observed at the lowest dose tested. Response slowing reflected the temporal domain (as opposed to the force domain) motor effects of low doses of haloperidol.

THE EFFECTS OF CODEINE ON AGGRESSION: A TIME COURSE STUDY. Ralph Spiga, Don R. Cherek and John D. Roache. University of Texas Health Sciences Center, Houston, TX.

The effects of codeine on aggressive responding were studied in a controlled laboratory condition. Aggressive responding was defined as the subject subtracting points from an ostensible person. Aggressive responding was provoked by a fictitious person when they subtracted points exchangeable for money from the subject. A nonaggressive response option was monetarily reinforced. Codeine at all doses diminished aggressive responding relative to placebo. While codeine had no effect on nonaggressive responding at lower doses (25 mg/70 kg and 50 mg/kg), at the highest dose codeine increased nonaggressive responding compared to placebo.

CROSS-TOLERANCE AND SENSITIVITY TO OPIOIDS IN MORPHINE-TREATED PIGEONS. Rebecca M. Craft, Mitchell J. Picker and Linda A. Dykstra. University of North Carolina at Chapel Hill, Chapel Hill, NC.

Response-rate decreasing effects of several opioid agonists were determined in pigeons responding under a fixed-ratio 30 schedule of food presentation. Following determination of acute dose-effect curves, pigeons were injected once daily with 56 mg/kg morphine, resulting in a 1-log rightward shift in the morphine, *l*-methadone and ethylketocyclazocine dose-effect curves. In contrast, the cyclazocine and bremazocine curves were shifted to the left, whereas the U50,488 curve remained unchanged. Results suggest that in morphine-tolerant pigeons, morphine, *l*-methadone and ethylketocyclazocine share mu agonist properties, cyclazocine and bremazocine share mu antagonist properties, and U50,488 effects are unrelated to mu opioid receptor activity.

CROSS-TOLERANCE TO OPIOIDS IN MORPHINE-TREATED ANIMALS. Pamela Doty, Mitchell J. Picker and Linda A. Dykstra. University of North Carolina at Chapel Hill, Chapel Hill, NC.

Cross-tolerance to various mu and kappa opioid agonists was evaluated in morphine-tolerant squirrel monkeys using cumulative dosing procedures. Lever-press responding was maintained under a multiple FR30 schedule of food presentation. In monkeys given 3.0 mg/kg of morphine twice daily, the dose-effect curve for the rate-decreasing effects of morphine shifted 1/2 to 3/4 log unit to the right. Dose-effect curves for *l*-methadone, ethylketazocine (EKC) and U50,488 were determined prior to and during the chronic regimen. Results indicated approximately a 1/2 log unit shift to the right for the *l*-methadone dose-effect curve and no shift for EKC or U50,488.

TOLERANCE TO A MORPHINE CUE: ROLE OF MORPHINE MAINTENANCE DOSE. Elizabeth S. Steigerwald. Wayne State University, Detroit, MI; Christine A. Sannerud. The Johns Hopkins University School of Medicine, Baltimore, MD; and William J. Lipinski, Mechele D. Doty and Alice M. Young. Wayne State University, Detroit, MI.

Experiments examined the ability of several chronic doses of morphine to confer tolerance to a morphine discriminative stimulus. Rats were trained to discriminate saline and 3.2 mg/kg morphine under RF schedules of food delivery. Morphine generalization gradients were determined before, during and after chronic drug treatment. For chronic treatment, separate groups of rats received saline or selected doses of morphine for 14 to 18 day periods while discrimination training was suspended. A final group received 36 mg/kg/day pentobarbital. Repeated administration of saline, 10 mg/kg morphine, or 36 mg/kg pentobarbital produced no tolerance. In contrast, 36 and 100 mg/kg morphine produced marked tolerance to the morphine cue, albeit accompanied by marked suppression of response rates. It appears that the magnitude of tolerance developed to a morphine cue is dependent on the maintenance dose employed for chronic treatment.

