# THE HEALTH EFFECTS OF CHRYSOTILE: CURRENT PERSPECTIVE BASED UPON RECENT DATA.


## ABSTRACT

This review substantiates kinetically and pathologically the differences between chrysotile and amphiboles. The serpentine chrysotile is a thin walled sheet silicate while the amphiboles are double-chain silicates. These different chemistries result in chrysotile clearing very rapidly from the lung ($T_{1/2}$ = 0.3 to 11 days) while amphiboles are among the slowest clearing fibers known ($T_{1/2}$ = 500 days to 8). Across the range of mineral fiber solubilities chrysotile lies towards the soluble end of the scale. Chronic inhalation toxicity studies with chrysotile in animals have unfortunately been performed at very high exposure concentrations resulting in lung overload. Consequently their relevance to human exposures is extremely limited.

Chrysotile following subchronic inhalation at a mean exposure of 76 fibers L>20 $\mu m/cm^3$ (3413 total fibers/$cm^3$) resulted in no fibrosis (Wagner score 1.8 to 2.6), at any time point and no difference with controls in BrdU response or biochemical and cellular parameters. The long chrysotile fibers were observed to break apart into small particles and smaller fibers. Toxicologically, chrysotile which rapidly falls apart in the lung behaves more like non-fibrous mineral dusts while response to amphibole asbestos reflects its insoluble fibrous structure.

Recent quantitative reviews of epidemiological studies of mineral fibers have determined the potency of chrysotile and amphibole asbestos for causing lung cancer and mesothelioma in relation to fiber type also differentiated between these two minerals. The most recent analyses also concluded that it is the longer, thinner fibers that have the greatest potency as has been reported in animal inhalation toxicology studies. However, one of the major difficulties in interpreting these studies is that the original exposure estimates rarely differentiated between chrysotile and amphiboles.

Not unlike some other respirable particulates, to which humans are, or have been heavily occupationally exposed, there is evidence that heavy and prolonged exposure to chrysotile can produce lung cancer.

The value of the present and other similar studies is that they show that low exposures to pure chrysotile do not present a detectable risk to health. Since total dose over time decides the likelihood of disease occurrence and progression, they also suggest that the risk of an adverse outcome may be low if even any high exposures experienced were of short duration.