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Past, present and future of artificial corneas: Ukraine experience

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F ilatov Institute (FI) develops human donor cornea substitutes since 1960-s. Original keratoprosthesis models and their implantation methods were developed during this period. 1060 keratoprosthesis surgeries were performed. Main indications were leukomas contra-indicated to conventional keratoplasty (burn, pemphigoid, aphakic keratopathy, etc.). As a result of keratoprosthesis, visual acuity of 2/200-20/20 was restored and preserved in 1023/1060 eyes (96.5%) in 1-35 year follow-up. Stable keratoprosthesis fixation in the cornea was achieved in 986/1060 eyes (93%).

ii) At FI in collaboration with Ternopil Medical University there was developed technology of porcine cornea processing to fit it to xenotransplantation in human. First-in-man clinical trial of cryo-lyophilized porcine cornea transplantation in patients with severe cornea disease (extensive corneal ulcer, melt, perforation) was started in 2010. 57 patients (61 eyes) underwent tectonic xenocornea grafting. All eye globes were saved and light perception was preserved in 1-4 years follow-up.

iii) Next generation keroprosthesis- collagen-based cell-free implant - is being developed at FI in collaboration with Linkoping University since 2009. First-in-man clinical trial to test safety and effectiveness of the implants in patients with corneal ulcers was initiated at FI: 4 patients (4 eyes) were grafted with developed implants after lamellar excision of the ulcerated areas. After 6-12 months post-grafting, all implanted corneas had a stable epithelium and visual acuity improved compared to pre-operative levels.

Due to increasing worldwide shortage of human donor corneas, keratoprosthesis, cornea xenotransplantation and biosynthetic collagen implant technologies developed and being developed at FI are perspective methods for eye globe preservation and vision restoration.

Biography

Oleksiy Buznyk earned his M.D. from Crimea Medical University and ophthalmology residency from Odessa Medical University. He has completed his Ph.D. at the age of 29 from Filatov Institute of Eye Diseases and Postdoctoral studies from Linköping University. He is the Head of Eye Burns Department at Filatov Institute, specialized center that exclusively deals with and treats eye burns and their consequences, being one of the leading international Keratoprosthesis Centers. Buznyk's main areas of expertise are cornea and oculoplastic surgery with special interest in human donor cornea substitutes. He has published 26 papers in peer-reviewed journals.

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