital in Birmingham. The analysis of measurement results assumes the determination of tissue saturation, critical closing pressure. Furthermore, the optical signals will be correlated with intracranial pressure. The results will be compared between the ones obtained in invasive and non-invasive way.

### Bibliography

1. Kacprzak, M., P. Sawosz, W. Weigl, D. Milej, A. Gerega, and A. Liebert, *Frequency analysis of oscillations in cerebral hemodynamics measured by time domain near infrared spectroscopy*. Biomed Opt Express, 2019. **10**(2): p. 761-771.
2. Durduran, T. and A.G. Yodh, *Diffuse correlation spectroscopy for non-invasive, micro-vascular cerebral blood flow measurement*. Neuroimage, 2014. **85 Pt 1**: p. 51-63.

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