

# Immediate Early Genes and Inducible Transcription Factors in Mapping of the Central Nervous System Function and Dysfunction (Handbook of Chemical Neuroanatomy)

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That molecular neurobiology has become a dominant part of neuroscience research can be credited to the discovery of inducible gene expression in the brain and spinal cord. This volume deals with genes, whose expression patterns in the vertebrate central nervous system were the first to be revealed and then the most extensively investigated over the last 15 years. Immediate early genes (IEG) and their protein products, especially those acting as regulators of transcription (inducible transcription factors, ITF) have proven to be very valuable tools in functional neuroanatomy and neurophysiology, as they are rapidly and transiently induced in specific neurons in response to various modes of stimulation. Thus, they have been used to map neuronal populations selectively responsive to a variety of conditions, such as sensory and learning experience, electrical stimulation of specific circuits, seizures, and neurodegeneration.

This single volume, written by the most prominent authors in the field, brings together for the first time information about the most widely studied IEG/ITF in a whole variety of phenomena of neuronal activation. It starts with a critical appraisal of the technologies employed for the studies on gene, protein, and transcription factor activity in the nervous system. Several chapters present exhaustive examples of expression patterns of the ITF in "vocal" avian brain, mammalian brain sensory regions, areas involved in regulation of circadian rhythms, and the spinal cord. The next parts cover functional and regular aspects of individual IEG/ITF expression: c-fos in learning and memory, c-jun and others in neuropathology and neuronal stress responses, Elk-1, egr family, and CREB in neuronal plasticity and learning.

This volume will be useful as a major reference on this topic. Furthermore, it attempts to unravel the seemingly overwhelming complexity of the phenomena of gene expression in the central nervous system.



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