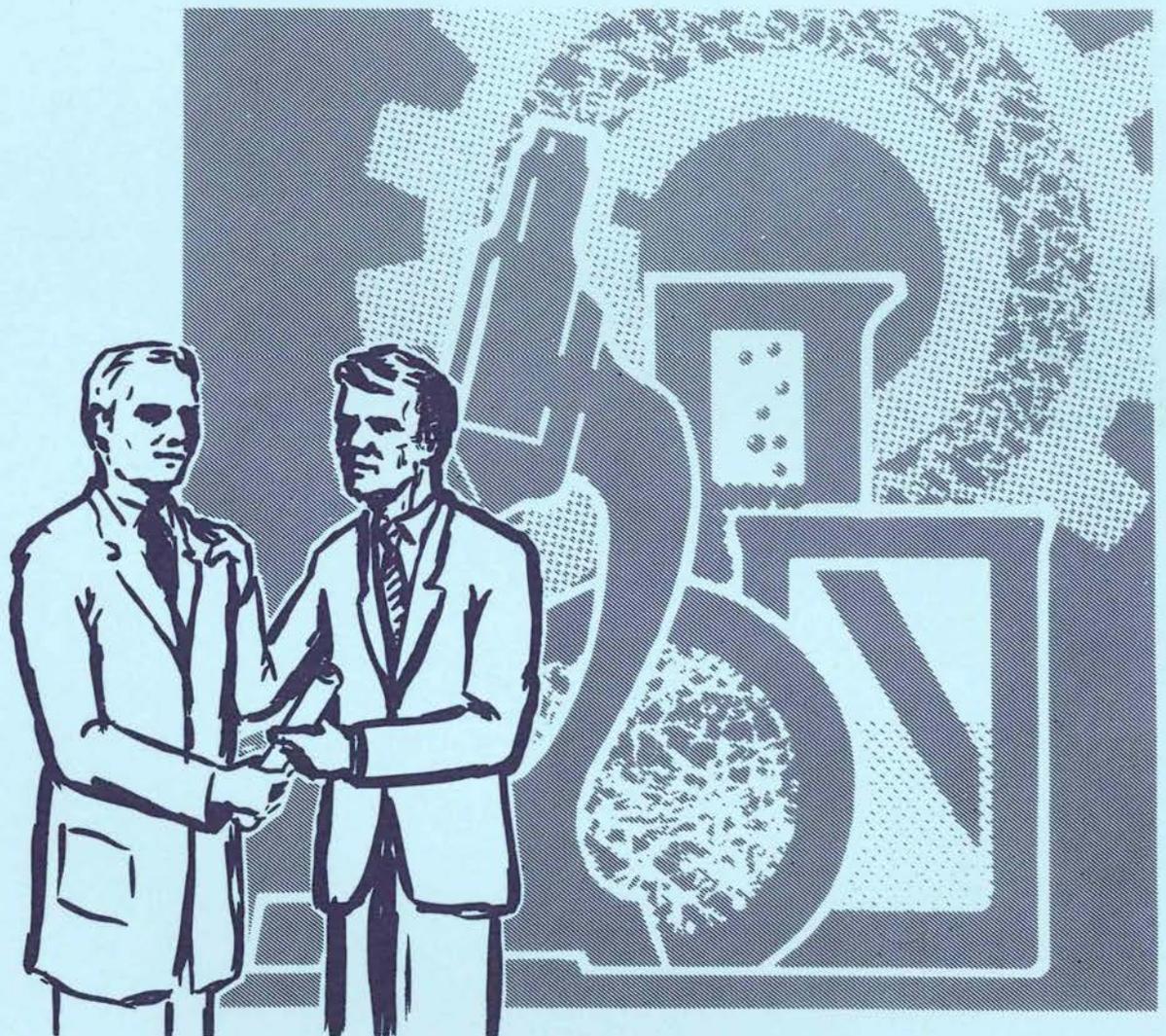


# NIOSH GRANTS

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## RESEARCH and DEMONSTRATION GRANTS AWARDED in FISCAL YEAR 1979



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
Center for Disease Control  
National Institute for Occupational Safety and Health

NIOSH GRANTS - 1979

RESEARCH AND DEMONSTRATION  
GRANTS AWARDED IN  
FISCAL YEAR 1979

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
Center for Disease Control  
National Institute for Occupational Safety and Health  
Rockville, Maryland 20857  
May 1980

## DISCLAIMER

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

DHHS (NIOSH) Publication No. 80-117

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## FOREWORD

The National Institute for Occupational Safety and Health (NIOSH) plans, directs, and coordinates the national program effort to develop and establish recommended occupational safety and health standards and to conduct research, training, and related activities to assure safe and healthful working conditions for every working man and woman. Under the provisions of the Federal Mine Safety and Health Act of 1977, and the Occupational Safety and Health Act of 1970, research investigations, particularly those in which dose-effect relationships may be identified and quantified thereby leading to the development of effective standards, represent one of the principal areas of responsibility of NIOSH.

NIOSH employs many mechanisms including the awarding of grants to eligible institutions and organizations for research projects relating to innovative approaches to understanding the underlying characteristics of occupational safety and health problems and for effective solutions in dealing with them. Grant support is also available for demonstration projects which are designed to show the technical and economic feasibility of new or improved methodologies for dealing with occupational safety and health problems.

This report, which describes the research and demonstration projects supported through grants should interest scientists, engineers, physicians, and others currently engaged in or contemplating research germane to the responsibilities and functions of NIOSH.



Anthony Robbins, M.D.

Director

National Institute for Occupational  
Safety and Health



## RESEARCH GRANTS PROGRAM ANNOUNCEMENT

Competitive grant applications are being accepted for research and demonstrations relating to occupational safety and health including innovative methods, techniques, and approaches for dealing with occupational safety and health problems. This support is in the form of project grants not exceeding 5 years. Eligible applicants may be universities, colleges, research institutions and other public and private nonprofit organizations including State and local governments.

A research grant application should address the establishment, discovery, development, elucidation or confirmation of information on the underlying mechanisms relating to occupational safety or health, including innovative methods, techniques, and approaches for dealing with occupational safety and health problems.

A demonstration grant application should address, either on a pilot or full-scale basis, the technical or economic feasibility or application of: (1) A new or improved occupational safety or health procedure, method, technique, or system; or (2) an innovative method, technique, or approach for dealing with occupational safety or health problems.

Particular emphasis is placed on: 1) causes and prevention of the following occupational diseases or disorders: skin, neurologic, respiratory, cardiovascular, digestive and reproductive; 2) control technology including asbestos and asbestos substitutes; 3) behavioral and motivational factors; 4) safety and injury prevention including musculoskeletal and back disorders; and 5) emerging problems particularly energy/radiation and sidestream smoking.

Applications are reviewed by an appropriate peer review group on the basis of scientific merit, including an assessment of the importance of the proposed research problem; the novelty and originality of the approach; the training, experience, and research competence or promise of the investigator(s); the adequacy of the experimental design; the suitability of the facilities; and the appropriateness of the requested budget relative to the work proposed.

Demonstration grant applications are reviewed additionally on the basis of the following criteria:

1. Degree to which project objectives are clearly established, obtainable, and for which progress toward attainment can and will be measured.
2. Availability, adequacy and competence of personnel, facilities, and other resources needed to carry out the project.
3. Degree to which the project can be expected to yield or demonstrate results that will be useful and desirable on a national or regional basis.
4. The substantive merit and potential contribution of the project

toward developing knowledge and techniques for meeting the objectives of the Occupational Safety and Health Act.

5. Extent of and expected cooperation of industry, unions, or other participants in the project, where applicable.

Applications are submitted on Form PHS-398 (or PHS-5161-1 for State and local governments). Forms are available from the institutional business offices or from the addresses listed below.

An original and six copies (original and two for State and local governments) of the application are sent or delivered to:

Application Receipt  
Division of Research Grants, NIH  
Room 240, Westwood Building  
Bethesda, Maryland 20205

The proposed timetable for receiving applications and awarding grants is as follows:

<u>Application Deadline</u>	<u>Review Group Meeting Date</u>	<u>Expected Start Date</u>
March 1	June	Dec 1
July 1	Oct/Nov	Apr 1
November 1	Feb/Mar	Jul 1

Awards will be made based on priority score ranking, emphasis area, and availability of funds.

FOR FURTHER INFORMATION CONTACT:

Mr. Joseph W. West  
Grants Management Officer  
NIOSH  
5600 Fishers Lane, Room 8-35  
Rockville, Maryland 20857  
Telephone: (301) 443-3122

Mr. Roger A. Nelson  
Grants Program Officer  
NIOSH  
5600 Fishers Lane, Room 8-63  
Rockville, Maryland 20857  
(301) 443-4493

These grants are awarded and administered by NIOSH under the research and demonstration grant authority of Section 20(a)(1) of the Occupational Safety and Health Act of 1970 (29 U.S.C. 669(a)(1)). Program regulations applicable to these grants are contained in Part 87 of Title 42, Code of Federal Regulations with the basic grant administration policies of the Public Health Service being applicable. This program is not subject to OMB Circular A-95.

(Catalog of Federal Domestic Assistance Program No. 13.262, Occupational Safety and Health Research Grants.)

PRINCIPAL INVESTIGATOR

Gerald A. Gellin, M.D.  
Department of Dermatology  
University of California  
San Francisco Medical Center  
San Francisco, CA 94143

TITLE

Pathomechanisms of Chemically Induced Depigmentation

SUMMARY

The goals of this study are to investigate depigmenting actions of chemicals on mammalian skin observed in the home, community or occupational environment. In vivo studies provide information on pathomechanisms of the chemically induced depigmentation. In vitro studies provide: 1) quick screening techniques for chemicals which have the depigmenting potential; and 2) further clarification of molecular biological changes which occur in both melanocytes and keratinocytes by direct contact of the chemicals. Newly developed chemical techniques will be reevaluated in order to apply them to quantitative screening of chemicals which cause skin depigmentation.

The depigmenting capacity of a variety of phenolics and catecholics, and their congeners will be studied using black guinea pigs and black mice. The histological, histochemical, and autoradiographic examination of normal, irritated, and depigmented animal skin with light and electron microscopy will be performed.

The findings so far have demonstrated that 4 - tertiary butyl catechol (TBC) depigmentation does not occur in the pigmented ear skin of Uscd strain hairless mice. This conclusion contrasts with findings with the pigmented ear skin of guinea pigs and indicates that genetic factors are involved in TBC depigmentation.

PUBLICATIONS

Mansur, J., Gellin, G.A. 1978. Fukuyama, K. and Epstein, W.L.: Effects of 4-tertiary butyl catechol on tissue cultured melanocytes. J. Invest. Derm. 70:275-279.

Hoshino, S., Gellin, G.A. 1979. Epstein, J.H. and Fukuyama, K.: Effects of 4-tertiary butyl catechol (TBC) on melanocytes (MC) in hairless mice. Clin. Res. 23:18A.

UNIVERSITY OF CINCINNATI  
Cincinnati, Ohio

GRANT NUMBER: 5 R01 OH00773-02

PRINCIPAL INVESTIGATOR

I. Leonard Bernstein, M.D.  
University of Cincinnati  
231 Bethesda Avenue  
Cincinnati, Ohio 45267

TITLE

Occupationally-Induced Isocyanate Reactions

SUMMARY

The specific aims of this grant are the:

- 1) Preparation, standardization and analysis of stable isocyanate protein conjugates by a) previously established laboratory methods; b) a new technique utilizing addition of TDI vapors to protein solutions and subsequent determination of ureido and urethane linkages by a "materials balance" apparatus.
- 2) Development of a reproducible murine model of homocytotropic antibody induced by a) toluene diisocyanate; b) hexamethylene diisocyanate. Hapten specificity of this model was proved and hapten cross-reactivity between TDI and HDI was also investigated.
- 3) Induction of homocytotropic antibody to TDI and HDI in a susceptible strain of guinea pig (English short hair strain). Hapten specificity and cross-reactivity of these antibodies were to be studied in the same manner as the murine HCA model. Anaphylactic reactions of guinea pigs passively sensitized with rabbit specific anti-haptenic antibodies were also included in this phase of the research.
- 4) Chronic exposure of guinea pigs to isocyanate vapors with special attention to a) controlled monitoring of isocyanate vapors in special chambers; b) immunologic phenomena occurring during the course of these exposures; c) serial physiologic monitoring of the animals before, during and at the conclusion of exposure; d) final pathologic assessment of anatomical changes occurring as a result of these experiments.
- 5) A series of experiments to determine the contact sensitization potential of isocyanates as well as a method of measuring these effects in guinea pigs.

PUBLICATIONS

None

YALE UNIVERSITY  
New Haven, Connecticut

GRANT NUMBER: 1 R01 OH00780-02

PRINCIPAL INVESTIGATOR

J. Wister Meigs, M.D.  
Yale University School of Medicine  
Connecticut Cancer Epidemiology Unit  
30 College Street  
New Haven, Connecticut 06510

TITLE

Cancer Risks in Cosmetologists

SUMMARY

This study will investigate the incidence of cancer of all sites among cosmetologists who were licensed in Connecticut before December, 1965 and will obtain a more definitive test of preliminary results which suggested that the cosmetologists have an increased risk of acute leukemia. The proposed study will increase the size of the study group by including in the target population 5,000 cosmetologists whose date of birth was previously unavailable. Follow-up status as of December, 1978 will be determined for all cosmetologists. The expected number of cases of cancer of individual sites will be determined by applying to the group at risk the cancer incidence rates of the general Connecticut population, specific for age, calendar year, sex and site. Cancer cases among the cosmetologists will be ascertained through December, 1978 by computer linkage of the names in the study group with those reported to the Connecticut Tumor Registry.

PUBLICATIONS

None

YESHIVA UNIVERSITY  
Albert Einstein College of Medicine  
The Bronx, New York

GRANT NUMBER: 2 R01 OH00535-04

PRINCIPAL INVESTIGATOR

Peter S. Spencer, Ph.D.  
Scientific Director  
Neurotoxicology Unit  
Albert Einstein College of Medicine  
1410 Pelham Parkway  
Bronx, New York 10461

TITLE

A Neuropathologic Study of Acrylamide Intoxication

SUMMARY

The objectives of the study are to develop new, sensitive methods for the assessment of chemically induced neurotoxicity and neuroteratogenicity and to illuminate the mechanism of neurotoxin-induced nerve fiber degeneration.

The experimental part of this study will examine the known neurotoxicity and the possible neuroteratogenicity of the vinyl monomer acrylamide and the ketonic solvent 2,5-hexanedione (the primary toxic metabolite of the hexacarbon solvents n-hexane and methyl n-butyl ketone). These compounds are widely used in commercially important polymers and solvents, but their neurotoxic properties make them significant industrial chemical hazards and environmental pollutants. Previous experimental studies with these chemicals, which demonstrated their ability to produce central-peripheral distal axonopathy, will be extended to examine by light and electron microscopy and by electron microprobe analysis: 1) the brain damage produced by chronic low-level systemic intoxication; 2) the extent and reversibility of nervous system damage after chronic exposure to these neurotoxins; 3) the differential effects of acute and chronic intoxication on the axon and supporting cells (Schwann cell, oligodendrocyte and astrocyte) in fetal, post-natal, adult, and aged states. These data will bear heavily on their understanding of the site of action of these agents and why the distal parts of central and peripheral nerve fibers are vulnerable to systemic intoxication. Light and electron microscopy will also be employed to study any abnormalities in the nervous system of fetal and post-natal rats which have been exposed to acrylamide or to 2,5-hexanedione in utero. The clinical part of study will develop and evaluate a simple assay of palmar vibration sensibility presently being used in acrylamide manufacturing plants for the detection of early, sub-clinical neurological damage in potentially exposed workers.

## PUBLICATIONS

- Spencer, P.S., Weinberg, H.J., Krygier-Brevart, V. and Zabrenetzky, V.: An in vivo method to prepare normal Schwann cells free of axons and myelination. Brain Research, in press.
- Achaumburg, H.H. and Spencer, P.S.: Clinical and experimental studies of distal axonopathy - a frequent form of nerve and brain damage produced by environmental chemical hazards, Annals of the N.Y. Academy of Science, in press.
- Schaumburg, H.H. and Spencer, P.S.: The toxic neuropathies - a review. Neurology, in press.
- Spencer, P.S. and Schaumburg, H.H.: Neurotoxic chemicals as probes of cellular mechanisms of neuromuscular disease. Excerpta Medica, in press.
- Schaumburg, H.H. and Spencer, P.S.: Toxic models of disorders of the peripheral nervous system. Excerpta Medica, in press.
- Schaumburg, H.H. and Spencer, P.S.: Toxic models of certain disorders of the nervous system - a teaching monograph. Neurotoxicology, in press.
- Weinberg, E.L. and Spencer, P.S.: Studies on the control of myelinogenesis. 3. Signalling of oligodendrocyte myelination by regenerating peripheral axons. Brain Research, in press.
- Spencer, P.S. and Schaumburg, H.H. 1978. Distal axonopathy-one common type of neurotoxic lesion. Environmental Health perspectives, 26:97.
- Schaumburg, H.H. and Spencer, P.S. 1978. Environmental Hydrocarbons produce degeneration in cat hypothalamus and optic tract. Science 199:199.
- Weinberg, H.J. and Spencer, P.S. 1978. The fate of Schwann cells isolated from axonal contact. Journal of Neurocytology, 7:555.
- Spencer, P.S. and Weinberg, H.J. 1978. Axonal specification of Schwann cell expression and myelination. In: The Physiology and Pathobiology of Axons (edited by Waxman, S.), Raven Press, New York.
- Spencer, P.S. and Schaumburg, H.H. 1978. The pathobiology of neurotoxic axonal degeneration. In: The Physiology and Pathobiology of Axons (edited by Waxman, S.), Raven Press, New York.
- Spencer, P.S., Bischoff, M.C. and Schaumburg, H.H. 1978. On the specific molecular configuration of neurotoxic aliphatic hexacarbon compounds causing central-peripheral distal axonopathy. Toxicology and Applied Pharmacology 44:
- Could, R. M., Lasek, R.H. and Spencer, P.S. 1978. Phosphoinositide metabolism in peripheral axons. In: Cyclitols and the Phosphoinositides, (edited by Fesinberg, F. and Wells, W.W.) New York, Academic Press.

