

**Subject**

**The use of optical techniques to assess the recovery process in stroke patients**

**Supervisors, contact, place of research**

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**Project Description**

The aim of the study is to assess the applicability of optical techniques, such as near infrared spectroscopy [1] or correlation diffusion spectroscopy [2], to assess the state of health of patients after stroke.

As part of this work, we will apply in particular the techniques of time-resolved near-infrared spectroscopy enhanced with optical contrast agent to assess cerebral blood flow and cerebral blood volume. Moreover, the technique of correlation diffusion spectroscopy to assess the blood flow index will be applied.

In addition, optical signals will be analyzed in the frequency domain. The evaluation of spectrum power in a given band will allow, among others, to assess the mechanism of cerebral autoregulation. The results of the study will be correlated with the results of standard clinical measurements and the patient's neurological status in order to propose parameters for assessing the condition of patients after stroke.

The research will be conducted in cooperation with the stroke wards of Warsaw hospitals.

**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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