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21 - 30 June 1978

PANEL DISCUSSION

Can We Project an Acceptable Standard for Industrial Use of Asbestos?

"Absolutely"

K. Robock*

First of all, it was not my choice to defend "absolutely" for the answer to this question. From my point of view as a physicist the term "absolute" makes me think of the Kelvin Scale of temperature based upon "absolute zero" which is absolutely unattainable. With regard to this question, if we are to behave as responsible scientists we can only give a valid answer which must be relative.

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Our knowledge of fibre concentrations in the past without any dust control is not based on ideal data and we can only compare meaningfully the relative concentrations in various branches of the asbestos industry. Accordingly, by collecting the data available including our own findings by reproducing conditions of the past as accurately as possible, we can arrive at a series of values differing by 7 orders of magnitude (Figure 1). This is the only way in which a threshold level could be determined. In uncontrolled situations from the 20th to the 50th the highest concentrations had always been in the insulation industry (spraying and stripping) with mean values ranging from 50 to 500 fibres/ml and up to peaks of 2000 fibres/ml (reported by HARRIES (1), REITZE (2) and ourselves - not yet published). In a decreasing tendency this was followed by the other branches of the asbestos industry, namely the textile industry, mines and mills and the asbestos cement industry. By controlled handling of asbestos and application of the best technical dust suppression methods available today, we have now achieved dust concentrations equal to or below 2 fibres/ml. This means fibre concentrations of 2 or 4 orders of magnitude less than we had in the past. For hundreds of years fibre concentrations within the general environment are equal to or below 10^{-2} fibres/ml - that means 6 orders of magnitude less than

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in the insulation industry in the past or 3 orders of magnitude less than the today 2 fibres/ml level in the working environment.

Excessive cancer risks are only observed in groups of insulation workers and confined to cigarette smokers.

In the case of cancer caused by exposure to radiation a reduction in intensity of 2 orders of magnitude is normally sufficient to eliminate that risk! We have gone far beyond that, reducing the fibre concentration by up to 4 orders of magnitude.

For those not familiar with logarithmic scales I have plotted the relative fibre concentrations using a conventional linear scale (Figure 2). On this scale it is not possible to mark the 2 fibre level or to distinguish between 2, 1 or 0.5 fibres/ml with any degree of meaning. The same conditions of the past are plotted in Figure 3 using gravimetric values in g/m^3.

The risks of getting mesothelioma as reported by MCDONALD (3) and coworkers and by RÜTTNER (4) are shown in Figure 4. Again, there is only an excessive risk within the group of insulation workers who have been

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exposed to the highest fibre concentrations in the past, but an insignificant or non-excessive risk to workers in the other branches of the asbestos industry. Additionally, there are further results - unpublished yet - (Balangero Mine Italy, Asbestos Cement Industry of Belgium, Germany, Austria, Switzerland, Colombia and Israel) showing no excessive mesothelioma risk.

According to WHITWELL (5) and coworkers, FRIEDRICHS (unpublished) found no significant difference in the fibre concentration in lungs of the general population suffering from mesothelioma or without (Figure 5). There was, however, a significantly higher concentration of fibres in lungs with asbestosis and / or mesothelioma in occupationally asbestos exposed cases (mainly insulation workers). The hypothesis of a "subasbestosis-level" for fibre concentrations for mesothelioma cannot be maintained. Therefore, on one hand one single fibre on its own cannot cause mesothelioma and, on the other hand, other influencing factors than asbestos cannot be excluded.

In animal experiments (i.e. injection experiments) FRIEDRICHS (unpublished) has found that a threshold of about 10^7 fibres per animal is needed for producing tumors (Figure 6). Again, this emphasizes that not one

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single fibre on its own will create tumors and that there is a threshold. Consequently, do you consider it right to compare asbestos with chemical carcinogens?

Isn't it, above all, necessary to complete our knowledge about the mechanism of how cancer and mesothelioma are created? For instance the fibre itself when in the lung may act only as an adsorber of carcinogenic substances present in the inhaled air (e.g. in cigarette smoke) and, therefore, the fibre itself may not necessarily be carcinogenic.

