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Contact lens drug delivery

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We have developed a drug-eluting contact lens that overcomes the historical challenge of controlled drug delivery from a contact lens. Acting as a platform for ocular drug delivery, the contact lens has demonstrated the ability to safely release therapeutic quantities of a range of molecules, including glaucoma drugs, steroids, and antibiotics for weeks at a time. In animal models, a latanoprost-eluting contact lens maintained therapeutic drug concentrations in the aqueous humor for one month. A dexamethasone-eluting contact lens was able to provide drug levels to the eye equivalent to an intensive drop regimen for one week. One of the advantages of this design is that the contact lens retains the visual performance that one would expect from a commercial contact lens. Compared to drops, a drug-eluting contact lens could provide improved efficacy and adherence by facilitating topical administration, reducing dosing frequency, and by minimizing systemic absorption and side effects.

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Coarse to fine visual orientation processing in discrimination tasks

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Introduction: The effects of visual stimulus orientation difference on visual event-related potential components (VERP) were studied in healthy humans.

Methods: Trials with an orientation difference of more than 150 ("coarse") and of less than 150 ("fine" identification) were compared for two tasks: Sensory-motor (left forefinger reaction for vertical stimulus orientation gratings, right forefinger reaction for oblique or horizontal gratings) and sensory-mental (counting oblique vs. horizontal stimuli). Task difficulty increased when the orientation difference decreased from 15° to 5°.

Results: We found cortical topological similarities in "coarse" and "fine" orientation discrimination processing. Greater VERP changes were observed within the range of 50-150 than within the range of 150-900. The amplitudes of the P2/N2 waves and the latency of the P3 wave decreased with increased task difficulty in both tasks. Task difficulty modulated the amplitude of P3 and the latency of N1/N2 waves in opposite directions for the sensory-motor and sensory-mental task respectively. Small changes in task difficulty affected attentional effort and modulated the parameters of N1/P2 waves only for the sensory-mental task.

Conclusion: The VERP changes correspond to psychophysical data regarding both the selectivity of human vision orientation-specific channels and the transition between detector and computational mode of operation in orientation perception.

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