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

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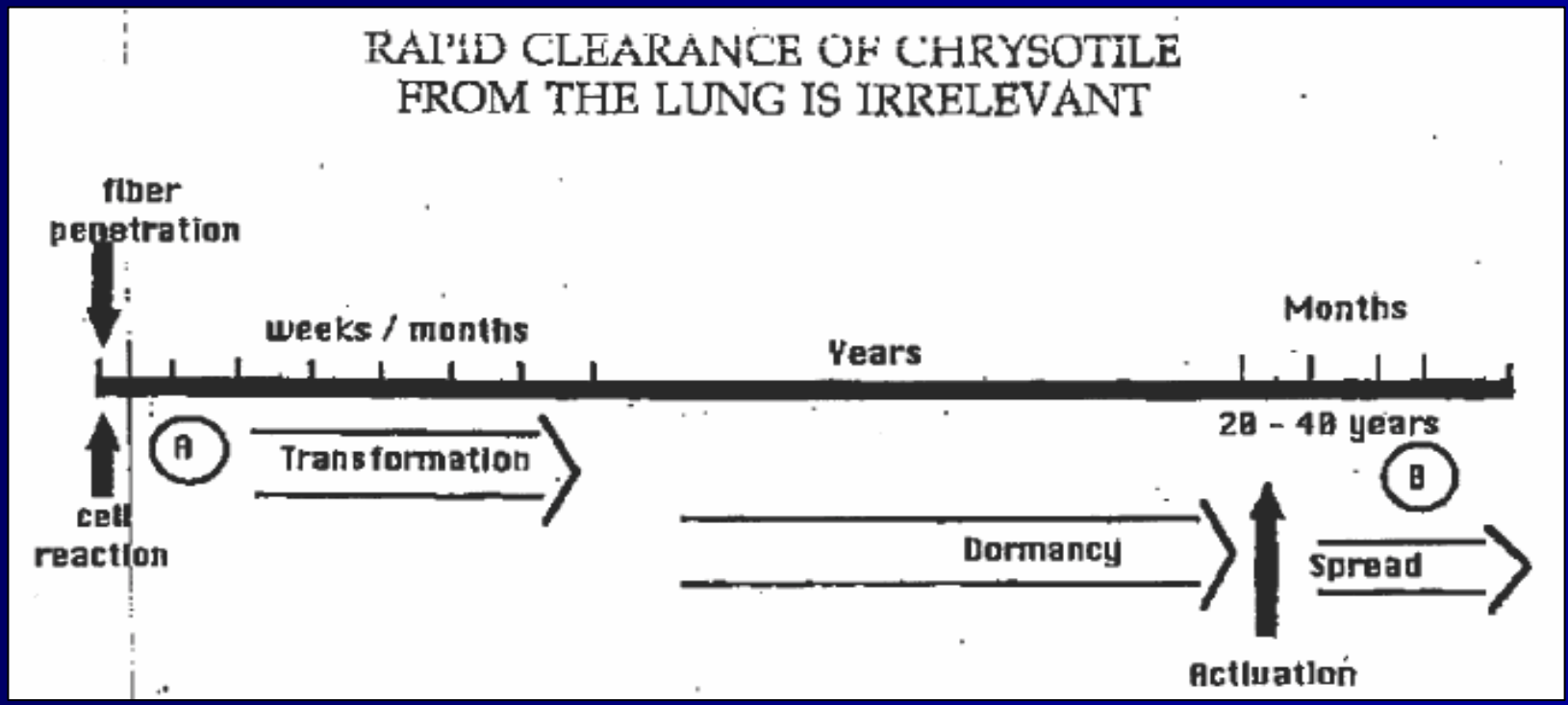
Biopersistence Irrelevant