The differences in risk in the various branches of the asbestos industry are correlated to the levels of dust concentrations occured in the past. So one can state that there is a dose-response relationship and also a threshold limit value. The only question is where do we set this value? My opinion is that the 2 fibre/ml value should be kept, taking into account the figures on my first slide.

My good friend, Professor SELIKOFF, has often mentioned that the threshold limit value should be set at a level somewhere between past household exposure and the 2 fibres/ml value. Since from our measurements the house-

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hold exposure was found to be between 5 and 30 fibres/ml (e.g. by cleaning clothes of asbestos workers), consequently the threshold limit value may be between 2 and 5 fibres/ml.

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REFERENCES

(1) HARRIES, P.G.
Experience with Asbestos Disease and Its Control in Great Britain's Naval Dockyards,
Env. Res. 11, 261-267 (1976)

(2) REITZE, W.B., NICHOLSON, W.J., HOLODAY, D.A. and SELIKOFF, I.J.
Application of Sprayed Inorganic Fibre Containing Asbestos: Occupational Health Hazards,
Amer. Ind. Hyg. Assoc., J.33, 178-191 (1972)

(3) MCDONALD, J.C. and MCDONALD, A.D.
Epidemiology of Mesothelioma from Estimated Incidence,
Prev. Med. 6, 426-446 (1977)

(4) RÜTTNER, J.R.
Proceedings "Asbestos Symposium", 86-89
Johannesburg 1977

(5) WHITWELL, F., SCOTT, J. and GRIMSHAW, M.
Relationship Between Occupations and Asbestos-Fibre Content of the Lung in Patients with Pleural Mesothelioma, Lung Cancer, and Other Diseases,
Thorax 32,. 377-386 (1977)

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Figure 1: Asbestos dust concentrations (fibres/ml) in different branches of the asbestos industry and of the general environment (dotted line: 2 fibres/ml) - logarithmic scale

Figure 2: Asbestos dust concentrations (fibres/ml) in different branches - linear scale

Figure 3: Asbestos dust concentrations (g/m³) in different branches of the asbestos industry and of the general environment (dotted line: 0.1 mg/m³) - logarithmic scale

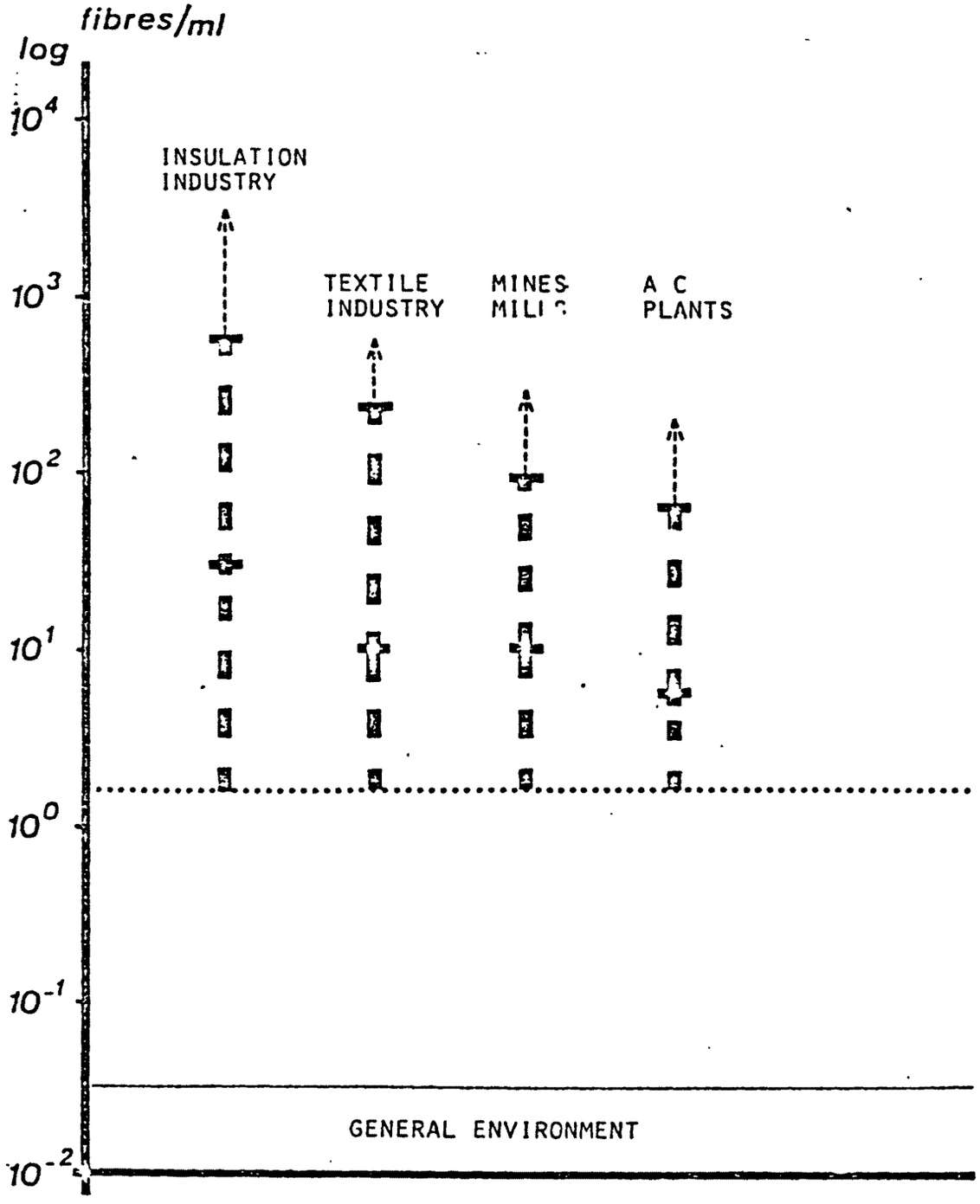
Figure 4: Mesothelioma risk to general population and workers of asbestos industry general and insulation industry

