

EVALUATION OF THE DISCRIMINATIVE STIMULUS EFFECTS OF TWO MIDAZOLAM DOSES. Christine A. Sannerud* and Nancy A. Ator.† *NIDA-Addiction Research Center, Baltimore, MD, †Johns Hopkins University, Baltimore, MD.

In drug discrimination studies, training drug dose can be an important variable in generalization profiles obtained. Rats were trained to discriminate two doses of the benzodiazepine (BZ)-receptor agonist midazolam (MDZ) (0.32 mg/kg and 3.2 mg/kg MDZ, SC) from no-drug (ND), in daily sessions consisting of multiple 20 min trials. MDZ occasioned dose-dependent increases in 0.32 and 3.2 MDZ lever responding. Pentobarbital dose-dependently occasioned only 0.32 MDZ lever responding. The muscle relaxant methocarbamol and drugs that are not sedatives or anxiolytics (morphine, caffeine, *d*-amphetamine, cocaine) did not substitute fully for either MDZ training dose. These data suggest that the DS effects of 3.2 MDZ are fully BZ-like and not a function of general sedative or muscle-relaxant effects. The DS effects of the 0.32 mg/kg MDZ training dose appeared less specific than those of 3.2 mg/kg MDZ and showed a generalization profile that differs from that seen in animals trained to discriminate midazolam in two-lever tasks. The generalization profiles suggest qualitative differences between the training stimuli that may not reflect simple quantitative dose magnitude differences.

STRESS, PREDICTABILITY, AND FENTANYL SELF-ADMINISTRATION IN MALE AND FEMALE RATS. Laura C. Klein, Eric J. Popke, and Neil E. Grunberg. Uniformed Services University of the Health Sciences, Bethesda, MD.

Effects of mild predictable and unpredictable foot shock stress on oral opioid consumption were examined in male and female rats. Fentanyl (50 µg/ml) self-administration (SA) was initiated in operant chambers under a partial water deprivation schedule. Animals were tested for lever pressing for fentanyl under a progressive-ratio (PR; dwell = 2) schedule of reinforcement for 30 min/day under stress (predictable or unpredictable) and no-stress control conditions. Animals under predictable stress consumed more fentanyl than did animals under unpredictable stress. Female rats self-administered more fentanyl than did male rats. Potential clinical relevance will be discussed.

NICOTINE, STRESS, AND ACOUSTIC STARTLE RESPONSES OF RATS. E. Jon Popke,* Jane B. Acri,† and Neil E. Grunberg.* *Uniformed Services University of Health Sciences, Bethesda, MD, †NIDA Addiction Research Center, Baltimore, MD.

Nicotine alters the acoustic startle response and prepulse inhibition in male and female rats. These responses are believed to index attention and sensory gating. The present experiment examined the effects of nicotine and stress on ASR and PPI in male and female rats. Nicotine had an inverted U-shaped dose-effect on ASR and PPI for both males and females with greater effects among females. Stress attenuated these effects among females but not among males. These findings are consistent with reports of greater sensitivity to nico-

tine among females. Implications of these findings to explain why people smoke under stress will be discussed.

PHENOBARBITAL THRESHOLD DOSAGE PRODUCING STATE DEPENDENT LEARNING AND DRUG DISCRIMINATIONS. Donald A. Overton, Gregg D. Standwood, Sreenivasa R. Pragada, Haoli Chai, and M. Kathleen Gordon. Temple University, Philadelphia, PA.

Two experiments used rats to determine the lowest doses of phenobarbital that could control a drug discrimination (DD) and produce state dependent learning (SDL), respectively. DD threshold was determined by drug vs. no drug (D vs. N) DD training in a 2-lever operant task using a dosage titration paradigm which changed dosage every 18 sessions. In the SDL study, rats were (1) trained in one drug state (D or N) to press one lever, (2) tested for SDL, (3) trained in the other drug state to press the 2nd lever, (4) tested for SDL, (5) reversal trained to eliminate both responses. This was repeated with several dosages. Mean DD threshold was 2.5 mg/kg. SDL was partially asymmetrical and threshold ranged from 2.7 to 11.2 mg/kg depending on the immediately preceding training conditions. The SDL thresholds after drug training (2.7 and 3.1) were approximately equal to the threshold for discriminative control. This has several theoretical consequences.

