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Industrial Hygiene Digest

INDUSTRIAL HEALTH NEWS

LITERATURE ABSTRACTS

MEDICAL

ENGINEERING

CHEMICAL

TOXICOLOGICAL

LEGAL

JANUARY, 1967
(Vol. 31, No. 1)

INDUSTRIAL HYGIENE FOUNDATION

MELLON INSTITUTE

4400 FIFTH AVENUE - PITTSBURGH, PA. 15213

PLAINTIFF'S EXHIBIT

CHR-309

Mushroom A. P. S. J. A. A. Salama.
Brit. Med. J., 70:71 (September 17, 1967).

A characteristic illness developing in workers on mushroom growing farms is described. In four cases constitutional and respiratory symptoms similar to those seen in farmer's lung developed following the inhalation of dust liberated from disturbance of compost on which mushrooms are cultivated. In sensitive workers, symptoms developed a few hours after exposure, and chest radiographs revealed diffuse miliary mottling. Precipitins to thermophillic actinomycetes (present in the compost) were demonstrated in the serum of two cases—*Thermopolyspora polyspora* and *Micromonospora vulgaris*, respectively. Similar serological findings are present in farmer's lung, and it is concluded that mushroom worker's lung is merely a variant of farmer's lung.

-- J. Am. Med. Assn. References & Reviews

- 59 Experimental Asbestosis. The Development of Lung Cancer in Rats With Pulmonary Deposits of Chrysotile Asbestos Dust. P. Gross, et al. *Arch. Environmental Health* 15, 343-355 (September, 1967). (Reprints available from Industrial Hygiene Foundation).

One hundred and thirty-one rats were exposed to chrysotile asbestos, finely milled, in an exposure chamber for six hours a day, five days a week for a maximum of 62 weeks. Dust concentrations were very heavy, ranging from 42 to 146 mg/cu m (average 86 mg/cu m). About half the animals exposed also had intratracheal application of caustic (lye) to reduce lung clearance and maximize dust retention and pathogenicity. Also, 64 additional animals were given intratracheal injections of chrysotile dust, 14 receiving single doses and the remainder multiple injections of 3.5 mg each. Controls consisted of 30 untreated, unexposed animals and 15 rats treated with caustic but unexposed to asbestos. Designed to study asbestosis, the most important findings of the investigation related to lung tumor production. Other investigators have not been successful in producing lung cancer experimentally in rats with chrysotile. Tumor incidence was high. Of those surviving 18 or more months (ie, after appearance of the first tumor) 31% had primary malignant tumors of the lung. Occurrence in rats treated with lye was 48%, twice the rate of those exposed but not treated with caustic. Malignant pulmonary tumors included adenocarcinomas, fibrosarcomas, and squamous cell cancers as well as a mesothelioma and a mucinous adenocarcinoma. A number of pulmonary lymphoblastomas which occur spontaneously in rats were not counted. Also, atypical metaplasia, not manifestly malignant, was commonly noted. Multicentricity of malignant lesions was observed in several animals. Results of this study support the unitarian concept of tumor origin from alveolar cells. Despite extreme exposure conditions, diffuse asbestosis was not seen. Fibrosis observed was multifocal, centered in the proximal portion of primary lobules with normal appearing tissue intervening. Cancer production with chrysotile in this study appears to involve trace metals introduced during hammer milling which increased nickel, chrome, and cobalt. Previous investigators have not reported subjecting their dusts to hammer milling. The increase in content of trace metals after milling was as follows: nickel, 82%; cobalt, 145%; chrome, 34%. Analysis of the worn hammer of the hammer mill revealed a nickel content of 2,338ug/gm of sample. This finding, if validated by further studies, should provide an important aid to guide industrial hygiene controls of potential health hazards. There are 13 references.

- 70 Asbestosis and Neoplasia. I. J. Selikoff, et al.
Am. J. Med. 42, 487-496 (April, 1967).

