

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

CINCINNATI, OHIO 45268
Toxicology and Microbiology Division

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SUBJECT: Brief Summary of Ingested Asbestos Studies

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Re: Request for summary of ingested asbestos studies.

A number of research studies have investigated the possible adverse health effects caused by ingesting asbestos. The following list summarizes the results of studies in the major areas of toxicology and epidemiology. The summaries were drawn from the abstract or results section of the papers. The full reports are being reviewed for their scientific usefulness in determining whether or not to regulate asbestos in drinking water.

Toxicology

- 1) Bonser and Clayson (1967) - no intestinal tumors in rats fed crocidolite asbestos.
- 2) Smith et al. (1965) - no effect of ingested asbestos in rats and hamsters.
- 3) Gross (1974) - no effect of ingested asbestos in three animal studies.
- 4) Gibel (1976) - increased tumor occurrence in rats fed asbestos containing filter material.
- 5) Cunningham et al. (1977) - inconclusive results on whether or not ingested asbestos causes cancer due to the small number of animals tested.
- 6) Donham et al (1980) - no increase in tumors in rats fed chrysotile asbestos. Other conclusions included evidence of increased probability of asbestos-fed animals to develop colon lesions in general.
- 7) Hilding et al. (1981) - no significant increase in the incidence of malignant tumors in any experimental group (Duluth tap water, taconite plant tailings, amosite asbestos) compared with that in the control group.

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8) Smith et al (1980) - no deleterious health effects and no tumors related to treatment were found in hamsters exposed to milled taconite ore. Tumors found in hamsters exposed to a preparation of amosite asbestos could not be specifically attributed to asbestos.

9) Ward et al (1980) experimental evidence suggested but did not prove that oral chrysotile asbestos exposure in rats may have increased the incidence of intestinal tumors occurring naturally. No control group maintained.

10) McConnel, E (1982) no evidence of increased tumor risk among hamsters eating chrysotile and amosite as 1% of their diets throughout their life-span.

11) Studies still underway at NIEHS and in Europe.

Epidemiology

1) Masson et al. (1974) and Sigurdson et al (1980) found no increase in gastrointestinal cancer incidence in Duluth, MN.

2) Harrington et al. (1978) and Miegs et al. (1980) found no association between increased cancer risk and use of asbestos-cement pipe in Connecticut.

3) Kanarek et al. (1980), Conforti et al. (1981), and Tarter (1981) found an association between cancer incidence and asbestos in the drinking water of the San Francisco Bay Area.

4) Wigle (1977) and Toft et al. (1981) found no relationship between cancer mortality and asbestos in municipal water supplies in Quebec, Canada.

5) Severson (1979) and Polissar (1982) found no effects of asbestos in drinking water on cancer incidence in the Puget Sound region of the State of Washington.

6) A case-control study is still underway in the Puget Sound Region.

Toxicology References

Donham, K.J., Berg, J.W., Will, L.A., Leininger, J.R. The effects of long-term ingestion of asbestos on the colon of F344 rats. Cancer 45:1073-1084 (1980).

Gibel, W., Lohs, K., Horn, K.H., Wildner, G.P., and Hoffman, F. Tierexperimentelle Untersuchungen uber eine Kanserogene Wirkung von Asbestfiltermaterial nach Oraler Aufnahme (Experimental study on cacerogenic activity of asbestos filters following oral ingestion). Arch Geschwulst-forsch Band 46 Heft 6;437-42 (1976).

Gross, P. Is short-fibered asbestos dust a biological hazard? Arch. Environ. Health 29:115-117 (1974).

Hilding, A.C., Hilding, D.A. and Larson, D.M. Biological effects of ingested amosite asbestos, taconite tailings, diatomaceous earth and L. Superior water in rats. Arch. Environ. Health 36(6):293-303 (1981).

Smith, W.E., Miller, L., Eleasser, R.E. and Hubert, D.D. Tests for carcinogenicity of asbestos. Ann. New York Acad. Sci. 132 9art 1):456-488 91965).

