

Introduction: Molecular Approaches to Drug Abuse Research

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The Extramural Molecular Biology and Genetics Program was launched in 1988 in the Division of Basic Research of the National Institute on Drug Abuse (NIDA) to encourage and support investigator-initiated basic research to employ molecular approaches to drug abuse research on all abused substances. In the past 6 years, the program has reached many milestones and achieved numerous successes. The progress made prior to 1991 was best documented in NIDA Research Monograph Series volumes 111 and 126 based on the proceedings of the first and second conferences on "Molecular Approaches to Drug Abuse Research" held in 1989 and 1991, respectively. The third conference on "Molecular Approaches to Drug Abuse Research" was held on March 22 and 23, 1994, at the Bethesda, MD, campus of the National Institutes of Health. This conference intended to capture the recent major advances in this field and to look at the future directions of the program.

The Molecular Biology and Genetics Program has indeed come a long way since 1988. NIDA not only has persuaded an unprecedented number of outstanding scientists to join the extramural scientific community engaging in drug abuse research, but recently celebrated the molecular cloning of the opioid receptors that had eluded numerous dedicated drug abuse researchers for more than 15 years. With the completion of the tedious task of gene cloning of all the pertinent receptors, transporters, channels, and regulatory proteins, a new era has begun. Using these powerful tools, researchers can now employ approaches previously unimaginable and concentrate their efforts and resources on elucidating the basic mechanism of each abused substance as well as the molecular and cellular mechanisms underlying tolerance, dependence, and withdrawal to generate better strategies for effective treatment, education, and prevention.

This conference was organized into three technical sessions: transgenic/ knockout animal models and other genetic approaches, studies on three families of transporters, and a whole session devoted to the rapidly progressing field of opioid receptors. Thirteen accomplished scientists presented their cutting-edge research, which

included many of the major breakthroughs in the field. Due to the ceiling on the number of speakers to invite for the conference, only one example from each category or superfamily could be included rather than encompassing all the recent accomplishments. The proceedings of this conference are presented in the following chapters of this monograph. By the time this monograph is published, virtually all the speakers at this conference will be members of the NIDA extramural scientific community.

Under the able leadership of Dr. James Patrick, significant consensus among the speakers has also been reached during the discussion session of this conference. Some of the highlights are: (1) refining tools for producing transgenic/knockout animals, especially conditional or tissue-specific knockouts; (2) developing effective expression systems for drug receptors; (3) expanding research on the polymorphism and diversity of drug receptors, transporters, and other relevant proteins; (4) developing clinically useful, safe opioid drugs employing the knowledge obtained from recent opioid receptor advances; and (5) using proper animal models to systematically screen nongenetic factors for clues leading to treatment of addiction.

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