EFFECTS OF ACRYLAMIDE ON MULTIPLE BEHAVIORAL ENDPOINTS IN THE PIGEON. S. A. Daniel and H. L. Evans. New York University.

Little is known about acrylamide's effects on cognitive function in animals. We now describe the effects of subchronic injections (PO) of 0, 20, and 60 mg/kg/day of acrylamide monomer on (1) duration discrimination responding; (2) fixed-interval and shape discrimination responding and (3) feeding behavior in pigeons (N=12). Sixty mg/kg/day caused rapid impairment on all tests; partial recovery occurred within 3 weeks. FI response rate remained elevated post-acrylamide. At 20 mg/kg/day for 90 days, small but consistent decreases in duration discrimination accuracies were seen. Acrylamide affects a variety of behavioral processes involving sensory, motor and associative functions

EFFECTS OF 2,4-D ON SCHEDULE-CONTROLLED BEHAVIOR. J. Dougherty, G. Shulze and R. Taylor. Veterans Administration Medical Center, Lexington, and Graduate Center for Toxicology, University of Kentucky.

2,4-Dichlorophenoxy acetate n-butyl ester was a component of Agent Orange herbicide used in Vietnam, and is commercially-available in lawn care products. The behavioral effects of 2,4-D were studied using a variable-interval (VI 120, TO 4 min) schedule of sucrose pellet-reinforced lever pressing in Wistar albino rats. The herbicide was injected SC in polyoxyethylated castor oil prior to daily 1-hr test sessions. Decreased response rates were observed within 60 min and reached a peak at 4–6 hr. Pre-drug response rates were recovered within 24–48 hr, which correlates with the urinary excretion of 95% of the injected dose within 48 hr as the hydrolysed metabolite (2,4-D acid). Doses of 10–300 mg/kg were active and motor incoordination was evident above 100 mg/kg.

DEVELOPMENT OF A PORTABLE PERFORMANCE ASSESSMENT SYSTEM FOR BEHAVIORAL TOXICOLOGY. Robert S. Kennedy,[1] Alvah C. Bittner, Jr,[2] Martin G. Smith[1] and Margy M. Harbeson[2]. [1]Essex Corporation, Orlando, FL and [2]Naval Biodynamics Laboratory, New Orleans, LA.

In a series of experiments conducted at the Naval Biodynamics Laboratory, over 140 performance tests of skills and abilities were evaluated by determining whether they were differentially stable and reliable when examined over a fifteen day repeated measures paradigm. Many of these were paper and pencil or apparatus tests frequently reported on in the information processing, environmental stress or behavioral toxicological literature. Surprisingly, less than 30% were found to be acceptable metrically, either because of instability or lack of acceptable reliability. Present plans call for adapting the "good" tests to a portable microcomputer system and progress in this program is discussed.

TRICHLOROETHYLENE: POSSIBLE OPIOID INVOLVEMENT. Jeffrey L. Nelson, Department of Psychology and Harold Zenick, Department of Environmental Health, University of Cincinnati, Cincinnati, OH 45257.

Trichloroethylene (TCE) is a chlorinated hydrocarbon solvent which is widely used as an industrial degreasing agent. Workers exposed to TCE often exhibit CNS symptoms similar to those symptoms produced by narcotics. The present study evaluated the analgesic properties of TCE and the effects of TCE exposure on measures of male sexual behavior in rats. The data indicated that TCE (1000 pm) produced an analgesic response 1 hour following administration. This analgesic response was blocked by the opiate antagonist, naloxone (2.0 mg/kg, IP) when given 15 minutes prior to testing. TCE (1000 pm) 4 hours before testing also produced effects on male copulatory behaviors. Naltrexone (2.0 mg/kg, IP) given 30 minutes before testing blocked several of these TCE-induced effects. These data suggest that many of TCE's effects may be mediated either directly or indirectly via the endogenous opioid system.

