Occupational Airways

A newsletter of the Occupational Health & Special Projects Program, Division of Environmental Epidemiology and Occupational Health (EEOH), Connecticut Department of Public Health, 410 Capitol Avenue, MS# 11OSP, P.O. Box 340308, Hartford, CT 06134-0308 (860) 509-7744

Vol. 2. No. 4 December 1996

Dear Physician/Health Care Provider:

The December '96 issue of the quarterly newsletter *Occupational Airways* marks the first full year of publication. The response from health care providers and non-health care providers alike has been very positive. We will be continuing publication in 1997 with three issues a year instead of four.

As you know, occupational asthma is a serious condition that can be debilitating and cost a worker his/her health, career and livelihood. It is also a condition that can be prevented with proper environmental controls. The purpose of this newsletter is to educate and increase awareness about occupational asthma and other occupational respiratory diseases. This issue's topic is fiber glass. Particularly during the fall and winter months, the health department receives calls on this topic from workers and the general public. We hope this article will provide you with useful information to share with your patients.

The Occupational Health & Special Projects Program (OHSPP) wants to ensure that the newsletter is serving its audience appropriately. Please take a few minutes to fill out the enclosed evaluation. Completed surveys can be faxed to my attention at (860) 509-7785 or mailed (pre-addressed on reverse side). If you have any questions, please call (860) 509-7744.

Thank you for your continued support. Happy holidays!

Sincerely,
Juanita Estrada, MSPH
Editor

REPORT Cases Of Occupational Disease For 1996

For more information, call (860) 509-7744

This issue:

Fiber Glass and Lung Disease: Is there a problem?

*By Margaret Quinn, ScD, CIH**
University of Massachusetts, Lowell

Glass wool, called fiber glass in the United States, belongs to the class of man-made mineral fibers which also includes rock wool and slag wool (residue of smelted metallic ore). A fiber is usually defined as a particle having a length to width ratio of 3:1. The major use of fiber glass is for insulating buildings, automobiles and appliances. Specialty glass fibers are made for aerospace and other applications. Fiber exposures can occur during the production and installation of fiber glass or when existing fiber glass insulation is disrupted.

Fiber glass is made in a "fiberizing " process that typically spins a molten stream of glass into fibers much the same way cotton candy is made. The resultant fibers have a wide range of lengths and diameters. Fiber glass is often coated with phenol-formaldehyde resin used as a binder to keep the fibers in a mat that is easily cut and installed. The resin gives the fiber glass insulation its characteristic color such as pink or gold. Some fiber glass used for blowing is not coated with a binder and has the translucent, white coloring of pure glass. Fiber glass without binder tends to be dustier. Fibers less than about 3 micrometers in diameter remain airborne and are easily inhaled. Larger diameter fibers are related to skin, eye, and mucous membrane irritation. Building insulation contains fibers in both size ranges.

There is much controversy about whether fiber glass causes lung disease. To date, no studies have documented mesothelioma in humans exposed only to fiber glass. Some studies have shown increased non-malignant respiratory disease in workers who make fiber glass. Most studies have focused on the association between fiber glass and lung cancer. Some of these studies provide evidence of a positive association, however, they are plagued by the usual insufficient population size, questions regarding selection of the appropriate control groups, insufficient accounting for smoking and co-exposures that may also be related to lung cancer such as formaldehyde and asbestos, and inadequate assessment of the fiber exposure itself. On the basis of these studies, the International Agency for Research on Cancer (IARC) classified fiber glass as a 2B substance, a possible human (lung) carcinogen. It is hoped that ongoing studies in Europe and in the United States will provide clearer evidence about the relationship between lung cancer, non-malignant respiratory disease and fiber glass in the next few years.

Exactly how the fiber may cause cell damage related to tumor formation is not known, although there are several hypotheses. One hypothesis suggests that fibers which are incompletely phagocyticized by a bronchial epithelial cell can function like a "wick" to introduce chemical carcinogens such as polycyclicaromatic hydrocarbons (PAHs) into the cell. A second hypothesis suggests that fibers present in a cell can cause chromosomal damage by mechanically interfering with the cell nucleus during mitosis. A third suggests that a fiber can actually insert pieces of viral DNA or RNA into a lung cell's DNA by transfection.