Figure 5: Fibre content per lung without and with occupational asbestos exposure (FRIEDRICHS)

Figure 6: Tumor frequency dependent on fibre concentration (logarithmic scale) per injection and animal (FRIEDRICHS)

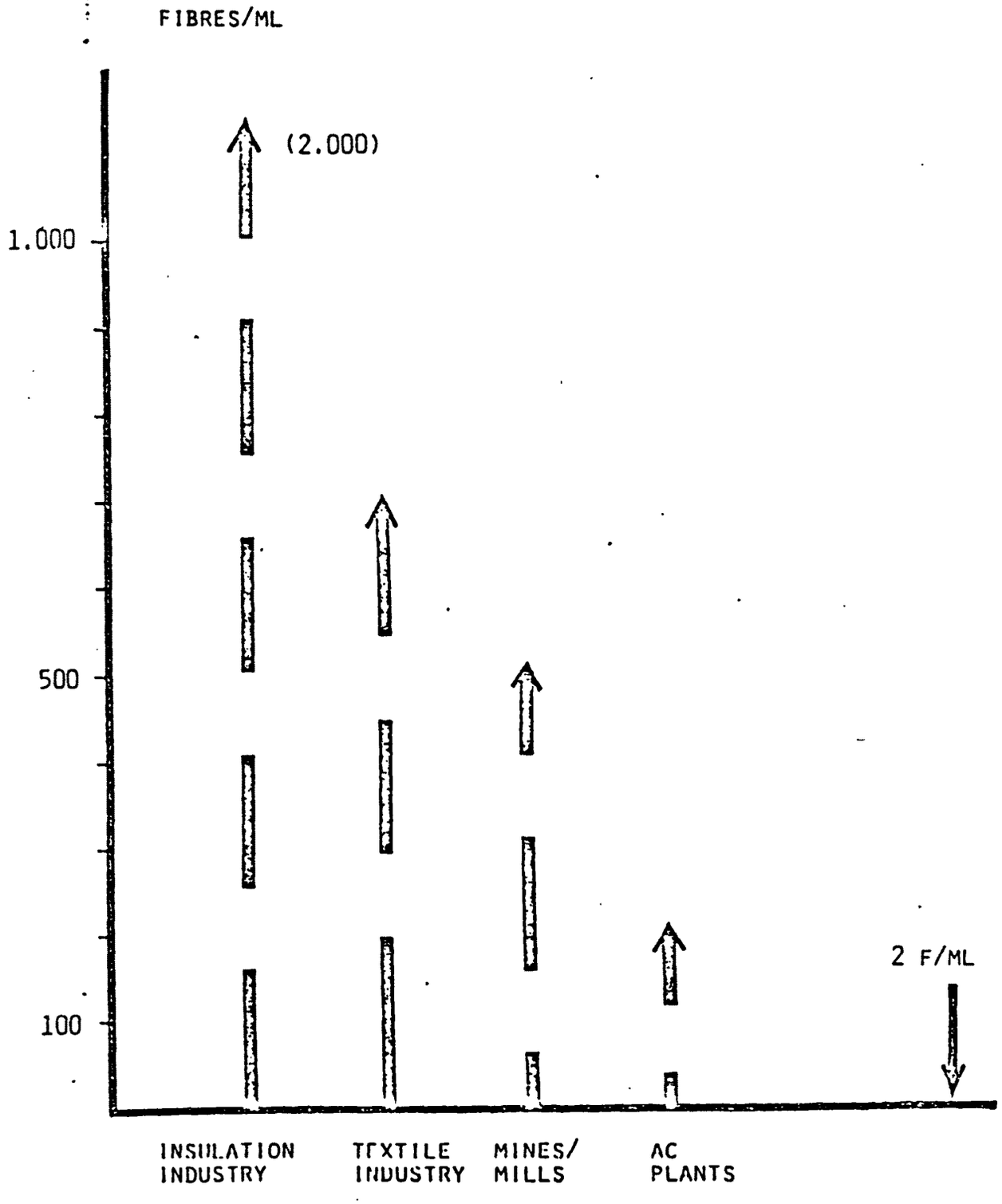
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FIGURE 1