COMBINATION OF BUPRENORPHINE WITH NALOXONE IN HUMANS. Linda L. Weinhold, George E. Bigelow and Kenzie L. Preston. The Johns Hopkins University School of Medicine, Baltimore, MD.

(Abstract not available)

DISCRIMINATIVE PROPERTIES OF BREMAZOCINE AND FENTANYL IN PIGEONS. Mitchell J. Picker and Linda A. Dykstra. University of North Carolina at Chapel Hill, Chapel Hill, NC.

Pigeons were trained to discriminate a dose of either bremazocine or fentanyl from water using a two-key drug discrimination procedure. During substitution tests, the kappa agonists bremazocine, U50,488 and tifluadom produced bremazocine-like but not fentanyl-like stimulus effects. The kappa agonists, ethylketocyclazocine, ketocyclazocine and nalorphine, and the mu agonists, fentanyl and morphine, produced fentanyl-like but not bremazocine-like stimulus effects. During tests of antagonism, the A50 doses of naloxone or Mr2266 in combination with the training dose of bremazocine were approximately equivalent, whereas in fentanyl-trained pigeons, the A50 dose of naloxone was approximately 1 log-unit smaller than the A50 dose of Mr2266.

ROLE OF DOPAMINE IN THE EFFECTS OF PENTAZOCINE AND TRIPELENNAMINE. Thomas J. Hudzik and Barbara L. Slifer. University of New Orleans-Lakeside, New Orleans, LA.

The present study was designed to identify the role of dopaminergic mechanisms in the mediation of the effects of pentazocine and tripelennamine. Utilizing milk intake as the dependent variable, dose-effect curves were constructed for these drugs in both the absence and presence of various dopaminergically active compounds. Pentazocine interacted in an additive manner with haloperidol and was antagonized by raclopride, while the effects of tripelennamine failed to be modified in a manner consistent with its hypothesized dopaminergic activity. These data lend further support to the notion that pentazocine may exert some of its effects via the dopaminergic system.

DO KAPPA EFFECTS EXPLAIN "T'S & BLUES"? Lynn A. Cones and Barbara L. Slifer. University of New Orleans-Lakeside, New Orleans, LA.

Rats were trained to discriminate the kappa agonist, ethylketocyclazocine (EKC; 0.3 mg/kg), from saline under a two-lever, fixed-ratio 30 (food) schedule. Dose-effect curves were determined for EKC, pentazocine and bremazocine alone and in combination with tripelennamine (TRP). Although TRP (0.3–10.0 mg/kg) alone did not substitute for EKC, it attenuated the EKC-like effects of each drug at one or more doses when combined with the opioids. Response rates were generally increased when each drug was tested with a low dose of TRP, while rates were decreased with a higher dose. Attenuation of the kappa-like properties of opioids may explain the use of TRP with pentazocine in the "T's & Blues" combination.

THE ROLE OF HISTAMINE IN PCP'S DISCRIMINATIVE STIMULUS PROPERTIES. Paul A. Gore, Jr. and Barbara L. Slifer. University of New Orleans-Lakeside, New Orleans, LA.

Rats were trained to discriminate phencyclidine (PCP: 3.0 mg/kg), from saline under a two-lever, fixed-ratio 3 (food) schedule. Dose-effect curves were determined for PCP and pentazocine (PTZ) alone and in combination with doses of tripelennamine (TRP). At the high dose (30.0 mg/kg), PTZ produced 65% drug-lever responding, while doses of TRP produced less than 10% PCP responding. TRP in combination with PTZ or PCP did not affect PCP-lever responding; however, the antihistamine plus PCP resulted in an increase in response rates. These data suggest that histamine antagonism neither potentiates nor attenuates PCP-like discriminative stimulus properties.

TOLERANCE TO PHYSOSTIGMINE'S EFFECTS ON SCHEDULE-CONTROLLED BEHAVIOR IN RATS. Raymond F. Genovese, Timothy F. Elsmore, Jeffrey M. Witkin and Lisa R. King. Walter Reed Army Institute of Research, Washington, DC.