Smith, W.E., Hubert, D.D., Sobel, H.J., Peters, E.T. and Doerfler, T.E. health of experimental animals drinking water with and without amosite asbestos and other mineral particles. J. Environ. path. Tox. 3:277-300 (1980).

Ward, J.M., Frank, A.L., Wenk, M., Devor, D. and Tarone, R.E. Ingested asbestos and intestinal carcinogenesis in F344 rats. J. Environ. Pathoo. Toxicol 3:301-12 (1980).

Will, L.A., Berg, J., Stevens, R., Donham, K., Leininger, J. Asbestos ingestion and 1,2-dimethyl-hyrazine injection effect on colon tumor development. In: Proc. 2nd Intern. Workshop on the In Vitro Effects of Mineral Dusts, Degray, AR, Apr. 28, 1982. (In Press).

Bonser, G.M. and Clayson, D.B. Feeding of blue asbestos to rats. In: 45th Annual Reports of the British Empire Cancer Campaign, 1967, p. 242.

Cunninghand, H.M., Moodie, C.A., Laurence, G.A. and Pontefract, R.D. Chronic effects of ingested asbestos in rats. Arch. Environ. Contam. Toxicol. 6:507-13 (1977).

McConnel, E. (1982) NIEHS Feeding Study-Hamster Data (In Review).

Epidemiology References

Duluth, MN

1. Masson, T.J., F.W. McKay, R.W. Miller (1974) Asbestos-like fibers in duluth water supply. JAMA, 228(8):1019-1020.
2. Levy, B.S., E. Sigurdson, J. Mandel, E. Landon, J. Pearson (1976) Investigating possible effects of asbestos in city water: Surveillance of gastrointestinal cancer incidence in Duluth, MN. Amer. J. Epi., 103:362-368.
3. Sigurdson, E.E., B.S. Levy, J. Mandel, R. McHugh, L. Michienze, H. Jagger, J. Pearson (1981) Cancer morbidity investigations: Lessons from the Duluth study of possible effects of asbestos in drinking water. Envir. Res., 25:50-61.

Connecticut

4. Harrington, J.M., G. Craun, J.W. Miegs, P. Landrigan, J. Flannery, R. Woodhill (1978) An investigation of the use of asbestos cement pipe for public water supply and the incidence of gastrointestinal cancer in Connecticut, 1935-1973. Amer. J. Epi., 107(2):96-103.
5. Meigs, J.W., S. Walter, J. Heston, J. Millette, G. Craun, R. Woodhill, J. Flannery (1980) Asbestos-cement pipe and cancer in Connecticut, 1955-1974. J. Envir. Health, 42:187-191.

Bay Area, CA

6. Kanarek, M.S., P. Conforti, L. Jackson, R. Cooper, J. Murchio (1980) Asbestos in drinking water and cancer incidence in the San Francisco Bay Area. Amer. J. Epi., 112:54-.
7. Conforti, P.M., M. Kanarek, L. Jackson, R. Cooper, J. Murchio (1981) Asbestos in drinking water and cancer in the San Francisco Bay Area: 1969-1974 incidence. J. Chron. Dis., 34:211-224.
8. Tarter, M.E. (1981) Pattern recognition in the context of an asbestos cancer threshold study. Preprint: Proc. of the Thirteenth Annual Symposium on the Interface: Computer Science and Statistics.

Quebec, Canada

9. Wigle, D.T. (1977) Cancer mortality in relation to asbestos in municipal water supplies. Arch. Envir. Health, 32:185-189.
10. Toft, P., D.T. Wigle, J.C. Meranger, Y. Mao (1981) Asbestos and drinking water in Canada. Science of Tot. Envir., 18:77-89.

Puget Sound, WA

11. Severson, R. (1979) A study of the effects of asbestos in drinking water and cancer incidence in the Puget Sound region. M.S. Thesis, Univ. of Wash., Seattle, Wash., p. 110.
12. Polissar (1982) Asbestos in Drinking Water and Cancer Incidence in the Puget Sound Area. Amer. J. Epi. (In Press).