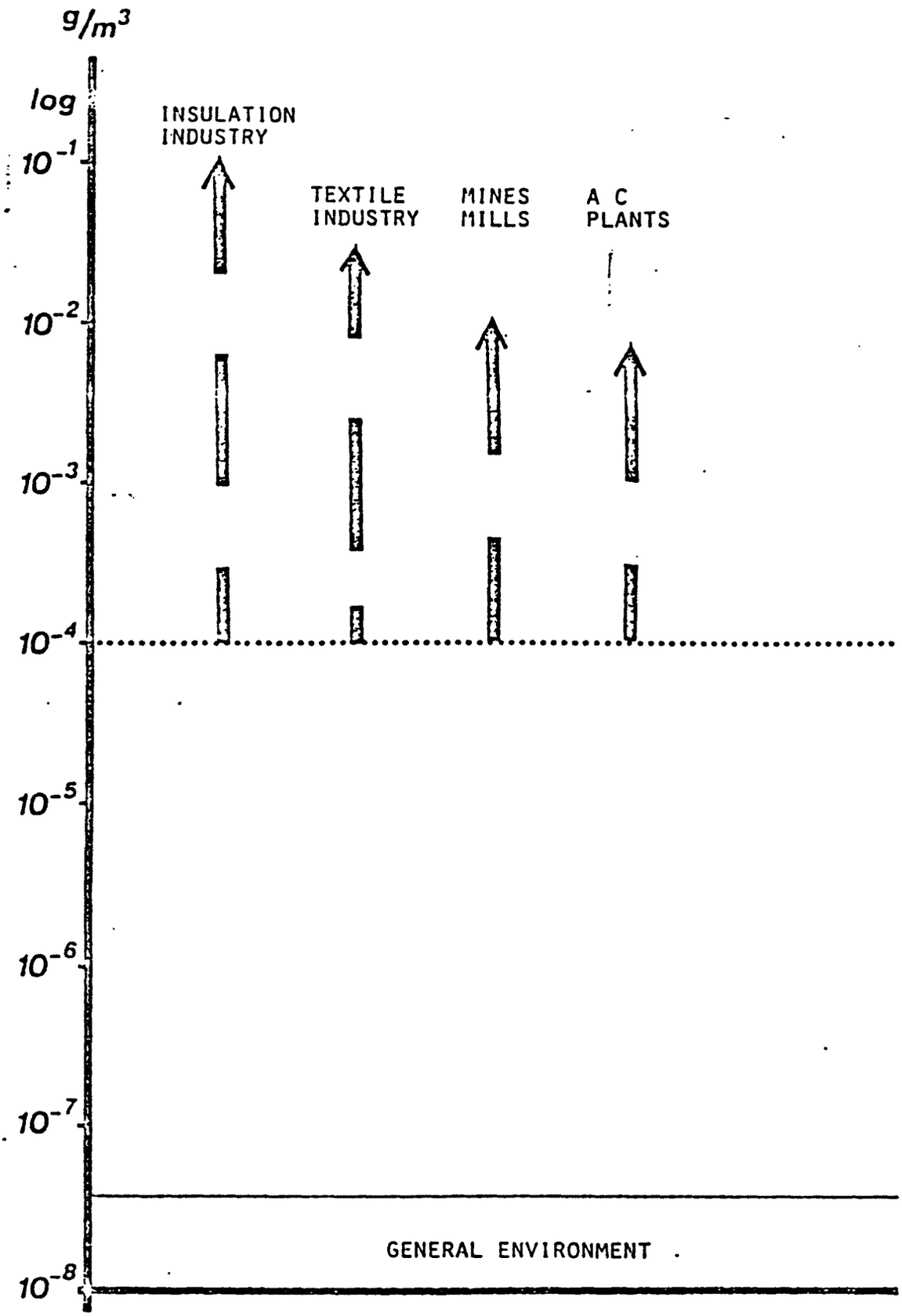


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FIGURE 4

