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Selected links:

- [Department of Biomedical Engineering](#)
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Research Summary

Applied neural control is an emerging technology that can be used to effect controlled and directed release of neurotransmitters. The technology is based on the electrical excitability phenomenon exhibited by neural tissue. A neural impulse can be evoked by exposing neural tissue to a changing electric field. The evoked response will be faithfully transmitted to the terminal end of the axon where the neurotransmitter is released to act upon an organ that is controlled by activity on the nerve. Because the end organ (or body system) responds only to the incoming signal, we have the possibility of controlling in the human any end organ or body system (including behavior) normally is under neural control. Basic aspects of research include electrochemical processes on stimulating electrodes, mechanisms of tissue damage, and tissue reaction to implanted electrodes. Applied aspects of research include the development of a respiratory assist device employing electrical activation of the diaphragm and of a micturition assist device.

Recent Publications

- Grill WM, Mortimer JT: Inversion of the current-distance relationship by transient depolarization. *IEEE Trans Rehab Eng* 44: 1-9 (1997).
- Schmit BD, Stellato Ta, Mortimer JT: Staple penetration and staple histological response for attaching an pimysial electrode onto the abdominal surface of the diaphragm. *Surgical Endoscopy* 11: 45-53 (1997).
- Schmit BD, Mortimer JT: The tissue response to epimysial electrodes for diaphragm pacing in dogs. *IEEE Trans on BME* 44: 921-930 (1997).
- Lin, C.C.K. and Crago, P.E., "Neural and mechanical contributions to the stretch reflex: A model synthesis", *Annals of Biomedical Engineering*, 30:54-67, 2002.
- Bhadra N, Mortimer JT: Extraction forces and tissue changes during explant of CWRU - Type intramuscular electrodes form rat gastrocnemius. *Annals Biomed Eng* 25: 1017-1025 (1997).
- Grill WM, Mortimer JT: Quantification of recruitment properties of multiple contact cuff electrodes. *IEEE Trans Rehab Eng* 43: 49-62 (1996).

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