

Strategies for repairing the injured brain

When the brain is injured, there are both degenerative and reparative changes over the ensuing hours, days, and even months. The degenerative changes may act to produce nonspecific effects of the brain injury such as the loss of synapses in widespread regions of the injured hemisphere. The reparative changes that follow may reverse some of the nonspecific degenerative changes but without experiential, physiological, or pharmacological assistance, the spontaneous reparative changes do not generally lead to significant behavioral restitution. As we learn more about the principles of brain plasticity in laboratory animals and human subjects we are gradually moving towards the development of novel treatments to facilitate behavioral compensation, and perhaps even some recovery, after cortical injury. Such treatments include postinjury experience, pharmacotherapy, cell-based therapy, and electrical stimulation. The objectives of this presentation will be: 1) to review the cascade of neural changes following neural injury; 2) to summarize recent advances in brain plasticity and the development of new rehabilitation strategies; and 3) to consider new directions to develop rehabilitation strategies.