Three experiments investigated the effects of chronic administration of physostigmine in rats responding under mult FR,EXT schedules of food reinforcement. Tolerance to physostigmine's response rate decreasing effects was observed in rats under a mult FR10,EXT schedule. Tolerance was observed with presession as well as postsession administration. Tolerance was retained for up to 25 drug-free days. Cross-tolerance to oxotremorine's effects was observed with a three times daily administration regimen of physostigmine, but not with a one time daily regimen. These results characterize environmental and pharmacological variables important to the development of tolerance to physostigmine's effects.

EFFECTS OF NICOTINE UPON PUNISHED RESPONDING IN HUMANS. Robert H. Bennett, Don R. Cherek, John D. Roache and John Grabowski. Mental Sciences Institute, University of Texas Health Sciences Center, Houston, TX.

Male subjects were administered varying doses of nicotine through tobacco smoke using the smoke inhalation spirometry procedure. The procedure ensured constant puff volume and introduced the smoke deep into the lungs. The doses delivered through research cigarettes were 0.3 mg, 1.2 mg, 2.0 mg and 2.7 mg nicotine (F.T.C. yield) per cigarette. Following the inhalation procedure, subjects were exposed to a multiple schedule with one component being an RI 20 sec of reinforcement (point additions) and the second component an RI 20 sec schedule with a concurrent VR 30 schedule of point subtractions. The research permitted analysis of dose-related effects of nicotine upon behavior in an aversive situation (punishment).

NICOTINE CESSATION AFFECTS PLASMA INSULIN AND GLUCOSE LEVELS IN RATS. Neil E. Grunberg, Stephanie M. Nespor, Kathryn A. Popp, Margarita Raygada, Elizabeth C. Sibolboro and Suzan E. Winders. Uniformed Services University of the Health Sciences, Bethesda, MD.

There is an inverse relationship between nicotine administration and body weight. Previous research has shown that chronic nicotine administration decreases circulating insulin levels and may thereby affect energy utilization. The present study was designed to examine the effects of cessation of nicotine administration on insulin and glucose. Cessation of chronic nicotine administration was accompanied by persistent increases of circulating levels of insulin and short-lived decreases of circulating glucose levels. The effects of cessation of nicotine on insulin were consistent with increases in body weight and changes in preference for sweet food shown after nicotine cessation.

NICOTINE GUM AND SKILLS TRAINING WITH OLDER, HEAVILY-ADDICTED, CHRONICALLY-ILL SMOKERS. Timothy P. Carmody. Veterans Administration Medical Center, San Francisco, CA; Robert G. Hall, Julia S. Breckenridge and James N. Breckenridge. Veterans Administration Medical Center, Palo Alto, CA; and Sharon M. Hall. University of California, San Francisco, CA.

The present study investigated the effects of a smoking cessation program combining nicotine gum and cognitive-behavioral skills training with older, heavily-addicted, chronically-ill smokers. Initially, 40 smokers were randomly assigned to either an intervention in which behavioral skills training was combined with nicotine gum or another condition in which nicotine gum was used with minimal follow-up contact. Abstinence rates at three months were not significantly different for these two intervention conditions. With a larger sample of 59 smokers, it was found that abstinence rates at three months were significantly lower for those smokers with elevated diastolic blood pressure. In addition, there was a trend for those smokers who had reduced their smoking more before entering the program to be more successful in quitting. These findings have implications for designing smoking cessation treatments for recalcitrant and recidivism-prone groups of older, heavily-addicted, chronically-ill smokers.

MARIJUANA EFFECTS ON TOBACCO CIGARETTE SMOKING BEHAVIOR. Thomas H. Kelly, Richard W. Foltin, Marian W. Fischman and Joseph V. Brady. The Johns Hopkins University School of Medicine, Baltimore, MD.

This study investigated the relationship between marijuana and tobacco smoking behavior in subjects who reported occasional marijuana use outside the laboratory. Eight male adults who participated in residential studies of marijuana effects on social behavior smoked their preferred brands of tobacco ad lib during normal waking hours. Sub-