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

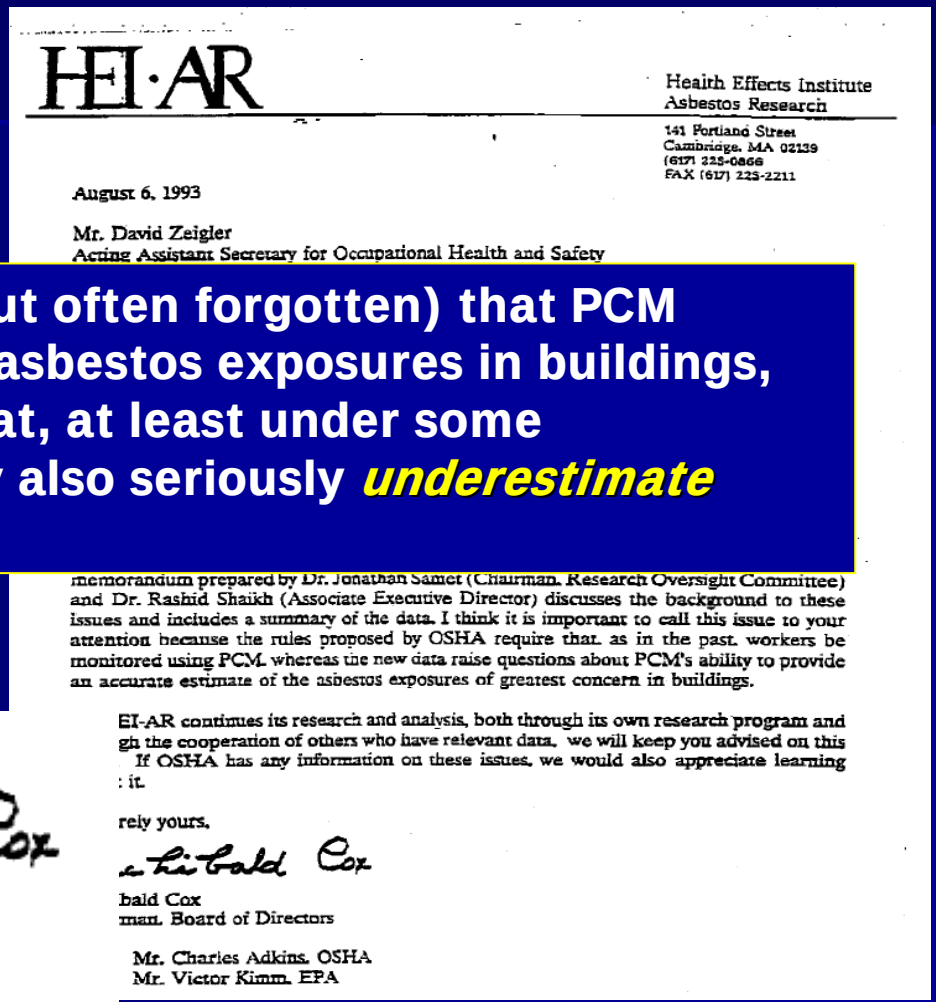
Chrysotile fibers are .02 to .05

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

PCM under estimates exposures – Company experts agree

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.



HEI·AR

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August 6, 1993

Mr. David Zeigler
Acting Assistant Secretary for Occupational Health and Safety

memorandum prepared by Dr. Jonathan Samet (Chairman, Research Oversight Committee) and Dr. Rashid Shaikh (Associate Executive Director) discusses the background to these issues and includes a summary of the data. I think it is important to call this issue to your attention because the rules proposed by OSHA require that, as in the past, workers be monitored using PCM, whereas the new data raise questions about PCM's ability to provide an accurate estimate of the asbestos exposures of greatest concern in buildings.

EI-AR continues its research and analysis, both through its own research program and gh the cooperation of others who have relevant data. we will keep you advised on this If OSHA has any information on these issues, we would also appreciate learning : it.

