

scans. However, it is not clear whether or how this task affects the subjects' metabolic or mood responses to the drug. Finally, both the mood-altering and the metabolic effects may depend critically on the dose of drug tested and on the characteristics of the subjects. It is important that a wide range of doses be tested, and that subject characteristics be examined carefully. These issues will be discussed with respect to selected data from our laboratory.

RECEPTOR LIGAND STUDIES USING PET. Nora Volkow, David Schlyer, Joanna Fowler, Gene Wong, Robert MacGregor and Alfred Wolf. Brookhaven National Laboratory, Upton, NY.

One of the unique advantages which PET has over other types of imaging modalities is the ability to assess receptor dynamics *in vivo*. By using specific radiolabelled compounds, it is possible to quantitate the availability of particular receptor systems and to define the interactions with other receptor systems. This ability makes PET extremely valuable in studying the mode of action in drugs of abuse. The effect on the receptor systems after chronic use of cocaine and other drugs of abuse can be evaluated and the effects of detoxification on the receptor systems over a period of time can also be determined. In the current studies, the effect of cocaine abuse and detoxification on the dopamine receptor system in terms of the presynaptic dopamine transporter, the postsynaptic dopamine D-2 receptor and the glucose metabolism of the regions involved with the dopamine receptors has been assessed. The studies were carried out in patients soon after detoxification and again after several months to determine the changes in the receptor systems over the period of detoxification. It has been found that the receptor systems and the associated glucose metabolism undergo variations which may be linked to the psychiatric symptoms. These observations may lead to a better understanding of the processes involved at the receptor level in detoxification. An understanding of the mechanism of detoxification could provide insights into more effective therapies.

TOPOGRAPHIC MAPPING AND SOURCE LOCALIZATION OF EEG AND ERP DIPOLES. Scott E. Lukas, Elena Kouri, Michelle Fortin and Leslie Amass. McLean Hospital/Harvard Medical School, Belmont, MA.

Drug-induced intoxication and changes in mood states are associated with episodic alterations in neurophysiological activity that are most easily quantified using topographic mapping techniques. Such techniques permit the simultaneous viewing of electrical activity from all electrode sites on the scalp. Previous studies have shown that ethanol-, marijuana-, morphine-, amphetamine-, pentobarbital- and cocaine-induced states of euphoria are associated with increases in EEG alpha activity, predominantly over occipital and parietal areas. Auditory P300 evoked response potentials (ERPs) provide information about an individual's ability to selectively attend to novel stimuli. Source localization of alpha activity or ERPs can provide new and important information about the similarities and differences among the neurophysiological activities produced by these various drugs. Using mathematical algorithms, the origin of the P300 ERP was calculated to be in the hippocampal formation while the alpha rhythm appeared to originate in the thalamus. Drug-induced states of intoxication disrupt the apparent source of these waves and parallel subjects' inability to selectively attend to novel stimuli. When combined with magnetic resonance imaging techniques, dipole localization can help locate a specific neurophysi-

ological response with a time resolution of only a few milliseconds. (Supported by grants DA03994, DA04059 and DA00115 from the National Institute on Drug Abuse.)

FUNCTIONAL MAGNETIC RESONANCE IMAGING OF COCAINE-TREATED RHESUS MONKEYS. Thomas Aigner and Joseph Frank. NIMH, Bethesda, MD.

Rapid magnetic resonance imaging (MRI) using paramagnetic contrast agents has been shown to be a reliable method for detecting small changes in cerebral circulation. Chronic abuse of cocaine may lead to changes in blood flow as well as in other neuropathological abnormalities, such as subarachnoid hemorrhage and demyelination of white matter. To examine the feasibility of using MRI to document these changes in experimental animals, we compared two monkeys with an extensive history of cocaine self-administration with two normal controls. Scanning was performed in a GE Signa 1.5 T scanner with a 5" receive-only surface coil. In procedure I, we used a rapid (MR) scanning procedure in combination with dysprosium-DTPA-BMA to examine possible differences in cerebral perfusion in the two groups. This was done during two different scanning sessions, once before and once after a bolus injection of 0.3 mg/kg of cocaine. In procedure II, we used standard MRI techniques to examine grey-white matter differences using scanning parameters that provided a level of detail not previously possible with earlier techniques.

PAPER SESSION

ADHD and Methylphenidate: Dosage Effects on Classroom Functioning and Internalizing Symptomatology

Chair: *Mark D. Rapport*, University of Hawaii, Honolulu, HI.

ATTENTION DEFICIT DISORDER: METHYLPHENIDATE DOSE-RESPONSE EFFECTS ON CLASSROOM BEHAVIOR. Mark D. Rapport. University of Hawaii, Honolulu, HI.

This multi-year investigation was designed to examine the effects of methylphenidate (MPH) at four doses (5, 10, 15, 20 mg) on the attention, academic efficiency, and teacher-rated behavior of 75 children with Attention Deficit Disorder/Hyperactivity (using direct observations), and to compare these effects to functioning under baseline and placebo conditions. MPH significantly improved all areas of classroom functioning in a linear, dose-related fashion. Intermediate and individual level analyses, however, indicated a wide range of optimal response across subjects. Implications for the construction of individual dose-response potency profiles and the ability to predict behavioral response are discussed.

PSYCHOSTIMULANT RESPONSE OF CHILDREN WITH ADHD: INTERACTION WITH INTERNALIZING SYMPTOMS. Russell A. Barkley and George J. DuPaul. University of Massachusetts Medical Center, Worcester, MA.

This investigation was designed to assess whether methylphenidate (MPH) effects on ADHD symptoms differ between children who also display internalizing disturbance relative to those who do not. Significant interactions between MPH Dose and Internalizing Groups were found for only 5 of 28 assessment measures collected across home, school, and clinic settings. The three Internalizing groups evinced similar significant improvements in behavior associated with the two highest MPH