THE PERFORMANCE OF INFANT MONKEYS EXPOSED TO CAFFEINE IN UTERO ON NON-SPATIAL DISCRIMINATION REVERSAL TASKS. Steven G. Gilbert and Deborah C. Rice. Toxicology Research Division, Bureau of Chemical Safety, Health and Welfare Canada.

Cynomolgus monkeys (*Macaca fascicularis*) were exposed *in utero* to caffeine throughout gestation by dosing the mothers with caffeine in the drinking water. Infants were separated from their mothers at birth. Beginning at about 45 days of age, they performed on a two-choice non-spatial reversal discrimination problem, followed by a multiple non-spatial discrimination using four sets of stimuli. Infants were tested in a home cage environment 16 hours a day; experimental control and data collection were by means of a minicomputer. Some caffeine exposed infants were impaired relative to controls on these tasks.

WORKING MEMORY PERFORMANCE IN THE RAT· EFFECTS OF AGING AND PREVIOUS ADMINISTRATIONS OF CARBARYL. George A. Heise, Jeffrey Hudson and Carl Overshiner. Indiana University.

At the end of their first year of life, groups of rats trained on working memory tasks (e.g., go-no go alternation and two-lever reversals) received either a range of doses of carbaryl, scopolamine and physostigmine, or 28 twice-weekly sub-acute doses of 5 mg/kg carbaryl. Only very slight deficits in working memory performance, and no differences between the treatment groups, were observed when the rats were reexamined (without further carbaryl or drug treatment) at 591–598 or 880–893 days of age. However the 880–893 day-old rats were profoundly deficient in complex motor coordination, as indicated by their inability to walk a narrow "bridge" without falling off.

BEHAVIORAL CORRELATES OF NEUROPATHOLOGY PRODUCED BY SOMAN INTOXICATION. M. Z. Mays, J. H. McDonough, Jr., H. E. Modrow, III, C. D Smith and C. G. McLeod, Jr. United States Army Medical Research Institute of Chemical Defense.

Rats surviving exposure to a convulsion-producing dose of the organophosphate, soman, frequently exhibit behavior typical of rats with setpal lesions. In two experiments rats were given either a subcutaneous injection of soman (123 μg/kg or 110 μg/kg; approximately a 24 hr LD50) or saline. Ratings of the degree of overt acute soman intoxication were significantly higher ($p<0.001$) in treated rats. Treated rats also took significantly longer to return to their pre-injection body weight ($p<0.001$). Analysis of ratings of reactivity to handling yielded a significant interaction ($p<0.001$), with groups not differing prior to treatment and treated animals

being significantly more reactive than controls at 7, 14, and 21 days post exposure. Thirty days after exposure all control animals passively avoided after a single training trial (1 mA shock for 1 sec). In contrast, there was high variability in the response latencies of treated rats on *both* training and testing trials. Histological analysis of these rats 35–40 days after exposure showed a consistent pattern of severe neuronal degeneration and necrosis in the hippocampus, amygdala, pyriform cortex, and septum of treated rats; no control rat showed any neuropathology. Thus, the behavioral measures of reactivity to handling, reactivity to novel environments, return to pre-injection body weight, and overt acute symptoms are indicative of neuropathology in rats that otherwise appear to be fully recovered from soman poisoning.

DRL-20 DEFICITS IN SURVIVORS OF THE NERVE AGENT SOMAN. Robert F. Smith, Department of Psychology, George Mason University, Fairfax, VA 22030 and John H. McDonough and Catherine D. Smith, U. S. Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, MD 21010.

