smokers, and smokers who smoked before a discriminative force-time emission task, was measured in terms of peak force, response duration, and response latency. Abstinent smokers exhibited significantly greater variability in both force emission and response latency compared to either nonsmokers or smokers who smoked. Abstinent smokers' greater response variability may reflect withdrawal from nicotine and a decreased ability to regulate force emission and time estimation.

PHYSIOLOGICAL AND VERBAL MANIFESTATIONS OF SMOKING URGES PRODUCED THROUGH IMAGERY. Stephen T. Tiffany, Denise M. Hakenewerth, David J. Drobes and Peg M. Maude-Griffin. Purdue University, West Lafayette, IN.

The results of two studies will be reviewed showing that smoking urges can be elicited in the laboratory through a procedure in which smokers are instructed to vividly imagine scripts presented by audiotape. The data indicate that the magnitude of self-reported urges and cravings produced through imagery can be manipulated by the urge and affective content of the imagery scripts. Furthermore, urge-eliciting scripts also produce somatovisceral changes during imagery trials, e.g., increases in heart rate and decreases in skin conductance habituation. The potential applications of the imagery paradigm in the study of the structure and function of drug urges will be discussed.

NICOTINE ALTERS INSULIN LEVELS IN RAT HYPOTHALAMI. Margarita Raygada, Stephanie M. Nespor and Neil E. Grunberg. Uniformed Services University of the Health Sciences, Bethesda, MD.

Effects of nicotine administration and cessation on insulin levels in hypothalami of rats were examined. Subjects were 63 rats that received 12, 8, 6, 4, or 0 mg nicotine/kg body weight/day by osmotic minipumps for 14 days. Hypothalami were assayed for insulin at the end of the drug administration period or 7 days after drug cessation. Nicotine administration was related to hypothalamic insulin values by a U-shaped function. Cessation of nicotine was accompanied by a dose-related decrease in hypothalamic insulin levels. These changes in hypothalamic insulin may underlie actions of nicotine on energy intake and expenditure.

NICOTINE AND BODY WEIGHT: EXAMINING THE ROLE OF ENDOGENOUS OPIOIDS. Elizabeth C. Sibolboro and Neil E. Grunberg. Uniformed Services University of the Health Sciences, Bethesda, MD.

To determine whether effects of nicotine on body weight and food consumption are mediated by opioid mechanisms, rats received nicotine, naltrexone, nicotine and naltrexone, or saline. Nicotine or naltrexone alone had similar suppressive effects on body weight and sweet food consumption. Together, these drugs suppressed body weight additively, but suppressed food consumption similar to each drug alone. After drug cessation, subjects gained more weight than controls. These results indicate that effects of nicotine on body weight and food consumption are not mediated by the endogenous opioid peptides. Effects of nicotine and naltrexone on body weight involve energy intake and expenditure during, and energy intake after drug administration.

THE EFFECT OF TRIAZOLAM ON COGNITIVE PERFORMANCE. Rosemarie L. Duncan. Walter Reed Army Institute of Research, Washington, DC; Lisa M. Simon. National Institute of Drug Abuse, Rockville, MD; and Vincent M. O'Donnell, Robert K. Winegar, Debra S. Friedman and Gregory L. Belenky. Walter Reed Army Institute of Research, Washington, DC.

The objective of this study was to determine the effects of a low dose of triazolam on cognitive performance on a variety of tasks across time. Subjects (151 males) were randomly administered either a 0.125 mg dose of triazolam or placebo and began a series of cognitive performance tasks forty minutes postdrug administration. Mean data were statistically evaluated using analyses of variance. Significance level was set at $p<0.05$. A treatment effect was found for a high memory load letter search task. The triazolam group attempted fewer items, scored fewer hits, and recorded fewer correct rejects than did the placebo group. To our knowledge, this study was the first to find cognitive impairment with the 0.125 mg dose of triazolam. These results suggest that the effects of the 0.125 mg dose on performance are strongest within the first hour postdrug and that in normal subjects, this dose of triazolam will only impair performance when the task taxes the ability of the subject.