BUPRENORPHINE AND NONDRUG REINFORCERS: COMBINED EFFECTS ON DRUG SELF-ADMINISTRATION. Joyce M. Rawleigh, Joshua S. Rodefer, Sandra D. Comer, Sylvie T. Lac, Laura K. Curtis, Jeffrey J. Hanson and Marilyn E. Carroll. University of Minnesota, Minneapolis, MN.

Male rats trained to self-administer 0.4 mg/kg IV cocaine were given 0.1 mg/kg buprenorphine injections on three consecutive days, with either glucose and saccharin solution (G + S) or water concurrently available. Combined G + S and buprenorphine treatment suppressed responding for cocaine to a greater extent than when water was available. Male monkeys trained to respond for orally delivered 0.25 mg/ml phenylcyclidine (PCP), 0.03 or 0.3 wt/vol saccharin (SACC) were given intramuscular injections of 0.005 mg/kg buprenorphine on 5 consecutive days. Buprenorphine lowered responding for PCP and SACC similarly, with a greater percentage of reduction at higher FR's.

EFFECTS OF INCOME ON A CHOICE BETWEEN ETHANOL AND SACCHARIN. Joshua S. Rodefer, Joyce M. Rawleigh and Marilyn E. Carroll. University of Minnesota, Minneapolis, MN.

The effects of income (duration of access—20, 60 and 180 minutes) on the choice between orally delivered ethanol and saccharin were investigated. In addition, the demand for ethanol (consumption × price) was evaluated by increasing the ethanol FR (price) from 4 to 8, 16, 32, 64, and 128 under all three income conditions. Eight rhesus monkeys self-administered ETOH (FR 4-128) and either water or saccharin (FR 32) under concurrent schedules in the three income conditions (20, 60 and 180 min sessions). The concurrent availability of saccharin as an alternative reinforcer always shifted the demand curve for ETOH downward, indicating a decreased

intensity of demand for ETOH. Consistent with prior research, at high income levels, saccharin was taken in much greater amounts than ETOH, while at low income levels ETOH was always preferred over saccharin. These results suggest that alternative nondrug reinforcers and income independently alter the demand for a drug.

COCAINE ACQUISITION IN RATS: EFFECT OF FEEDING CONDITIONS AND PALATIBILITY. Sylvie T. Lac and Marilyn E. Carroll. University of Minnesota, Minneapolis, MN.

The influence of food deprivation and food palatability on the acquisition of intravenous cocaine (0.2 mg/kg) self-administration was assessed in groups of male Wistar rats. An autoshaping method was used in which 6 h of automatically delivered infusions (10 infusions/hr) were followed by 6 h of self-administration under a fixed-ratio 1 schedule. The criterion for acquisition was an average of 100 infusions per day over 5 consecutive days during the self-administration period. Three groups of rats received daily rations of 10 g, 20 g or ad lib food. Levels of food deprivation were positively correlated with rate of cocaine acquisition. The 10 g group met the acquisition criterion in a mean of 6 days, while the ad lib group met the acquisition criterion in an average of 16.1 days. Three additional groups were tested with the same food conditions, but saccharin (0.2% wt/wt) was added to enhance palatability without changing caloric content. Initial results indicate that deprivation and palatability independently alter patterns of acquisition.

STRESS AND RELAXATION INCREASE THE REINFORCEMENT VALUE OF NICOTINE. Yoli G. Quevedo and Frank L. Collins, Jr. Oklahoma State University, Stillwater, OK.

