Contact Lens Update
CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

Summary: Report of the Neurobiology Subcommittee

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Stapleton F, Marfurt C, Golebiowski B, Rosenblatt M, Bereiter D, Begley C, Dartt D, Gallar J, Belmonte C, Hamrah P, Willcox M. The TFOS International Workshop on Contact Lens Discomfort: Report of the Subcommittee on Neurobiology. Investigative Ophthalmology and Vision Science 2013 54:TFOS71-TFOS97.

Ocular surface nerves: overview

The tissues of the ocular surface such as the cornea and lid margin are richly innervated but the innervation is particularly dense in the cornea. The neurons that innervate the cornea respond to different physical and chemical stimuli and impulses originating at peripheral nerves, travel to the lower brain stem before reaching the cortex.

Pain is the main sensation evoked by inflammatory and traumatic events, especially in the cornea, tactile sensations are evoked at the conjunctiva, and cold is evoked at the corneal surface. Other sensations like dryness, grittiness and fatigue are due to complex integration in the brain.

The sensory nerves express neuropeptides that are involved in transmission of ocular sensations and modulation of ocular surface inflammation.

Different parts of the eye perceive different sensory messages, which can be explored via aesthesiometry:

Physiological changes with dry eye

In vivo confocal microscopy has shown morphological changes in nerve fiber density in the cornea of both Sjögren's and non-Sjögren's patients with dry eye.

Orthokeratology

Orthokeratology results in corneal nerve redistribution, which reflects the pressure effects of the rigid lens on the cornea. These changes are associated with decreased corneal sensation.

Contact lens wear

The wear of soft contact lenses has for the most part not demonstrated an effect on corneal nerve morphology, although a recent study has shown small but significant changes in the limbal scleral region. Contact lens wear is associated with reduced sensitivity. PMMA and RGP lenses are especially associated with a reduction in corneal sensitivity that recovers with the cessation of lens wear.

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Corneal mechanical adaptation may have a role in lens discomfort as a symptomatic group showed no adaptation to suprathreshold mechanical stimuli.

In summary the understanding of contact lens discomfort is incomplete.

For further details, please refer to The TFOS International Workshop on Contact Lens Discomfort: Report of the Neurobiology Subcommittee.