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Fund “Nauka” Project № 17008 Resume – Competition-Based Session 2017:

“An innovative infrastructure for optical reconstruction of cells and tissues in normal and pathological conditions”

Project leader: Prof. Anton Bozhidarov Tonchev, MD, PhD, DSc

In recent decades, fluorescence microscopy has become the leading method for imaging cells and tissues in biomedical research. A reference in the PubMed database as of 30.09.2017 with the key term “fluorescence microscopy” brought out over 120 000 titles, while by 2000 the publications were below 30 000. The interest in using this methodology led to the development of methods, which will maximize the quality of the obtained image and to overcome the limitations of fluorescence microscopy caused by factors such as the optical properties of individual tissues, age and type of the studied samples, etc. One of these methodologies is structured illumination microscopy (SIM), which allows the detection of an optical section with a quality close to laser confocal scanning microscopy, but using an epifluorescence microscope attachment. The Medical University of Varna has a microscope system, fully compatible with the latest generation of SIM technologies, which allows the upgrade of this technique with exceptional efficiency in terms of price/ quality of images. Our solution is ten times lower in financial value than a laser scanning confocal microscope, while at the same time providing a comparable quality of tissue and cell imaging. The provision of this infrastructure will be available to all researchers at the University and will raise to a new level the quality of morphological research in Northeastern Bulgaria.

Short-term results:

1. Provision of equipment for high quality analysis and visualization of immunofluorescent histological sections
2. Approbation of the equipment and test examinations
3. Carrying out initial experiments concerning multiple immunofluorescent stains to demonstrate the superiority of the images obtained with Apotom in comparison to standard fluorescence.

Long-term results:

1. Opportunity for all researchers at MU-Varna to perform high quality morphological studies and 3-dimensional reconstructions of cells and tissues
2. Increasing the scientific capacity in MU-Varna and the region of Northeast Bulgaria