



Biomedical Engineering Department Seminar

Friday, November 2, 2007

Location: Cullimore Hall, Lecture Hall 3

Time: 11:30 AM – 12:30 PM

Electrical Stimulation of the Oribicularis Oculi to Restore Eye Blink

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Dysfunction of the seventh cranial nerve typically results in facial paralysis and loss of the ability to blink the eye. Without adequate treatment this can lead to corneal scarring, diminished vision, and potential loss of the eye.

Current methods for preserving the cornea and/or ensuring eye closure following facial paralysis include the use of artificial tears, the implantation of gold weights or mechanical springs in the eyelid, nerve and muscle transfer, and tarsorrhaphy. All of these are helpful in preserving the eye however none of these techniques, even used in combination, are fully effective. Additionally, these techniques are often inconvenient, subject the patient to multiple surgical procedures, and are cosmetically unacceptable. Electrical stimulation of the orbicularis oculi muscle has the potential to provide a more elegant and effective method for eliciting eyelid closure.

A study was conducted investigating the use of electrical stimulation of the orbicularis oculi muscle as a means of restoring blink function in an animal model of surgically induced seventh nerve paralysis. Rabbits had a subcutaneous stimulating electrode implanted near the margin of the upper eyelid and stimulating current pulses were delivered to elicit orbicularis oculi contraction resulting in eyelid closure. The study was divided into three stages: 1) acute stimulation of the paralyzed orbicularis oculi, 2) chronic stimulation of the paralyzed orbicularis oculi, and 3) contralaterally triggered stimulation of the paralyzed orbicularis oculi. Results indicated the following: 1) electrical stimulation produced substantial eyelid closure in both acute and chronic experiments, 2) stimulus levels necessary to achieve substantial eyelid closure were well tolerated in awake animals, and 3) the use of contralateral EMG as a trigger produced a symmetric looking blink in a unilateral model of facial nerve paralysis.

Refreshments will be served.