UNIVERSITY OF MICHIGAN  
Ann Arbor, Michigan

GRANT NUMBER: 5 R01 OH00707-03

PRINCIPAL INVESTIGATOR

Gary D. Langolf, Ph.D.  
Industrial and Operations Engineering  
2260 G. G. Brown Laboratory  
The University of Michigan  
Ann Arbor, Michigan 48109

TITLE

Longitudinal Study of Effects of Mercury Exposure

SUMMARY

This research will demonstrate the use of an advanced behavioral testing methodology as a part of medical monitoring of workers exposed to inorganic mercury. It will also evaluate possible subclinical changes in tremor, electromyographic spectra, and psychomotor functions in mercury-exposed chlor-alkali workers.

By employing a longitudinal design, this research will use test measures that explore timewise functional changes in individual workers after they are either newly introduced to mercury exposure or removed from mercury exposure. Previously tested mercury exposed workers will also be retested on a continuing basis in order to explore the possibility of functional changes which may accompany long-term chronic exposures. A methodology and statistical basis for using sensitive subclinical tests will be provided as an aid in controlling individual workers' exposure to inorganic mercury. The longitudinal monitoring methods developed may also be applicable to control of exposure to other potentially neurotoxic substances.

PUBLICATIONS

Langolf, G.D., Chaffin, D.B., Henderson, R., and H.P. Whittle. Dec. 1978. Evaluation of Workers Exposed to Elemental Mercury Using Quantitative Tests of Tremor and Neuromuscular Functions. AIHA Journal.

TEMPLE UNIVERSITY  
Philadelphia, Pennsylvania

GRANT NUMBER: 5 R01 OH00740-02

PRINCIPAL INVESTIGATOR

David L. Innes, Ph.D.  
Department of Physiology and Biophysics  
Temple University  
Health Sciences Center  
3223 North Broad Street  
Philadelphia, Pennsylvania 19140

TITLE

Methyl Methacrylate Induced Changes in CNS Activity

SUMMARY

This research will investigate the hypothesis that neuronal activity in the hypothalamic area of the rat is markedly depressed during acute exposure to methyl methacrylate (MMA) vapor. The cortical EEG and multiple unit activity from those brain regions involved in the regulation of gastrointestinal function will be studied. The investigators will also determine if chronic exposure to MMA vapor alters those neuronal structures found to be acutely affected over a longer period of time.

Adult rats under Nembutal anesthesia will be implanted with recording electrodes in four specific brain loci, rats will be exposed to methacrylate vapor in room air at 400 ppm for one hour and multiple unit activity will be recorded from lateral, ventromedial, anterior and posterior regions of the hypothalamus, amygdala and hippocampus. Controls from these studies will include recordings from brain areas unrelated to GI function, exposure of rats to a related acrylate, exposure of rats to an agent unrelated but with a pungent odor, and exposure of rats following severance of the olfactory nerves. The site of electrode implantation will be verified histologically at termination after production of direct current marking lesions. In the second phase, multiple unit recording electrodes will be chronic positioned into those neuronal structures with the greatest amount of change in the acute phase. Rats will be exposed to concentrations of 400, 100, and 25 ppm of methyl methacrylate monomer vapor in air, verified by gas chromatography. An Anova analysis of recording data will be conducted.

PUBLICATIONS

None

DUKE UNIVERSITY  
Durham, North Carolina

GRANT NUMBER: 1 R01 OH00823-01

PRINCIPAL INVESTIGATOR

Mohamed B. Abou-Donia, Ph.D.  
Assistant Professor  
Department of Pharmacology  
Duke University Medical Center  
Durham, North Carolina 27710

TITLE

Occupational Neuropathies Due to Industrial Chemicals

SUMMARY

Outbreaks of occupational neuropathies due to industrial chemicals are well documented. Many different chemicals are known to cause damage to the human nervous system. The recent outbreak of neuropathy among some workers in a Texas factory where the delayed neurotoxic insecticide leptophos was manufactured and packaged is an example of occupational neuropathies. The possibility that those workers might have been exposed to other "neurotoxic" chemicals such as n-hexane, which was used in the plant, made it difficult to establish a relationship between leptophos exposure and worker symptoms. The purpose of the proposed study is to investigate the effect of inhaled hexacarbon solvent vapors, i.e. n-hexane, methyl n-butyl ketone, 2,5-hexanedione and 2,5-hexanediol on the production of delayed neurotoxicity by topically applied EPN (o-ethyl o-4-nitrophenyl phenylphosphonothioate) which is neurotoxic in hens. It is also proposed to study the effect of these solvents on the hepatic microsomal enzyme activities in hens. A study is proposed to investigate the effect of hexacarbon solvents on the pharmacokinetics and metabolism of carbon 14-EPN

PUBLICATIONS

None

UNIVERSITY OF TEXAS  
Galveston, Texas

GRANT NUMBER: 1 R01 OH00897-01

PRINCIPAL INVESTIGATOR

Bohdan R. Nechay, D.V.M.  
Associate Professor  
Department of Pharmacology and Toxicology  
University of Texas Medical Branch  
Galveston, Texas 77550

TITLE

Cadmium and Hypertension

SUMMARY

The purpose of this study will be to examine the possible relationship between cadmium exposure and hypertension. Preliminary observations have indicated that pre-exposure of rats to cadmium produced an increase in arterial reactivity to adrenergic stimulation. This investigation plans to elucidate the mechanism by which cadmium raises the vascular reactivity to adrenergic stimulation and ultimately to explore the role that cadmium exposure plays in the development of hypertensive disease in man.

The specific aims proposed are to: (1) determine if the enhanced vascular responsiveness to norepinephrine is associated with the development of hypertension; (2) define a cadmium exposure regimen which will consistently lead to increased vascular reactivity and hypertension; (3) determine if the enhanced vascular reactivity includes increased responsiveness to other vasoactive agents; (4) determine if there are other factors altered by cadmium such as renal salt retention; (5) determine whether a genetic predisposition to hypertension influences the response to cadmium; and (6) establish the mechanism of vascular effect of cadmium.

PUBLICATIONS

None

COLUMBIA UNIVERSITY  
New York, New York

GRANT NUMBER: 1 R01 OH00906-01

PRINCIPAL INVESTIGATOR

Robert A. Karasek, Ph.D.  
Room 302  
Seeley Mudd Bldg.  
Columbia University  
New York, New York, 10027

TITLE

Job Conditions, Occupation and Coronary Heart Disease

SUMMARY

The object of this research is to examine U.S. data on cardiovascular disease and job conditions for associations similar to those recently obtained by these researchers in cross-sectional and prospective analysis of Swedish national data. Those findings confirmed the relationship between C.V.D. and psychosocial job characteristics using a previously untested model of job psychological strain development based on job decision latitude (low) and psychological job demands. These same job characteristics have been previously shown to be stress-related in both U.S. data and Swedish data based on comparable populations and survey instruments.

This project will examine five major U.S. data base including information on job characteristics and C.V.D. or C.H.D.: The H.I.S. (1972); H.E.S. (1960-62); H.A.N.E.S. (1970-75) the Western Collaborative Study, and the Framingham Study. While data measuring job characteristics is generally weak in all existing large scale U.S. C.V.D.-C.H.D. data bases, the above surveys do contain either limited direct measures of the relevant job characteristics or detailed U.S. Census Occupational Codes (382 categories). These codes can be used to indirectly assess job condition impacts with the help of job characteristic-occupation data in three national U.S. working condition surveys (1969, 1972, 1977). The U.S. data bases also allow isolation of the unique contribution of job conditions to C.V.D. risk, through multivariate control for conventional risk factors (especially age, smoking, serum cholesterol, type A behavior and socio-economic status.) It should be noted that this model, based on work environment conditions, represents an alternative psycho-social mechanism of disease development to that implied by current "Type A" behavior research (based on personality characteristics). Also, previous U.S. and Swedish findings based on the model have not substantially weakened when socio-economic status is controlled.

The presently available U.S. data probably cannot provide the final assessment of job-related C.H.D. risk. This project makes maximum use of the

extensive existing data resources, and should provide a basis for development of more exact data collection instruments in the future. This project output will include a recommended job analysis instrument, as well as a discussion of detailed occupational categories presently at risk in the U.S.

PUBLICATIONS

None

AMERICAN DENTAL ASSOCIATION HEALTH FOUNDATION  
Chicago, Illinois

GRANT NUMBER: 5 R01 OH00742-02

PRINCIPAL INVESTIGATOR

A. Carl Verrusio, Ph.D.  
American Dental Association  
Health Foundation  
211 East Chicago Avenue  
Chicago, Illinois 60611

TITLE

Biological Effects of Nitrous Oxide Used in Dentistry

SUMMARY

This research will 1) determine if chronic exposure to low levels of nitrous oxide is teratogenic and/or mutagenic in rats and mice and, 2) to investigate the toxic effects, if any of nitrous oxide at low levels and delineate the biochemical mechanisms of this toxicity.

PUBLICATIONS

None

STANFORD UNIVERSITY  
Stanford, California

GRANT NUMBER: 5 R01 OH00775-02

PRINCIPAL INVESTIGATOR

Ellis N. Cohen, M.D.  
Stanford University  
Department of Anesthesia  
Stanford, California 94305

TITLE

Anesthetic Exposure and Health of Dental Personnel

SUMMARY

The objectives of this study are to conduct a comprehensive epidemiologic survey investigating possible health hazards present in the dental operatory involving both dentists and their chairside assistants. A second objective is to define the possible role of anesthetic exposure to the waste gases as causal in any noted increase of these health problems. A third objective is to separate the effects of nitrous oxide from other inhalation anesthetics in order to determine which anesthetic agent or combinations are contributory. A fourth objective is to determine the effect of cigarette smoking upon fetal viability and the development of fetal abnormalities. Finally, the study would attempt to determine the effect of administration of an inhalation anesthetic during a given trimester to a pregnant woman upon fetal outcome.

The present survey is to be conducted through mail questionnaires distributed to a representative segment of the approximately 100,000 members of the American Dental Association and a random sample of their 150,000 dental assistants. The study design calls for two consecutive mailings, followed by personal telephone calls to the non-responders. Since the validity of the epidemiologic approach depends upon completeness of the response rate, every effort is to be made to ensure the highest possible return rate of the questionnaires.

PUBLICATIONS

None

JOHNS HOPKINS UNIVERSITY  
Baltimore, Maryland

GRANT NUMBER: 1 R01 OH00803-01

PRINCIPAL INVESTIGATOR

Genevieve Matanoski, M.D., Dr.P.H.  
Professor of Epidemiology  
Johns Hopkins School of Hygiene and  
Public Health  
615 N. Wolfe Street  
Baltimore, Maryland 21205

TITLE

Occupational Exposures and Selected Congenital Defects

SUMMARY

Several studies have associated occupational exposures with the subsequent development of disease in the exposed workers, but relatively little work has been done on the reproductive effects of various exposures.

Deleterious reproductive effects may be manifested as children born with severe defects. In particular, congenital heart disease is of interest because, unlike lesions that are clearly genetically transmitted, prior research has indicated that certain lesions can result from exogenous agents, such as chemicals (eg, drugs) used during pregnancy and viruses (eg, rubella) contracted during pregnancy.

This study proposes to investigate the feasibility of using a geographically defined birth population of congenital heart disease cases and compare them with a similarly defined random sample of normal controls for differences in parental occupations grouped according to possible exposures. A second set of controls with Down's Syndrome is included to control for bias of recall.

The study uses a retrospective approach because the incidence of congenital heart defects, particularly tetralogy of Fallot and pulmonic stenosis with and without ventricular septal defect, is relatively rare. Primary interest would center on grouping parental occupations according to possible exposures to lead, anesthetic gases, and detergents. Other variables of interest to be included in the analyses are pregnancy history, smoking, alcohol, and drug use during pregnancy.

PUBLICATIONS

None

LOUISIANA STATE UNIVERSITY  
New Orleans, Louisiana

GRANT NUMBER: 1 R01 OH00835-01

PRINCIPAL INVESTIGATOR

William J. Swartz, Ph.D.  
Department of Anatomy  
Louisiana State University  
Medical Center  
1542 Tulane Avenue  
New Orleans, Louisiana 70112

TITLE

Occupational Risks of Pesticide Exposure for Females

SUMMARY

This study is designed to characterize some of the occupational hazards that confront both pregnant and non-pregnant females engaged in occupations in which pesticide exposure is a distinct possibility. This investigation will explore the effect of pesticide exposure on embryonic gonadal development and on basic reproductive processes of the sexually mature female. Pesticides to be employed in this study are DDT, Diazinon, Malathion and Carbaryl. In the first part of this study, both chick and mouse embryos will be exposed to a single pesticide during the period of gonadal development. Effects of the pesticides on normal embryological development of the gonads and on sex differentiation will then be evaluated. This will involve tabulating the number of primordial germ cells (PGCs) colonizing the gonads, determining the sex of the embryos and detecting histochemically any alteration in enzyme activity in both PGCs and other cellular components of the gonads. In addition, some of the female mice exposed prenatally to pesticides will be allowed to reach sexual maturity in order to determine whether embryonic exposure to pesticides can cause deleterious effects on basic ovarian functions which remain undetected until the period of sexual maturity. Measurements of the ability of the ovaries of the offspring to elicit an ovulatory response to exogenous gonadotropins and of the capacity of the ovarian oocytes to undergo normal meiosis will be used to assess these physiological capacities. The second part of this study will examine these same physiological parameters in ovaries of mice exposed to pesticides when sexually mature. An additional histochemical study of specific enzymes in the different cellular components of the ovary will provide information on the metabolic activities affected.

PUBLICATIONS

None

HARVARD UNIVERSITY  
Boston, Massachusetts

GRANT NUMBER: 1 R01 OH 00856-01

PRINCIPAL INVESTIGATOR

Lawrence J. Fine, M.D.  
Harvard University School of Public Health  
665 Huntington Avenue  
Boston, Massachusetts 02115

TITLE

Occupational Exposures and Rates of DNA Damage

SUMMARY

The objective of this study is to investigate the relationship between DNA damage and exposure to carcinogens or mutagens in selected occupations. They will 1) study occupational groups exposed to known or suspected carcinogens and mutagens by determining the rates of chromosome aberrations (ChAbs) and sister chromatid exchanges (SCEs) in these groups (exposures include benzene, coke oven fume, vinyl chloride, acrylonitrile, ethylene oxide and lead); 2) compare the sensitivity of SCE's to ChAb's by examining the rates of these two tests in 3 occupational exposures (vinyl chloride, lead, benzene) which have been associated with elevated ChAbs.

Both ChAbs and SCEs are measures of DNA damage. Most occupational exposures which cause cancer and mutations probably do so by damaging DNA. As a result, investigating the relationship between exposure and human DNA damage could lead to better quantification of the risk of current exposures to known carcinogens or mutagens. In the past, the only method for detecting DNA damage in humans was ChAb's, however, a new method, SCE's may represent a more useful test. In vivo testing suggests that measures of SCE's are more sensitive, require 1/8 of the time, and detect a type of DNA damage which better correlates with cellular transformation. The rates of DNA damage for exposed groups and control groups from the same industry will be compared. Personal exposure will be determined by traditional air sampling techniques. Where multiple carcinogen exposures occur or where it is technically difficult to measure a suspected carcinogen, 2 new methods of estimating level of exposure will be used. Both are based on the Salmonella microsome (SM) test. In the 1st method, urine samples are concentrated and assayed for mutagenic activity. In the 2nd air samples are fractionated and tested for mutagenic activity.

PUBLICATIONS

None

UNIVERSITY OF CALIFORNIA  
Santa Barbara California

GRANT NUMBER: 1 R01 OH00858-01A1

PRINCIPAL INVESTIGATOR

Barbara L. Drinkwater, Ph.D.  
Associate Research Physiologist  
Steven M. Horrath, Ph.D.  
Research Physiologist  
Institute of Environmental Stress  
University of California  
Santa Barbara, California 93106

TITLE

Thermoregulatory Response of Women

SUMMARY

A recent series of laboratory studies concentrated on describing the relative role of age, cardiovascular endurance, and the menstrual cycle in determining women's ability to tolerate work in hot environments. The results indicate that fluctuations in hormonal levels play a minor role and that most of the variability between individuals was due to differences in age and fitness levels. While women of any age can and do react to acute exposure to heat with signs of physiological strain, the proportion of susceptible individuals was higher at each end of the age continuum. Prepubertal children and postmenopausal women were more likely to be at risk than women between these age extremes. Their lower tolerance to exercise in the heat was related primarily to circulatory instability and to decreased sensitivity in the sweating mechanism. The purpose of the proposed series of studies is to investigate these mechanisms in detail. The relative contribution of central and peripheral mechanisms in effecting changes in the sensitivity of the sweating mechanism, patterns of body fluid shifts, and responses to acclimatization procedures will be quantified and evaluated for age and/or fitness related differences in response. The results of such studies will help the understanding of how females respond to the stress of working in hot environments as well as providing insight into some of the unanswered questions in the area of thermoregulation.

PUBLICATIONS

None

UNIVERSITY OF CALIFORNIA  
Santa Barbara, California

GRANT NUMBER: 9 R01 OH00896-06

PRINCIPAL INVESTIGATOR

Barbara L. Drinkwater, Ph.D.  
Associate Research Physiologist  
Institute of Environmental Stress  
University of California  
Santa Barbara, California 93106

TITLE

Physiological Adaptation of Women to Heat Stress

SUMMARY

Results from previous studies describing the relative role of age, cardiovascular endurance, and the menstrual cycle in determining women's ability to tolerate work in hot environments have indicated that fluctuations in hormonal levels play a minor role and that most of the variability between individuals was due to differences in age and fitness levels.

This study will investigate these mechanisms in detail. The relative contribution of central and peripheral mechanisms in effecting changes in the sensitivity of the sweating mechanism, pattern of body fluid shifts, and responses to acclimatization procedures will be quantified and evaluated for age and/or fitness related differences in response.

PUBLICATIONS

Drinkwater, B.L., I.C. Kupprat, J.E. Denton, J.L. Crist, and S.M. Howath. 1977. Response of Prepubertal Girls and College Women to Work in the Heat. J. Appl. Physiol: Respirat. Environ. Exercise Physiol. 43:---.

Drinkwater, B.L., I.C. Kupprat, J.E. Denton, and S.M. Howath. 1977. Heat Tolerance of Female Distance Runners. Ann. N.Y. Acad. Sci. 301: 777-792.

