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Funding decision

Name	Organisation	Project title	Decision No.	Decision date	Funding period	Funding
Myllylä, Risto	OY	Ultrashort laser pulse interactions with biological structures at tissue, cellular, and molecular levels	124176	17.12.2007	01.01.2008 - 31.12.2010	222 310

Project description
This project focuses on enhancement of capabilities of current imaging techniques. Special attention is to be paid to investigation at cellular and molecular scales. Interactions of ultrashort laser pulses with media are to be studied in such tissue-mimicking phantoms as Intralipid solutions and developed multilayer phantoms. The main instrument to be used is a Ti: sapphire laser operating at a femtosecond scale. Laser pulses diffusively reflected from the investigated phantom are to be detected with a streak camera. Probe geometries of different modifications are to be used for the studying. Use of the Ti: sapphire laser coupled with a microstructured quartz optical fiber allows enhancing longitudinal spatial resolution of OCT device to micrometer scale. Thus, OCT and time-of-flight techniques are to be used for imaging the optical changes in the samples. Concerning other imaging instruments, fluorescence imaging is to be studied in the project. The tunable Ti: sapphire laser is to be used as a tool to excite florescent molecules of the studied media, and a highly sensitive detector - to detect the emitted fluorescence. Gradually, OCT setup is to be modified for simultaneous measurements of OCT images combined with fluorescent images from the sample. Effects of glucose on living red blood cells using optical trapping technique and glucose sensing in tissue phantoms are also to be studied in the investigation. The research benefits on the cooperation with Russian group are due to its top quality theoretical knowledge on light scattering and mathematical skilfulness in simulations. The Russian group has long research tradition on light interaction with human tissue. Finnish group is experienced in constructing advanced devices for optical measurements.