INDIVIDUAL DIFFERENCES IN THE EFFECTS OF TRIAZOLAM ON COGNITIVE PERFORMANCE. Debra S. Friedman. Walter Reed Army Institute of Research, Washington, DC; Lisa M. Simon. National Institute of Drug Abuse, Rockville, MD; and Vincent M. O'Donnell, Rosemarie L. Duncan, Robert K. Winegar and Gregory L. Belenky. Walter Reed Army Institute of Research, Washington, DC.

The purpose of this study was to determine if the cognitive effects of triazolam, a benzodiazepine hypnotic, are dependent on the baseline personality of the subject. One hundred fifty-one subjects were given the Eysenck and Freiburg Personality Inventories and, the State-Trait Anxiety Inventory, in order to determine personality type. Each subject was then administered either placebo or a 0.125 mg dose of triazolam. The subjects performed a series of cognitive tasks during periodic testing from 40 minutes to 5 hours postdrug administration. On each of the personality dimensions, subjects were divided into high and low trait groups using a median split of their scores. Two-way analyses of variance were conducted to determine if interaction effects were present. Many of the cognitive tests were differentially affected by treatment (triazolam vs. placebo) depending on subject personality type. Portions of the Differential Aptitude Tests (DAT), the Symbol Digit Modalities Test, and a letter search task revealed a significant ($p<0.05$) drug by personality interaction. Dimensions of personality interacting with drug included anxiety, sociability, neuroticism, impulsivity, and stability. This is the first study to demonstrate interactive effects of triazolam and personality on cognitive performance.

THE EFFECTS OF TRIAZOLAM (HALCION) ON HUMAN MULTI-OPERANT RESPONDING. Ralph Spiga, Don R. Cherek, Richard A. Meisch and John D. Roache. University of Texas Health Science Center at Houston, Houston, TX.

The acute effects of triazolam on multi-operant responding were studied under controlled laboratory conditions. Three response options were provided: 1) lever A responding maintained by the presentation of points exchangeable for money, 2) lever B responding which ostensibly subtracted points from another person, i.e., aggressive responding, and 3) lever C responding which protected the subject's counter from point subtractions for some period of time, i.e., escape responding. Aggressive and escape

responding were engendered by point subtractions attributed to another person, and maintained by initiation of intervals free of point subtractions. Triazolam produced dose-dependent decreases in point-maintained responding, while very different dose-response functions were observed for aggressive and escape responding.

CHOLINESTERASE INHIBITOR MSF ENHANCES ONE-TRIAL REWARD LEARNING IN AGED RATS. David H. Malin, Patricia J. Toups, Linda D. Osgood, David E. Fowler, K'Ann A. Warren and Stephanie J. Crouse. University of Houston—Clear Lake, Houston, TX.

Eighteen-month-old rats show significantly less retention than 2–3-month-old rats on a one-trial food-rewarded task in a five-arm sunburst maze. Methanesulfonyl flouride (MSF) is a selective CNS acetylcholinesterase inhibitor. Ten 18-month-old rats injected IP with 0.5 mg/kg MSF before the single training trial showed significantly better retention 24 hours later in terms of speed and errors than eleven 18-month-old rats receiving injection vehicle. Pretreatment with 0.5 mg/kg MSF failed to increase retention in 2–3-month-old rats. MSF administered prior to the retention trial was ineffective, suggesting that it may effect memory formation rather than memory retrieval. (Supported by Moody Foundation and UH-CL Fac. Res. Fund.)

MONOAMINE OXIDASE INHIBITORS IMPROVE PERFORMANCE IN ANIMAL MODELS OF HYPERACTIVITY. Elizabeth A. Reyes, M. Jack Lee, Allen E. Butt and Gordon K. Hodge. University of New Mexico, Albuquerque, NM.

Attention deficit hyperactivity disorder (ADHD) is characterized by impulsivity and attention deficits. The relationship between dopamine (DA) deficiency and ADHD symptoms was examined and the therapeutic efficacy of *d*-amphetamine, pargyline, and clorgyline was assessed. To delineate the extent of DA involvement, 6-hydroxydopamine was administered to 5-day-old rats. A modified differential reinforcement of low rate responding light discrimination task was used to measure impulsivity, defined as commission errors. Rats treated with 6-hydroxydopamine demonstrated impulsive behavior, which was attenuated by clorgyline or pargyline; amphetamine treatment was less efficacious. (Supported, in part, by NIH grant RR08139; UNM RAC grant 88-45; and APA Neuroscience Fellowship to E. A. Reyes.)