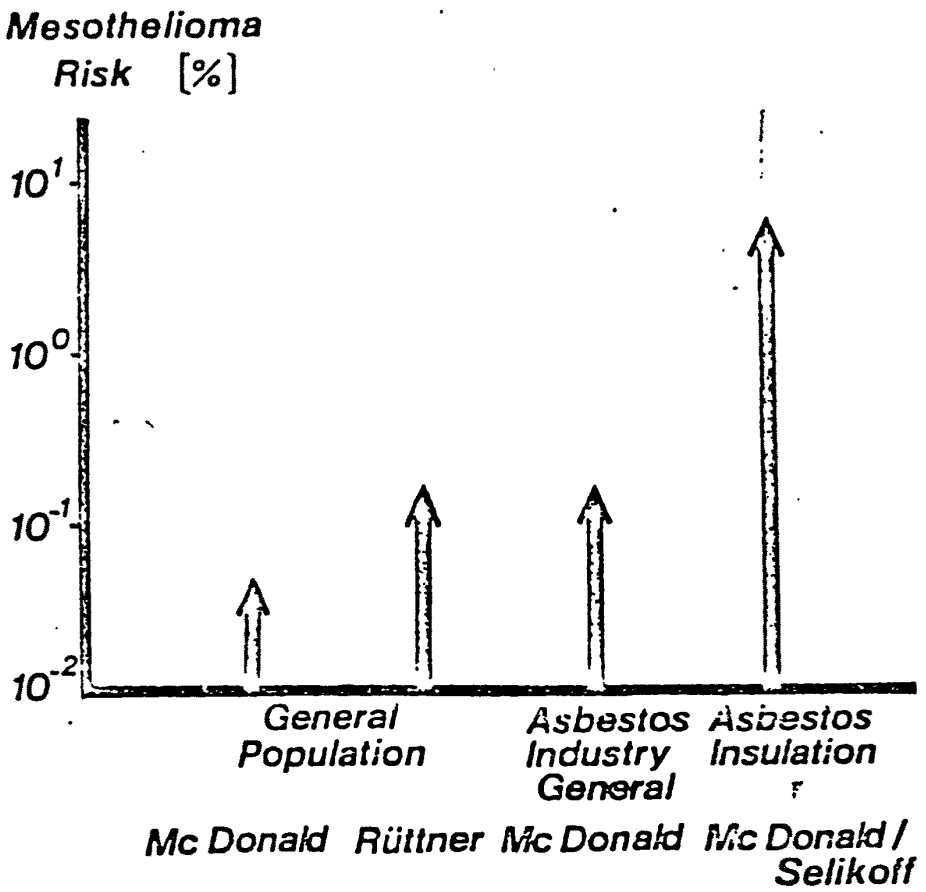


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