VI. UPTAKE AND DISTRIBUTION OF ASBESTOS, PATHOLOGICAL MECHANISMS

Uptake of asbestos fibres in the human body has two pathways: the respiratory tract and the digestive tract. Contamination of the skin may give rise to formation of asbestos warts, but this does not lead to the uptake of asbestos in the body. Parenteral administration of asbestos is used in animal experiments, and there also exists the possibility of such administration in humans (see chapter IX-4).

Uptake through respiratory tract

Human airways are equipped with defence mechanisms preventing the penetration of dust particles to the lungs. This mechanism consists mainly of the mucous membrane with ciliary epithelium in the nasopharynx and the upper and the lower respiratory tract. Particles in inhaled air will be trapped and subsequently propelled in the direction of the nasopharynx. These mechanisms work very efficiently for particles >5μ. (N.B.: heavy cigarette smoking interferes with the ciliary epithelium activity). For smaller dimensions the efficiency decreases rapidly; for the smallest particles the mechanism has no effect, resulting in deposition in the lung alveoli.

Purification of asbestos-dust containing respiratory air is unfortunately hampered by the property of asbestos fibres to split up easily in numerous fibres of relatively great length and very small diameters (see chapter I). Timbrell (1965, 1973) showed that the passage of asbestos fibres through the airways was only related to fibre diameter; the upper limit of this diameter is 3μ. With regard to the length of fibres there is no clear limit; lengths > 200 μ however lead to more efficient activity of the defence mechanisms. This means, that exposure of a human being to asbestos dust leads to the passage of a substantial part of the inhaled asbestos to the lungs themselves. Subsequently a part of these fibres may be coughed up, either as fibres or in the shape of asbestos bodies (see chapter VII). The clearance of the lungs also depends upon the physical properties of the fibres: the curliness of the fibre, greater in chrysotile than in amphiboles, will influence the deep penetration: so that there is less penetration in chrysotile, more in amphiboles.

The above mentioned physical property of asbestos fibres of splitting up into diameters which are very small in comparison with diameters of most other natural or artificial fibres, leads to the conclusion that fibres found in

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