

drugs, causes and consequences of drug use, and improving prevention and treatment. Others are involved in NIDA's demonstration projects which involve service delivery and evaluation by psychologists. Unfortunately, the demand for psychologists with research skills far exceeds the available pool. In addition to these opportunities in research and research administration, NIDA is making a major effort to build and maintain an alliance between researchers and practitioners. In January 1991, the Institute held a major national conference in Washington, DC to examine and share new methodologies for prevention and treatment programs. The conference was part of a major technology transfer initiative begun in 1990 to ensure that new technologies are adapted by practitioners in the field. Workshop sessions included such areas as risk and protective factors for adolescent drug use, diagnosis and treatment of drug-dependent women, pharmacological advances in drug abuse treatment, and drug abuse funding and abuse treatment, and drug abuse funding and treatment resources. The field of substance abuse is one in which the interplay between the researcher and clinician is often highly collaborative and mutually rewarding. NIDA distributes much of this work in its highly regarded series of Monographs, of which almost 100 have been published since 1975. These are but a few of the areas in which psychologists are making contributions at NIDA and NIDA-supported research and in which significant opportunities remain.

**BEHAVIORAL PHARMACOLOGY: RESEARCH WITH HUMAN SUBJECTS.** Marian W. Fischman. The Johns Hopkins University School of Medicine, Baltimore, MD.

Laboratory research with psychotropic drugs has provided both the foundation for understanding the behavioral mechanisms of actions of these substances, as well as procedures for evaluating behavioral and pharmacological interventions for treating their excessive use. Such laboratory studies are remarkably diverse, ranging from neurotransmitter systems to multidisciplinary studies that combine physiology and behavior. In addition, laboratory studies can be accomplished with multiple species, providing cross-species generalization of the results collected. Although evaluation of drugs of abuse and treatment of substance abuse disorders has been carried out for more than 50 years, most of the laboratory work has been done with nonhuman subjects. The major exception to this has been in the area of evaluation of subjective effects in humans. A shift in direction began in the 1970's, when investigators began to adapt previously used behavioral procedures and combine these measures with more traditional subjective effects evaluations. Such an approach has provided the structure for behavioral pharmacology research with humans. Laboratory research on substances of abuse with humans is most frequently carried out within an academic environment, often including a medical school/hospital setting. Because medical monitoring can be a part of the design, collaboration with physician-researchers is generally appropriate. This presentation will describe a multiple laboratory approach to carrying out substance abuse research, including both inpatient and outpatient designs, varying from a highly structured residential laboratory in which subjects are monitored 24 hours daily, to experimental designs in which subjects are briefly tested as outpatients at daily or weekly intervals. Human research subjects, under some conditions, are given the opportunity to self-administer specific substances of abuse while under other conditions these substances are administered by the experimenter. A range of measures, including performance and learning, are all repeatedly made, and correlated with blood levels of the drug. This

research is under the direction of psychologists, trained in the experimental analysis of behavior using nonhumans, who are extending this laboratory method to testing humans. The research provides data on the antecedents and consequences of substance abuse, necessary in designing and implementing both treatment and prevention strategies.

**THE ROLE OF PSYCHOLOGISTS IN VA SUBSTANCE ABUSE TREATMENT AND RESEARCH.** A. Thomas McLellan and Arthur I. Alterman. Veterans Affairs Medical Center, Philadelphia, PA.

This presentation examines some representative roles taken by psychologists in the VA and discusses these and other future opportunities for psychologists. The Department of Veterans Affairs (VA) is the largest health care organization in the world and offers quantitatively more treatment, provided in more varieties and more settings, than any other organization in the United States. Historically, psychologists have had leading roles in all aspects of substance abuse treatment within the VA and these often translated into major contributions to treatment and research throughout the field. Three types of contribution will be discussed with representative examples provided in each. First, psychologists within the VA have been developers and providers of innovative treatments within the field of substance abuse (e.g., "relapse prevention," "extinction of conditioned responses," "AIDS awareness and education," etc.) and these have been used extensively throughout other public and private settings. Second, VA psychologists have developed instruments and methods for evaluating the efficacy and costs of substance abuse treatments (e.g., ASI, MAST, RAB, etc., plus a series of representative evaluation studies). Finally, the VA has provided psychologists with opportunities to direct and administer not just treatment programs but treatment policies for substance abusers throughout the system (e.g., director of substance abuse services within the VA, several "Service Chiefs," etc.). These opportunities have been used to great advantage by psychologists in the past and this has, in turn, offered an even greater variety of opportunities in administration, direct care and treatment research for psychologists now working in this area. The presentation will conclude with information regarding the methods for applying to become clinically certified to work within the VA and the procedures associated with applying for research grants within the VA.

**TREATMENT RESEARCH IN DRUG ABUSE.** James L. Sorensen and Sharon Hall. University of California, San Francisco, CA.

Psychologists have long recognized the value of research with implications for the human services; however, they have not typically availed themselves of opportunities to conduct applied research in the addictions. The decade of the 1990's presents unparalleled opportunities for psychologists to conduct "treatment research"—evaluating the efficacy of substance abuse treatment approaches. The eruption of cocaine abuse in the 1980's, together with the role of intravenous drug use in the AIDS epidemic, have made drug problems a central public health issue. Financial support for addressing these problems is now available from federal, state and local sources. There is an urgent need for behavioral scientists to be involved. This presentation focuses on two roles for psychologists in the public sector: leading treatment programs and organizing treatment research. The first author leads a substance abuse treatment center

in a municipal hospital. The principles of administering such programs are discussed, with illustrations of how to build a support base by applying research results to clinical programs, seeking funds from nonlocal sources, and addressing the needs of the organization in which it is located. The authors are co-directors of a Treatment Research Unit, one of eight units funded by the National Institute on Drug Abuse to develop and evaluate innovative drug treatments to slow the spread of AIDS. The San Francisco TRU is presented, including the leadership role of psychologists in fostering collaboration among professional disciplines, the scope of pharmacological and behavioral treatment trials, and preliminary research results. The roles described here (providing administrative and research leadership in substance abuse treatment) fit well with the discipline of psychology, but there is a need for more emphasis on substance abuse, applied research, and administrative leadership skills in training programs for psychologists. (Supported by Grant No. 1R18DA-06097 from the National Institute on Drug Abuse.)