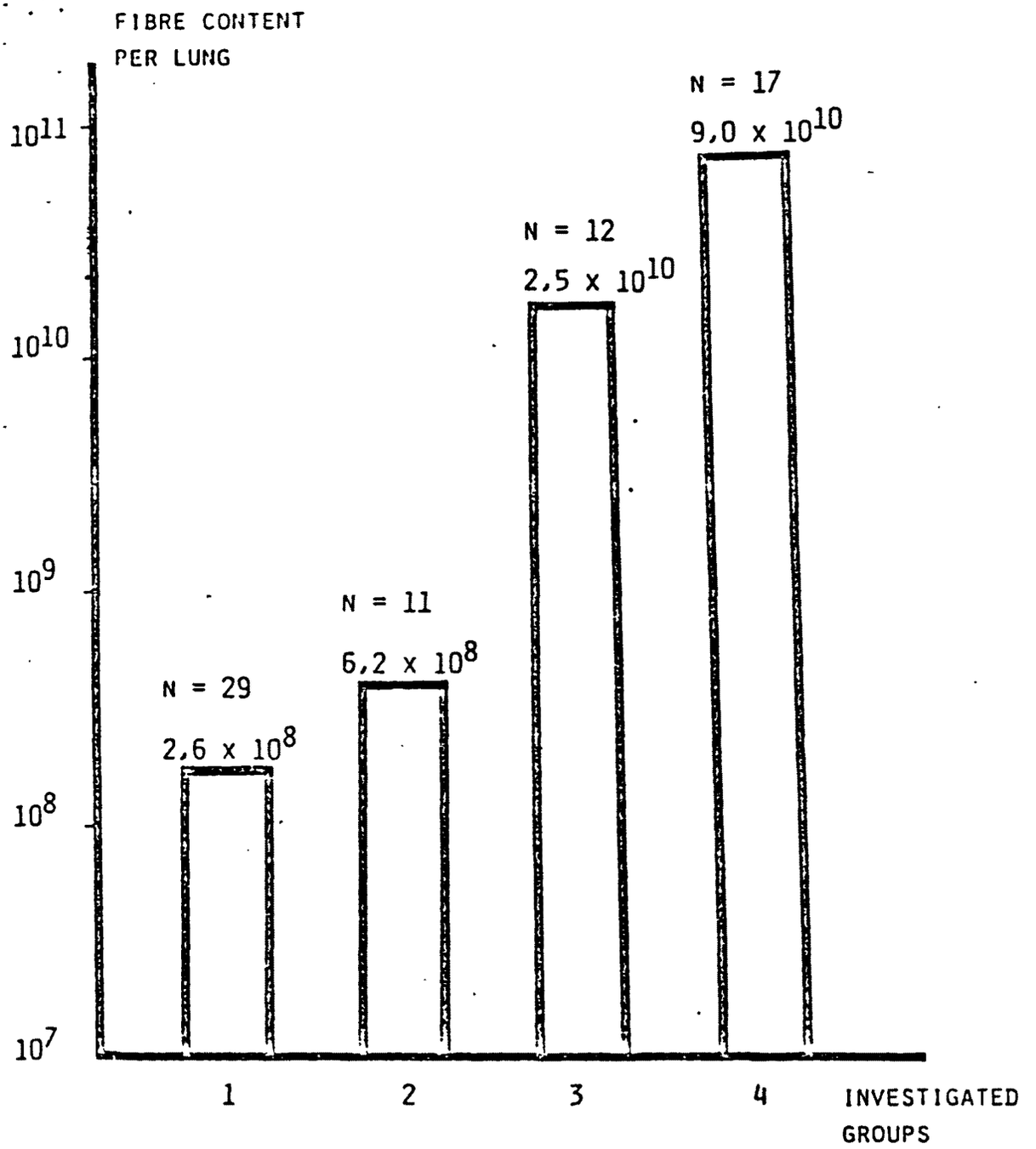
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FIGURE 4