UNIVERSITY OF ALABAMA  
University, Alabama

GRANT NUMBER: 1 R01 OH00912-01

PRINCIPAL INVESTIGATOR

Ronald D. Hood, Ph.D.  
Associate Professor of Biology  
The University of Alabama  
P. O. Box 1927  
University, Alabama 35486

TITLE

Toxicology of Prenatally Administered Arsenic

SUMMARY

Arsenic is a widespread toxic environmental contaminant. Arsenic is ferotoxic and teratogenic when injected in animals, and recent reports have suggested arsenic as an etiologic factor in human birth defects. This study will be conducted in order to gain a better understanding of arsenic's prenatal effects. Effects of oral intake of arsenite during pregnancy will be evaluated by standard teratological techniques in two species (mouse and hamster). Additional dams will be allowed to litter, and their pups will be observed for 28 days to assess postnatal growth, behavior and survival. Methylated arsenic metabolites will also be tested for teratogenicity, to learn more of the role of arsenic metabolism in protection of the conceptus. Because chronic exposure to arsenic has been reported to lead to tolerance of the element's toxic effects, pregnant mice and hamsters will be treated with low levels of arsenite or of arsenate prior to a potentially teratogenic dose. The likelihood of a protective effect on the conceptus as a result of prior chronic exposure to arsenic can then be evaluate. In order to learn more of the mechanisms of arsenic's prenatal effects and about arsenic metabolism and to allow a correlation of the animal data with what is known of human metabolism, animals will be treated similarly to those in the aforementioned studies. They will be sacrificed following treatment, and uptake of arsenite, arsenate, and their metabolites by the conceptus and excretion by the mother will be determined.

PUBLICATIONS

None

WEST VIRGINIA UNIVERSITY  
Morgantown, West Virginia

GRANT NUMBER: 5 R01 OH00360-09

PRINCIPAL INVESTIGATOR

Robert Burrell, Ph.D.  
Department of Microbiology  
West Virginia University Medical Center  
Morgantown, West Virginia 26506

TITLE

Immune Injury in Occupational Respiratory Diseases

SUMMARY

The overall aim is the identification of the underlying mechanisms responsible for producing immune injury in occupationally-related chronic pulmonary disease. This project aims at development of simpler methods of assessing impairment in pulmonary function due to immune injury in an experimental model of hypersensitivity pneumonitis (EHP). Also to be continued is the investigation of long-term effects of passive administration of anti-lung serum on normal pulmonary structure and function.

PUBLICATIONS

1. Burrell, R. and McCullough, M.J. 1978. Production of Thermophilic Actinomycetehay. Aerosols for Use in Experimental Hypersensitivity Pneumonitis. App. Environ. Micro. 34:715.
2. Smith, S.M., Hill, J.D., Snyder, I.S. and Burrell, R. 1978. Mitogenicity of Cell Wall Fractions of Micropolyspora Faeni. Ann. Allergy 40:12.
3. Burrell, R., Law, F.W., and Olenchock, S.A. 1978. The Role of Precipitins in Allergic Lung Disease, Life Sciences 22:1685-1690.
4. Smith, S.M., Burrell, R. and Snyder, S.M. 1978. Complement Activation by Cell Wall Fractions of Micropolyspora Faeni. Infec. Immun. 22:568-574
5. Burrell, R. and Rokorney, D. 1977. Mediators of Experimental Hypersensitivity Pneumonitis. Int. Arch. Allergy App. Immunol. 55:161.
6. Burrell, R. and C.K. Thomas. 1977. Improved Methods of Producing Precipitating Aspergillus Antigens. Annals of Allergy 38:202-205.
7. Burrell, R.A. 1975. Immunology of Occupational Lung Disease. In: W.K.C. Morgan and A. Seatan (eds.) Occupational Respiratory Diseases. New York.

8. Burrell, R. and D.M. Lewis. 1975. Further Studies on the Effect of Lung Antibodies on the Pathogenesis of Tuberculosis. *J. Lab. and Clin. Med.* 86:741-745.
9. Cate, C.C. and R. Burrell, 1974. Lung Antigen Induced Cell-Mediated Immune Injury in Chronic Respiratory Diseases. *Amer. Rev. Resp. Dis.* 109:114-123.
10. Burrell, R. 1974. Commentary: Immunological Reflections on Asbestos. *Environ. Hlth. Perspec.* 9:297-298.
11. Burrell, R., D.K. Flaherty, P.B. DeNee, J.L. Abraham, and A. H. Gelderman. 1974. The Effect of Lung Antibody on Normal Lung Structure and Function. *Amer. Rev. Resp. Dis.* 109:106-113.

UNIVERSITY OF PITTSBURGH  
Pittsburgh, Pennsylvania

GRANT NUMBER: 5 R01 OH00367-09

PRINCIPAL INVESTIGATOR

Yves C. Alarie, Ph.D.  
Department of Occupational Health  
Graduate School of Public Health  
University of Pittsburgh  
130 Desoto Street  
Pittsburgh, Pennsylvania 15261

TITLE

Respiratory Tract Irritants; Mechanisms and Tolerance

SUMMARY

The objective of this grant is to establish the mechanisms by which one category of "respiratory tract irritants," i.e., the "sensory irritants" or "upper respiratory tract irritants," exert their action and to delineate the importance of reflex reactions when they are retained in the upper respiratory tract. The aim of the present investigation is fourfold:

- 1) to continue the study of sensory irritation of the upper respiratory tract by various airborne chemicals and to correlate their irritant property with their chemical structure;
- 2) to determine the in vitro reactivity of these chemicals with SH groups;
- 3) to determine the mechanism of desensitization and why this appears with some but not all irritants; and
- 4) to study the effects of sensory irritation in animals with pulmonary impairment.

Recent activity has been the initiation of a main effort on isocyanates and diisocyanates as irritants because of their wide distribution and number of workers exposed. By NIOSH estimates 215,000 workers are exposed to isocyanates and the production of one diisocyanate, toluene diisocyanate (TDI), is projected to be 1.2 million metric tons in 1980. The work with TDI has now been completed and an article submitted to Toxicology Applied Pharmacology in February 1979 with the results presented at the Society of Toxicology in March 1979. With this chemical, they were able to demonstrate cumulative effects occurring above 0.023 ppm, but not at exposure concentrations below 0.02 ppm. The TLV is currently 0.02 ppm and in the article to be published we have recommended that the TLV be lowered to 0.006 ppm as a TWA and 0.02 ppm be set as a ceiling value. In collaboration they have demonstrated that a 5 minute exposure of acetylcholinesterase in solution to 0.2 ppm of TDI is sufficient to completely inhibit the activity of this enzyme. This collaboration will continue during this year in order to see if bronchial hyperreactivity to TDI can be explained by this metabolism.

Other isocyanates being investigated are: Hexamethylene diisocyanate (HDI), phenyl isocyanate (PI), tolyl isocyanate (TI), fluorophenyl isocyanate (FI) and hexyl isocyanate (HI) to determine the effect of substituents and structure on the effects of isocyanates.

#### PUBLICATIONS

Kane, L.E. and Alarie, Y. 1978. "Evaluation of sensory irritation from acrolein formaldehyde mixtures." *Am. Ind. Hyg. Assoc. J.* 39, 270-274.

Karol, M.H., Ioset, H.H., Riley, J.E. and Alarie, Y.C. 1978. "Hapten-specific respiratory hypersensitivity in guinea pigs." *Am. Ind. Hyg. Assoc. J.* 39, 546-556.

Barrow, C.S., Alarie, Y. and Stock, M.F. 1978. "Sensory irritation and incapacitation evoked by thermal decomposition products of polymers and comparisons with known sensory irritants." *Arch. Environ. Health* 33, 79-88.

Barrow, C., Alarie, Y., Warrick, J. and Stock, M.F. 1977. "A comparison of the sensory irritation response to chlorine and hydrogen chloride in mice." *Arch. Environ. Health* 32, 68-76.

Kane, L.E. and Alarie, Y. 1977. "Sensory irritation to formaldehyde and acrolein during single and repeated exposures in mice." *Am. Ind. Hyg. Assoc. J.* 38, 509-522.

Alarie, Y. 1973. Sensory irritation of the upper airways by airborne chemicals, *Toxicol. Appl. Pharmacol.* 24: 279-297.

Alarie, Y., I. Wakisaka, and S. Oka. 1973. Sensory irritation by sulfur dioxide and chlorobenzilidene malonitrile, *Environ. Physiol. Biochem.* 3: 53-64.

Alarie, Y. and L.W. Keller. 1973. Sensory irritation by capsaicin, *Environ. Physiol. Biochem.*, 3:169-181.

Alarie, Y., I. Wakisaka, and S. Oka. 1973. Sensory irritation by sulfite aerosols, *Environ. Physiol. Biochem.* 3:182-184.

Allarie, Y. 1973. Sensory irritation by airborne chemicals, *CRC Critical Reviews in Toxicology* 2:299-363.

Barrow, C.S., Y. Alarie J.C. Warrick, and M.F. Stock. 1976. Sensory irritation evoked by thermal decomposition products of plasticized polyvinyl chloride, *Fire and Material.* 1:147-153.

Barrow, C., Y. Alarie, J. Warrick, and M. Stock. 1977. A comparison of the sensory irritation response to chlorine and hydrogen chloride in mice, *Arch. Env. Health.* 32:68-76.

ST. LOUIS UNIVERSITY  
St. Louis, Missouri

GRANT NUMBER: 5 R01 OH00398-06

PRINCIPAL INVESTIGATOR

Raymond G. Slavin, M.D.  
Associate Professor of Internal Medicine  
Director of Section of Allergy and Immunology  
St. Louis University School of Medicine  
St. Louis, Missouri 63104

TITLE

Pathogenesis of Allergic Pulmonary Aspergillosis

SUMMARY

The objectives of the total project are to (1) establish an animal model of allergic aspergillosis in non-human primates and, (2) continue studies on the epidemiology of allergic aspergillosis.

Current objectives are (1) to gain information on the development of the inflammatory response and alteration of tissue due to aspergillus by studying the interaction of monkey IgG and human IgE in monkey skin; (2) to begin investigations on the contribution of cell mediated immunity in the monkey model of allergic aspergillosis; (3) expand the panel of human allergic sera that can sensitize monkey skin; and (4) begin studies on the atmospheric burden *A. fumigatus*.

PUBLICATIONS

Slavin, R.G., et. al. 1978. A primate model of allergic bronchopulmonary aspergillosis. *Int'l. Arch. Allergy & Applied Immun.* 56:325-333.

Slavin, R.G., 1978. Allergic Aspergillosis Chapter 46 in *Allergy: Principles and Practice* edited by Middleton, E., Reed, C., & Ellis, E., C.V. Mosby, Co., St. Louis, Mo.

Slavin, R.G., and P.A. Winzenburger. 1977. Epidemiologic aspects of allergic aspergillosis. *Ann. of Allergy* 38:215-218.

Slavin, R.G. 1978. What Does a Fungus Among Us Really Mean? *J. Allergy & Clinical Immunology* 62:7.

STANFORD UNIVERSITY  
Stanford, California

GRANT NUMBER: 5 R01 OH00622-03

PRINCIPAL INVESTIGATOR

Ellis N. Cohen, M.D.  
Department of Anesthesia  
Stanford University Medical Center  
300 Pasteur Drive  
Stanford, California 94305

TITLE

Anesthetic Metabolism-Toxic Effects in Personnel

SUMMARY

The primary aim of this research is to study the metabolism and binding characteristics of two anesthetics; halothane and nitrous oxide.

A proposed scheme for the possible metabolism of nitrous oxide to other nitro compounds or amines and its possible role in producing tumors will also be studied. The identification of halothane metabolites in the liver and studies of their binding properties will be continued. The in vitro metabolism of halothane metabolites in human liver microsomes will be made possible by using human heart transplant donors. Fresh human liver is available through the heart transplant program and studies that have been done in experimental animals can now be extended to man. Heavy isotopically labeled  $^{15}\text{N}$ -nitrous oxide will be used in the study of the metabolism of nitrous oxide. The use of isotope-ratio mass spectroscopy will be employed rather than tracer techniques. Where metabolites are isolated, they will be converted to molecular nitrogen via a Kjeldahl procedure.

A series of male and female rats as well as human volunteers will receive  $^{15}\text{N}_2\text{O}$  and urine and feces will be collected and metabolites will be sought for. The separation of nonvolatile metabolites will be accomplished with a Sephadex gel exclusion chromatography. Consideration has been given to the quantification and the amount of potential metabolite that might be formed under the experimental conditions in animal and man.

PUBLICATIONS

None

UNIVERSITY OF VERMONT  
Burlington, Vermont

GRANT NUMBER: 5 R01 OH00653-03

PRINCIPAL INVESTIGATOR

John E. Craighead, M.D., Chairman  
Department of Pathology  
Medical Alumni Building  
College of Medicine  
University of Vermont  
Burlington, Vermont 05401

TITLE

Industrial Dust Interaction with Respiratory Mucosa

SUMMARY

Selected industrial and environmental dusts, of defined type, size, and concentration, will be studied using organ culture techniques to determine the response of the porcine bronchial mucosa and adult human bronchial mucosa to these dusts.

The in vitro effects of exposure to carbon, fiberglass, hematite and asbestos dusts on porcine and human tracheo-bronchial mucosal cells in culture will be determined. The rationale for the study is based on the fact that, after inhalation, a large amount of the dust particles are deposited in the upper airways and are removed or trapped in the tracheo-bronchial secretions, resulting in an altered mucosa. This research may provide information regarding early responses in carcinogenesis or chronic respiratory diseases resulting from occupational dust exposures.

The tissue reactions will be studied both biochemically and morphologically to elucidate the cellular changes that take place. Studies of mucin production and composition will be done as will studies of cellular enzyme release, and and composition will be done as will studies of cellular enzyme release, and mucosal cell DNA synthesis through 3 -thymidine labeling. The tissues will be examined by electron microscopy and energy dispersive x-ray spectrometer. In addition, the effect of respiratory virus infections on the response to the dusts will be evaluated in the porcine organ cultures utilizing vesicular stomatitis virus type III, 3 common pig viruses, and infecting the tracheal organ cultures prior to the exposure to the dusts.

PUBLICATIONS

Mossman, B.T., Bradley, B.J. and Craighea, J.E. 1979. Comparative cytotoxicity of chrysotile and crocidolite asbestos in hamster tracheal epithelial cells. Fed. Proc. 38:1352.

Bradley, B.J., Bellomo, S.C. and Craighead, J.E. 1979. Interaction of chrysotile asbestos with human erythrocytes. Fed. Proc. 38:1352.

Mossman, B.T. and Craighead, J.E. 1979. Induction of neoplasms after implantation of hamster trachea exposed in vitro to 3-methylcholanthrene on ferric oxide. Proc. Amer. Assoc. Cancer Res. 20:228.

Mossman, B.T., Adler, K.B. and Craighead, J.E. 1978. Interaction of carbon particles with tracheal epithelium in organ culture. Environ. Res. 16:110-122.

MOUNT SINAI SCHOOL OF MEDICINE  
New York, New York

GRANT NUMBER: 1 R01 OH00681-01A1

PRINCIPAL INVESTIGATOR

Yasunosake Suzuki, M.D.  
Research Professor  
Environmental Sciences Laboratory  
Mount Sinai School of Medicine  
Fifth Avenue and 100th St.  
New York, New York 10029

TITLE

Pulmonary Effects of Vinyl Chloride

SUMMARY

Health hazards associated with vinyl chloride exposure have focused primarily on hepatic effects (angiosarcoma, fibrosis, Banti's syndrome). However, other effects are known to occur, viz. acroosteolysis, and there are scattered data which suggest that important pulmonary lesions, including both malignancy and non-neoplastic effects, occur. A risk of lung cancer among vinyl chloride workers has been reported on a basis of epidemiology studies by Waxweiler and his associates. In addition, radiological pulmonary changes as well as pulmonary disfunction have been reported among vinyl chloride workers, suggesting that non-neoplastic effects of vinyl chloride occur among workers. Animal experiments have indicated that in addition to liver, various organs such as lung, brain, breast, kidney and skin were involved in neoplastic changes by vinyl chloride.

Animal lungs (90 mice and 30 hamster) exposed to vinyl chloride monomer by inhalation at low doses (1ppm, 10ppm and 100ppm) and for short durations of exposure (4 weeks), are to be studied by gross anatomy, light microscopy and electron microscopy. The objectives are (1) to study oncogenetic effects of vinyl chloride on mouse lung under these conditions and to observe processes of formation of the neoplastic cell from the precursor via the preneoplastic cell in the lung, on the level of ultrastructure, (2) to characterize the non-neoplastic pulmonary damage by vinyl chloride in mouse and hamster, and to consider mechanisms underlying the damage and (3) to evaluate vinyl chloride induced lesions in vinyl chloride workers' lungs.

PUBLICATIONS

None

CHAIM SHEBA MEDICAL CENTER  
Tel Hashomer, Israel

GRANT NUMBER: 1 R01 OH00763-01

PRINCIPAL INVESTIGATOR

Gerald L. Baum, M.D.  
Director, Pulmonary Division  
Chaim Sheba Medical Center  
Tel Hashomer, Israel

TITLE

Hypersensitivity Lung Disease in Animal Workers

SUMMARY

Survey of persons whose profession puts them into contact with animals will be made to determine the prevalence of hypersensitivity lung disease, specific antigen sensitivity, and characteristics of the subject immune response. The prevalence of respiratory illness will be estimated by a respiratory questionnaire while the sensitivity to antigens will be assayed by immediate-type skin testing, determination of presence of precipitating antibody, total IgE levels, and specific IgE antibody levels to relevant antigens. Some insight into immune response of the host will be obtained by doing bronchial challenge testing with relevant animal antigens as well as doing eosinophile counts and noting the IgE levels. Subjects will have initial simple pulmonary function studies and, complete pulmonary function studies if they are found to have clinical or laboratory evidence of hypersensitivity lung disease. Follow-up screening will be done of all subjects and those with any positive findings will have complete studies repeated yearly for at least 2 years. Subjects will include the veterinarians of Israel and a selection of animal caretaker personnel in the country. Appropriate controls will be compared for all variables except challenge testing. With this data the question of risk of becoming sensitized to relevant animal antigens should be answered for the test population. Additionally if permanent progressive damage to lung function results from prolonged contact with the source of the antigens it should be evident from this experience. Suggestions for possible desensitization treatment may result from careful analysis of the sources of antigen sensitization such as urine and serum of the relevant animals as well as the usual skin and hair sources previously studied.

