NEUROPLASTICITY - A STRICTLY GENETICALLY CONTROLLED PROCESS

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The nervous system is subjected in every moment to the action of several processes, both physiological and pathological. Facing these challenges the nervous tissue has only one viable option: to adapt. Neuroplasticity is the term used to describe the brain's ability to change in response to an injury or other environmental stimulus, such as learning or experiencing something new.

This definition is strongly supporting the fact that neuroplasticity involves intimate cellular processes that will all be based on gene expression. In a normal nervous system, plasticity underlies all types of memory formation.

In addition, plasticity occurs in reward- and stress-related centers of the brain, contributing to survival and avoidance of potentially dangerous situations. Protein expression is the key to nervous tissue cells adaptation.

Developmental proteins not normally expressed in the adult brain re-emerge in the hours and days after brain injury and exert their effects for a number of weeks or months. These proteins are involved in neuronal growth, apoptosis, angiogenesis, and cellular differentiation.

The different triggers will start complex cascades of molecular mechanisms, stimulating the expression of Immediate Early Gene/Transcription Factors, Kinase Network Molecules, Neurotransmitter Receptors, Growth Factors/Receptors, Neuronal Growth-Associated Molecules, Cytoskeletal Molecules, Synapse-Related Molecules, Adhesion Molecules.