

IS NEURORECOVERY A VALID CONCEPT?

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Neurological disorders, especially stroke, traumatic brain and spinal cord injuries, as well as degenerative diseases, represent a leading cause of long term disability all over the world. Many advances have been done in the treatment of these pathologies, mostly confined to acute phase, especially in stroke (e.g. thrombolysis, mechanical recanalization, augmentation of cranial perfusion, etc).

The need to identify therapeutic methods, able to limit brain and spinal cord damage or enhance recovery of motor function through neuroprotective and neurorestorative mechanisms when administered at later time points, is desirable.

Neurorecovery is the positive outcome that produces clinically relevant results with immediate functional and late structural effects. Neurorecovery depends on the adaptative plasticity of the undamaged nervous tissue, and of the non-affected elements of functional network. Initial size and location of injury are the main factors that determine the extent of recovery in brain and spinal cord lesions.

Neurorecovery can be enhanced by pharmacological intervention, physical activity, electromagnetic stimulation, psychological support, environmental stimulation or any demonstrated combinations of these factors capable of improving the patient's condition after brain and spinal cord injuries.

From the pharmacological perspective, it is clear that the focusing on molecules that are capable of mimic the function of endogenous molecules with multimodal and pleiotropic neuroprotective effects is the best approach in neurorecovery, especially when they are associated with intensive physical training.

Biological agents (e.g., neurotrophic factors and related molecules) with modulating and multimodal effects are better pharmacological agents for brain and spinal cord protection and recovery, because they usually have also pleiotropic neuroprotective effect. That is why they are capable of pharmacologically bridging acute neuroprotective processes with the long-term recovery processes.

There are many animal and human studies trying to elucidate the cellular and molecular mechanisms of plasticity of the nervous system. A better understanding of the mechanisms underlying the neuroplasticity will reflect in a more efficient and comprehensive treatment.

This presentation will focus on the validity of different methods able to stimulate neurorecovery after brain lesions.