The prediction that asbestos-induced neoplasms will rival cigarette-induced lung cancer in the next several decades is reviewed as well as the present state of our knowledge of the role of asbestos in pulmonary asbestosis lung cancer, mesothelioma, other neoplasms, and pleural calcification. The progression of asbestos disease without continued exposure and the diagnosis of asbestos disease are reviewed also. All of the conditions arising from asbestos are slow in developing. The neoplasms now encountered in both industry and in the general public are the result of the inhalation of asbestos associated with the limited asbestos production of 30 years ago. The neoplasms associated with the present utilization of and exposure to asbestos will not be evident until the 1990's. From 50 tons a year 90 years ago, the world production is now 4 million tons a year. Asbestos has been described as the fiber with a half life of infinity. In at least 1/4 of the adults who die in the U.S. and other industrial countries, asbestos bodies are found in the lung. At present, in most cases, neither pulmonary fibrosis nor neoplasia is associated with the asbestos now being found postmortem. There

so many questions which have to be answered such as: whether different kinds of fibers exert the same biological effects; the nature of the dose-disease relationship; sources and extent of environmental contamination; the range of industrial exposure; the range of neoplastic effects of asbestos exposure; and whether asbestos bodies may not sometimes result from mineral fibers other than asbestos.

-- APCA Absts.

- 91 Fiber Glass, Chemistry and Technology. C. P. McCord.
J. Occ. Med. 1, 339-344 (July, 1967).

Fiber glass, like all common forms of glass, is a chemically inert substance. It possesses no known toxic properties. On a mechanical basis, spicules may abrade the skin leading to superficial and transitory irritation. Among fiber glass makers, particularly new workers who are most exposed, skin irritation occurs, but is not remarkable. Although free silica is a major primary ingredient of the batch before melting, no free silica occurs in the glass fibers or in the ultimate products. Silicosis is not a fiber glass hazard. The present consensus is that, because of the particle size, fiber glass is not respirable, and thus unlikely to reach the alveoli of the lungs, but it may reach the tissues of the upper respiratory tract. In animal experiments the introduction of fiber glass particles into the respiratory tract has failed to provoke pneumoconiosis. However, some minor tissue changes have been observed, chiefly reflecting a foreign-body reaction. Fiber glass is not a known carcinogen. Animal experimental work with fiber glass particles introduced into the lungs has failed to provoke lung cancer. No clinical cases of lung cancer have been traced to fiber glass as the source. A fair number of chemicals in ancillary use in fiber glass production may possess some harmful properties. As example, the number includes partially polymerized resins of phenol formaldehyde, urea formaldehyde and epoxies, and fluorides, and trichloroethylene. Such substances involve the fiber glass makers, whose exposures are not contemplated in this presentation, but do not carry over to secondary fabricators, to installers, or to consumers. All considered, fiber glass, on a relative basis, is one of the least harmful substances known to industry.

- 192 Pulmonary Hazards From Exposure to Glass Fibers. A. N. M. Nasr.
J. Occ. Med. 9, 345-348 (July, 1967).

The results from animal experiments and human experience with respect to the effects of fibrous glass upon the respiratory tract have been reviewed. The opinion that inhalation of glass fibers may result in irritation of the upper respiratory tract, with no prospect of significant pulmonary involvement, is repeatedly encountered in the literature. The size of the glass fibers in common application and their tendency to form felt-like masses upon any object with which they come in contact probably prevent inhaled glass fibers from penetrating into the pulmonary alveoli. Three cases in which exposure to fibrous glass was associated with the development of inflammatory lung disease have been reported by individual authors. In those cases the illness was acute, and infection played the major role. A case of bronchial asthma in association with exposure to fibrous glass has been also reported. In all four cases, no appraisal was made concerning other air contaminants that may have been present in the work environment. In a limited number of workers who had been exposed for years to glass fibers, cardiac and pulmonary-function studies revealed no functional impairment. As far as could be ascertained from a search of the American and European literature, available evidence indicates that fibrous glass is a relatively inert material with no fibrogenic or other significant toxic properties. There are 23 references.

-- Author's summary

PHYSICAL ASPECTS OF THE ENVIRONMENT

- 1193 Barometric Pressure Fluctuations: Effects on the Activity of Laboratory Mice. R. L. Sprott.
Science 157, 1206-1207 (September 8, 1967).

Fluctuations in naturally occurring levels of barometric pressure appear to be an important determinant of activity in laboratory mice. In three experiments, activity was higher after increases in barometric pressure than it was after decreases. When the barometric pressure remained relatively stable, intermediate levels of activity were observed. -- Author's abst.