

Vol. 49 No. 8 Abstracts Nos. 2467-2777

August 1974

Leong Wolf

Abstracts on *#2494* *To Marlene Sumak next* Hygiene

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ST0095210

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of asbestos) are as follows: Be 2-14 micrograms per gram of asbestos, Cd 3-10, Cr 202-771, Co 36-78, Cu 9-26, Mn 325-1065, Ni 299-1187, Ti 35-71."

2494 WAGNER, J. C., BERRY, G., SKIDMORE, J. W. & TIMMRELL, V. The effects of the inhalation of asbestos in rats. *Br. J. Cancer*, 1974, v. 29, No. 3, 257-69.

In this paper the authors describe experiments involving more than 700 rats to which asbestos was administered by inhalation for periods varying from 1 day to 24 months. The UICC reference samples of amosite, anthophyllite, crocidolite, Canadian chrysotile and Rhodesian chrysotile were used.

Lung tumours ranging in severity from adenomas to squamous carcinomas were produced by all types of dust. The total numbers of tumours in each group (number of animals in parenthesis) were: control group, 7 (126), all adenomas; amosite, 38 (146); anthophyllite, 50 (145); crocidolite, 55 (141); Canadian chrysotile, 45 (137); Rhodesian chrysotile, 59 (144). Of the 20 tumours that metastasized, 16 occurred after exposure to chrysotile.

The numbers of mesotheliomas observed were: control group, 0; amosite, 1; anthophyllite, 2; crocidolite, 4; Canadian chrysotile, 4; Rhodesian chrysotile, 0. The mesothelioma produced by amosite and one of the 4 produced by crocidolite occurred in animals that inhaled the asbestos dust for only one day.

A total of 412 tumours were observed at sites other than the lung but the difference between the dusted and the control rats was not significant.

P. F. Holt

2495 CALLEJO B. R., HONTER, J. A., A., BEATTIE, A. D. & MOORE, M. R. Lead poisoning and blistering of the skin. *Scott. Med. J.*, 1974, v. 19, No. 1, 3-6.

In 3 patients who presented with blistering of exposed areas of the skin, investigations eventually showed biochemical evidence of lead poisoning. Skin lesions have not been reported among the many manifestations of lead poisoning but there were features in these cases which suggested that photosensitivity, resulting from disturbances in porphyrin metabolism, may occur in slight poisoning. In severe poisoning, with high blood Pb levels and more marked inhibition of erythrocyte δ -aminolaevulinic acid dehydratase (ALA-D), when excess ALA results, photosensitivity is unlikely. It has happened when ALA was administered to normal healthy people because ALA-D activity rapidly con-

verts it to porphyrin. The authors suggest that a watch for skin lesions in lead poisoning might give an opportunity for further study.

From the findings in one or other of all 3 patients data are tabulated with normal values for comparison. A figure giving stages in haem biosynthesis shows where and how Pb affects it. The case-histories are described by the authors, who are from university departments in Edinburgh and Glasgow. Action spectrum studies were carried out at Dundee University.

The unilocular blisters, 0.5-3 cm, on hands or legs for 3 or 6 months, were unlike those seen in common blistering disorders. No photosensitizing drugs had been used. Porphyrin cutanea tarda was excluded by low or absent urinary uroporphyrins. The monochromator test showed porphyrin-like photosensitivity in patient A and in the others there was urinary or blister-fluid fluorescence. All patients had increased erythrocyte protoporphyrin, which in patient B had been attributed to iron deficiency anaemia until this was corrected. Their blood Pb levels were 50, 47 and 41 $\mu\text{g}/100\text{ ml}$. Patient A had diabetes and some abnormal hepatic enzymes but histology and bilirubin were normal; his faecal protoporphyrin and urinary ALA, coproporphyrin and Pb were increased (porphobilinogen normal) and ALA-D activity was decreased. The others had increased urinary ALA. Domestic water with Pb contents of 82, 3126 and 240 $\mu\text{g}/\text{litre}$ was the source of poisoning. The family of patient B was also affected.

M. Patricia Fitzsimons

2496 WADA, O., NAKAJIMA, T. & TOYOKAWA, K. Stability of δ -aminolaevulinic acid (ALA) dehydratase (ALA-D) in blood samples and of dissolved ALA as substrate for assay of ALA-D. *Ind. Hlth. Kawasaki*, 1973, v. 11, Nos. 1/2, 75-6.