PUBLICATIONS

None

UNIVERSITY OF CINCINNATI  
Cincinnati, Ohio

GRANT NUMBER: 1 R01 OH00796-01

PRINCIPAL INVESTIGATOR

William R. Burg, Ph.D.  
Associate Professor  
Department of Environmental Health  
Kettering Laboratory  
University of Cincinnati  
3223 Eden Avenue  
Cincinnati, Ohio 45267

TITLE

Aflatoxin Exposures of Agricultural Workers

SUMMARY

Recent studies have shown that prior to harvest, corn can become highly contaminated with the mold, *Aspergillus flavus*. The extent and degree of the contamination have been linked to weather conditions and damage to the ears by insects. The mold can become established on the surface of the kernels or, if the insects bore a hole in the kernel to lay eggs, internal contamination of the kernels also occurs. Along with a number of other metabolites, *Aspergillus flavus* produces several compounds called aflatoxins B<sub>1</sub>, G<sub>1</sub>, B<sub>2</sub> and G<sub>2</sub> which are among the most toxic and carcinogenic substances known. While many of the effects of aflatoxin ingestion have been well documented, the effects of inhaling aflatoxins are largely unknown.

The abrasive actions of the harvesting processes are likely to dislodge a fraction of the aflatoxin from the kernels and create a serious inhalation health hazard to combine operators, truckers and grain handlers. The purpose of this project is to determine the levels of airborne aflatoxins, to measure worker exposure levels and to assess worker health effects. Prior to harvest, corn fields in regions which have frequently shown high contaminations will be screened and the ten fields with the highest aflatoxin contamination will be selected for study. Worker exposure levels at two commercial grain elevators in the area receiving the contaminated corn will also be measured. Based on the data collected, conclusions will be prepared dealing with the needs for personal protection and the needs for future toxicological, medical, and epidemiological studies.

PUBLICATIONS

None

UNIVERSITY OF IOWA  
Oakdale, Iowa

GRANT NUMBER: 1 R01 OH00825-01

PRINCIPAL INVESTIGATOR

Kelley J. Donham, M.S., D.V.M.  
Institute of Agricultural Medicine and  
Environmental Health  
University of Iowa  
Oakdale, Iowa 52319

TITLE

Respiratory Hazards of Swine Confinement Workers

SUMMARY

A recent trend in livestock production is the use of enclosed or confinement systems for increased economical production of animal protein. Design of these buildings has not considered potential health hazards that exist for agricultural workers. Preliminary data offers strong evidence that occupational health hazards exist, particularly with respect to the respiratory system.

This project consists of epidemiologic, clinical and environmental studies designed to document and characterize the extent that disease occurs in swine confinement workers with particular emphasis on respiratory disease, and to characterize certain parameters of gases and particulates in the work environment to provide data whereby industrial hygiene techniques may be applied to improve the environment.

Epidemiological studies will use data collected by mail and personal interview surveys to quantify the exposed population, characterize symptoms, and establish a data base to develop cohorts for the clinical studies. Clinical studies involving 4 separate cohorts, including a cross-sectional, two environmental challenge studies, and a study of severely affected individuals will be performed to identify etiology of and predict symptoms and effects of chronic exposure. Animal studies will be carried out to predict pathological effects on the human respiratory tract. Environmental studies will include characterization of particulates in the work environment, quantitation of trace toxic gases, and measurement of gases evolved from the manure pit under different environmental variables.

PUBLICATIONS

None

CITY OF HOPE MEDICAL CENTER  
Duarte, California

GRANT NUMBER: 1 R01 OH00914-01

PRINCIPAL INVESTIGATOR

Charles Mittman, M.D.  
Director, Respiratory Disease Department  
City of Hope Medical Center  
1500 East Duarte Road  
Duarte, California 91010

TITLE

Lung Cancer Screening of Workers at High Risk

SUMMARY

This is, a 5-year prospective health screening of 8000 coke-oven workers at high risk of bronchogenic carcinoma to (1) Evaluate the effectiveness for the early detection of lung cancer by estimating the sensitivity and specificity of serum carcinoembryonic antigen (CEA) and DNA content of exfoliated bronchial epithelial cells; (2) Contrast that effectiveness with that of concomitant screening using chest x-rays and exfoliative bronchial cytology; (3) Determine the histologic types of bronchogenic carcinoma found in these workers and to relate these findings to those above; and (4) Examine the relationship in the development of bronchogenic carcinoma between metaplasia, dysplasia and anaplasia in exfoliated bronchial epithelial cells and to correlate the cytomorphologic findings with the DNA content (ploidy) of the cells.

Baseline biologic screening tests will be performed and personal, smoking, occupational and medical histories will be obtained from all subjects at the inplant medical facilities. Specimens and data will be sent to the City of Hope for analysis and evaluation. Then the screening will be performed semiannually in those workers specified by federal regulations; and annually in the others. The screening test battery will consist of a chest x-ray and samples of sputum and blood. Statistical specificity procedures will be used to evaluate the validity of these tests; and "stepwise" discriminant analysis, to evaluate their cancer-screening capability over specific time periods.

The experience derived from this research will be used to formulate a medical surveillance, intervention and control strategy appropriate not only to coke oven workers, but also both to other occupational groups and to those in general community who are at high risk of developing lung cancer.

PUBLICATIONS

None

UNIVERSITY OF MARYLAND  
College Park, Maryland

GRANT NUMBER: 1 R01 OH00735-02

PRINCIPAL INVESTIGATOR

Arthur T. Johnson, Ph.D.  
Assistant Professor  
Sports Medicine and Physical Fitness Center  
University of Maryland  
College Park, Maryland 20742

TITLE

Respiratory Stress and Occupational Respirator Wear

SUMMARY

In order to (1) improve mask design criteria based on biomedical evidence from respiratory stress in working humans, and (2) clarify criteria for medical surveillance of mask wearers based on improved knowledge of respiratory stress and mask wear, this project will (1) experimentally establish exhalation time as the parameter characterizing the degree of respiratory stress during physical exertion, and (2) theoretically establish the ability to predict exhalation time from human and mask parameters. Specifically, the project will involve six tasks: (1) develop the airflow perturbation device to measure airways resistance in exercising humans, (2) develop models to predict respiratory period and inhalation/exhalation time ratio from human and mask data, (3) determine exhalation time variations with age, sex, and physical condition, (4) correlate exhalation time with sedentary pulmonary function measurements, (5) measure airways resistance changes at exhaustion in respiratory stress - limited exercise, (6) determine if oxygen uptake is limited by respiration at exhaustion. This research is to be a broadly-based, multidisciplinary attempt to solve several perennial problems in occupational safety and health.

PUBLICATIONS

None

NORTH CAROLINA STATE UNIVERSITY  
Raleigh, North Carolina

GRANT NUMBER: 1 R01 OH00744-01A1

PRINCIPAL INVESTIGATOR

Solomon P. Hersh, Ph.D.  
Charles A. Cannon Professor of Textiles  
North Carolina State University  
P. O. Box 5006  
Raleigh, North Carolina 27607

TITLE

Methods for Reducing Exposure to Cotton Dust

SUMMARY

The objective of this research is to investigate methods for reducing the concentrations of cotton dust in the workplace utilizing less costly and more effective techniques than those currently available. The methodology to be employed in the proposed research is to process cotton in an isolated model card room, measure the dust concentration generated in the room on a large variety of aerosol samplers, and to collect the airborne respirable cotton dust for study by other investigators. Cottons of known genetic, growing cultivating, harvesting, ginning, and processing history will be processed to determine the influence of these factors on dust concentrations. Intervention studies, such as steaming and processing variations such as the use of antistatic finishes and lubricants will be carried out. The influence of blending with synthetic fibers will also be examined. Additional benefits expected to be realized from the study include assessment of the suitability of using alternative simpler sampling devices, and collecting relatively large quantities of documented samples of respirable cotton dust which can be utilized by other investigators for chemical, biological, and medical studies.

PUBLICATIONS

None

UNIVERSITY OF CINCINNATI  
Cincinnati, Ohio

GRANT NUMBER: 5 R01 OH00755-02

PRINCIPAL INVESTIGATOR

Howard E. Ayer  
Professor of Environmental Health  
Department of Environmental Health  
University of Cincinnati  
College of Medicine  
3223 Eden Avenue  
Cincinnati, Ohio 45267

TITLE

Control of Indoor Air Contaminants

SUMMARY

Factors governing the behavior of air contaminants within a few meters of point sources - micrometeorology - will be examined. Theoretical and/or empirical equations for prediction of exposures of people within 1 m. and from 1 to 10 m. of indoor sources will be developed. The methods which minimize exposures to toxic or irritating aerosols and vapors with the lowest energy expenditure will be described. Methods will be applicable to control of side-stream cigarette smoke and various domestic, commercial and industrial indoor air contaminants.

Experiments will be conducted in a 3 x 3 x 3 m. chamber equipped with separate and controllable inlet and exhaust ventilation. Thermal point sources and organic solvent contamination sources will be simulated, their behavior measured and described under varying ventilation conditions. Typical general ventilation configurations will be modeled. Methods of estimating mixing ("K") factors for widely varied ventilation conditions will be developed and tested. A procedure for calculating potential exposures to health-damaging aerosols and vapors, including cigarette smoke, in public places and industry will be published.

PUBLICATIONS

None

UNIVERSITY OF CINCINNATI  
Cincinnati, Ohio

GRANT NUMBER: 1 R01 OH00774-02

PRINCIPAL INVESTIGATOR

Klaus Willeke, Ph.D.  
Department of Environmental Health  
University of Cincinnati  
College of Medicine  
3223 Eden Avenue  
Cincinnati, Ohio 45267

TITLE

Sampling Efficiencies of Personal Particulate Samplers

SUMMARY

Personal samplers for the monitoring of industrial air environments sample air at the lowest possible flow rates in order to keep the instrument weight at a minimum. The efficiency of drawing airborne particulates to the sampler's inlet face and of transporting the particles from the inlet face through the inlet configuration to the particle collection medium is dependent on the volumetric air flow rate, inlet geometry, particle size and particle adhesion to the inside walls of the sampler. Except for some respirable dust standards, most present federal standards require that particles of all sizes be sampled by means of an open-face filter holder or by a closed-face filter holder with a small inlet hole.

In this work, the presently regulated inlet designs will be tested for their sampling efficiency as a function of particle size, particle adhesion, ambient air velocity and sampler's orientation relative to the ambient air flow direction. The sampler inlets will be tested in a wind tunnel. The overall sampling efficiency of the open-face filter holder will be determined by sampling fluorescent-dye tagged aerosols. The overall sampling efficiency of the inlet holes will be determined by sampling aerosols through the inlet into an optical single particle counter sensor. The sampling efficiency up to the inlet face will be distinguished from the losses in the inlet through the difference in performance of liquid versus bouncy, solid particles. By means of another new technique, utilizing hypodermic needle feeding of aerosols, particles will be placed into specific locations of the flow field surrounding the inlet, and the sampling efficiency will be derived from the individual particle trajectories relative to the inlet. The latter technique, in particular, is expected to result in a better understanding of inlet performances and may provide a basis for improved inlet designs suitable for future standard setting.

PUBLICATIONS

None

UNIVERSITY OF MASSACHUSETTS  
Amherst, Massachusetts

GRANT NUMBER: 1 R01 OH00811-01

PRINCIPAL INVESTIGATOR

Thomas P. Cullinane  
Associate Professor  
Industrial Engineering and  
Operations Research  
University of Massachusetts  
Amherst, Massachusetts 01003

TITLE

Better Hygiene Through Systematic Equipment Location

SUMMARY

The intention of this research effort is to develop a quantitative procedure for determining the best location for contaminant, stress, or hazard producing equipment within the working environment. The optimization criteria employed will be the minimization of workers' exposures to undesirable environmental factors and stresses. It will be demonstrated that through the use of mathematical modeling techniques a procedure can be developed that will aid in the determination and selection of the best or least threatening location within a specified area (plant, department, etc.) for operating a piece of equipment or process that produces contaminants, stresses, or hazardous conditions. To enhance implementation of the procedure a computer program and user's guide will be developed.

PUBLICATIONS

None

COLORADO SCHOOL OF MINES  
Golden, Colorado

GRANT NUMBER: 1 ROI OH00822-01

PRINCIPAL INVESTIGATOR

Franklin D. Schowengerdt  
Associate Professor  
Department of Physics  
Colorado School of Mines  
Golden, Colorado 80401

TITLE

Coal Dust Control by Condensation Enlargement

SUMMARY

This is a research and development effort aimed at applying the concept of condensation enlargement to the problem of controlling respirable coal dust in underground mines. A laboratory prototype dust collection system will be designed, constructed, and evaluated. This system will consist of a parallel-plate condensation conditioner, inside of which the dust particles will nucleate water droplets and grow to collectable sizes, followed by a water spray. Design calculations are presented here which indicate that the basic design is feasible in terms of size, air handling capacity, dust load capacity, and water and energy consumption. The proposed concept has advantages of very high efficiency, quietness of operation, no high voltages or potential for sparking, low water consumption, moderate energy consumption, and simplicity. The design will be based on data obtained previously in this laboratory on nucleation and water droplet growth on coal dust. The evaluation experiments will consist of measurements of output droplet sizes, coal dust transmission, and water and energy consumption. During the evaluation, design parameters will be optimized for application to a full-scale model to be built and tested in the later phases of the program. The ultimate objective of the research is the development of a dust collection system having the potential for greatly decreasing respirable dust concentrations in coal mines.

PUBLICATIONS

None

UNIVERSITY OF SOUTH CAROLINA  
Columbia South Carolina

GRANT NUMBER: 1 R01 OH00838-01

PRINCIPAL INVESTIGATOR

Charles E. Feigley, Ph.D.  
School of Public Health  
University of South Carolina  
Columbia, South Carolina 29208

TITLE

Control of Volatile Materials in Surface Coatings

SUMMARY

The overall objective of this investigation is to develop methods of estimating the ventilation requirements for controlling the toxicity and explosion hazards resulting from volatile release from surface coatings. The method will explicitly account for the effects of important variables which affect the rate of volatile evolution. Specifically, an experimental method of measuring the rate of volatile evolution from surface coatings is to be developed. This method is then to be used to investigate the effects of air velocity over the surface, air temperature, substrate materials, and coating composition on rates of volatile evolution. Several industrially important coating materials are to be studied. The final objective is to utilize the theory of volatile loss from coatings to apply the experimental information to the estimation of volatile evolution rates and ventilation requirements in realistic work situations.

The volatile evolution rate of samples tested is to be measured by monitoring the concentration of volatiles in the air in a recirculating enclosure using gas chromatography and infrared absorption.

PUBLICATIONS

None

UNIVERSITY OF ARIZONA  
Tucson, Arizona

GRANT NUMBER: 1 R01 OH00860-01

PRINCIPAL INVESTIGATOR

Hiroshi Muramoto, Ph.D.  
Associate Professor of Plant Sciences  
Plant Science Department  
University of Arizona  
Tucson, Arizona 85721

TITLE

Developing Cotton Cultivars With Caducous Bracts

SUMMARY

Byssinosis or "Brown-lung" disease afflicts over one-half million textile workers in the United States of America. The main cause of this disease is believed to be the fine cotton dust of organic origin, most of which comes from the small dry, leaf-like appendages to the boll called bracts. All commercial cotton varieties have persistent bracts which adhere to the seed cotton as it matures. The mechanical harvesting operation shatters the brittle bracts which are mixed with the seed cotton, and upon ginning, becomes a major constituent of organic dust in the lint cotton. Water extract of dried bracts are biologically active, and are known to cause byssinotic symptoms in humans, while water extract of other cotton plant parts are asymptomatic. A type of hexaploid cotton that drops its bracts before the bolls opens has been developed in Arizona. This trait, called caducous bracts, is being transferred to tetraploid cotton cultivars in a breeding program. The transfer of caducous bract to cotton cultivars involves hybridization, back cross breeding, and selfing of plants with different chromosome numbers.

PUBLICATIONS

None

NORTH CAROLINA STATE UNIVERSITY  
Raleigh, North Carolina

GRANT NUMBER: 1 R01 OH00953-01

PRINCIPAL INVESTIGATOR

Franklin D. Hart, Ph.D.  
Professor of Mechanical and  
Aerospace Engineering  
Center for Acoustical Studies  
Box 5801  
North Carolina State University  
Raleigh, North Carolina 27650

TITLE

Control Technology Demonstration - Furniture Industry

SUMMARY

Considerable progress has been made in developing control technology to significantly reduce noise exposure through engineering means from many sources in the furniture industry. Greater progress could be made in implementation if the feasibility and cost factors were better understood. The objective of this project is to carry out and fully document a demonstration program of feasible control technology for reduction of noise from woodworking machinery in the furniture industry including an economic impact analysis.

PUBLICATIONS

None

THE PENNSYLVANIA STATE UNIVERSITY  
University Park, Pennsylvania

GRANT NUMBER: 1 R01 OH00959-01

PRINCIPAL INVESTIGATOR

Robert J. Heinsohn, Ph.D.  
Professor of Mechanical Engineering  
The Pennsylvania State University  
301 Mechanical Engineering Bldg.  
University Park, Pennsylvania 16802

TITLE:

Design and Demonstration of a Ventilation System

SUMMARY

This research proposes to design and demonstrate an industrial ventilation system for portable welding and grinding and to develop a computer-aided design program that can be used by engineers to design similar ventilation systems. The computational procedure will enable designers to compute air velocities, particle trajectories, and contaminant concentrations in the region between the contaminant source and a hood configuration of his choosing. The program will be written so that the designer can easily change the hood configuration to recalculate the above and assess how changes in the design affect the hood's performance. The program provides designers a capability they presently do not have, the ability to quickly and quantitatively assess the affects of changing the hood configuration and exhaust flow rate.

PUBLICATIONS

None

JOHN B. PIERCE FOUNDATION LABORATORY  
New Haven, Connecticut

GRANT NUMBER: 5 R01 OH00647-03

PRINCIPAL INVESTIGATOR

Jan A. J. Stolwijk, Ph.D.  
Associate Director  
John B. Pierce Foundation Laboratory  
290 Congress Avenue  
New Haven, Connecticut 06519

TITLE

Continuous Optical Monitoring of Asbestos in Air

SUMMARY

The investigators plan to develop and test a continuous monitor for the identification and counting of asbestos fibers in the ambient air, and in the occupational and residential environment. The instrument determines the size and asymmetry of dilute suspension of particles largely compared with the wavelength of incident polarized light by measuring the scattering, birefringence or dichroism of the particle as it is aligned, through an external moderate-sized electric field, first parallel to and then perpendicular to the incident polarized light. The instrumental technique is based upon theoretical considerations of the behavior of particles in an induced electric field and the ability of a material to become polarized. The determination of these characteristics may be translated into particle identification, dimension and their absolute amounts.

