

Abstract

Intrinsic optical signals are the signals reflecting changes in transmittance or reflectance of the light illuminating the tissue. Registration of such changes can be applied for the detection of physiological condition in the slices of biological tissues (in vitro) or in the whole animal (in vivo).

The aim of this project is to introduce this topic and show different possibilities for the detection of changing optical properties of nervous tissue both in vitro and in vivo.

The detection system of both light source and attachment of the optical fibre to the skull of the animal for in vivo experiments have been designed. The proper experimental part of the study have been done in hippocampal tissue slices and shows the correlation of the tissue activity and the optical signal at level of ion channels, glutamatergic synaptic activity, glial component of the signal and mitochondrial signal.

We are dealing with the source of the noise that we record while detecting rather subtle changes of optical properties. We are introducing the software VisionBrain for synchronous detection of both electrical and optical changes.

Keywords: Intrinsic optical signals, hippocampus, imaging, biomechanics