rely yours,

Archibald Cox

bald Cox
man, Board of Directors

Mr. Charles Adkins, OSHA
Mr. Victor Kimm, EPA

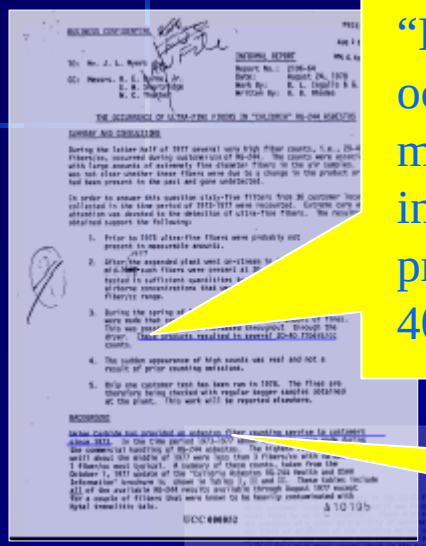
Sincerely yours,

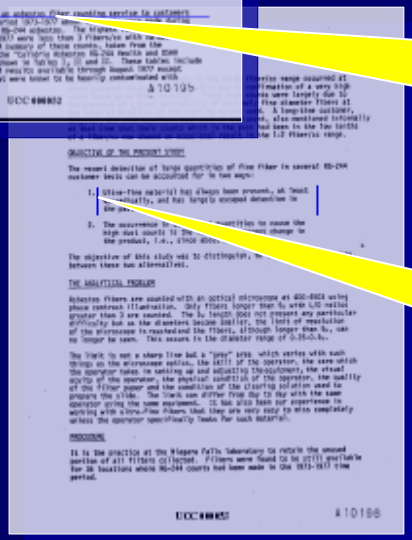
Archibald Cox

Archibald Cox
Chairman, Board of Directors

cc: Mr. Charles Adkins, OSHA
Mr. Victor Kimm, EPA

UCC Thin fibers missed





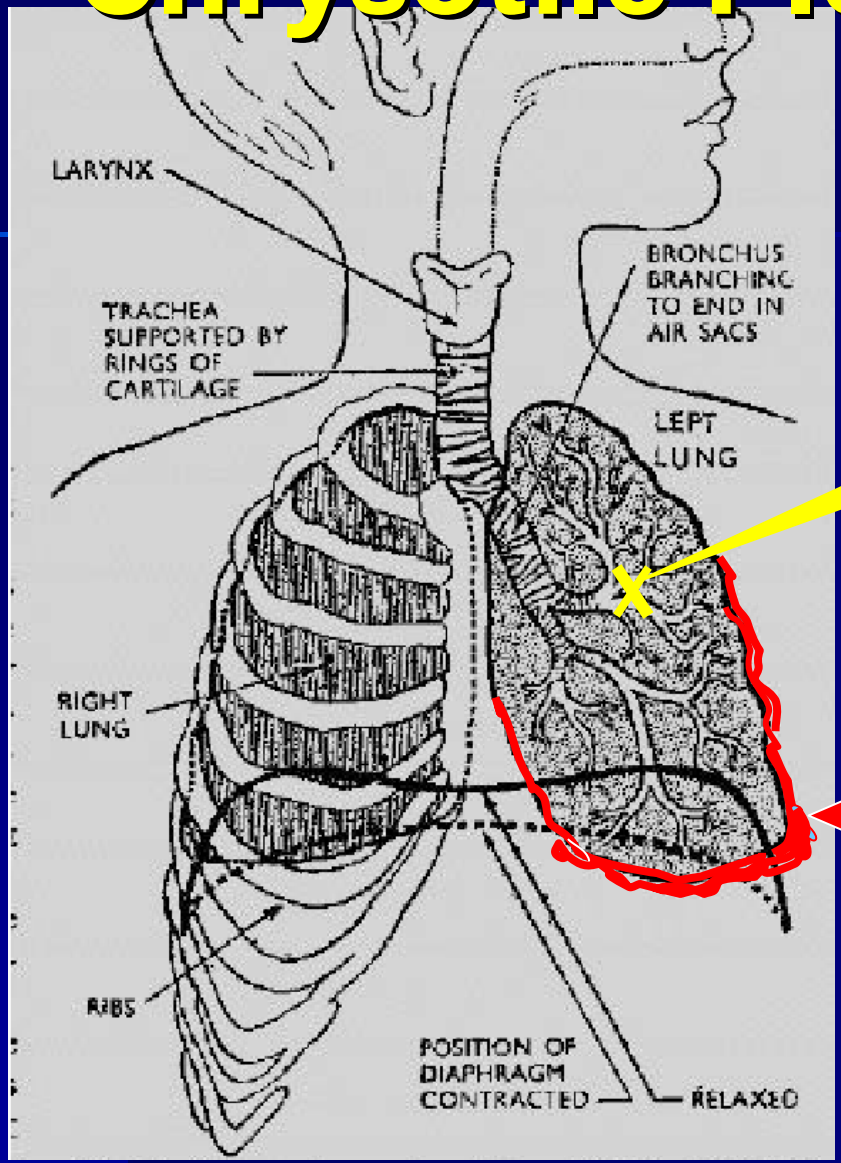
"During the spring of 1977 occasional batches of product were made that contained a sharply increased amount of fines…These products resulted in several 20 – 40 fibers/cc counts."

