dichromate. (The Toxicologist 15:312). Both may contribute to oxidative stress. The current studies were designed to evaluate the stop-flow technique for kinetic studies of Cr(VI) reduction. Studies using the Olis Rapid Scanning Monochromator show that the in vitro reduction of Cr(VI) by ascorbate is at least a two step process en route to Cr(III). A synthetic Cr(V) chelate, [potassium bis (2-ethyl, 2-hydroxy-butyrato) chromate V] was reduced in vitro by ascorbate also in a two-step process, with production of an unidentified intermediate and Cr(III). Addition of 2-ethyl, 2-hydroxy butyric acid (10 mM) [as a trapping agent for CrV)] to a dichromate (50 μM)/ascorbate (2 mM) mixture did not result in production of any intermediate with maximal absorption at 355 nm [indication of Cr(V)]. Maximal reduction of dichromate at pH 7.4 was found with excess ascorbate, with a minimal ratio of ascorbate:-dichromate of 20:1. Preliminary studies with mouse lung homogenate and H4 cells using the stop-flow system suggest that this technique may be applicable to kinetic studies of dichromate reduction in these systems.

1397 SIDESTREAM CIGARETTE SMOKE EXPOSURE AND PULMONARY ANTIOXIDANT ENZYMES IN NEONATAL AND ADULT RATS

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Passive cigarette smoke exposure has been implicated in the development of respiratory disorders in humans. Cigarette smoke contains highly reactive radicals which can potentially cause oxidative damage to lung tissue. Past studies have suggested that while neonates exhibit antioxidant enzyme induction in response to oxidative stress, the adults do not. To determine if smoke exposure also elicits similar response, we compared the pulmonary antioxidant enzymes of neonatal and adult rats after exposure to sidestream cigarette smoke (SS-CS). Adult female Sprague Dawley rats were exposed 6 hrs/day to SS-CS in a whole body exposure chamber, and neonates received exposure for 2 hrs/day, beginning at age day-1. Control animals were maintained in parallel. Animals were sacrificed after 1 and 4 weeks of daily exposure and the lungs were processed for analysis of antioxidant enzymes; Mn/CuZn-superoxide dismutase (SOD), glutathione peroxidase (GSH-Px), and catalase (CAT) activity. One-week exposure to SS-CS did not produce any change in antioxidant enzyme levels of neonates or adults. Exposure to SS-CS for 4 weeks, however, significantly increased the activity of Mn-and CuZn-SOD in neonatal but not the adult rats. Other enzymes were not significantly altered in either group. These results suggest an adaptive response of neonatal but not the adult rats to oxidative stress induced by sidestream cigarette smoke exposure (supported by NIEHS ES05604).

1398 EVIDENCE OF OXIDATIVE INJURY IN RATS FOLLOWING SMOKE INHALATION INJURY

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Oxygen radical mechanisms have been implicated in the pathophysiology of smoke inhalation injury. The present study further characterizes lung, liver, heart and kidney antioxidant enzymes and indices of lipid peroxidation in a smoke inhalation injury rat model. Adult rats (n = 5/gp) were exposed to cooled western bark (fir and pine) smoke (S) or air (controls, C) for 16.25 min. Groups were then euthanized at 1, 12, 24, 48 and 96 h and tissues removed. Analysis of bronchiolar lavage (BAL) fluid from S rats revealed significantly higher protein levels at 12 h and 24 h after exposure when compared with C. Lung water content was not different between the 2 groups. In S rats, of the antioxidant enzymes assayed, lung glutathione peroxidase activity was about 25% higher ($p<0.05$) than C at 12, 24 and 48 h. In contrast, both Cu, Zn and Mn-superoxide dismutase activities were significantly lower in S lungs than C at 12 h and 24 h after exposure. These data were associated with significant elevations in indices of lipid peroxidation. Concentrations of thiobarbituric acid-reactive substances were 2-fold higher and levels of conjugated dienes were 170% and 70% higher at 12 h and 24 h, respectively, in S lungs than C. These variables were not significantly different in the other organs assayed. These data suggest that in this rat model of smoke inhalation injury, evidence of oxidative injury was manifest at 12 h and 24 h after smoke exposure and appeared limited to the lung. However, increasing smoke exposure an additional 30-60 sec resulted in 100% mortality in this model.

