
Preface

Drugs of Abuse: Neurological Reviews and Protocols is intended to provide insightful reviews of key current topics and, particularly, state-of-the-art methods for examining drug actions in their various neuroanatomical, neurochemical, neurophysiological, neuropharmacological, and molecular perspectives. The book should prove particularly useful to newcomers (graduate students and technicians) in this field, as well as to those established scientists (neuroscientists, biochemists, and molecular biologists) intending to pursue new careers or directions in the study of drugs. The book's protocols cover a wide variety of coherent methods for gathering information on quantitative changes in proteins and mRNAs at both tissue and cellular levels. Inducible gene expression in striatal neurons has been a hot topic over the last decade. Alterations in gene expression for a wide range of proteins in the striatum have been investigated in response to drug administration. Altered expression of given mRNAs and their product proteins constitutes essential molecular steps in the development of neuroplasticity related to long-term addictive properties of drugs of abuse. With the multiple labeling methods that are also described in the book, gene expression can be detected in a chemically identified cell phenotype; the expression of multiple genes of interest can be detected in a single cell simultaneously. Hundreds or thousands of gene expression products can today be detected in one experimental setup using the powerful systematic cDNA macroarray or microarray screening technology. Moreover, protocols useful in analyzing the functional roles of genes and proteins (e.g., viral-mediated gene transfer, knockout mice, and antisense strategy) are also included. Also important here is the inclusion of studies on the release kinetics of striatal dopamine, a prime brain transmitter that such psychostimulants as cocaine and amphetamine interact with, using an *in vivo* microdialysis or real-time voltammetry technique. This study will also expand to include the quantitative measurement of other neurotransmitters (such as acetylcholine) because increasing evidence for the role of this transmitter in the control of drug actions has emerged. The properties of drugs have also been recently linked to the activity of adult neural stem and progenitor cells in the forebrain. Therefore, a timely review and two protocol chapters describing an immunohistochemical method to examine cellular proliferation and differentiation in the adult rodent

brain, along with a culture method to grow viable neural progenitors, are also provided in the book.

A further feature of *Drugs of Abuse: Neurological Reviews and Protocols* is the introduction of primary neural culture preparation for studies on intracellular signaling pathways, gene expression, and so on. These cultures provide a relatively purified and easily controlled model for the investigation of cellular events related to drug's actions. Analysis of DNA binding activity in specific sites of DNA promotor regions is now possible with an electrophoretic mobility-shift assay in the cell culture tissue, in addition to striatal tissue from living brain. It can be anticipated that the usefulness of the neural culture model will undoubtedly help expand cellular and molecular research into drugs of abuse.

The chapters in *Drugs of Abuse: Neurological Reviews and Protocols* follow the format of previous volumes in the Methods in Molecular Medicine series. All chapters have been contributed by scientists with considerable experience in the protocols covered, and each protocol has been thoroughly tried and successfully tested in the respective contributor's laboratory. In each article, a final section of Notes has proven to be particularly helpful because many of the tricks of the trade are provided there; I recommend reading them thoroughly whenever troubleshooting is necessary. Illustrative data have also been included as frequently as possible so that the reader will have an opportunity to compare well-documented data with their own results from the first run of a protocol. Good luck!

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