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Fund “Nauka” Project № 18034 Resume – Competition-Based Session 2018:

“Improvement of the infrastructure of the Center for Translation Medicine and Cell Therapy and establishment of the first bank for corneal tissue and sklera outside Sofia”

Project leader: Assoc. prof. Yoana Dimitrova Kiselova-Kaneva, PhD

Over the years, more and more donors, as well as their families, have shown their trust in the eye banks in terms of providing the highest quality tissue in corneal transplantation, ensuring the provision of the most valuable human sense – vision. It is extremely important that the donated tissue is healthy, and its examination in a precise and timely manner guarantees its ability to function in the receiver for a long period of time.

Tissue testing is a delicate process in which eye banks purposefully determine the suitability of tissues. This is a very difficult process, practically impossible without modern technological advances. Since the clinical introduction of the specular microscope in eye banks in 1970, imaging technology was initially limited to imaging the central corneal endothelium to determine endothelial cell density (PEC), morphology (coefficient of variation, and% of hexagonal cells), and the detection of gross pathological changes. Unfortunately, this technology is still used by some eye banks in Sofia city. Originally used basic specular microscopy, today it is replaced by innovative confocal microscopy, which provides information about the entire endothelium, regardless of its position, as well as the qualitative and quantitative characteristics of the cornea throughout its thickness.

The aim of the project is to improve the infrastructure of the Center for Translational Medicine and Cell Therapy by purchasing the only *ex vivo* speculative microscope in Bulgaria with the possibility of complex assessment of cadaveric donor cornea and creating the first corneal tissue and sclera bank outside Sofia. This will contribute to the creation of the first eye bank outside Sofia city in the transplant history of Bulgaria. The work includes: development of new methods for preparation and evaluation of corneal grafts; creation of new biological products; creation and registration of new medical devices; patenting of new technologies and products; development of the first research projects of young scientists.

After a precise analysis of the overall process of production of quality corneal tissues, the methods ensuring the implementation of the project include a complete assessment of the donor tissue in its entire thickness and precise fotodocumentation. Specular microscopy has been used in corneal tissue banking for 48 years, but due to the specifics of the technology, there are only two manufacturers in the world: HAI Laboratories, Ins. (Lexington, MA) and Konan Medical Inc. (Irvine, CA), which produce only pre-orders.

The implementation of the project will contribute to the creation of a unique for Bulgaria tissue bank for eye tissues and decentralization of transplantation in its entirety, which is a precedent in historical terms; innovative treatment of corneal tissue in order to increase the efficiency and improve the treatment of patients with corneal diseases; improving the visual rehabilitation and quality of life of patients and reducing surgical time and stress for the surgeon; significantly improving the quality of training and enabling trainees to improve their skills; use of infrastructure for research and development; interaction with the European and world related institutions and providing opportunities for scientific exchange.