1399 MOLECULAR DETERMINANTS OF ORGANIC DUST EXPOSURES IN RESPIRATORY CELLS

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We are utilizing a cell model to explore the pro-inflammatory responses of rat alveolar macrophages (AM) and respiratory epithelial cells to aqueous extracts of respirable grain dusts collected during routine agricultural operations. These studies are aimed at elucidating the underlying mechanisms of pulmonary injury and adaptation in agricultural workers exposed to organic dusts. Exposure to grain dusts or purified bacterial endotoxin/LPS resulted in a dose-dependent inhibition of cell growth in both AM and epithelial cell lines. Comparison of growth curves suggested the presence of other, unidentified, cytotoxic components of grain dusts, besides endotoxins. The inhibition of cell proliferation was preceded by the production of reactive oxygen species (ROS) in AM cells, measured by spectrophotometric determinations of hydrogen peroxide and superoxide anion, as well as by DNA fragmentation that is associated with apoptotic cell death, measured by DNA gel electrophoresis and ELISA. The comparative magnitudes of these pro-inflammatory responses suggest that the AM cells may be pivotal in producing toxicity in other respiratory cells following inhalation of organic dusts. We have also detected an immediate induction of the stress protein, metallothionein, in AM cells following their exposures to grain dust extracts and endotoxin. We are further studying the role of ROS in triggering apoptosis and whether metallothionein can inhibit ROS-related cell injury, as well as measuring the activation of the DNA transcription factor, NF-KB, in these cells following their exposures to organic dusts. (Supported by NIOSH #U07/CCU807121).

1400 INDUCTION OF HEPATIC MICROSOMAL ENZYMES IN THE PUERTO RICO GROUND LIZARD

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The Puerto Rico ground lizard, *Ameiva exsul*, is being evaluated as a potent sentinel model to monitor environmental contamination in Puerto Rico. Induction of hepatic microsomal enzymes is being examined as an indicator of xenobiotic exposure. Previous enzymatic studies have verified the presence of the mixed-function oxidase enzyme system and the phase II enzyme glutathione-S-transferase in the liver of *Ameiva exsul*. The purpose of this study was to evaluate the response of the hepatic cytochrome P450 enzymes to inducers like β-naphthoflavone (BNP). Lizards were captured from the field and housed in the laboratory for 21 days to allow the dissipation of any previous induction. Microsomes were prepared from lizards treated for four days with either β-naphthoflavone in corn oil or corn oil alone (controls). Total P450 spectra and P450-dependent enzyme activity were measured. P450 and B5 concentrations as well as enzyme activities in microsomes showed no significant differences except for a 5.5 - fold increase in ethoxyresorufin-o-deethylase (EROD) activity. EROD activity in control was 0.4 nmoles/min/mg compared with 2.2 nmoles/min/mg BNP treated animals. This apparent induction of CYP1A1 isozyme is supported by cross-reaction of a microsomal protein of about 50 kDa with a rabbit polyclonal anti CYP1A1. Initial studies indicate that exposure to other xenobiotics like pregnenolone-16α-carbonitrile, isoniazid, and phenobarbital can selectively induce other hepatic isozymes of cytochrome P450.

1401 EFFECT OF BITTER MELON (MOMORDICA CHARANTIA) JUICE ON THE HEPATIC CYTOCHROME P450 (CYP) ACTIVITIES IN STREPTOZOTOCIN INDUCED DIABETIC RATS

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Bitter melon (Karela fruit) has been reported to have antidiabetic and antitumor activities. In the present study we have investigated the effect of oral feeding of karela fruit juice (KJ) on liver CYP enzymes in the STZ diabetic rats. Male Wistar rats (200–250g) were made diabetic by a single I.P. dose (60 mg/Kg) of STZ. Animals were divided into 4 groups: STZ-induced diabetic, KJ fed (10 ml/kg/day for 10 wk) -diabetic, KJ alone and untreated control group. At the end of 10th week animals were sacrificed and liver microsomes prepared by ultracentrifugation. CYP contents, ethoxycoumarin -0-deethylase (ECOD), ethoxyresorufin-0-deethylase (EROD), aniline hydroxylase (AH), aminopyrene N-demethylase (APD) activities and lipid peroxida-

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Preface

This issue of *The Toxicologist* is devoted to the abstracts of the presentations for the symposium, platform, poster / discussion, workshops, roundtables, and poster sessions of the 35th Annual Meeting of the Society of Toxicology, held at the Anaheim Convention Center, Anaheim, California, March 10-14, 1996.

An alphabetical Author Index, cross-referencing the corresponding abstract number(s), begins on page 351.

The issue also contains a Keyword Index (by subject or chemical) of all the presentations, beginning on page 375.

The abstracts are reproduced as accepted by the Program Committee of the Society of Toxicology and appear in numerical sequence.

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