PUBLICATIONS

None

MT. SINAI SCHOOL OF MEDICINE  
New York, New York

GRANT NUMBER: 5 R01 OH00682-02

PRINCIPAL INVESTIGATOR

Irving J. Selikoff, M.D.  
Professor of Community Medicine  
The Mount Sinai School of Medicine  
100th Street and Fifth Avenue  
New York, New York 10029

TITLE

Shipyard Asbestos Disease: Low-Level Exposure Effects

SUMMARY

A clinical study is being conducted of a large number of currently employed shipyard workers. The spectrum of trades included in this study will provide appropriate information concerning the prevalence of asbestosis and asbestotic pleural abnormality, although it is unlikely that many neoplasms will be found. Specifically, we will analyze findings in relation to both direct asbestos exposure and indirect exposure ("bystander disease"). The latter is particularly important in shipyard work, since only approximately 0.5% of employees have been directly exposed in their work, but very large numbers of other workers have been indirectly exposed (painters, electricians welders, carpenters, pipefitters, machinists, boilermakers, laborers, lead bonders, inspectors, etc.). The experience of these men will provide information concerning the risk of asbestos disease, particularly cancer with indirect intermittent, "low-level" exposure. Further, an epidemiological mortality study will be undertaken, to analyze the experience of a cohort of approximately 4,000 shipyard workers, characterized by trade, employed in a major eastern shipyard in 1967 for at least 10 years and traced through 1975. Since many of these men began work (and asbestos exposure) during 1940-1955, their experience will provide important information concerning the cancer risk associated with asbestos shipyard exposure.

These data will provide information concerning two important questions: the extent and nature of asbestos-associated disease with low-level, intermittent, episodic asbestos exposure, an important problem in much of American industry, including construction and shipyard work. Second, there are now almost 4,000,000 Americans currently engaged in shipyard work or formerly so employed at sometime during the period 1940-1975. Available information indicates that this is a group at high risk of developing cancer in the future. It is anticipated that the information in this investigation will assist in identifying criteria for the development of an optimum medical surveillance program, a matter of considerable practical importance.

## PUBLICATIONS

Selikoff, I.J. and Hammond, E.C. 1978. Asbestos-associated disease in United States shipyards. *Ca-A Cancer Journal for Clinicians*. 28(2):87-99.

Selikoff, I.J. Cancer risk of asbestos exposure 1977. In: *Origins of Human Cancer*. Eds. H.H. Hiatt, J.D. Watson and J.A. Winsten. Cold Spring Harbor, N.Y., Pp. 1765-1784.

Selikoff, I.J. Perspectives in preclinical management of cancer 1977. Initiation of a mesothelioma therapy research program. *Mount Sinai J. Med.* 44(5): 645-647.

Rom, W., Thornton, J., Miller, A., Lillis, R. and Selikoff, I.J. 1977. Abnormal spirometry in shipyard workers with pleural disease. *Am. Rev. Respir. Dis.* 115(4, part 2):239. (Abstract).

Selikoff, I.J. Air pollution and asbestos carcinogenesis: Investigation of possible synergism 1977. In: *International Carcinogenesis Meeting, 2nd, Hanover, Germany, 1975. Proceedings. Air Pollution and Cancer in Man*. Eds. Mohr, U., Schmahl, D. and Tomatis, L. Lyon, International Agency for Research on Cancer. pp. 247-253.

Kannerstein, M., McCaughey, W.T.E., Churg, J. and Selikoff, I.J. 1977. A critique of the criteria for the diagnosis of diffuse malignant mesothelioma. *Mount Sinai J. Med. N.Y.* 44(4):485-494.

Auerbach, O., Hammond, E.C., Selikoff, I.J., Parks, V.R., Kaslow, H.D. and Garfinkel, L. 1977. Asbestos bodies in lung parenchyma in relation to ingestion and inhalation of mineral fibers. *Environ. Res.* 14:286-304.

UNIVERSITY OF VERMONT  
Burlington, Vermont

GRANT NUMBER: 1 R01 OH 00888-01

PRINCIPAL INVESTIGATOR

Brooke T. Mossman, M.D., Ph.D.  
Rm A-151 Medical Alumni Building  
Department of Pathology  
University of Vermont  
College of Medicine  
Burlington, Vermont 05405

TITLE

Cocarcinogenic Mechanisms of Asbestos

SUMMARY

An association has been established between environmental and occupational exposure to asbestos and the occurrence of neoplasms of the respiratory tract. The incidence of bronchogenic carcinoma in asbestos workers who smoke is increased significantly as compared to non-smokers. At present, the biologic mechanisms by which asbestos acts as a cocarcinogen are unclear. Experiments in this laboratory suggest that asbestos serves as a "carrier" of polycyclic hydrocarbons (PCH) into the cell. In addition, asbestos induces hyperplasia and squamous metaplasia of the respiratory tract basal cells, an effect intrinsic to carcinogenesis.

This study is designed to answer the following questions: 1) Does the binding (or adsorption) of PCH by asbestos relate to the structure, chemical composition and surface charge of the fiber, and does this affinity correlate with the carcinogenic potential of the asbestos? 2) What is the mechanism whereby asbestos increases the uptake of PCH by the cell and what are the structural and biochemical events in the cell that result in carcinogenic transformation? 3) Does asbestos act as a classical "tumor promoter" (i.e. does it induce nucleic acid and protein synthesis and the activity of certain characteristic enzyme systems)? Studies will be designed to assess comparatively the effects of sized preparations of crocidolite and chrysotile asbestos in assays using tracheal organ cultures, grafts of trachea in syngeneic animals and monolayers of tracheal epithelial cells.

PUBLICATIONS

None

CORNELL UNIVERSITY  
Ithaca, New York

GRANT NUMBER: 1 R01 OH00910-01

PRINCIPAL INVESTIGATOR

Roger L. Barker, Ph.D.  
Asst. Prof. of Textile Science  
Dept. of Design & Environmental Analysis  
Cornell University  
Ithaca, New York 14853

TITLE

Asbestos Substitute Fabrics For Safety Clothing

SUMMARY

The principal objective of the proposed research is to evaluate heat resistant fabrics for use in specialized safety clothing and thermal barriers for the protection of industrial workers who are exposed to occupational hazards in the form of intense heat or flame, or who may suffer serious burn injuries as the result of the handling of hot materials. Asbestos is traditionally used to make heat-resistant fabrics. The health risks associated with the production of asbestos materials have been formally recognized by OSHA. However, new high-temperature fibers and fabrics are available and the technology exists to evaluate these new materials to determine which are acceptable alternatives to asbestos. The program of comparative testing and evaluation proposed by this research will identify and test a variety of fire-resistant fabrics. The thermal response and physical properties of the fabrics will be measured. Because the program of testing will be sufficiently designed to competitively rank the performance of the fabrics that are tested, this research will provide a unique and highly necessary resource that will contribute to the scientific knowledge concerning the properties of high-temperature textiles, make the design of superior thermal protective materials for industrial applications possible, and make choices concerning replacement alternatives for asbestos in the American workplace easier and better informed.

PUBLICATIONS

None

PRINCIPAL INVESTIGATOR

Franz Halberg, M.D.  
Chronobiology Laboratories  
380 Lyon Laboratories  
Laboratory Medicine & Pathology  
University of Minnesota  
Minneapolis, Minnesota 55455

TITLE

Repeated Schedule-Shifts, Rhythms and Life Span of Mice

SUMMARY

The objectives of this study are to investigate lifespan and circadian rhythms in rodents subjected to repeated shifting of synchronizers (daily lighting and/or feeding schedules). Possible contributory factors to be examined are 1) age at first exposure; 2) interaction of synchronizers; 3) frequency of shifting; 4) extent of shift; and 5) direction of shift. These studies on a few well-controlled models relate to possible adverse or beneficial effects of shift-work in human beings.

Currently work schedules are empirical and dictated largely by sociologic considerations. Optimization, once it is documented in experimental animals (in physiologic terms, i.e., in terms of life duration and quality) may eventually lead to physiologic optimization in human beings as well.

PUBLICATIONS

Carandente, F., E. Halberg and F. Halberg 1978. Zirkadian-Periodic and Magengeschwur. Fortschritte der Medizin 96: 983-988.

Bazin, R., M. Apfelbaum, R. Assan, L. Brigant, P. De Gasquet, S. Griglio, F. Halberg, X. Lelievre, J. Longchamp, M. Malewiak, E. Planche, R. Rozen and N.T. Tonnu. 1978. Redistributing proportions of food at conventional meal times, reschedules differentially hormones and substrates involved in energy metabolism. Chronobiologia 5: 203.

Bazin, R., M. Apfelbaum, R. Assan, F. Halberg and P. de Gasquet. 1978. Timing of meals manipulates amplitude and acrophase of circadian rhythms in human plasma insulin. Chronobiologia 5: 203-204.

Brockway, B.P., M. Kaveh, E.W. Powell, L.E. Scheving and F. Halberg. 1978. Transient partial frequency demultiplication of intraperitoneal temperature rhythms in Fischer rats by desynchronization with 48-h cycles of lighting and feeding. *Chronobiologia* 5: 343.

GEORGIA INSTITUTE OF TECHNOLOGY  
Atlanta, Georgia

GRANT NUMBER: 1 R01 OH00777-01

PRINCIPAL INVESTIGATOR

Judi Komaki, Ph.D.  
Georgia Institute of Technology  
Engineering Experiment Station  
Atlanta, Georgia 30332

TITLE

A Behavioral Approach: Motivational/Financial Impact

SUMMARY

The purposes of this research are (a) to further develop, implement, and evaluate a select psychological technique, the behavioral approach, in improving the health and safety practices of employees in a medium-sized plant in the food industry and (b) to assess the financial benefits of these improved practices, using the human resource accounting method. To avoid problems associated with the traditional indices, a direct observational technique will be used. Desired health and safety practices will be identified, permitting construction of observational codes suitable for observing workers' performance. Observers will record whether or not workers perform selected incidents safely or unsafely while on-the-job. A behavioral analysis will be conducted to determine what might be maintaining unsafe practices and hindering healthful acts. In particular, it will be determined whether there is any positive reinforcement for desired behaviors and whether there are any immediate consequences for unhealthful acts. The intervention will consist of the presentation and explanation of the desired behaviors, as well as frequent, low-cost reinforcement in the form of feedback. First, it will be determined how much employees already know about the proper work procedures. Pairs of slides depicting safe and unsafe practices will be used. Then employees will be told about potential health hazards and will be instructed on the requirements of the work procedures. Thereafter, each time supervisors make observations, they will post the percentage of incidents performed safely by the group on a graph prominently posted in each department. Supervisors will also be encouraged to recognize instances of desired performance. A multiple-baseline design across groups will be used. Baseline data will be collected in two different groups; the intervention will be introduced at staggered intervals. The financial impact of improved health and safety practices will be determined by disaggregating appropriate costs and computing the organization's total nonproductive dollar.

PUBLICATIONS

None

ILLINOIS INSTITUTE OF TECHNOLOGY  
Chicago, Illinois

GRANT NUMBER: 1 R01 OH00917-01

PRINCIPAL INVESTIGATOR

Donald I. Tepas, Ph.D.  
Chairman and Professor of Psychology  
Department of Psychology  
Illinois Institute of Technology  
11T Center  
Chicago, Illinois 60616

TITLE

The Sleep of Shift Workers

SUMMARY

Little is known about the sleep of American shift workers despite the fact that a large and perhaps growing segment of the U.S. labor force is employed on jobs utilizing shifts. This research study is examining the effects of shiftwork on sleep and related behavior in a comprehensive manner using survey, clinical, laboratory and interview methods. Appropriate measures of electroencephalogram sleep stages, evoked brain response, body temperature, urine volume, mood, and performance are being made in the laboratory with the members of this worker population. Standardized evaluation instruments are being used to assess the personality, job satisfaction, medical history, adjustment, and mood states of the men and women participating in the study. Interview data concerning the sleep, health, adjustment, home and community life of these workers is being collected. Workers studied include those on day, afternoon and night schedules as well as workers employed on changing (rotating) shift systems. The influence of job duties, work shift and work shift experience is being examined as well as the degree of flexibility the worker has in determining his or her starting and/or quitting time. The results of this study will provide new quantitative information on how shift work is related to sleep as well as the general health and safety of working men and women.

PUBLICATIONS

None

UNIVERSITY OF CALIFORNIA  
LaJolla, California

GRANT NUMBER: 5 R01 OH00404-04

PRINCIPAL INVESTIGATOR

Alan M. Nahum, M.D.  
University of California Medical Center  
225 West Dickinson  
San Diego, California 92103

TITLE

Prevention of Accidental Head Injury

SUMMARY

The objective of the project is to correlate postconcussive states (ranging from minimal to severe) in primates with associated impact forces and physiologic parameters of brain function. By means of examinations of cadavers, the researchers are attempting to relate their findings to man. A principal function is the attempt to develop a reproducible, experimental, and mathematical model relating head injury with the various force parameters. Implantation of a floating electrode within the primate brain is used to determine unit discharges from central locations so as to provide electroencephalographic information. This information is more informative than comparable information obtained from surface electrodes.

High speed motion picture photography is used to record kinematics of impact and permit calculations of rotational acceleration. After impact, physiologic and clinical measurements of depth and duration of concussion are made continuously. Recordings of impedance, EEG, intracranial pressure, and multiple unit activity continue. Skull X-rays are also obtained.

PUBLICATIONS

1. Pressure Relationships in the Protected and Unprotected Head. Proceedings of 23rd Stapp Car Crash Conference. (in press).
2. Nahum, A.M., et. al. 1977. Intracranial pressure dynamics during head impact. Proc. 21st Stapp Car Crash Conference.
3. Nahum, A.M., 1947. Prediction of maxillo-facial trauma. Trans. AA00. 84: 932.
4. Nahum, A.M., and Smith, R.W. 1976. An experimental model for closed head impact injury. Proc. 20th Stapp Car Crash Conference.

5. Nahum, A.M., 1975. Prevention of accidental head injury. DHEW (NIOSH) 75-143 Personal Protection.

UNIVERSITY OF CALIFORNIA  
Berkeley, California

GRANT NUMBER: 1 R01 OH00766-01A1

PRINCIPAL INVESTIGATOR

Werner Goldsmith, Ph.D.  
Professor of Applied Mathematics  
Department of Mechanical Engineering  
6129 Etcheverry Hall  
University of California  
Berkeley, California 94720

TITLE

Fracture Resistance of Ophthalmic Lens/Frame Systems

SUMMARY

This proposal will investigate the response of a complete eye-glass system to impact by various objects on the lens in order to ascertain the fracture potential of such glasses. This topic is of considerable importance in assessing and reducing the hazard to the wearer of eyeglasses from splinters being driven into the eyeball as the result of disintegration of the ophthalmic lens when struck by particles commonly found in industrial, recreational, home and ordinary daily environments. The current FDA requirement for lens prescriptions sets an artificial standard for their survival under specified drop test conditions; previous preliminary experiments have indicated that one of the most important factors in such survival is the lens-frame interaction which has not been seriously considered (relative to the strength of the lens itself) as a basic consideration in the design of safety standards.

The study will involve a coordinated experimental and theoretical approach to determine the history of stress, strain, and deformation in the system so that a better combination of both material and configuration of the lens and supporting structure can be fabricated as a result of the program. The effect of various mounting methods, including bevel configuration and eyewire grooving, on the frangibility of the system will be investigated. The correlation of data and analytical prediction of displacement and stresses from such investigation will permit an assessment of the validity of the model and will then allow the employment of the latter as a design tool to permit the construction of safer lens-frame combinations.

PUBLICATIONS

None

STATE UNIVERSITY OF NEW YORK  
Buffalo, New York

GRANT NUMBER: 1 R01 OH00820-01

PRINCIPAL INVESTIGATOR

Colin G. Drury, Ph.D.  
Department of Industrial Engineering  
SUNY at Buffalo  
342 Bell Hall  
Amherst, New York 14260

TITLE

Increased Safety in Carrying Bulky Objects

SUMMARY

This project is a pilot study to obtain data on optimum placement of lifting and carrying handles on awkward, bulky objects. Manual materials handling, accounting for about 25-30% of compensable injuries, has been recognized by NIOSH as a significant safety hazard and a significant research area. Within this area the problem of design and placement of handles, or other devices to couple the material to the human operator, has emerged as one with inadequate data to provide usable recommendations to designers.

This research has as its objective the determination of the optimum position and angle of carrying handles on bulky cubic boxes--a frequently-encountered manual materials handling object. Ten subjects, chosen to represent the adult male population, will each perform a holding task using three box sizes, two box weights and nine handle positions. Measurements will be taken of arm forces required, angle of handle, heart rate and subjective ratings of local and general exertion. Biomechanical analysis of results will include an evaluation of the role of body/box friction in manual materials handling tasks.

PUBLICATIONS

None

UNIVERSITY OF KENTUCKY  
Lexington, Kentucky

GRANT NUMBER: 1 R01 OH00849-01

PRINCIPAL INVESTIGATOR

Ira J. Ross, Ph.D.  
Professor of Agricultural Engineering  
Room 130  
Agricultural Engineering Department  
University of Kentucky  
Lexington, Kentucky 40506

TITLE

Safety in Grain Bins

SUMMARY

The number of deaths occurring in grain storage bins has been rising in recent years primarily as a result of the increased use of on-the-farm storage and automatically controlled bin unloading equipment. The overall objective of this project is to determine the exact nature of the physical circumstances involved in these accidents and to provide design data which can be used to develop safety equipment, procedures, and standards for their prevention. More specifically the aims are to:

1. Determine the magnitude and character of forces acting on a person trapped in a mass of grain flowing to a bin outlet from bulk storage under normal and faulty grain conditions.
2. Develop equipment and procedural criteria for preventive safety and emergency techniques to (a) avoid and/or minimize risk for a person entering a grain bin and (b) carry out search, sustain life, and complete rescue.

A large grain bin will be used for testing with manikins. A variety of potential safety procedures are being considered and it is anticipated that experience gained from actual testing will suggest others. The ultimate contribution of the project will be a reduction in the number of deaths that occur annually in grain bin accidents.

PUBLICATIONS

None

UNIVERSITY OF ILLINOIS AT CHICAGO CIRCLE  
Chicago, Illinois

GRANT NUMBER: 5 R01 OH00514-05

PRINCIPAL INVESTIGATOR

Albert B. Schultz, Ph.D.  
Professor of Mechanical Engineering  
Department of Materials Engineering  
University of Illinois at Chicago Circle  
Box 4348  
Chicago, Illinois 60680

TITLE

Back Injuries: Mechanical Stresses in the Human Spine

SUMMARY

The objectives of this research are (1) to analyze the three-dimensional force systems that act in the human spine during industrial handling and lifting tasks; (2) to analyze the mechanical stresses within the intervertebral motion segments caused by these systems.