Forty-five dependent smokers were randomly assigned to one of three conditions: Mental Math, Relaxation, and a Neutral Control. Subjects were required to earn either cigarette puffs or money using a concurrent schedule paradigm. The costs associated with puffs increased at a higher rate than the cost associated with money. Subjects were observed for 2 hours wherein they were sequentially exposed to the experimental manipulation (Stress, Relaxation, Neutral Control) and the concurrent schedule. Results indicated that both Stress and Relaxation increased the reinforcement value of nicotine compared to the Control Condition. Thus, activation of an emotional state (either stress or relaxation) may increase the reinforcement value of nicotine.

MARIJUANA SMOKING: EFFECTS OF PUFF SPACING. Mark K. Greenwald and Maxine L. Stitzer. Johns Hopkins University, Baltimore, MD.

This study demonstrates that effects of a uniform marijuana dose are related to speed of puffing. Six subjects smoked 10 puffs from marijuana or placebo cigarettes (3.55%, 0.0% Δ^9 -THC; double-blind), one puff per 30, 60 or 180 s, in six sessions. Plasma THC, CO and HR boost, subjective effects, and psychomotor performance were measured before, during and after smoking. Effects (plasma THC, HR,

subjective "high") differed both in magnitude and time course across conditions, presumably reflecting characteristics of marijuana absorption and redistribution kinetics.

SEMANTIC/SPATIAL INFORMATION PROCESSING IN ADULT CHILDREN OF ALCOHOLICS. Steven L. Schandler,* Connie S. Thomas-Bigney,* and Michael J. Cohen.† *Chapman University, Orange, CA. †Veterans Affairs Medical Center, Long Beach, CA.

Adult children of alcoholics display mild deficits in the processing of verbal information and a more significant deficit in visuospatial information processing. This study examined the degree to which the verbal learning of adult children of alcoholics is affected by altering the visual content of the information to be learned. Twenty matched adult children of alcoholics and 20 adult children of nonalcoholic learned the spatial locations of low and high imagery nouns. Overall, the data indicated that adult children of alcoholics experience not only disruptions in visuospatial encoding, but also disruptions in the encoding of semantic information with an imaginal content.

CIGARETTE MENTHOLATION INCREASES SMOKERS' EXHALED CARBON MONOXIDE LEVELS. Gregory E. Miller,* Nicholas H. Caskey,*† and Murray E. Jarvik.*† *University of California, Los Angeles, CA, †Brentwood VAMC, Los Angeles, CA.

Male smokers ($n = 12$) participated in three controlled-dose smoking sessions spaced one week apart. In each session, subjects inhaled a cumulative total of 1200 cc of cigarette smoke. Menthol dosage varied across sessions, such that subjects smoked experimental cigarettes that had been injected with either 0 mg, 4 mg, or 8 mg of menthol. Exhaled carbon monoxide levels increased concomitantly with menthol dosage. There were no differences in smoking topography across the three conditions. Menthol's ability to increase the toxicity of cigarette smoke by raising CO levels is discussed. Results suggest that menthol cigarette preference may account for some of the racial differences in smoking behavior and smoking-related outcomes found in past literature.

NICOTINE AND CAFFEINE CONSUMPTION IN DETOXIFYING ALCOHOLICS. Craig P. Weisman and Irving Maltzman. University of California, Los Angeles, CA.

In spite of a lack of research literature regarding the affect of nicotine and caffeine withdrawal in detoxifying alcoholics, there is pressure to develop nicotine and caffeine free treatment facilities. We randomly assigned 40 alcoholics seeking detoxification to one of four caffeine conditions and monitored their nicotine consumption. There was no significant increase in severe withdrawal symptoms associated with the level of caffeine consumed or changes in nicotine consumption. Caffeine use did increase the minor withdrawal symptoms of tremor, anxiety, and agitation. Decreased caffeine consumption led to increase in the severity of headaches reported.