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1: NORMAL LUNGS

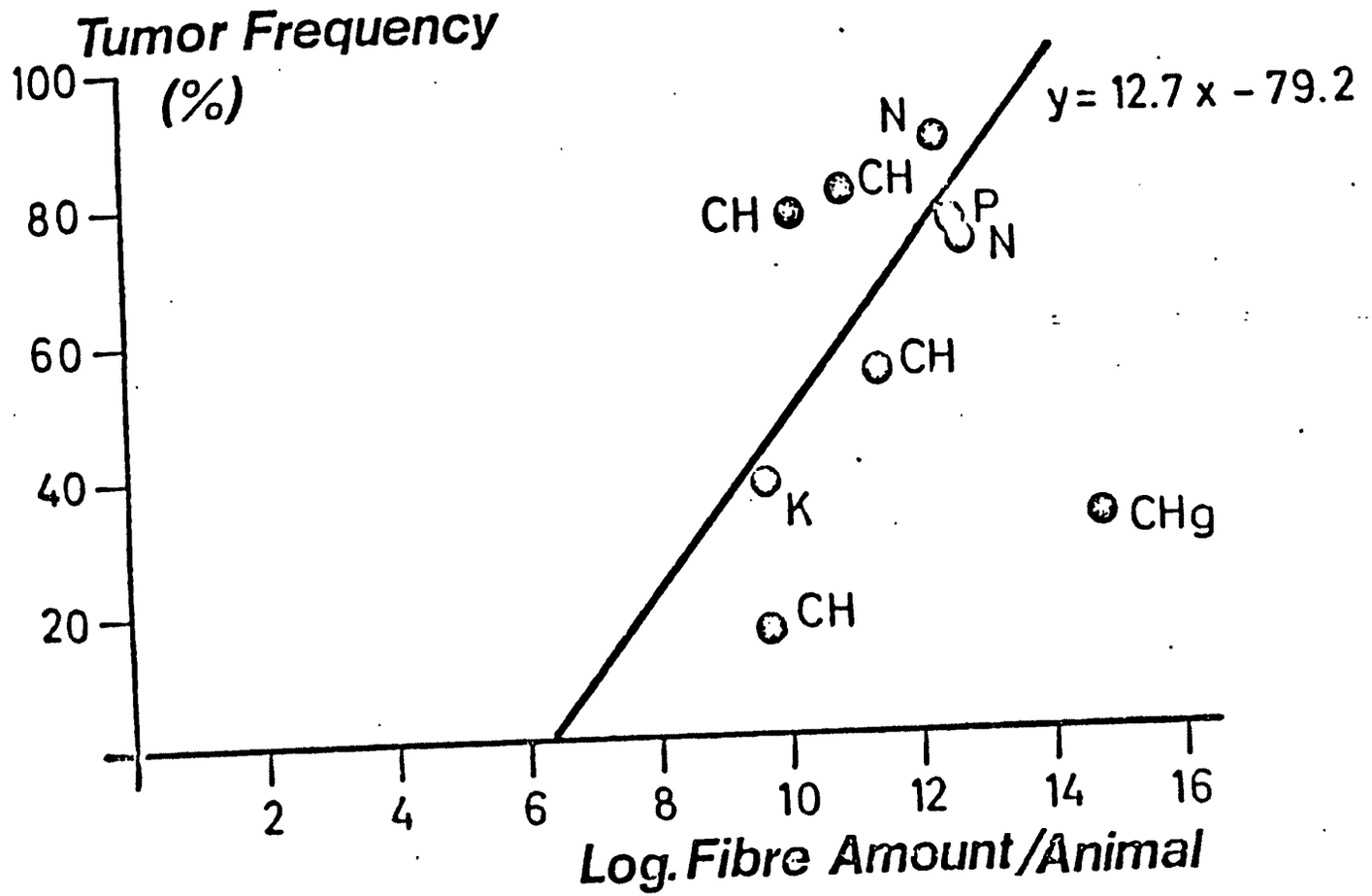
2: MESOTHELIOMA WITHOUT OCCUPATIONAL EXPOSURE

3: ASBESTOSIS CASES

4: MESOTHELIOMA WITH OCCUPATIONAL EXPOSURE

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FIGURE 6



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