AB092. Database for the anatomopathological, functional and surgical characterization of the cornea

Jean Meunier[1], Mona Dagher[2,3], Julia Talajic[4], Marie-Claude Robert[2], Isabelle Brunette[5,6]

[1]Département d'informatique et de recherche opérationnelle, Université de Montréal, Montréal, QC, Canada; [2]Département Neurosciences, CHUM Research Center, Montréal, QC, Canada; [3]Département ophtalmologie, Université de Montréal, Montréal, QC, Canada; [4]Centre Michel-Mathieu, Institut d'excellence en ophtalmologie, Pavillon Maisonneuve, Hôpital Maisonneuve-Rosemont, Montréal, QC, Canada; [5]Centre Universitaire d'Ophtalmologie de l'Université de Montréal et Centre de Recherche de l'Hôpital Maisonneuve-Rosemont, CIUSSS-E, Montréal, Canada; [6]Hôpital Maisonneuve-Rosemont Research Center, CIUSSS-E, Montréal, Canada

Background: The purpose of this infrastructure is to provide to the Network researchers a database and diverse related tools for the anatomical and functional analysis of the normal, pathological and surgical cornea.

Methods: This database is composed of normal and pathological individuals, totaling more than 36,000 patients. It includes anatomical and functional imaging data, physiological optics data, psychometric and clinical data (medical history, surgical parameters, acuteness, etc.). Various corneal topography tools were added, giving the database a unique character: tools for analyzing individual maps, average map tools for the study and comparison of populations, 3D modeling and visualization tools, statistical tools, etc. There are also screening tools for detecting various corneal conditions (LASIK, PRK, RK, keratoconus) and for secure data exchange between colleagues.

Results: Several studies were made in recent years thanks to this common infrastructure. For example, this database has provided important information regarding the evolution of the 3D shape of the normal cornea with age and ametropia and has confirmed the mirror symmetry of corneas for the right and the left eyes (enantiomorphism). The different stages of Fuchs' dystrophy were also characterized to provide essential knowledge for surgery of the posterior layer of the cornea. Our database also allowed studying the anatomy of the wounds and the shape of the cornea before and after a transfixing transplant or an endothelial transplant (DSAEK and DSEK). The data on the characterization of experimentally transplanted corneas with corneal equivalents generated by tissue engineering and the recent addition of clinical data on the replacement of a diseased cornea with a synthetic corneal equivalent (keratoprosthesis) also resulted in several publications. More recently, the database has allowed to develop innovative algorithms to determine the optimal shape of an implant according to the clinical parameters of the recipient. On the other hand, we also demonstrated that the 3D shape of the cornea can be used as a biometric characteristic (such as fingerprints) for identification of individuals for various applications ranging from forensics to secure border crossings. Consequently, a new multimodal database (cornea + iris + eventually retina) was created for the purpose of biometric identifications. This database provides a unique set of anatomical and functional tools for the analysis of the cornea. It is characterized by the scientific quality and large quantity of accumulated information on the cornea and the high-level tools to exploit its content.

Conclusions: The common infrastructure is easily accessible to all VHRN members on request. The database will also be accessible online in 2018 (see http://cvl.concordia.ca for more information).

Keywords: Cornea; corneal topography; atlas; keratoprosthesis; transplant; biometrics

doi: 10.21037/aes.2018.AB092

Cite this abstract as: Meunier J, Dagher M, Talajic J, Robert MC, Brunette I. Database for the anatomopathological, functional and surgical characterization of the cornea. Ann Eye Sci 2018;3:AB092.