



Biomedical Engineering Department Seminar

Friday, January 19, 2007

Location: Cullimore Hall, Lecture Hall 3

Time: 12:00 - 1:00 PM

Electrical Stimulation of the Oribicularis Oculi for Eye-blink Restoration

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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 were acutely implanted with a subcutaneous stimulating electrode near the margin of the upper eyelid and stimulating current pulses were delivered to elicit orbicularis oculi contraction resulting in eyelid closure. Results indicated that normal rabbits achieved the greatest lid response to electrical stimulation, followed by paralyzed rabbits demonstrating evidence of at least partial reinnervation and paralyzed rabbits demonstrating persistent denervation, respectively.

Future studies will investigate the effects of chronic stimulation, as well as methods for decreasing the amount of current necessary to achieve lid closure.

Refreshments will be served.