



## **Fund “Nauka” Project № 22017 Resume – Competition-Based Session 2022:**

**“A platform for three-dimensional (3D) visualization, reconstruction and analysis of the microcirculatory bed”**

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The microcirculatory bed is of fundamental importance for normal embryonic development, for ensuring the flow of oxygen in mature organs and in tumorigenesis. Because the microcirculation follows the three-dimensional relief of tissues, 3D visualization followed by 3D analysis is required to achieve a comprehensive “picture” of the microvessels. The precise and detailed description of the morphological characteristics of vessels in the three-dimensional environment and their quantification in a way that allows statistical processing requires a specialized software platform. One such software platform is Vesselucida®360 – MBF Bioscience. The program allows the automatic 3D reconstruction of microcirculatory channels from histological or microCT images with the possibility of customized editing of the obtained models. The software can be integrated into the existing in MU – Varna microscopic motorized system, and thus its use will begin immediately after installation. Vesselucida will be used to analyse the three-dimensional microanatomy of blood vessels and the interaction with other cells in the environment in different biological contexts:

1. During development – role of vessels in the formation of normal organ structure;
2. In adult organs in normal and pathological conditions – the role of newly formed vessels (angiogenesis) is important for adaptation to pathological processes such as ischemia;
3. In tumorigenesis – malignant tumour cells must find their way to blood vessels in order to metastasize, and suppression of tumour angiogenesis is an important stage of the modern therapeutic strategy in oncology. The acquisition of this platform is of interest to a wide range of researchers working in the priority areas of “Oncology”, “Regenerative medicine” and “Neurosciences” for MU – Varna.

### **Short-term expected results:**

1. Provided equipment for 3D reconstruction of vascular organization in biological samples;
2. Approbation of equipment and test trials;
3. Performing initial experiments, with tissues from human subventricular zone and colorectal cancer to evaluate the capabilities of the generated 3D models and the information that can be extracted from them;

**Long-term expected results:**

1. An opportunity for all researchers at MU – Varna to carry out high-quality morphological research studies and 3D reconstructions of vessels, cells and tissues;
2. Expanding the already available capabilities of MU – Varna to analyze histological samples in 3D;
3. Increasing the scientific capacity in the MU-Varna and the region of North-Eastern Bulgaria.