Irrelevance of Bipersistence & What you can’t see can kill you

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Hypothetical schema based on the work of Brand depicting the temporal development of mesothelioma from the time of movement of fiber to the site where the pleuripotential mesothelioma cells undergo neoplastic transformation. Latency from an epidemiologic perspective is considered the interval from initial exposure to the time of clinical presentation. Little is known about the interval from exposure to transformation and from the time of transformation until the development of clinical disease.
What you can’t see can kill you – it’s the fibers

PCM limit of detection is .25
NIOSH 7402 only PCM fibers count

Chrysotile fibers are .02 to .05

The testing method only counts chrysotile bundles

So you can’t say short or long fibers are irrelevant because you have not been testing their levels
It is widely accepted (but often forgotten) that PCM generally overestimate asbestos exposures in buildings, but our data suggest that, at least under some circumstances PCM may also seriously underestimate workers' exposures.
“During the spring of 1977 occasional batches of product were made that contained a sharply increased amount of fines…These products resulted in several 20 – 40 fibers/cc counts.”

“Union Carbide has provided an asbestos fiber counting service to customers since 1973.”

“Ultra-fine material has always been present, at least sporadically, and has largely escaped detection in the past.”
Chrysotile Pleura Chart

Lung

Pleura

(Cancer found here)
Type of Asbestos Found at Site of Mesothelioma

- Chrysotile: 77%
- Chrysotile + Amphibole: 21%
- Amphibole: 2%

Dose response People are not rats (usually)
"Because of the rather unique structure characteristics of Calidria Asbestos, there was concern that it might be unusually fibrogenic and perhaps cause an acute asbestosis... The results of this test [on rats and rabbits] showed Calidria Asbestos to be slightly more fibrogenic than long fibre asbestos but the difference was not so great as to suggest an unusual degree of hazard. From this I conclude that the same precautions to avoid breathing asbestos dust must be observed whether the dust be from Calidria Asbestos or from a standard long fibre form... Some people believe there is an association between exposure to asbestos dust and the development of lung cancer and mesothelioma. There is no information regarding Calidria Asbestos in this respect as yet. It would be prudent to assume that Calidria Asbestos will behave like other asbestos in this regard."
Pre-Disease Asbestos Exposures Are Important in Causing Mesothelioma

“Fibers in the lung at the time of disease detection may not be biologically active, and exposures to fibers that have not persisted to the point of disease manifestation may have been critical for early, pre clinical states.”

Cellular and Molecular Mechanism of Asbestos Carcinogenicity: Implications for Biopersistence. (1994)
J. Carl Barrett, Laboratory of Molecular Carcinogenesis, Environmental carcinogenesis Program, National Institute of Environmental Health Sciences, National Institutes of Health.
“Lungs from patients with asbestos-induced disease commonly have an elevated amosite and crocidolite content, but often do not have an elevated chrysotile content; however, this observation most likely reflects the failure of chrysotile to accumulate in the lungs and should not be interpreted as denying a role for chrysotile.”

Churg, Pathology of Occupational Lung Disease, 234 (1986).
Background Exposure to Chrysotile Consists of Very Short Fibers

“Virtually all the chrysotile in nonoccupationally exposed persons was composed of short fibrils, most > 1µm in length. Most of the chrysotile fibers observed in this study were <5 µm in length. Only 52 of 9256 (0.56%) chrysotile observed were longer.

Lungs of individuals with occupational exposure to asbestos contained more chrysotile fibers > 5 µm in length.”

Chrysotile Persists in Human Lung Tissue

"The study of human tissues shows that sometimes, even many years after cessation of exposure, chrysotile fiber is encountered in lung tissues, and occasionally at exceedingly high concentrations."