Since the (reduced) activity of erythrocyte δ -aminolaevulinic acid dehydratase (ALA-D) is the most sensitive and specific indicator of lead absorption, the authors at Tokyo University tested conditions for their assay method in blood samples from 5 normal persons to establish a stable method for field surveys. The results of 3 main experiments are presented as mean percentages of an assumed standard value for ALA-D. This value is given as 100 ± 18 when the assay was carried out practically immediately with a freshly prepared ALA substrate solution in a 20 mM ALA concentration which had a pH of 3. (0.1 ml of 0.5 M phosphate buffer, pH 7, is added in 0.4 ml of the final reaction mixture.)

occupations of the 62 deceased persons, obtained from the death certificates, were divided into three categories according to possible asbestos exposure. Exposure was present or probable in 9 (11.0%) cases, 28 (34.2%) had a possible exposure, and in 33 (40.2%) cases exposure was absent or unlikely. The occupation of 12 (14.6%) persons was unknown. Additional information of possible exposure history was obtained by interviewing the relatives of 10 mesothelioma patients. For half of the persons a definite, although in some cases trivial, exposure to asbestos could be ascertained. For the other five persons no exposure, either occupational, neighborhood or domestic, to asbestos could be traced. The residential distribution of the 65 persons with mesothelioma revealed no clustering of cases. --Author's abstr.

- 1293/75 The Hazards of Asbestos for Brake Mechanics. B. Castleman, et al. Public Health Reports 90: 254-256, May/June 1975. 26 refs.

In view of the tendency of the accumulating literature to reveal cancer induction from asbestos at progressively lower levels of exposure, mechanics should be advised not to blow out brake parts and to use instead methods which create less airborne dust. The manufacturers of automotive friction materials could easily attach a clear hazard warning to every item sold. The limited success of both the Baltimore and Washington studies shows the limited efficacy of voluntary compliance with health warnings--the shop managers and the mechanics simply do not have the same regard for a warning that they have for a regulation. The margin of safety, if any, provided by the current asbestos standards has been sharply criticized as insufficient. While it is advisable that brake mechanics at least be warned of the potential hazard of their work, it is also apparent that blowing out brakes will be a common practice so long as health regulations permit it. --Cond. from text

- 1294/75 Post Mortem Ascertained Cases of Lung and Pleural Tumors Due to Asbestos. F. Mirabella. Med. Lavoro 66: 192-211, May/June 1975. 145 refs. (Italian)

In a revision of autopsy cases with asbestosis carried out and published between 1900 and 1974, upon 2044 subjects (of both sexes), 583 malignant intrathoracic neoplasms have been found, comprising bronchogenic carcinomata and pleural mesotheliomata (or 28.5%). Chronologically in the period 1930-1955 the percentage of such neoplasm was 19.7% of all autopsies; in the period 1955-1974 they rose to 35.3%, reaching in some post-mortem departments an average of over 40%. In the total of malignant growths of the asbestotics, the intrathoracic location would often constitute 60-70% and above. The Anglo-Saxon ethnic group (but not exclusively), would seem to be more affected than the Neo-Latin branch. Asbestosis and Mesothelioma: The mesothelioma of the pleura is an uncommon neoplasm in the autopsies of the general population; in the post-mortem departments of industrial and especially of maritime cities with dockyards involved in naval construction and demolition, notwithstanding a chronological increase of incidence, there have not been such frequent reports of mesothelioma over 0.77% of autopsy cases (Koenig, at St. George's Hospital Hamburg); but generally the average would be about 0.20% (on 346, 720 records of the pathological institutes in general hospitals, documented in the medical bibliography, the discovered mesotheliomata were 685). In the post-mortems of asbestosis sufferers, the incidence of the mesothelioma seems, of the contrary, to be 20-30 times over. Pertinent tables are included. --Author's Summary in English

- 1295/75 Asbestos Emissions From Baghouse Controlled Sources. C.F. Harwood, et al. Amer. Ind. Hyg. Assn. J. 36: 595-603, August 1975. 8 refs.

There is virtually no information published on the absolute efficiency of baghouses in reducing the emissions of fine particles of asbestos. This lack of information is unfortunate because serious occupational health problems may result from the common practice of recirculating air to conserve energy. Emission testing has been conducted at five asbestos processing plants where the emission are controlled by baghouses. The results showed that the mass removal efficiency frequently exceeded 99.00%. Membrane filter samples of the effluent were examined by optical and electron microscope. It was observed that despite the high mass efficiency, the number of fibers emitted, which were greater than 1.5 μm in length, was about 10^4 - 10^5 fibers/ m^3 , while the number of fibers less than 1.5 μm was 10^7 - 10^8 fibers/ m^3 . The significance of the size of the fibers in terms of probable health impact is briefly discussed. --Author's abstr.