"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."

1. UCC1+39_Cull\UCC_01_Cull\KnowExpUsersUCC000052-000063.pdf

Chrysotile Pleura Chart

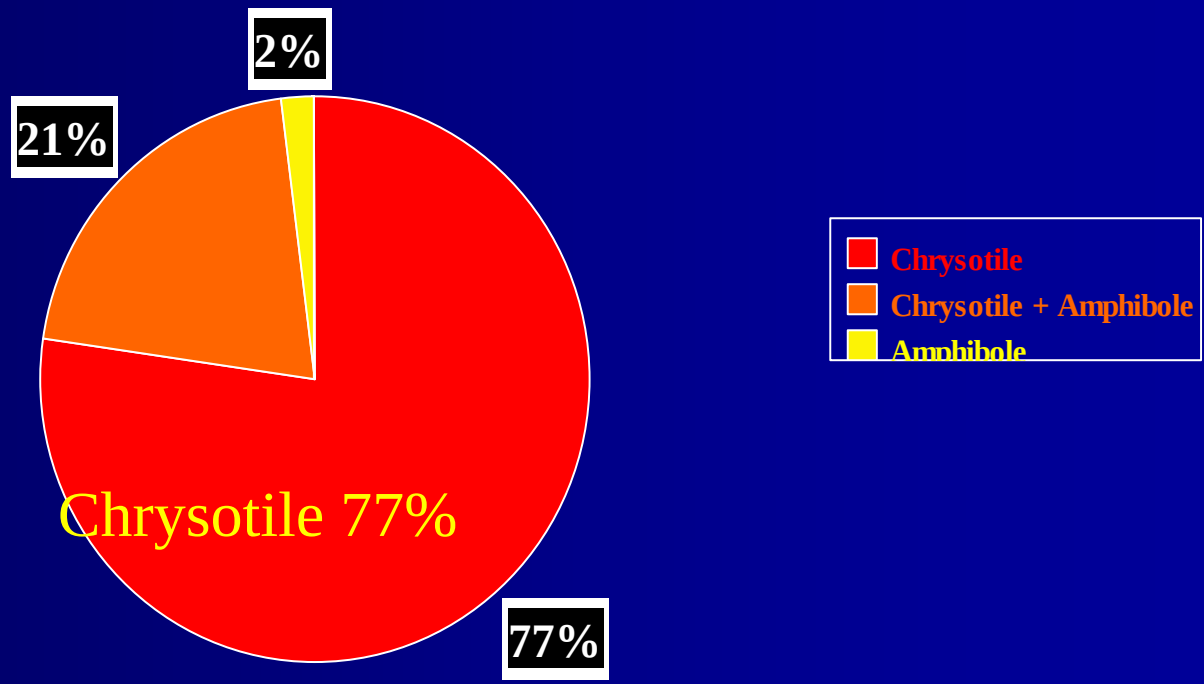


Lung

Pleura

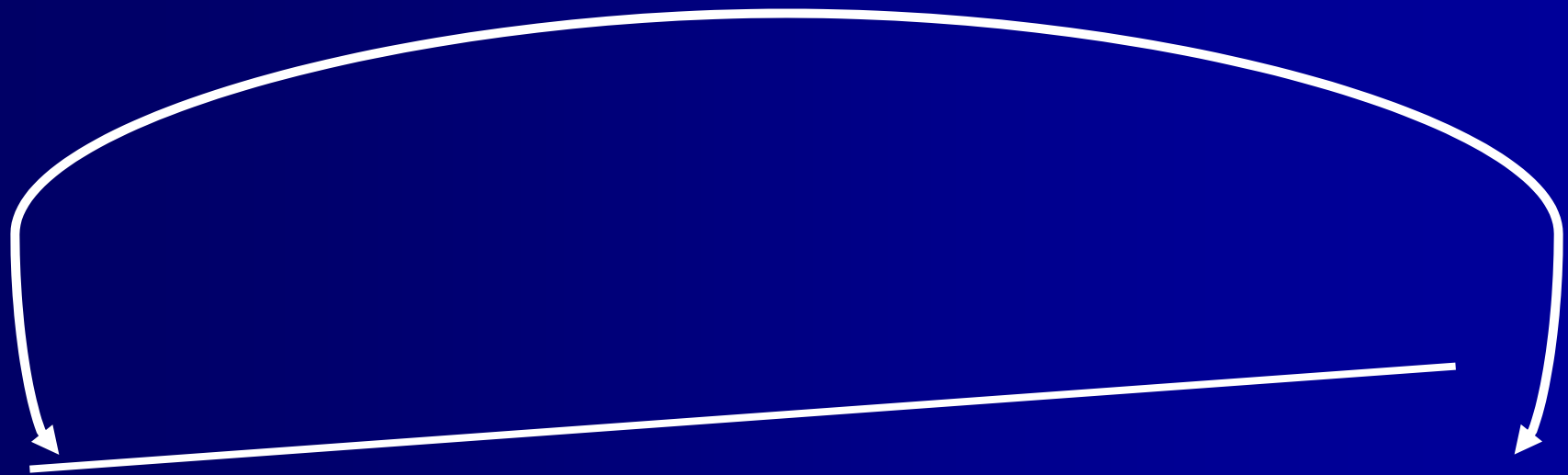
(Cancer found here)