Experimental studies provide evidence that both fiber length and diameter are important determinants of lung disease. Both dimensions determine where a fiber will deposit in the lung. Fiber dimension also determines how rapidly a fiber will be cleared by macrophages; fibers with length greater than 5 micrometers are not cleared as rapidly as shorter ones.

Most researchers now agree that the fiber's composition is also important, at least as it affects its durability. Durability refers to the length of time a fiber persists in the lung tissue before it dissolves. Durability varies by fiber type. For example, an asbestos fiber of 1 micrometer in diameter takes about 200 years to dissolve in lung fluid, compared to 7 years for a typical glass fiber of similar diameter.

The problem is that we do not know how long a fiber must reside in the lung to initiate damage. Also we do not know the risks of prolonged, continuous exposure to a fiber of lower durability, as often occurs in the occupational setting. Until we have more answers, it is important to continue work to characterize fiber exposures as precisely as possible and to take precautions to control exposures.

Recommendations for Worker Protection

Wherever possible, engineering or process control should be used to reduce the exposure to fiber glass. This is done more easily in the manufacturing setting. Fiber glass "end users" such as those involved in construction and insulation work, tend to be the most heavily exposed, and it is in this setting that respirators are most strongly recommended. In these situations, workers should use personal protection equipment and avoid doing insulation work in poorly ventilated space.

The following equipment and work practices take into account the effect of fiber glass on the eyes, skin and the lungs. These are the author's recommendations and are not required legally. The final respirator selection is, of course, based on the airborne dust concentration:

Respirator and eye protection:

- Wear a full face piece mask to protect eyes and to avoid skin irritation around the nosepiece with HEPA (High Efficiency Particulate Air) cartridges; or
- Wear a half face piece mask with goggles for eye protection
- Do not use contact lenses
- Carefully clean the inside and seals of respirators

Skin protection:

- Wear coveralls and hair covering; remove and dispose of them at the work site
- Wear gloves with extended cuffs and put them over a long sleeve
- Wash fiber glass exposed clothing separately from other laundry
- Avoid contact with bare skin. Shower with cool water after work. Hot water on fiber glass-exposed skin can increase irritation.

SELECTED READINGS

Barrett, JC, Lamb, PW and Wiseman, RW (1989): Multiple mechanisms for the carcinogenic effects of asbestos and other mineral fibers. Environ Health Perspect 81:81-89.

Brown, R, et al, (1991): Carcinogenicity of the insulation wools: reassessment of the IARC evaluation. Regulatory Toxicol and Pharmacol 14:12-23.

Corn, M, et al, (1976): Employee exposure to airbourne fiber and total particulate matter in two mineral wool facilities. Environ Res 12:59-74.

Esmen, N, and Erdal, S (1990): Human occupational and nonoccupational exposure to fibers. Environ Health Perspect 88:277-286.

International Agency for Research on Cancer (1988): Evaluation of carcinogenic risks to humans: man-made mineral fibres and radon. IARC, Lyon, France, Vol. 43.

Miettinen, OS, and Rossiter, CE (1990): Man-made mineral fibers and lung cancer: epidemiologic evidence regarding the causal hypothesis. Scand J Work Environ Health 16:221-31.

Dr. Margaret Quinn is a professor in the Work Environment Department at the University of Massachusetts, Lowell. She is a researcher on fiber glass exposure. This article is reprinted with minor changes from the November 1995 issue of* ***SENSOR Occupational Lung Disease Bulletin* *from the MA Department of Public Health Occupational Health Surveillance Program.*

Occupational Disease Surveillance Data Overview

The Occupational Health & Special Projects Program (OHSPP) continues to conduct outreach to physicians and health care providers to increase reporting of occupational disease. This newsletter is one of the outreach tools. Reporting of occupational diseases allows the Department of Public Health (DPH) to monitor work-related diseases in CT's work force, identify clusters of disease, target public health education efforts and identify the need for workplace interventions.

Since 1992, the first full year of data collection, there has been approximately a 20% increase in reporting each year. In 1995, the health department received 1696 disease reports, compared to the 975 disease reports received in 1992. It is believed that despite the increase in reporting, it is still an underrepresentation of the number of occupational diseases in CT due to underreporting and underrecognition.