Basic features of the program are (1) the use of computer-generated analogs of the entire thoracolumbar spine and finite-element model of single intervertebral motion segments, and (2) the use of experimental data to ensure that the models are valid, and to confirm predictions made from model-obtained results.

The results of these studies may lead to significant breakthroughs in learning how the incidence and severity of industrial back injuries can be reduced.

PUBLICATIONS

Schultz, A.B., "Biomechanics of the Spine and Trunk," Ch. 15 in Orthopaedic Engineering; A Treatise, Katz, J.L. and Mow, V.C., editors, Marcel Dekker, New York.

Schultz, A.B., et. al. 1977. Voluntary Strengths of Male Adults with Acute Low Back Syndromes. Clinical Orthopaedics and Related Research. 129:84-95.

Schultz, A.B., et. al. 1976. Roentgenographic Evaluation of Vertebral Rotation. J. of Bone and Joint Surgery. 58A:1125-1129.

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UNIVERSITY OF MICHIGAN  
Ann Arbor, Michigan

GRANT NUMBER: 5 R01 OH00679-04

PRINCIPAL INVESTIGATOR

Don B. Chaffin, Ph.D.  
2260 G. G. Brown Laboratory  
The University of Michigan  
Ann Arbor, Michigan 48019

TITLE

An Investigation of Occupational Wrist Injuries in Women

SUMMARY

This investigation seeks to ascertain the influence of intra-wrist forces as factors in the etiology of tenosynovitis and carpal tunnel syndrome, as problems of particular significance to women in industrial wrist injuries.

The investigators are conducting series of in-plant studies in workers who have developed wrist injuries and are compared with workers on the same jobs who have not developed such afflictions. Careful analyses of hand-wrist postures and force loadings are developed for a variety of jobs that have both a high incidence rate and a low incidence rate of wrist injury.

The investigations are performed at the Fisher-Body Division of General Motors Corporation, Tecumseh Plant in Michigan. Eight different jobs are studied in which at least three different operators are filmed to obtain postural information of hand positions. Force measurements are then performed to determine peak forces operating on the hand during the entire job cycle.

In addition, workers who have been identified as having carpal tunnel syndrome are to be investigated and compared to a control group.

Simulations are to be conducted for data analysis on a digital computer and a statistical approach is made for the interpretation of the data derived from the experimental and control subjects.

The results of this project should clarify the approaches to be taken diagnostically, preventatively, and therapeutically in workers especially female workers performing jobs with a high risk factor for wrist damage. The results should provide a clearer understanding of why women workers are at much greater risk than men, and it would better define those work methods which increase important tissue loading in the wrist and which are correlated with increased incidence of disorders.

PUBLICATIONS

None

UNIVERSITY OF VERMONT  
Burlington, Vermont

GRANT NUMBER: 5 R01 OH00745-02

PRINCIPAL INVESTIGATOR

John Frymoyer, M.D.  
Department of Orthopaedic Surgery  
Medical Alumni Building  
University of Vermont  
Burlington, Vermont 05401

TITLE

Vibration and Industrially Related Low Back Disease

SUMMARY

This research will attempt to clarify mechanical factors responsible for low back pain through retrospective and prospective studies. A survey of a general practice population will be performed to determine the incidence of low back disorders. Six study populations will be selected with various mechanical risk factors, and will be studied through questionnaires, psychological evaluation, and physical examination. The greatest emphasis of the study will be placed on the role of repetitive vibrational stresses. The questionnaire will determine (1) episodes of low back pain not requiring treatment, (2) episodes treated by other health care professionals, (3) disability resulting from the pain, and (4) any occupational stresses such as vibration or heavy lifting. From the retrospective study, the investigators will attempt to define age-matched volunteers from the six male population subgroups that can be used for their prospective study: those with a history of low back pain, both with and without identifiable mechanical risk factors, who have required medical attention; and those with an without identifiable mechanical risk factors who have never had any low back pain.

The prospective studies will involve five steps: giving all volunteers (1) a computerized questionnaire and (2) a standard physical examination, (3) taking AP and lateral spine radiographs, (4) doing biomechanical studies, and (5) studying individual case histories. The computerized questionnaire will include medical, historical, occupational and psychosocial variables, the latter designed to generate personality characteristics similar to those currently identified as important in the large-scale MMPI test. The standardized physical examination will include a Moire Fringe analysis of spinal posture, a Moire Fringe and a modified vectorstereographic analysis of spine motion, determinations of abdominal and extensor strength and hamstring tightness, and a standardized neurological examination.

## PUBLICATIONS

Frymoyer, JW, Pope, MH, Wilder, DG, Stokes, IA, Moreland, M. 1979. Moire fringe topography of the human body. Presented and published as Abstract at 31st ACEMB. Pending publication in Medical Instrumentation.

Pope, MN, Buturla, E., Wilder, DG, Frymoyer, JW. 1979. Changes in the form of the lumbar spine. Accepted by 7th Annual N.E. Bioengineering Conf.

Pope, MH, Wilder, DG, Stokes, IA, Frymoyer, JW: 1978: Biomechanical testing as an aid to decision making in low back pain patients. Presented at the 1978 meeting of the International Society for the Study of the Lumbar Spine. Invited paper to Symposium in decision Making in SPINE.

TEXAS TECH UNIVERSITY  
Lubbock, Texas

GRANT NUMBER: 1 R01 OH00798-02

PRINCIPAL INVESTIGATOR

M.M. Ayoub, Ph.D.  
Professor of Industrial Engineering  
and Biomedical Engineering  
Dept. of Industrial Engineering  
Texas Tech University  
Lubbock, Texas 79409

TITLE

Effects of Task Variables on Lifting Capacity

SUMMARY

There are three basic approaches for establishing criteria for Manual Materials Handling (MMH) standards of guidelines. These are the psychophysical, the physiological, and the biomechanical. These approaches have yielded data on lifting capacity which conflict. Therefore prior to the establishment of any guidelines or standards for MMH any conflicts must be resolved to determine a criterion or a set of criteria to be used for this purpose. In phase I, the proposed research is designed to achieve this end, namely, use both the physiological and psychophysical techniques to determine which of these should be used for establishing MMH guidelines or standards. The proposed work calls for three experiments using both operator and task variables to determine the capacity of lifting and develop models to predict this capacity. Both of these will be a function of the task and operator variables.

The objectives of this research are to determine whether or not a single criteria can be used for MMH standards, to establish the optimum weight/bulk ratio for containers, to determine the effects to spine twist on MMH capacity, to study the effects of training on MMH capacity, and to study the interactive effects of task variables on MMH capacity.

During Phase II of the proposed work, it is planned to carry out an intervention study where results of the phase I work as well as previous research results will be implemented in a typical industrial environment. Thus phase II will investigate the effectiveness of job redesign as well as screening techniques (for assigning personnel to jobs which are within their MMH capacities) in terms of MMH injury reduction in both frequency and severity.

PUBLICATIONS

None

UNIVERSITY OF PITTSBURGH  
Pittsburgh, Pennsylvania

GRANT NUMBER: 1 R01 OH00929-01

PRINCIPAL INVESTIGATOR

Thomas F. Mancuso, M.D., Ph.D.  
Research Professor  
Graduate School of Public Health  
University of Pittsburgh  
Pittsburgh, Pennsylvania 15261

TITLE

Occupational Health Risks of Workers in Atomic Plants

SUMMARY

This is an epidemiologic study of the long-term effects of chronic exposure to low-level ionizing radiation in normal adult industrial populations. The study involves workers employed since 1944 at nuclear facilities at Hanford, Washington; Oak Ridge, Tennessee; and three feed mill plants who have been exposed to fractionated doses of low-level ionizing radiation over a span of years and who have had their occupational radiation exposure measured and recorded on a uniform basis during their period of employment at these facilities.

The total study will involve approximately 150,000 workers as well as a matched control population. Successive cohort analyses of employee populations, with simultaneous control of employment measures, patterns, occupations and external and internal radiation measurements will be carried out. The data collected and analyzed will include both radiological and nonradiological occupational exposures.

PUBLICATIONS

None

UNIVERSITY OF FLORIDA  
Gainesville, Florida

GRANT NUMBER: 5 R01 OH00316-14

PRINCIPAL INVESTIGATOR

Kenneth C. Leibman, Ph.D.  
Department of Pharmacology  
Health Center Box J-267  
University of Florida  
Gainesville, Florida 32610

TITLE

Metabolism of Industrial Toxicants

SUMMARY

The objectives are to study the metabolism of a number of classes of organic industrial chemicals that are on the N.I.O.S.H. priority list of hazardous industrial chemicals. These include the eight polychloroethanes, the group of ally and acrylal compounds containing the CH =CH-CO group and their derivatives, and the solvent dioxane.

Currently the metabolic interrelationships of allyl alcohol, acrolein, and acrylic acid, the epoxidative metabolism of these three compounds and the further metabolism of the epoxide products are being studied. Also studied are the "double dechlorination" of polychlorinated ethanes and the cyanide release from acrylonitrile.

PUBLICATIONS

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- Patel, J.M. and K.C. Leibman. 1978. Metabolism of Allyl Alcohol and Acrolein by Rat Liver and Lung Preparations. *Pharmacologist* 20:181.
- Leibman, K.C. and E. Ortiz. 1977. Metabolism of Halogenated Ethylenes. *Environ. Health Perspect.* 21:91.
- Ackerman, D.M. and K.C. Leibmen. 1977. Effect of Experimental Diabetes on Drug Metabolism in the Rat. *Drug Metab. Disp.* 5:405.
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Leibman, K.C. and E. Ortiz. 1973. Mammalian Metabolism of Terpenoids. I. Reduction and Hydroxylation of Camphor and Related Compounds. *Drug Metab. Disp.* 1:543.

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Herschleb, W.P. and K.C. Leibman. 1972. Microsomal Metabolism of Butadiene. *Federation Proc.* 31:559.

Naeger, L.L. and K.C. Leibman. 1972. Mechanisms of Decaborane Toxicity. *Tox. Appl. Pharmacol.* 22:517.

UNIVERSITY OF MINNESOTA  
Minneapolis, Minnesota

GRANT NUMBER: 2 R01 OH00350-07A1

PRINCIPAL INVESTIGATOR

W. Dixon Ward, Ph.D.  
Department of Otolaryngology  
University of Minnesota  
Box 461 Mayo Memorial Building  
Minneapolis, Minnesota 55455

TITLE

Damage-Risk Criteria for Intermittent Noise Exposures

SUMMARY

Present damage-risk limits for exposure to intermittent noise are based on inadequate data and are therefore unrealistic. On the one hand, use of the total-immersion principle being actively promoted both on a national and international scale is generally over-conservative, since this principle assumes that the temporal pattern of noise exposure is irrelevant (only the total energy matters) and thus ignores the ability of the auditory mechanism to recuperate between noise bursts. On the other hand, damage-risk contours proposed by CHABA, based on a criterion of a particular limiting temporary threshold shift (TTS) 2 minutes after cessation of the daily noise exposure, are not only complicated and unwieldy but are under-conservative for some exposure conditions because of faulty generalizations and unjustified extrapolations involved in their preparation. This research will provide empirical data that will permit correction and simplification of the CHABA contours. Normal listeners will be exposed for 8 hours to various patterns of interrupted noise, and the TTS produced will be measured at intervals from 2 minutes to 16 hours following exposure. Noise-exposure parameters to be varied include octave-band frequency and level, rate of interruption, and noise burst duration. The effects of (1) moderate noise during "quiet" periods, (2) the presence of pure-tone components in the noise, and (3) irregular (multi-level) patterns are also studied. Several TTS-based damage-risk criteria will be suggested, and equal-risk contours for intermittent noise will be constructed for each criterion.

## PUBLICATIONS

Ahaus, W.A., and W.D. Ward. 1975. Temporary Threshold Shift from Short-Duration Noise Bursts. *J. Am. Audiol. Soc.* 1:4-10.

Ward, W.D., E. Cushing, and E.M. Burns. 1976. Effective Quiet and Moderate TTS: Implications for Noise Exposure Standards. *J. Acoust. Soc. Am.* 59: 160-165.

Ward, W.D. 1976. A Comparison of the Effects of Continuous, Intermittent, and Impulse Noise. In: The Effects of Noise on Hearing--Critical Issues, D. Henderson and R.P. Hamernik, Eds. Raven Press.

Ward, W.D., E.M. Cushing, and E.M. Burns. 1976. TTS from Neighborhood Aircraft Noise. *J. Acoust. Soc. Am.* 60:182-185.

STATE UNIVERSITY OF NEW YORK UPSTATE MEDICAL CENTER  
Syracuse, New York

GRANT NUMBER: 2 R01 OH00364-08

PRINCIPAL INVESTIGATOR

Donald Henderson, Ph.D.  
The Research Foundation of  
the State Univ. of New York  
Upstate Medical Center  
750 East Adams Street  
Syracuse, New York 13210

TITLE

The Effects of Impulse Noise on the Auditory System

SUMMARY

The objective of this research is to establish the relationship between the physical factors of impulse noise and their effects upon anatomical, physiological, and behavioral aspects of the ear. The physical factors to be studied include peak pressure, duration, number, repetition rate, etc.

This grant has demonstrated that the effects of impulse noise are qualitatively different from those of continuous noise; that the degree of hearing loss is related not only to intensity and duration, but also to the inter-stimulus interval and the total number of impulses; that impulse noise may also affect the ampullae of the vestibular system; that part of the hearing loss following noise exposure can be traced to the central auditory system and that "safe" impulse noise can interact with "safe" continuous noise to produce large hearing losses. The research is continuing in an effort to formulate a comprehensive damage-risk criterion (CDR) for impulse noise. The plan is to conduct parametric studies in which chinchillas are initially screened by either evoked auditory response audiometry or conditioning audiometry, systematically exposed to a set of impulses and audiometric changes followed for 30 days, at which time the animals will be sacrificed. In-depth studies of exposures in which the animals will be examined by electron microscopy and histochemistry in addition to the audiometric procedures. Realistic noise exposures of either "work week" or asymptotic threshold shift regiments of impulse noise will be employed. Selected animals will also be examined for vestibular noise.

## PUBLICATIONS

Hamernik, R.P., Henderson, D., Hynson, K., "Impulse Noise and Synergistic Effects Aggravate Hearing Loss", Occupational Health and Safety, January/February 1978.

Henderson, D., Hamernik, R.P. 1978. "Long Term Impulse Noise Studies in the Chinchilla." International Scientific Noise Teams-Symposium on Noise as a Public Health Problem (III) Freiberg, September.

Salvi, R.J., Hamernik, R.P., Henderson, D., "Auditory Nerve Activity and Cochlear Morphology After Noise Exposure", 15th Workshop Inner Ear Biology, Seefeld, Austria 1978, also in press, Acta. Otol.

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Woodford, C.W., et. al. 1978. Effects of Combinations of Sodium Salicylate and Noise on the Auditory Threshold, Ann. of Oto Rhino. Laryngol. 87:117.

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Henderson, D., et. al. 1976. Impulse Noise and the Equal Energy Hypothesis, Proc. 13th Internat. Cong. of Audiology, Florence Italy.

Hamernik, R.P., et. al. 1976. Potentiation of Noise by Other Ototraumatic Agents. In: The Effects of Noise on Hearing, Henderson, D., et. al. Eds.

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Woodford, C. W., et. al. 1974. The Threshold Duration Function of the Acoustic Reflex in Man, Internat. Audio. 14:53.

Hamernik, R.P., et. al. 1974. Combined Impulse and Continuous Noise: Auditory Effects, J. Acous. Soc. Amer. 55:117.

Hamernik, R.P., and D. Henderson. 1974. Impulse Noise Trauma: A Study of Histological Susceptibility, Arch. of Otolaryng. 99:118.

Henderson, D., et. al. 1974. Audiometric and Anatomical Correlates of Impulse Noise Exposure, Arch. of Otolaryng. 99:62.

AMERICAN HEALTH FOUNDATION  
Valhalla, New York

GRANT NUMBER: 2 R01 OH00611-04

PRINCIPAL INVESTIGATOR

John H. Weisburger, Ph.D.  
Vice President for Research  
American Health Foundation  
Hammond House Road  
Valhalla, New York 10595

TITLE

Mechanism of Action: Carcinogenic o-Methylarylamines

SUMMARY

Ortho-methyl substitution in 2-naphthylamine and 4-aminobiphenyl enhances the carcinogenicity and, depending on the experimental protocols, affects diverse target tissues. Certain of these chemicals are important industrial products. This research is intended to elucidate the mechanism whereby ortho-methyl substitution leads to the enhanced carcinogenicity of 2-amino-3-methylnaphthalene (AMN) and 3,2'-dimethyl-4-aminobiphenyl (DMAB). These chemicals can cause colon cancer in male rats and mammary and colon cancer in female rats. One of the approaches will involve the clarification of the activation and detoxication pathways in vivo using the Carbon 14 labeled carcinogens. AMN-carbon 14 has already been prepared; the synthesis of DMAB-carbon 14 is in progress. To test the working hypothesis that the o-methylamino effect involves oxidation of the methyl group, another approach will be to synthesize derivatives in which the amine group and the o-methyl group are progressively oxidized with derivatives devoid of the o-methyl group, in mutagenicity assays and when indicated, in rats, hamsters and mice for carcinogenicity. These efforts will be paralleled by a search for metabolites analogous to those derivatives both in vivo and in vitro. While evidence for activation through N-hydroxylation for AMN and DMAB has already been obtained. They also will examine the possibility of epoxide formation through the analysis of the products of in vivo and in vitro metabolism. Long term plans include a determination of the interaction of these chemicals with cellular macromolecules in target tissues. It is hoped that an understanding of the metabolic pathways and interaction of these chemicals will help to elucidate the mechanism of action and provide leads to rational preventive measures.

PUBLICATIONS

None

MOUNT SINAI SCHOOL OF MEDICINE-CUNY  
New York, New York

GRANT NUMBER: 5 R01 OH00690-02

PRINCIPAL INVESTIGATOR

William J. Nicholson, Ph.D.  
Environmental Sciences Laboratory  
Mount Sinai School of Medicine  
100th Street and Fifth Avenue  
New York, New York 10029

TITLE

Cohort Mortality Study of Dimethylnitrosamine Workers

SUMMARY

A cohort of workers exposed to nitrosocompounds is being evaluated as to their mortality patterns, compared to known environmental measurements of their exposures.

