

Remarkable possibilities: clinical applications of interactions among the cornea, extraocular muscles and retina

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The significant increase in brain injuries, ocular surface disease and macular degeneration has stimulated extensive studies on the extraocular muscles, cornea and retina, respectively. Currently, the majority of research in these areas is isolated, yet the three structures are inextricably linked functionally via many electrical and chemical systems. The activity and changes of these interrelated ocular structures can be quantified using technological advancements, such as those that monitor brainwaves and/or chemical gradients. Alterations of one of those three components, stimulating adaptations in the other two structures via feedback and feed forward pathways, lead to changes in brain processing. Thus, by analyzing the combination of chemicals from the corneal tear layer with afferent stimuli from both proprioceptors in the extraocular muscles and retinofugal pathways, and efferent responses from retinopetal projections and cranial nerves III, IV and VI, assessments can be made regarding brain processing. From there, many future implications become possible. A few examples of attaining “bench to bedside” procedures might be 1) off-label usage of punctal plugs to induce modification of estrogen content in the corneal tear layer as a natural way to affect hormonal regulation, 2) peripheral retinal stimulation to lessen patient awareness of macular damage, or 3) filtering incoming retinal stimulation to affect seizure activity.

Biography

Deborah Zelinsky, O.D., F.N.O.R.A. is the founder and clinical director of the Mind-Eye Connection, in Northbrook, Illinois, which emphasizes functional systems connected to the eyes, beyond traditional vision care. She is a life member of MENSA, with patents on innovative methods of retinal and corneal stimulation that affect sensory integration and hormonal regulation respectively. Recognized internationally in her field of neuro optometric rehabilitation, she was asked to be a reviewer for PM&R, the official scientific journal of the American Academy of Physical Medicine and Rehabilitation.