SCOPOLAMINE ANTAGONIZES HALOPERIDOL'S EFFECTS ON RATE AND FORCE OF RESPONSE. Stephen C. Fowler and Michael A. Kirkpatrick. University of Mississippi, University, MS.

Scopolamine hydrochloride (0.1 mg/kg), a centrally-acting anticholinergic, substantially reversed the rate decrementing and peak force incrementing effects of the antipsychotic drug haloperidol (0.08 mg/kg) in laboratory rats. The peripherally active methyl form of scopolamine did not antagonize haloperidol's effects. Not only do these data support the idea that neuroleptic-induced decrements in rats' behavior are similar to extrapyramidal side effects in man, but the data also suggest that the neuroleptic-related elevations in peak force of rats' operant responses are manifestations of the same process whereby neuroleptics decrease response rate.

BEHAVIORAL EFFECTS OF TWO D_2-SELECTIVE DOPAMINE ANTAGONISTS, RACLOPRIDE AND SPIPERONE. Leonard L. Howell, DeLoris M. Wenzel and Larry D. Byrd. Yerkes Regional Primate Research Center, Emory University, Atlanta, GA.

Raclopride (0.001–0.03 mg/kg) and spiperone (0.001–0.01 mg/kg) were administered intramuscularly (IM) and intravenously (IV) to squirrel monkeys (*Saimiri sciureus*) trained to lever-press under a fixed-interval (FI) 300-sec stimulus-shock termination schedule. A session consisted of 10 or 13 consecutive FI components, each followed by a 60-sec timeout. Drugs were administered IM 5 min presession, and IV either 5 sec presession or during sequential periods of FI responding (cumulative-dosing). Both drugs produced dose-dependent decreases in response rates, and 0.01 mg/kg of either completely suppressed responding. Although raclopride and spiperone were equipotent, they differed markedly in onset and duration of action. Peak effects occurred 5–10 min after raclopride administration, and partial recovery of responding was seen within 30–40 min. Test sessions one day after raclopride administration were typical of control performance. In contrast, peak effects occurred 25–30 min after spiperone administration, and response rates were markedly suppressed up to 48 hr. Complete recovery of rate and pattern of responding occurred 2 days after an intermediate dose (0.003 mg/kg) and 3 days after the highest dose (0.01 mg/kg) of spiperone. Route of administration did not affect potency or time course of action of either drug. (Supported, in part, by USPHS Grants DA-01161 and RR-00165 to the Yerkes Research Center from the Division of Research Resources, NIH.)

EFFECTS OF *d*-AMPHETAMINE ON CHOICE OF SOCIAL VS. MONETARY REINFORCEMENT. Stephen T. Higgins, John R. Hughes, Warren K. Bickel and Mimi Benedict. University of Vermont, Burlington, VT.

Two mutually exclusive options (socializing versus obtaining monetary reinforcement) were concurrently available to eight volunteers during 60-min experimental sessions under controlled laboratory conditions. Using a discrete-trial choice arrangement, subjects chose every three minutes between an option in which they could converse with another same-sex volunteer and an option in which money was earned by providing speech monologues. *d*-Amphetamine (12.5 and 25 mg/70 kg) significantly increased the percent of trials subjects chose the social over the monetary option, and produced a nonsignificant increasing trend in total seconds of social conversation. Additionally, *d*-amphetamine significantly increased subject ratings of effects indicative of greater sociability such as friendliness, elation and energetic. The present results provide further evidence suggesting that *d*-amphetamine may increase the relative reinforcing effects of social interaction.

TRAINING DOSE AS A DETERMINANT OF MORPHINE'S DISCRIMINATIVE STIMULUS PROPERTIES. Sondra R. Mattox, Mitchell J. Picker and Linda A. Dykstra. University of North Carolina at Chapel Hill, Chapel Hill, NC.

The purpose of this study was to evaluate the influence of training dose on morphine's discriminative stimulus properties. Rats were trained to discriminate either 3.0 or 10 mg/kg of morphine sulfate from saline. After a stable discrimination was established, substitution tests were conducted in both groups with the mu opioid agonists, morphine, fentanyl, and *l*-methadone and the kappa opioid agonists, U50,488, bremazocine, ethylketocy-