Employment rosters and union records will be used for the identification of the cohort and the tracing of the members of the cohort have been done. The full mortality experience of the cohort is being studied and expected and observed rates of death by cause have been tabulated in search for unusual mortality patterns. Cause of death will be verified by obtaining a review of appropriate hospital and medical records and available pathological material. The expected rates of death by cause will be calculated using appropriate age, sex, race, calendar period, and location specific data from the National Office of Vital Statistics on a person years-at-risk basis. The calculated rates will be compared with those observed at yearly intervals during the course of this research. The individuals in the study will be characterized according to exposure categories defined by company environmental measurements, by the data from periodic blood analysis for SGOT and SGPT, and by descriptions of work activities and circumstances.

PUBLICATIONS

None

PRINCIPAL INVESTIGATOR

Donald W. Nielsen  
Director  
Otological Research Laboratory  
Henry Ford Hospital  
2799 West Grand Boulevard  
Detroit, Michigan 48202

TITLE

Animal Model to Study the Effects of Noise on Humans

SUMMARY

The goal of this research is to identify an appropriate animal model for use in studying the effects of long-term noise on the inner ear of humans. Specifically, it is proposed to investigate the amount of temporary threshold shift (TTS), its growth and decay in squirrel monkeys and humans to long term exposure to noise. In addition, histopathological data will be collected from the monkeys. The variety of noises used will be artificially generated noises and recorded factory noises. Experimental exposure durations will replicate work-day durations. By combining the human testing facilities on one institution, the animal testing facilities of another, and the histological facilities of a third, a complete systematic investigation of the appropriateness of the squirrel monkey as an animal model for use in studying the effects of long-term noise on the inner ear of humans can be accomplished.

Once the relationship between man and monkey is established, the monkey can be used and the appropriate stimuli can be systematically extended into durations and levels considered dangerous to humans. The behavioral and histological consequences of long term exposure to noise can then be evaluated and generalized to man.

PUBLICATIONS

None

HARVARD UNIVERSITY  
Boston, Massachusetts

GRANT NUMBER: 5 R01 OH00706-02

PRINCIPAL INVESTIGATOR

Peter B. Dews, M.D.  
Department of Psychiatry  
Harvard Medical School  
25 Shattuck Street  
Boston, Massachusetts 02115

TITLE

Test of Environmental Toxins on Behavior of Mice

SUMMARY

Exposure of humans to chemical influences in the work place or home may have behavioral effects.

This project outlines an approach for a systematic, but relatively simple, assessment of the behavioral toxicity of a group of highly volatile organic solvents commonly used in industry. An apparatus has been developed for the rapid training of mice on a mult. FR30 FI300 schedule of reinforcement. This procedure has been shown to be sensitive to a wide variety of pharmacological agents and has been widely used in behavioral pharmacology. Mice will be placed in an airtight metal enclosure and exposed to an organic solvent (trichloroethylene, acetone, methyl, ethyl, ketone, carbon disulfide, carbon tetrachloride, benzene, toluene, ethyl acetate, or octane) over a range of concentrations while responding under a mult FR FI schedule of reinforcement to determine dose-behavioral effect curves. The behavioral effects of the exposure will be assessed after both acute and chronic exposure.

PUBLICATIONS

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Dews, P.B. 1978. Epistemology of Screening for Behavioral Toxicity. Environmental Health Perspectives, 26:37-42.

UNIVERSITY OF CINCINNATI  
Cincinnati, Ohio

GRANT NUMBER: 1 R01 OH00739-01A1

PRINCIPAL INVESTIGATOR

Joseph A. Caruso, Ph.D.  
Professor of Chemistry  
Department of Chemistry  
University of Cincinnati  
Cincinnati, Ohio 45221

TITLE

Atomic Spectrometry of Occupational Health Samples

SUMMARY

Trace element analysis is ever increasing in importance. Applications to blood, urine and tissue samples are very widespread. Atomic spectroscopy is a preferred technique in many of these analyses. Usually it is applied in the single element mode although inductively coupled plasma emission spectrographs are now being utilized more for simultaneous multielement analyses. This proposal considers an alternate approach to multielement analysis, namely through generation of volatile hydrides followed by chromatography and subsequent sequential determination of the individual elements by a microwave induced plasma emission spectrometer. Alternately sequential atomic absorption spectrometry may serve as the determining step. Elements of both essential and toxicological significance such as Se, As, Sb, Sn, and Ge will be studied.

Hydride generation for these elements and others such as Pb, Bi, and Te has significant advantages over other methods including furnace atomic absorption spectrometry or any of the techniques which require solution aspiration. These advantages include relative freedom from matrix interferences, detection at sub-ppb levels, wide dynamic linear ranges, as well as potential for sequential multielement analysis; this potential will be thoroughly investigated in the proposed work.

Sequential multielement analysis can be accomplished through computer control of an atomic spectrometer for slewing and data acquisition. Samples will include blood and other biological fluids; however, the emphasis will be on freeze dried human lung tissue.

PUBLICATIONS

None

DUKE UNIVERSITY  
Durham, North Carolina

GRANT NUMBER: 1 R01 OH00781-02

PRINCIPAL INVESTIGATOR

Joannes H. Karis, M.D.  
Box 3094  
Duke University Medical Center  
Durham, NC 27710

TITLE

Increase of Toxicity of Trace Anesthetics by UV Light

SUMMARY

Trace levels of anesthetics released during operations are potential health hazards for operating room personnel. The common anesthetic agents, halothane, enflurane, and nitrous oxide, can be metabolized in vivo or converted to more reactive compounds in vitro. Ultraviolet light irradiation is used in some operating rooms in the U.S. to decrease intraoperative infections. Ultraviolet light irradiation may decompose these agents to toxicants either directly or indirectly through ozone, singlet oxygen or other photochemical reactions. To investigate the potential role of photochemical reactions on the occupational hazards of inhalation of trace concentrations of these agents by operating room personnel rats and mice will be exposed to known concentrations of halothane, enflurane or nitrous oxide with and without light irradiation. The wavelength of the light source will be varied to determine the nature of the photochemical reaction using fluorescent, germicidal and ultraviolet lamps. The concentration of the anesthetic agent before and after irradiation will be measured by electron capture gas liquid chromatography and mass spectrometry. The nature of the decomposition product(s) will be determined and the inhalation toxicity of the irradiated gases will be determined. Conversion of nitrous oxide to nitrogen dioxide and other oxides of nitrogen will be determined chemically. Finally the concentration of the anesthetic agents and their potential toxic decomposition products will be measured in the operating room. These data will be used to assess the potential human hazards from long term occupational exposure.

PUBLICATIONS

None

THE JOHN B. PIERCE FOUNDATION  
New Haven, Connecticut

GRANT NUMBER: 1 R01 OH00836-01

PRINCIPAL INVESTIGATOR

Richard R. Gonzalez, Ph.D.  
The John B. Pierce Foundation Laboratory  
290 Congress Avenue  
New Haven, Connecticut 06519

TITLE

Heat Strain: Biophysical and Physiological Evaluation

SUMMARY

This proposal concerns how the stress and strain of a warm thermal environment may be assessed in terms of the various physical and physiological factors involved. The entire physics of heat transfer between the skin surface and the environment can be characterized by a single factor defined as the ratio of the effective sensible heat transfer coefficient (for radiation, convection and conductance) to the insensible heat transfer coefficient (by evaporation). The major goal of the proposed research is to validate a concept of physiological equivalence over a wide range of thermal stress and thus to determine how various physiological responses, such as changes in heart rate, in esophageal temperature as well as in total and regional sweating, compare with Effective Temperature. Observations will be made at various clothing insulations and under different exercise intensities at both constant and transient levels of temperature and humidity. The pattern of physiological responses by males and females will be evaluated during acclimation to heat and for various levels of physical fitness.

PUBLICATIONS

None

IOWA STATE UNIVERSITY  
Ames, Iowa

GRANT NUMBER: 1 R01 OH00859-01

PRINCIPAL INVESTIGATOR

Glenn E. Fanslow, Ph.D.  
Associate Professor  
College of Engineering  
122 Coover Hall  
Iowa State University  
Ames, Iowa 50011

TITLE

Dosimetry for Non-Ionizing Radiation

SUMMARY

This research will focus on the use of the temperature-dependent property of thermoluminescence fade as a means of determining average and accumulated non-ionizing radiation. The methodology will involve the comparison of the thermoluminescence signals of two sensors. While both sensors will have temperature variations due to changes in ambient temperature, the temperature of one of the sensors will be raised above ambient by an amount related to the non-ionizing radiation present. This higher temperature will cause more fade in one sensor than the other, and the difference in the thermoluminescence signals from the two sensors will be a measure of the non-ionizing radiation.

PUBLICATIONS

None

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

GRANT NUMBER: 1 R01 OH00874-01

PRINCIPAL INVESTIGATOR

Stephan A. Konz, Ph.D.  
Kansas State University  
Institute for Env. Research  
Manhattan, Kansas 66506

TITLE

Physio. Responses to Exposures to Intermittent Heat

SUMMARY

When working in heat, most workers wear clothing (e.g. long-sleeved shirt and trousers). However, most heat stress research has used semi-nude subjects. Workers also tend to go in and out of heat all day (intermittent exposure) while most research has continuous heat exposure for 1 or 2 hours. Most workers are heat acclimatized; much research uses non-acclimatized subjects.

This project has five phases: clothing worn in the field, insulation values, physiological responses, model validation and intermittent heat stress guidelines. In phase one, they will determine, for at least 25 organizations, what articles are actually worn in heat stress and recovery. In Phase two they will determine, using our electrically heated copper mannequin, insulation values (clo) of typical ensembles from Phase 1. In Phase 3, they will measure physiological responses of 12 acclimatized subjects at 4 temperature levels, 3 work-rest cycles, and 3 clothing levels and 2 recovery levels. Each session will last 10.5 hours (pretest, heat, post-test sessions with time for subjects to have coffee and lunch breaks in controlled environments). Heart rate, skin temperature, rectal temperature and clothing surface temperatures will be recorded automatically on tape every five minutes. Weight loss will be recorded every 60 min. In Phase four, from the previous data and from Phase three, they will validate the biophysical 25 node human thermoregulatory model for clothed exercising individuals exposed to intermittent heat stress. In Phase five, from the experimental data and computer simulations using the model, guidelines will be developed giving permitted exposure to intermittent heat stress for clothed workers.

PUBLICATIONS

None

UNIVERSITY OF MINNESOTA  
Minneapolis, Minnesota

GRANT NUMBER: 1 R01 OH00876-01

PRINCIPAL INVESTIGATOR

Peter W. Carr, Ph.D.  
Department of Chemistry  
University of Minnesota  
207 Pleasant St., S.E.  
Minneapolis, Minnesota 55455

TITLE

Novel LC Multielement Methods for Occupational Health

SUMMARY

This work is aimed at developing new liquid chromatographic (HPLC) methodologies and materials for use in environmental health. Fluorescence detectors will be used to achieve high sensitivity detection of trace metals which will be concentrated and pre-column derivatized with fluorogenic chelating agents and then separated by reverse phase chromatography. Amperometric detectors will be tested as sensors for metal complexes which are non-fluorescent. In both cases picogram sensitivities can be obtained for appropriate metals. The extraction and chromatographic separation can obviate many spectral and electrochemical interferences.

PUBLICATIONS

None

UNIVERSITY OF PENNSYLVANIA  
Philadelphia, Pennsylvania

GRANT NUMBER: 1 R01 OH00886-01

PRINCIPAL INVESTIGATOR

Irving Shapiro, B.D.S., M.Sc., Ph.D.  
Professor and Chairman, Biochemistry  
School of Dental Medicine  
University of Pennsylvania  
4001 Spruce Street  
Philadelphia, Pennsylvania 19104

TITLE

Mercury Burden and Health Impairment in Dental Auxiliaries

SUMMARY

Previous studies of dental personnel have indicated that mercury exposure in the dental office represents a health hazard of dental practice. Attempts to measure the clinical health deficits associated with exposure have been few. Furthermore, the investigations that have been performed have been limited to evaluating current mercury exposure through blood, urine or hair analysis. The important relationship between cumulative mercury exposure and chronic health impairment has not been studied. This research addresses itself to examining this relationship.

The population consists of 300 dental auxiliaries who have had contact with mercury and a cohort of 50 dental auxiliaries who do not use mercury in their practice. Cumulative mercury levels will be ascertained by measuring bone and brain mercury levels in situ by an X-ray fluorescence technique that was developed in our laboratories. The top ten per cent of the ranked population will then be further examined for neurological and renal deficits. Electrodiagnostic studies will measure nerve conduction velocity, denervation, neuromuscular transmission and sensory action potentials. Renal examination will include kidney urinary concentrating function, osmolality and urinary microprotein. The kidney mercury level will also be ascertained by X-ray fluorescence in the group demonstrating elevated bone mercury. Neuropsychological evaluation is being performed on the ranked upper and lower twenty-five percent of the population. Current mercury exposure levels of these populations will also be determined through analysis of blood, urine and hair and correlated with total body mercury burden as determined by X-ray fluorescence. The results of these evaluations will indicate whether functional health deficits have occurred as a result of mercury accumulation.

PUBLICATIONS

None

UNIVERSITY OF CALIFORNIA  
Berkeley, California

GRANT NUMBER: 1 R01 OH00889-01

PRINCIPAL INVESTIGATOR

William J. Pependorf, Ph.D.  
Assistant Professor  
School of Public Health  
Room 203, Earl Warren Hall  
University of California  
Berkeley California 94720

TITLE

Predicting Diluted Vapor Ratios for Solvent Mixtures

SUMMARY

This project addresses the need for predicting multicomponent vapor concentrations of evaporating organic solvent mixtures from the measurement of a single component of the vapor phase and quantitative analysis of the bulk liquid. Existing solutions to this problem suffer from one or more shortcomings due to (1) inappropriate or unrealistic simplifying assumptions, (2) limiting restrictions not applicable to most field situations, or (3) lack of sufficient and accurate thermodynamic data for the implementation of more exact solutions. An engineering model of the processes of evaporation and dilution to breathing zone concentrations is proposed to be used with a thermodynamic model to predict the equilibrium vapor concentrations. The proposed models employ the approach of calculating relative vapor ratios to eliminate the approximation of otherwise indeterminate mass transfer parameters and a recent breakthrough in the computer prediction of the thermodynamic parameter activity coefficient, which adjusts for non-ideal liquid behavior. This model will be tested and refined in the laboratory under various air flow conditions. During Year 2 of this study it is proposed to do field testing to complete the verification of the new prediction methodology. Various schemes will also be explored to allow general field usage of the methodology without the need for a computer.

PUBLICATIONS

None

UNIVERSITY OF MICHIGAN  
Ann Arbor, Michigan

GRANT NUMBER: 9 R01 OH00913-04

PRINCIPAL INVESTIGATOR

Arthur Vander, M.D.  
Professor  
Department of Physiology  
The University of Michigan  
Ann Arbor, Michigan 48104

TITLE

Lead: Its Renal Handling, Renin and Erythropoietin

SUMMARY

This project has four broad objectives: (1) To evaluate the possible role of lead, as an activator of the renin-angiotension-aldosterone system (RAAS), in generating chronic hypertension; (2) to further clarify the renal mechanisms of lead-handling; (3) to elucidate effects of lead on transport at the blood-brain barrier (BBB); (4) to determine how lead gets into brain extracellular fluid (ECF). Small doses of lead have been shown to increase renal electrolyte excretion and renin secretion; such activation of the RAAS could lead to hypertension. The hypertensive effects of lead alone or in combination with other stimuli, e.g. psychosocial stress, cadmium exposure, etc. will be studied. The role of RAAS will be evaluated using pharmacologic blockers. We have determined that lead itself is filtered, reabsorbed, and secreted by the kidney; we will now elucidate more fully the mechanisms, i.e. transport sites, chelators or co-transported molecules/ions, effects of drugs and hormones, etc. Clearance and stop-flow techniques in vivo, as well as renal slices and isolated perfused tubules in vitro will be employed.

Lead and blood-brain transport will be studied in rats lead-poisoned from birth or in acutely poisoned guinea pigs. Cerebrospinal fluid (CSF) electrolytes and the entry of amino acids into brain will be measured (brain-uptake index). Ventriculo-cisternal perfusion will be used to assess subtle lead-induced changes in permeability of the BBB to radioactive ions and molecules. Passage of  $^{203}\text{Pb}$  from blood into CSF of suckling rats (undeveloped BBB) and in BBB-damaged adult rats (osmotic technique) will elucidate the role of the BBB in keeping lead out of brain ECF. These results will provide critical information on how lead-induced changes in brain ECF may lead to encephalopathy or minimal brain dysfunction.

PUBLICATIONS

Vander, A.J., Mouw, D.R., Cox, J., and Johnson, B. in press March 1979. Lead Transport by renal Slices and Its Inhibition by Tin. *Am. J. Physiol.*

Smith, J.M., Mouw, D.R., and Vander, A.J. in press March, 1979. Parathyroid Hormone and Renin Secretion Am. J. Physiol.

Abbrecht, P., D. Mouw, A.J. Vander, and K. Kalitis. 1978. The Effect of Chronic, Low-Level Lead-Poisoning on the Erythropoietin and Renin Response to Hypoxia. Proc. Soc. Expt. Biol. Med. 158: 109-117.

Mouw, D.R., A.J. Vander and J.Cox. Fleischer, N. 1978. Acute Effects of Lead on Renal Electrolyte Excretion and Plasma Renin Activity. Tox. App. Pharm. 46: 435-447.

NEW YORK UNIVERSITY  
New, York, New York

GRANT NUMBER: 1 R01 OH00915-01

PRINCIPAL INVESTIGATOR

Bernard S. Pasternack, Ph.D.  
Professor of Environmental Medicine  
New York University Medical Center  
Institute of Environmental Medicine  
550 First Avenue  
New York, New York 10010

TITLE

Epidemiological Study of Malignant Melanoma

SUMMARY

The objective of this case-control study is to determine the magnitude of the association between malignant melanoma and a comprehensive set of possible risk factors, some of which previously have not received quantitative epidemiologic analysis. To accomplish this, data collected at New York University Medical Center on approximately 650 cases and twice as many controls was analyzed. The effects of potential confounding factors will be removed primarily by stratification. A composite risk factor score will be developed for the purpose of identifying high risk populations, at whom future monitoring for malignant melanoma could be directed. Significant positive associations found in this study, if corroborated by others, may also identify behavior, which, if modified, could result in a decreased incidence of disease.