The four most commonly reported disease categories have remained the same over the past four years; (1) Cumulative trauma; (2) Poisonings due to toxic materials; (3) Skin diseases/disorders; and (4) Respiratory diseases/disorders. All four categories are being addressed with some form of intervention, i.e., fact sheets; newsletter; physician, patient and/or company follow-up. The majority of the poisonings due to toxic materials are elevated blood lead levels which are monitored by the ABLES (Adult Blood Lead Epidemiology Surveillance) program in OHSPP.

Table 1

Summary of Number of Reported Cases of Selected Respiratory Diseases
CT DPH Occupational Disease Surveillance Data

	1994	1995	1996*	ODSS Total**
Asthma	13	34	19	106
RADS***	1	1	4	12
Silicosis	4	1	0	7
Asbestosis	3	5	7	42
Asbestos-related pleural diseases	17	8	6	121
Total	**38**	**49**	**36**	**288**

* As of October 31, 1996. Data subject to change.
** Occupational Disease Surveillance System (ODSS) total since 11/91
*** Reactive Airways Dysfunction Syndrome

As shown in Table 1, 118 cases of occupational asthma, including reactive airway dysfunction syndrome, have been reported to DPH between 11/91-10/96. Over half of the reports were from workers in manufacturing companies. Of the cases reported, the majority of the workers are white non-Hispanic between the ages of 20-59. The reports are almost equally divided between men and women. A list of the commonly reported asthmagens is in Table 2.

Table 2

Commonly Reported Asthmagens
CT DPH Occupational Disease Surveillance Data

Acids	Colophony solder	Isocyanates
Aldehydes	Dust/dust mites	Latex
Amines	Epichlorohydrin	Welding fumes
Buffing compds	Epoxy	Wood dusts

Asthma Interview Protocol Update

As described in the December 1995 newsletter, patients with occupational asthma are followed-up through the occupational asthma interview protocol which was initiated in July 1995. The goal of the interview protocol is to learn more about workplace practices and conditions leading to exposures that may cause asthma in workers.

The protocol entails contacting the reporting physician for permission to administer a telephone interview to his/her patient. The patient is subsequently contacted by mail and then by telephone. Thirty-six interviews have been conducted thus far. Twenty-two workers have been lost to follow-up, especially reports from 1991 and 1992. Two workers refused to be interviewed, and two workers have since died.

What we have learned

The interviews provide information beyond what is collected on the occupational disease report form. It is an opportunity to talk with workers first hand about problems in the workplace. It is a source of additional evidence to decide whether or not a particular workplace needs further investigation.

After a preliminary overview of the interviews, it appears that most workers have been medically removed for a period of time or indefinitely. Some have been able to return to the same workplace in the same position with modifications. There are others who have had to find jobs elsewhere, and some who are permanently disabled and unable to work at all. There are others who have developed a sensitivity to chemicals, even to common household chemicals, because of their workplace exposure(s). Some workers have been fired or laid-off because of their illness. The majority of workers stated that they did not receive any type of health and safety training, were not aware of the chemicals or substances they were working with nor their hazards, did not have personal protective equipment available to them, and worked in areas with improper or inadequate ventilation-all factors which, mitigated, could have helped prevent their condition. Almost all of the workers interviewed characterized their employer as apathetic.

Once the information from the interviews is compiled, the goal is to use the information to assist with interventions to prevent other workers from acquiring asthma. If one employee in a workplace has been affected, most likely others are being affected as well. DPH provides educational materials and sponsors workshops to increase awareness of factors contributing to occupational asthma and to promote appropriate preventive actions.

For more information, please call the Occupational Health & Special Projects Program at (860) 509-7744.

Occupational Airways is produced by the Occupational Health & Special Projects Program, Division of Environmental Epidemiology & Occupational Health, Connecticut Department of Public Health.

Editor: Juanita Estrada, Epidemiologist

Staff:

Carolyn Jean Dupuy, Director Betty Jung, Epidemiologist

Marian Heyman, Epidemiologist/Industrial Hygienist

Connecticut Department of Public Health
Division of Environmental Epidemiology & Occupational Health
410 Capitol Avenue, MS# 11OSP
P.O. Box 340308
Hartford, CT 06134-0308

TO: