A/C Pipe Producers Association

ADVISORY

Volume I, Issue 18

October, 1983

REVIEW OF SCIENTIFIC/MEDICAL STUDIES OF THE POTENTIAL HEALTH EFFECTS OF INGESTED ASBESTOS - ANIMAL STUDIES

This is the second part of a two part series reviewing scientific and medical research on the potential health effects of ingested asbestos. This issue summarizes animal feeding studies.

In 1977, the (U.S.) National Academy of Sciences' Safe Drinking Water Committee [1] provided underlying principles to guide the U.S. Environmental Protection Agency (EPA) when assessing effects of long-term, low dose exposures to carcinogenic substances. The very first principle was, "Effects in animals properly qualified, are applicable to man." The Committee stated, "This premise underlies all of experimental biology and medicine ... ," and the third principle declared, "The exposure of experimental animals to toxic agents in high doses is a necessary and valid method of discovering possible carcinogenic effects in man."

Animal studies support epidemiologic findings that there is no association between the ingestion of asbestos fibers in drinking water and adverse health effects. Test animals have been fed diets containing substantial portions of asbestos, without inducing related tumors or shortening lifespans.

Smith, W. E., "Asbestos, Talc and Nitrites in Relation to Gastric Cancer," American Industrial Hygiene Association Journal 34:227-228 (1973). This was a life span experiment in which hamsters were fed abnormally large amounts of asbestos. Dr. Smith concludes:

> In 45 hamsters maintained throughout their lives on diets containing 1% of the chrysotile or amosite varieties of asbestos, we found no gastric carcinomas and no tumors in the gastrointestinal tract except for a neoplasm in the mesentery of the colon. We are unable to relate that lesion to the treatment, since ashing has revealed no asbestos fibers in it.

Webster, I., "The Ingestion of Asbestos Fibers," Environmental Health Perspectives, 9:199-202 (1974). Dr. Webster fed baboons heavy doses of crocidolite over considerable periods of time to determine if peritoneal or gastrointestinal cancers could be induced. The report states:

> In none of the many baboons used was there any evidence of a peritoneal tumor or gastrointestinal tumor.

1600 Wilson Boulevard Δ Suite 1008 Δ Arlington, Va 22209 Δ (703) 841-1556

Gross, P., et al., "Ingested Mineral Fibers: Do They Penetrate Tissue and Cause Cancer?" Arch. Environmental Health, 29(6):341-347 (1974).

> Twenty-one months of intimate contact of rat GI (gastrointestinal) mucosa with very high concentrations of chrysotile asbestos failed to produce cancer or any other kind of lesion. Short-term and long-term feeding (up to 1 1/2 years) of chrysotile and crocidolite by a second laboratory resulted in no tumor production in the GI tract or mesothelium during the lifetime of the animals.

Bonser, G. M. and **Clayson**, D. B., "Feeding of Blue Asbestos to Rats," 45th Annual Report of the British Empire's Cancer Campaign, 242 (1976). An experiment was performed to ascertain whether feeding asbestos to rats would induce peritoneal tumors. Sixty-five rats were fed 1,500 milligrams of crocidolite asbestos per kilogram body weight for life. No tumors were observed.

Wagner, J.C., et al., "Animal Experiments with Talc," Inhaled Particles IV, Pergammon Press, 647-654 (1977). Thirty-two rats were fed 100 milligrams of chrysotile or talc over a five month period. No significant increased incidence in tumors was observed.

Smith, W. E., et al., "Health of Experimental Animals Drinking Water With and Without Amosite Asbestos and Other Mineral Particles," Journal of Environmental Pathology and Toxicology, 3:277-330 (1980). This study is the first and, to date, only experiment in which animals were actually exposed to asbestos fibers via drinking water for their entire lifetimes. Tumor incidence was compared with hamsters that did not consume asbestos. Dr. Smith concludes:

> In the present experiment, no malignant tumors were found in hamsters maintained on drinking water containing 13,000 million amosite fibers per liter.

Hilding, A.C., et al., "Biological Effects of Ingested Amosite Asbestos, Taconite Tailings, Diatomaceous Earth and Lake Superior Water in Rats," Archives of Environmental Health, 36:298-303 (1981). Rats were fed asbestos during their lifetimes and were examined at autopsy. The dose levels for the treated animals were the equivalent of 5.5 billion fibers per liter (low dose group) and 78 billion fibers per liter (high dose group) of drinking water. The investigators conclude:

> The most significant finding in our study was the total absence of gastrointestinal cancer in the animals exposed to the test materials.
>
> * * * * * *
>
> Under the conditions of our study, ingested asbestos ... had no demonstrable carcinogenic effect on the gastrointestinal tract or on other body tissues of the rat.

Bolton, R.E., **Davis**, J.M.G., and **Lamb**, D., "The Pathological Effects of Prolonged Asbestos Ingestion in Rats," Environmental Research, 29:134-150 (1982). Animals in three treatment groups were exposed to amosite, crocidolite and chrysotile asbestos in a margarine-based dietary supplement. The dose level resulted in an average weekly consumption of 250 milligrams of asbestos per rat per week. The researchers conclude:

> These studies show no evidence of widespread penetration of, or damage to, the gastrointestinal mucosae of laboratory rats following prolonged ingestion