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Digestive System Cancer Among Persons Subjected to Occupational Inhalation of Asbestos Particles: A Literature Review with Emphasis on Dose Response

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MARGINALIA REDACTED

Human data show a dose–response relationship between industrial exposure to asbestos and later development of cancer of the bronchus and lung and of cancer of the digestive tract. The data do not provide much evidence for a threshold or for the existence of a clearly "safe" level of exposure. Good dose–response data, with quantitative estimates of dose are uncommon; however, in all the literature reviewed only one paper did not support the conclusion that increased exposure to inhaled asbestos particles leads to increased digestive system cancer.

There are no direct epidemiologic data on the possible carcinogenic affects of ingested asbestos. There are some data relating inhaled asbestos to the subsequent development of digestive tract cancer. Since there is evidence that some portion of inhaled asbestos eventually enters the digestive tract, relationships shown between inhaled asbestos and digestive tract cancer should have some meaning for establishing (or denying) a dose response relationship between ingested asbestos and cancer.

This paper follows this plan to investigate this relationship: review of dose-response relationships between inhaled asbestos and bronchiogenic cancers with emphasis on establishing possible "threshold" or "safe" levels; review of dose–response relationships between inhaled asbestos and digestive system cancers with attempts to determine if the dose-response relationship (if any) is similar to the dose–response relationship for bronchiogenic cancer and inhaled asbestos; review of literature which does not give clear quantitative dose data, but which does address the problems of digestive system cancers and exposure to asbestos through inhalation.

As a result of this review, the data I have examined suggests to me that there is an increase of digestive tract cancer associated with inhaled asbestos; the proportionality factor for converting inhaled dose to ingested dose to produce digestive cancer with rates at the same level as bronchiogenic cancer ranges from 1/20 to 1/1; for both bronchiogenic cancer and gastric cancer, the data do not provide strong evidence for a threshold, or for the existence of a clear "safe" level of exposure.

The major quantitative dose–response data, with dose given in units of millions of particles per cubic foot-years (mppcf-years), have been given in papers by McDonald (McGill University, Montreal, Canada) and Enterline (University of Pittsburg, Pittsburg, Pennsylvania). There are other papers which give dose in semiquantitative terms, and these are considered later.

Figure 1 plots the data given by McDonald *(1)* and Enterline *(2, 3)* for cancer of the bronchus and lung. The McDonald data are plotted at the median of the "dust index" (mppcf-years) classes except for his open-ended class of 800 mppcf-years and more, which is plotted at 1130 mppcf-years (which would be the median if the

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