

RESEARCH OVERVIEW

MECHANISMS OF NEURON DEGENERATION; CLINICAL MECHANISMS OF MOTOR RECOVERY.

Research Description: Neurodegenerative diseases of aging are insidious, and unrelenting. Models and techniques now permit the exploration of chronic neuronal pathophysiology that unfolds after the primary insult. Using in vivo models, experiments explore the affect of hormonal manipulation on delayed neuronal degeneration. Combining the delayed degeneration model with transgenic technology, experiments explore the role of amyloid precursor protein fragments. Other experiments have demonstrated effective pharmacological strategies to protect neurons from the degenerative process. Techniques employ systems neuroanatomy, stereotaxic surgery, quantitative immunohistochemistry, cell culture, hormone and trophic factors, and functional analysis. Patients with stroke usually recover some motor function, however the mechanism of this recovery is not clear. Experiments test new robot aided neuro-rehabilitation techniques that have enhanced patients' motor recovery of a paralyzed upper limb. These unique machines permit control over the sensorimotor input experience, and provide objective measure of motor performance. Current studies are testing whether the best-recovered motor performance exhibits characteristics of motor learning. New devices will test whether the recovery of motor function of the hand and wrist may also be altered by controlled sensorimotor exercise, and whether robot training causes a discrete functional magnetic resonance signature.

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