**OPPORTUNITIES FOR CLINICIANS IN SUBSTANCE ABUSE.** Joan Ellen Zweben. The East Bay Community Recovery Project, Oakland, CA.

Many exciting possibilities exist for clinical psychologists with substance abuse expertise. Manifestations of alcohol and drug use readily imitate every other entity seen in a clinical practice, allowing both use and abuse to influence treatment in ways which often remain unrecognized. Failure to assess and appropriately treat or refer places the psychologist in an increasingly untenable position, especially as sophistication about drug and alcohol problems increases among other professionals and the lay public. The clinician with knowledge of addictive disorders is a valuable asset to treatment teams in mental health settings, crisis services, and other specialty settings such as eating disorders programs. Enormous opportunities for undergraduate, graduate, and postgraduate teaching have developed as clinicians in other fields become aware of the importance of this problem. An increasing number of states mandating substance abuse training as a condition of licensure heightens the demand for clinical supervisors with updated skills in this area. Within the field of substance abuse itself, increasing awareness of the comorbidity of mental disorders with alcohol and other drug abuse has stimulated a desire to upgrade the skills of existing practitioners. Historically, many front line counselors come to the field via the route of their own recovery, carrying a mistrust of the professional community. With the growing recognition of the magnitude of the problem of coexisting disorders, the sophisticated assessment and treatment skills of psychologists is increasingly appreciated. Working with victims of childhood physical and sexual abuse, AIDS dementia and other issues, and the need to document the effectiveness of treatment interventions are but a few examples of places psychologists in substance abuse have made contributions.

#### **PAPER SESSION**

*Recent Findings in the Neurobiology of Drug Abuse*

Chair: *Steven I. Dworkin*, Bowman Gray School of Medicine, Wake Forest University, Winston-Salem, NC.

**REINFORCING AND ANXIOGENIC PROPERTIES OF SELF-ADMINISTERED COCAINE.** Aaron Ettenberg. University of California, Santa Barbara, CA.

It has long been known that the administration of dopaminer-

gic antagonist drugs can interfere with the initiation and maintenance of operant behaviors. Qualitative and quantitative analyses of such results have led many to suggest a role for central dopamine (DA) pathways in neurobiology of positive reinforcement. To further investigate this hypothesis, our laboratory has developed a series of behavioral tests that provide a means of examining the putative reward-attenuating actions of dopamine antagonists in animals that are no longer drugged at the time of testing. Data derived from these tests are not, therefore, confounded by the motoric and sedative side effects of neuroleptic treatments. Our results thus far provide support for the notion of a dopaminergic role in the reinforcing action of food, water and amphetamine. In experiments with IV cocaine reward, an unexpected anxiogenic action of the drug was identified. This took the form of a diazepam-reversible "conflict" behavior for entering a goal box associated with prior cocaine administration. While the cocaine appears to maintain its reinforcing properties with repeated exposure (as measured by traditional conditioned place preference) the putative "anxiogenic" action appears to increase in magnitude over trials/days. This work has implications for understanding the concurrent positive (reinforcing) and negative (anxiogenic) consequences that together determine the nature and extent of cocaine self-administration.

**MDMA AND THE PSYCHOPHARMACOLOGY OF PRESYNAPTIC SEROTONIN RELEASERS.** Mark A. Geyer. University of California, San Diego, La Jolla, CA.

Methylenedioxyamphetamine (MDMA or Ecstasy) is an amphetamine derivative with novel effects that are distinguishable from hallucinogens or amphetamine. In rats, studies using a behavioral pattern monitor to record sequences of locomotion and investigation demonstrate that MDMA congeners increase locomotion and decrease investigation. The hyperactivity is blocked selectively by the serotonin uptake inhibitor fluoxetine or the serotonin synthesis inhibitor PCPA, but not by a dopamine synthesis inhibitor. These drugs also disrupt the spatial patterning of locomotion in a manner that is distinguishable from amphetamine. Hence, these drugs increase activity by releasing serotonin.

**NEURAL MEDIATORS OF THE DISCRIMINATIVE STIMULUS EFFECTS OF COCAINE.** Kathryn A. Cunningham and Patrick M. Callahan. The University of Texas Medical Branch at Galveston, Galveston, TX.

The subjective aspects of the reinforcing effects of cocaine can be inferred from the study of its interoceptive stimulus properties in animals using drug discrimination procedures; the neural mechanisms underlying this *in vivo* effect of cocaine are accessible to pharmacological analysis. In this behavioral assay, cocaine-induced internal states become biologically meaningful and function as interoceptive stimuli ("cues") which signal the availability of reinforcement. These subjective "cues" associated with cocaine probably play an important role in establishing and maintaining cocaine dependence. Although cocaine is a local anesthetic and inhibits reuptake mechanisms for dopamine (DA), serotonin (5-HT) and norepinephrine (NE), previous research suggests that DA is the primary neurotransmitter involved in the interoceptive cocaine state. To gain a full appreciation of the specific brain mechanisms underlying the stimulus effects of cocaine, the present research was designed to investigate the role of reuptake inhibition and specific DA receptor subtypes (D<sub>1</sub> and D<sub>2</sub>) in mediating the cocaine cue. Although reuptake inhibitors