A near-lethal dose of the nerve agent soman produces diffuse neuropathy and punctate lesions, particularly prominent in limbic system. To determine whether soman also produces lasting behavioral changes, 45 male Edgewood rats (Sprague-Dawley derived) were first pretrained to bar press for liquid reinforcement and then dosed with 110 micrograms/kg soman (24 animals) or saline (21 animals). Survivors were then reshaped to bar press, given three days of continuous reinforcement, and 45 days of DRL-20 sec training. Six of 15 soman survivors could not be reshaped, but all controls reshaped ($p=0.003$, Fisher's exact test). ANOVA revealed that soman treated animals received significantly fewer reinforcements on the DRL schedule; on the final day of testing, the controls received a mean of 44.0 reinforcements, while the soman group received a mean of 20.3. These data indicate that near-lethal soman administration in rats produces behavioral deficits lasting at least 75 days after dosing.

SELECTIVE EFFECTS OF NEONATAL EXPOSURE TO CADMIUM CHLORIDE ON ADULT OPERANT BEHAVIOR IN RATS. M. C. Newland, W. W. Ng, R. K. Miller, R. B. Baggs and B. Weiss. Divisions of Toxicology and Laboratory Animal Medicine, Departments of Radiation Biology and Biophysics, Obstetrics/Gynecology, and Pharmacology, University of Rochester, Rochester, NY.

In Long Evans rats, neonatal exposure to cadmium chloride (0, 1, 3 and 6 mg/kg, SC on postnatal day 1) resulted in short and long term behavioral, neurological, and morphological alterations. Dysfunctions in several preweanling assessments, which included suckling, location of home bedding, cliff avoidance, and gait, were associated with hydrocephalus. Alterations in the acquisition and maintenance of fixed-ratio (FR) 75 performance were noted in non-hydrocephalic adult males which performed normally on the preweanling assessments. These alterations in operant behavior were also unrelated to body weight changes. The effect on FR performance was related to dose in an inverted U manner: overall rates increased at 3 mg/kg and decreased at 6 mg/kg. Post-reinforcement pausing was unaffected at these doses. The highest dose of cadmium eliminated the cohesiveness of FR performance by disrupting the running rate while having no effect on post-reinforcement pausing. Thus, selective changes in adult operant behavior were seen in animals which appeared normal as determined by the preweanling assessments. (Funded by ES 01248 and ES 07026).

PRE- PLUS POST-NATAL METHYLMERCURY EXPOSURE IN MONKEYS PRODUCES DEFICITS IN SPATAIL VISION. Deborah C. Rice and Steven G. Gilbert. Toxicology Research Division, Bureau of Chemical Safety, Health and Welfare Canada.

Monkeys (*Macaca fascicularis*) were exposed to methylmercury during the entire period of gestation; from birth to four years of age they received the same dose that their mothers had received. Immediately thereafter, spatial visual function was determined using a forced-choice psychophysical procedure. The monkey faced two oscilloscopes, one displaying a vertical sine wave grating, and the other displaying a blank field of equal average luminance. The monkey was required to press the button corresponding to the oscilloscope displaying the grating in order to be reinforced. For each of a number of spatial frequencies, the contrast at which the monkey responded with 70% correct choices was determined and considered the threshold for that frequency. Three of six treated monkeys exhibited impaired spatial visual function relative to controls under both high and low luminance conditions.

THE ROLE OF ATTENTIONAL PROCESSES IN POSTNATAL LEAD NEUROTOXICITY. Lloyd Hastings and True-Jenn Sun. Department of Environmental Health, University of Cincinnati, College of Medicine, Cincinnati, OH 45267.

The objective of the present study was to investigate the effects of early exposure to low-levels of lead on attentional processes using a rat model. Attentional processes were assessed by looking at two tasks involving the blocking paradigm. Rat pups were exposed to 0 or 1090 ppm (0.2%) lead acetate via dams' milk and weaned onto the same solution as their dams had received. Flinch-jump thresholds were obtained on day 91. The rats were then evaluated using a two-way avoidance task, followed by testing on a conditioned suppression task. No differences were found in flinch-jump thresholds. Analysis of the avoidance task data revealed that there was neither a significant lead effect, nor a significant blocking effect. Analysis of the suppression ratios from the conditioned suppression task revealed that while there was not a significant lead effect, there was a significant blocking effect for both groups.

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