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Células Madre neuronales. Caracterización electrofisiológica y desarrollo de una terapia celular para el tratamiento del Ictus Isquémico

Neural Stem Cells. Electrophysiological characterization and development of a cell therapy for the treatment of Ischemic Stroke

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Stroke is a common neurodegenerative disorder and one of the leading causes of death and disability in adult humans (Jorgensen et al., 1995). Treatments to support efficient functional recovery in these patients are inadequate.

The possibility to isolate and then propagate neural stem cells (NSCs), and their potential applications in cell therapy have attracted a lot of research interest in recent years. This field is just starting to reveal its full potential. Many aspects related to the basic biological properties of NSCs, and their posible application as a therapeutic tool still have to be established. This project will study the electrical properties of NSCs and attempt to use them for reconstruction of stroke-damaged brain.

Ion channels expressed in neuronal membranes have been noted to play a major role in electrical signal transmission in the nervous system. In particular, expression of K^+ channels in neural membranes has been related to maintenance of a variety of cellular activities, including setting the resting membrane potentials, repolarizing/hyperpolarizing the cells (Korotzer and Cotman, 1992; Hille, 1992). Acquisition of voltage-gated ionic channels is a crucial part of terminal differentiation. By using whole-cell patch-clamp recordings, we will characterize and compare electrophysiological properties of cortical human NSCs and study how these properties develop over time while cells are morphologically maturing under in vitro conditions.