PUBLICATIONS

None

THE JOHNS HOPKINS UNIVERSITY  
Baltimore, Maryland

GRANT NUMBER: 1 R01 OH00920-01

PRINCIPAL INVESTIGATOR

Genevieve M. Matanoski M.D., P.H.  
Professor  
School of Hygiene and Public Health  
The Johns Hopkins University  
615 North Wolfe St.  
Baltimore, Maryland 21205

TITLE

Multiple Myeloma and Brain Tumors in Physicians

SUMMARY

The present investigators have noted that radiologists and otolaryngologists who have entered the field in recent years have a significantly higher rate of multiple myeloma than U.S. white males in general. It has been proposed that exposure to repeated low-doses of radiation would have a stimulatory effect on the immune system and thus result in plasma cell dyscrasias. Confounding variables such as exposure to infections and chemicals could influence this risk in physicians.

Tumors of the brain occur with unusual frequency among internists with rates significantly higher than those seen in dentists. Very little is known about the etiology of these tumors but it has been noted in the total U.S. County Study that the mortality for brain tumors and multiple myeloma are correlated.

This project will study the etiology of these two cancers and their correlation in physicians, a relatively homogeneous population distributed across the U.S. This group is unique in having a high probability of exposure to repeated low-dose radiation and infections and good medical histories. The design is a case-control study with an estimated 350 cases of each of the cancers and a stratified random sample of 700 deceased controls comparable by age, race, sex and year of death selected from the total physician deaths over 15 years. Equal numbers of living controls will also be selected. The risk factors identified in previous studies will be examined by a telephone interview to the next-of-kin, the physician's associates, or the physician if a living control. A Multivariate analysis of data will be used to determine association of each of these cancers with radiation, infection, or other factors.

PUBLICATIONS

None

UNIVERSITY OF PENNSYLVANIA  
Philadelphia, Pennsylvania

GRANT NUMBER: 1 R01 OH00960-01

PRINCIPAL INVESTIGATOR

Lorne Houten Ph.D.  
Associate Professor  
Department of Research Medicine  
University of Pennsylvania  
36th and Hamilton Walk GA  
Philadelphia, Pennsylvania 19104

TITLE

An Occupational History Module for Cancer Patients

SUMMARY

This project will develop and test an occupational history questionnaire, possibly computer assisted, which will collect both routine occupational information and detect data concerning specific exposures in chosen occupations and industries of suspected high risk. A system will be designed so as to be compatible with the Centralized Cancer Patient Data System currently in operation at nineteen Comprehensive Cancer Centers. The validity and reliability of the occupational data collected by the questionnaire will be tested and the system will be demonstrated to the Comprehensive Cancer Centers in order to promote its general adoption by them for specific collaborative research studies.

PUBLICATIONS

None

NEW YORK UNIVERSITY  
New York, New York

GRANT NUMBER: 1 R01 OH00932-01

PRINCIPAL INVESTIGATOR

Bernard S. Pasternack, Ph.D.  
Professor of Environmental Medicine  
New York University Medical Center  
550 First Avenue  
New York, New York 10016

TITLE

Mortality Experience of Workers Exposed to Haloethers

SUMMARY

The primary purpose of this study is to examine the respiratory cancer mortality experience of workers in the chemical industry who have been exposed to chloromethyl methyl ether (CMME). This will be accomplished by updating the mortality experience for the period 1973-1977 among workers in the six firms previously included in our epidemiologic study of occupational exposure to CMME. In addition, all exposed and nonexposed production workers in a seventh firm (plant on the West Coast) will be included in our retrospective cohort for complete mortality followup from the year in which CMME operations first began, 1955, through the end of 1977. Respiratory cancer and other mortality experience of the CMME-exposed workers will be characterized according to duration and intensity of CMME exposure; the temporal patterns of respiratory cancer mortality, including estimation of the induction-latency period, will also be examined.

Ascertainment of deaths among separated employees will be based on the searching service of the Social Security Administration. Those not indicated as dead by the Social Security Administration will be traced further for vital status ascertainment by utilization of other resources including the Internal Revenue Service, Post Offices, State Motor Vehicle Bureaus and Union records. Death certificates will be located and obtained, and diagnostic confirmation will be gotten from appropriate physicians, autopsy records, and/or hospitals when any form of cancer is listed as a cause.

PUBLICATIONS

None

UNIVERSITY OF IOWA  
Iowa City, Iowa

GRANT NUMBER: 5 R13 OH00694-03

PRINCIPAL INVESTIGATOR

L. W. Knapp, Jr., M.S.  
Director, International Studies Program  
Institute of Agricultural Medicine  
and Environmental Health  
University of Iowa  
Oakdale, Iowa 52319

TITLE

VII International Congress of Rural Medicine

SUMMARY

The VII international Congress of Rural Medicine was held in Salt Lake City, Utah on September 17-21, 1978, as scheduled. Seventeen nations were represented at the Congress by 135 delegates who presented 80 scientific papers and reports.

The purpose of this was to provide a forum and means to accumulate the latest worldwide research and expertise in occupational health related to agriculture. It defined occupational differences in agricultural enterprises, examine rural health statistics and the delivery of health care for farm workers, identify types of body insults and the engineering aspects of design of operator stations, personal protective equipment and environmental controls. A compendium of the present state of the art concerning occupational safety and health, nationally and internationally, will be published.

PUBLICATIONS

None

STATE UNIVERSITY OF NEW YORK  
UPSTATE MEDICAL CENTER  
Syracuse, New York

GRANT NUMBER: 1 R01 OH00848-01

PRINCIPAL INVESTIGATOR

Donald Henderson, Ph.D.  
Professor  
Department of Otolaryngology and  
Communication Sciences  
SUNY, Upstate Medical Center  
750 E. Adams St.  
Syracuse, New York 13210

TITLE

A Symposium: Effects of Noise on Hearing

SUMMARY

In the summer of 1975 a conference on "The Effects of Noise on Hearing: Critical Issues", was held in Syracuse, New York. The conference, sponsored by NIOSH, was attended by over 150 scientists, clinicians and government officials who are involved with problems of noise and its effect on hearing. The direct product of the conference was a book summarizing the results of the symposium proceedings. This volume entitled "Effects of Noise on Hearing" and published by Raven Press has received very positive reviews and it now serves as a valuable reference text for scientists and government officials dealing with noise problems. Since the original symposium, and perhaps because of it, there have been a number of relevant research findings that have important implications for audiological diagnoses and ultimately noise standards. Furthermore, progress has been made on demographics of industrial noise induced permanent threshold shift (NIPTS), especially in several European countries.

In light of these findings, a three-day symposium is planned for the summer of 1979 to provide a forum for discussing new basic science and demographic data which are specifically germane to the issue of noise standards and hearing hazards. Special emphasis is to be given to impulse noise. The proceedings of this conference, containing approximately 25 summary papers arranged in five chapters will be published and made widely available through a commercial publishing firm. The location of the conference is the Cazenovia College Conference Center.

PUBLICATIONS

None

RESEARCH AND DEMONSTRATION GRANTS AWARDED IN FISCAL YEAR 1979

<u>Grant Number</u>	<u>Institution and Principal Investigator</u>	<u>Budget Period</u>	<u>FY 1979 Award</u>
5 R01 OH 00316-14	University of Florida Leibman, K.C.	01-01-79 12-31-79	\$62,869
2 R01 OH 00350-07A1	University of Minnesota Ward, W.D.	04-01-79 03-31-80	24,862
5 R01 OH 00360-09	West Virginia University Burrell, R.	09-01-79 08-31-80	37,311
5 R01 OH 00364-08	Upstate Medical Center, SUNY Henderson, D.	05-01-79 04-30-80	80,766
5 R01 OH 00367-09	University of Pittsburgh Alarie, Y.C.	06-01-79 05-31-80	46,720
5 R01 OH 00398-06	St. Louis University Slavin, R.G.	08-01-79 07-31-80	54,350
5 R01 OH 00404-04	University of California, San Diego Nahum, A.M.	08-01-79 07-31-80	47,721
5 R01 OH 00514-05	University of Illinois Schultz, A.B.	02-01-79 01-31-80	85,027
2 R01 OH 00535-04	Albert Einstein College of Medicine Spencer, P.S.	12-01-78 11-30-79	92,290
2 R01 OH 00611-04	American Health Foundation Weisburger, J.H.	12-01-78 11-30-79	91,805
5 R01 OH 00622-03	Stanford University Cohen, E.N.	06-01-79 05-31-80	206,347
5 R01 OH 00631-03	University of Minnesota Halberg, F.	08-01-79 07-31-80	111,755

RESEARCH AND DEMONSTRATION GRANTS AWARDED IN FISCAL YEAR 1979

5 R01 OH 00647-03	John B. Pierce Foundation Stolwijk, J.A.J.	09-01-79 08-31-80	\$37,091
5 R01 OH 00653-03	University of Vermont Craighead, J.E.	08-01-79 07-31-80	79,710
5 R01 OH 00679-04	University of Michigan Chaffin, D.B.	05-01-79 04-30-80	84,804
1 R01 OH 00681-01A1	Mount Sinai School of Medicine Suzuki, Y.	12-01-78 11-30-79	98,592
5 R01 OH 00682-02	Mount Sinai School of Medicine Selikoff, I.J.	06-01-79 05-31-80	92,436
5 R01 OH 00690-02	Mount Sinai School of Medicine Nicholson, W.J.	07-01-79 06-30-80	25,164
5 R13 OH 00694-03	University of Iowa Knapp, L.W., Jr.	03-01-79 02-29-80	3,217
1 R01 OH 00705-01	Henry Ford Hospital Nielsen, D.	03-01-79 02-29-80	166,459
5 R01 OH 00706-02	Harvard University Dews, P.	05-01-79 04-30-80	109,834
5 R01 OH 00707-03	University of Michigan Langolf, G.D.	04-01-79 03-31-80	54,245
5 R01 OH 00714-03	University of California, Gellin, G.A.	07-01-79 06-30-80	70,744
5 R01 OH 00735-02	University of Maryland Johnson, A.T.	09-01-79 08-31-80	82,395
1 R01 OH 00739-01A1	University of Cincinnati Caruso, J.A.	01-01-79 12-31-79	69,056

RESEARCH AND DEMONSTRATION GRANTS AWARDED IN FISCAL YEAR 1979

5 R01 OH 00740-02	Temple University Innes, D.L.	03-01-79 02-28-80	\$16,007
5 R01 OH 00742-02	American Dental Association Health Foundation Verrusio, A.C.	03-01-79 02-29-80	55,039
1 R01 OH 00744-01A1	North Carolina State Univ. Hersh, S.P.	01-01-79 12-31-79	108,899
5 R01 OH 00745-02	University of Vermont Frymoyer, J.	03-01-79 08-31-79	146,210
5 R01 OH 00755-02	University of Cincinnati Ayer, H.E.	05-01-79 04-30-80	36,747
1 R01 OH 00763-01	Tel Aviv University Baum, G.	07-01-79 06-30-80	61,912
1 R01 OH 00766-01A1	University of California Goldsmith, W.	09-28-79 08-31-80	58,429
5 R01 OH 00773-02	University of Cincinnati Bernstein, I.L.	07-01-79 06-30-80	105,734
5 R01 OH 00774-02	University of Cincinnati Willeke, K.	09-01-79 08-31-80	24,931
5 R01 OH 00775-02	Stanford University Cohen, E.N.	06-01-79 06-01-80	114,550
1 R01 OH 00777-01	Georgia Inst. of Technology Komaki, J.	01-01-79 12-31-79	61,886
5 R01 OH 00780-02	Yale University Meigs, J.W.	09-01-79 08-31-80	73,322
5 R01 OH 00781-02	Duke University Karis, J.H.	09-01-79 08-31-80	62,068
1 R01 OH 00796-01	University of Cincinnati Burg, W.R.	03-01-79 02-29-80	53,203
5 R01 OH 00798-02	Texas Tech University Ayoub, M.M.	01-01-79 08-31-80	83,001
1 R01 OH 00803-01	Johns Hopkins University Matanoski, G.M.	12-01-78 11-30-79	28,356

RESEARCH AND DEMONSTRATION GRANTS AWARDED IN FISCAL YEAR 1979

1 R01 OH 00811-01	University of Massachusetts Cullinane, T.P.	12-01-78 11-30-79	\$26,253
1 R01 OH 00820-01	SUNY-Buffalo Drury, C. G.	04-01-79 03-31-80	11,960
1 R01 OH 00822-01	Colorado School of Mines Schowengerdt, F.D.	05-01-79 04-30-81	75,815
1 R01 OH 00823-01	Duke University Abou-Donia, M.B.	04-01-79 03-31-80	76,305
1 R01 OH 00825-01	University of Iowa Donham, K.J.	06-01-79 05-31-80	75,822
1 R01 OH 00835-01	Louisiana State U. Swartz, W.J.	04-01-79 03-31-80	31,004
1 R01 OH 00836-01	John B. Pierce Foundation Gonzalez, R.R.	04-01-79 03-31-80	84,482
1 R01 OH 00838-01	U. of South Carolina Feigley, C.E.	04-01-79 03-31-80	49,396
1 R13 OH 00848-01	SUNY Syracuse Henderson, D.	09-01-79 08-31-80	38,325
1 R01 OH 00849-01	University of Kentucky Ross, I.J.	04-01-79 03-31-80	83,263
1 R01 OH 00856-01	Harvard University Fine, L.J.	07-01-79 06-30-80	111,909
1 R01 OH 00858-01	Univ. of California Drinkwater, B.L.	04-01-79 03-31-80	71,161
1 R01 OH 00859-01	Iowa State University Fanslow, G.	09-28-79 08-31-80	36,135
1 R01 OH 00860-01	University of Arizona Muramoto, H.	09-28-79 08-31-80	46,459
1 R01 OH 00874-01	Kansas State University Konz, S.	09-28-79 08-31-80	129,126
1 R01 OH 00876-01	Univ. of Minnesota Carr, P.	09-28-79 08-31-80	77,614
1 R01 OH 00886-01	Univ. of Pennsylvania Shapiro, I.	07-01-79 06-30-80	192,449

RESEARCH AND DEMONSTRATION GRANTS AWARDED IN FISCAL YEAR 1979

1	R01	OH	00888-01	Univ. of Vermont Mossman, B.T.	07-01-79 06-30-80	\$99,023
1	R01	OH	00889-01	Univ. of California Popendorf, W.	09-28-79 08-31-80	43,049
9	R01	OH	00896-06	University of California Drinkwater, B.L.	05-01-79 04-30-80	69,655
1	R01	OH	00897-01	University of Texas Nechay, B.R.	04-01-79 03-31-80	67,741
1	R01	OH	00906-01	Columbia University Karasek, R.A.	07-01-79 06-30-80	114,588
1	R01	OH	00910-01	Cornell University Barker, R.	09-28-79 08-31-80	82,353
1	R01	OH	00912-01	University of Alabama Hood, R.D.	06-01-79 04-30-80	73,942
9	R01	OH	00913-04	University of Michigan Vander, A.	09-01-79 08-31-80	80,900
1	R01	OH	00914-01	City of Hope Med. Center Mittman, C.	05-01-79 04-30-80	301,173
1	R01	OH	00915-01	New York University Pasternack, B.S.	04-01-79 03-31-80	110,879
1	R01	OH	00917-01	Illinois Institute of Tech. Tepas, D.I.	04-01-79 03-31-80	90,193
1	R01	OH	00920-01	The Johns Hopkins Univ. Matanoski, G.	08-01-79 07-31-80	183,323
1	R01	OH	00929-01	University of Pittsburgh Mancuso, T.	08-01-79 07-31-80	410,260
1	R01	OH	00932-01	New York University Pasternack, B.	06-01-79 05-31-80	55,426
1	R01	OH	00953-01	North Carolina State Univ. Hart, F.	09-28-79 08-31-80	95,360
1	R01	OH	00959-01	Pennsylvania State Univ. Heinsohn, R.	09-30-79 08-31-80	81,666
1	R01	OH	00960-01	University of Pennsylvania Houten L.	09-01-79 08-31-80	125,240

RESEARCH AND DEMONSTRATION GRANTS SUMMARY BY PROGRAM AREA

<u>PROGRAM AREA</u>	<u>NO. OF AWARDS</u>	<u>AMOUNT OF AWARDS</u>	<u>NO. OF COMPETING AWARDS</u>	<u>AMOUNT OF COMPETING AWARDS</u>
Skin disease	3	\$ 249,800	0	0
Neurologic disease	4	238,847	2	\$168,595
Respiratory disease	10	1,015,140	5	590,702
Cardiovascular disease *	2	182,329	2	182,329
Digestive disease *	0	0	0	0
Reproductive effects	8	555,616	6	386,027
Control technology	10	627,921	7	483,848
Asbestos and substitutes	4	310,903	2	181,376
Behavioral and motivational	3	263,834	2	152,079
Safety	4	201,373	3	153,652
Musculoskeletal and back disorders	4	399,042	0	0
Energy/mining*	1	410,260	1	410,260
Sidestream smoking*	0	0	0	0
Other	22	1,853,048	16	1,509,130
<b>TOTAL**</b>	<b>75</b>	<b>\$6,308,113</b>	<b>46</b>	<b>\$4,217,998</b>

\* Program area new for FY 1979

\*\* Does not include \$91,887 for Chairman's grant for SOH Study Section operation and 2 supplemental grants.



RESEARCH AND DEMONSTRATION GRANTS DISTRIBUTION BY REGION



<u>REGION</u>	<u>NUMBER OF GRANTS</u>	<u>TOTAL AMOUNT</u>
I	9	\$ 767,834
II	12	894,584
III	10	1,203,727
IV	9	673,988
V	15	1,120,569
VI	3	181,746
VII	5	298,650
VIII	1	75,815
IX	10	1,029,288
X	0	-
FOREIGN	1	61,912
	<u>75</u>	<u>6,308,113</u>

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DISTRIBUTION BY STATE

<u>STATE</u>	<u>NUMBER OF INSTITUTIONS</u>	<u>NUMBER OF PROJECTS</u>	<u>FY 79 AWARDS (TOTAL FUNDS)</u>
Alabama	1	1	73,942
Arizona	1	1	46,459
California	4	9	982,829
Colorado	1	1	75,815
Connecticut	2	3	194,895
Florida	1	1	62,869
Georgia	1	1	61,886
Illinois	3	3	230,259
Iowa	2	3	115,174
Kansas	1	1	129,126
Kentucky	1	1	83,263
Louisiana	1	1	31,004
Maryland	2	3	294,074
Massachusetts	2	3	247,996
Michigan	2	4	386,408
Minnesota	1	3	214,231
Missouri	1	1	54,350
New York	7	12	894,584
North Carolina	2	4	342,632
Ohio	1	5	289,671
Pennsylvania	4	6	872,342
South Carolina	1	1	49,396
Texas	2	2	150,742
Vermont	1	3	324,943
West Virginia	1	1	37,311
Foreign	1	1	61,912

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