A Proposed New Measure of Corneal Sensitivity

Nathan Efron

Institute of Health and Biomedical Innovation, and School of Optometry and Vision Science, Queensland University of Technology, Kelvin Grove, Queensland, Australia; n.efron@qut.edu.au

Corneal nerves can be adversely impacted by a variety of ophthalmic and systemic conditions, and there is a commensurate requirement for tests of corneal structure and function that have good diagnostic capability. A number of important advancements in the clinical assessment of corneal nerves have emerged over the past two decades. Corneal confocal microscopes, which became available in the early 1990s, allowed corneal nerve structure to be assessed through viewing of the subbasal nerve plexus, at around ×500 magnification. Techniques for assessing nerve function, however, have met with limited success. The Cochet-Bonnet esthesiometer, which measures corneal sensitivity by applying a fine nylon thread set at various lengths to the corneal surface, lacks diagnostic sensitivity and is loathed by patients who fear the thread approaching their eye. Noncontact “air puff” corneal esthesiometry is an improvement, but no such devices are commercially available, so this remains a research technique. Yorek et al. introduce a simple, novel alternative approach, which essentially involves measuring the “discomfort response” to graded hyperosmotic solutions. They have demonstrated proof of concept by accurately measuring the eye squinting response in rats. Yorek et al. observed an osmolarity-dependent increase in eye squinting in control rats, and noted that the response was significantly reduced in diabetic rats and absent when the cornea was anesthetized with proparacaine. Could this approach be applied to humans? Yorek et al. believe so, and reveal that they are developing an automated portable video-based system for recording and analysis of blink rate and squinting in both animals and humans. At the very least, this approach may have clinical utility in assessing corneal sensitivity in patients who, for whatever reason, are otherwise incapable of indicating a reliable subjective response.

References