Type of Asbestos Found at Site of Mesothelioma



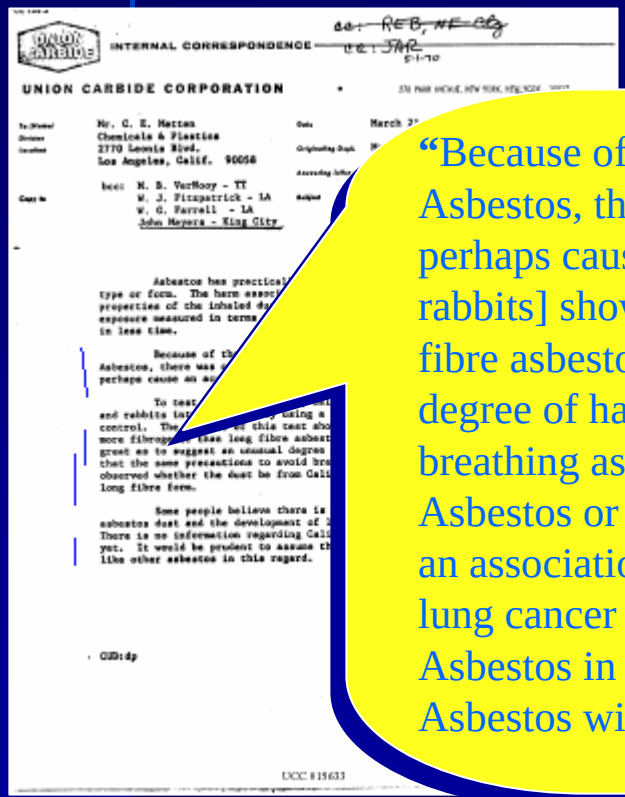
Suzuki and Yuen, Asbestos Tissue Burden Study on Human Malignant Mesothelioma, Industrial Health, 39:150 (2001)

Dose response People are not rats (usually)



March 21, 1970

Secret animal studies: Calidria more Hazardous



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Asbestos has practical
type or form. The harm assoc
properties of the inhaled du
exposure measured in terms
in less time.

Because of th
Asbestos, there was
perhaps cause an ac

To test
and rabbits to
control. The
more fibrogenic than long fibre asbest
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observed whether the dust be from Cali
long fibre form.

Some people believe there is
asbestos dust and the development of
There is no information regarding Cali
yet. It would be prudent to assume th
like other asbestos in this regard.

CGB:dp

UCC 015633

"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."

•1. UCC1+39_Cull\UCC_39_Cull\KnowAsbToxicKeyUCC015631-015640.pdf

Biopersistence Irrelevant

- 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.

Biopersistence Irrelevant

- Pre-Disease Asbestos Exposures Are Important in Causing Mesothelioma

> "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).

Biopersistence Irrelevant

- 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."

Langer & Nolan (1994) Chrysotile Bipersistence in the Lungs of persons in the General Population and Exposed Workers.

Biopersistence Irrelevant

- 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."

Langer and Nolan, *Chrysotile Biopersistence in the Lungs of Persons in the General Population and Exposed Workers*. Environmental Health Perspectives. 102:235-239 (1992).