

ABSTRACT FOR THE GENERAL PUBLIC IN ENGLISH:

The aim of the project is to develop a new method that will help clinicians better assess the oxygenation of the brain in patients. Near-infrared spectroscopy (NIRS) is currently used by clinicians to gather cerebral information about concentrations of oxyhaemoglobin and deoxyhaemoglobin and hence oxygen saturation of blood. The measurements are non-invasive, can be performed continuously for many hours, with non-ionizing radiation and near the patient's bed. The problem that all current commercially available clinical NIRS setups have is a lack of depth information. The measurements are highly dependent on the signals from the skin rather than from the brain and without depth information the clinicians cannot reliably trust the measured values. This project proposes to develop a new method that will separate the signals from the skin and from the brain with the use of the multiwavelength time-resolved NIRS system. The end result will be a new measure for assessing the oxygenation of blood in an adult's brain. Measurements will be performed on a phantom with blood during controlled changes in oxygen saturation of blood at various depths and for various background absorption and scattering. Lastly, measurements will be performed in a clinical study during endarterectomy (carotid artery surgery) to test the method and assess its usefulness for clinicians.