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Exposure to Mineral Dusts

Exposure to dust in the air of many work places constitutes a potential hazard to health. Grinding, crushing, blasting and drilling produce dust particles ranging in size from the sub-microscopic to the visible.

Inhalation of dust may result in a variety of lung diseases known as the pneumoconioses. In common usage, this word has become a general term for any of the dust diseases of the lung.

Here we are concerned only with pneumoconioses produced by mineral dusts. The lung diseases mentioned below are therefore restricted to this class of dusts. Lung diseases include:

Silicosis	Baritosis
Cool workers' pneumoconiosis	Talcosis
<u>Asbestosis</u>	Siderosis
Stannosis	

FACTORS AFFECTING DEGREE OF HAZARD

The degree of hazard associated with exposure to a particular dust depends on:

- (1) size of dust particle
- (2) physical and chemical composition of the dust
- (3) concentration and duration of exposure.

Size of Dust Particle

Fortunately for man, healthy lungs can deal with a certain quantity of dust without being damaged. Only extremely minute particles reach the lungs and are retained in them. Few particles greater than 5 microns reach the deep lung regions. Usually these particles are in the range of 0.3 to 2 microns, a micron being $\frac{1}{25,400}$ millimetre in diameter. Most particles larger than 5 microns either settle out of the air before it is breathed, or are trapped in the secretions of the nose and throat and are expelled or swallowed. Extremely fine particles, below 5 microns, are trapped in the trachea (windpipe) and bronchial tree, including the deeper portions of the lungs.

Reference to the drawing shows that comparison of this system to a tree is an apt one. Just as the trunk of a tree has branches of different sizes, so the respiratory trunk (trachea) has two branches or tubes — the bronchi which, after further divisions, divide

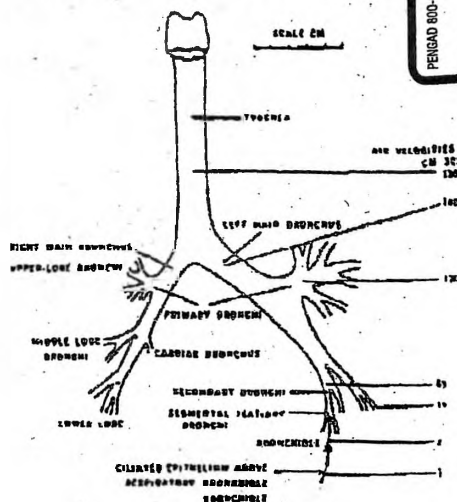
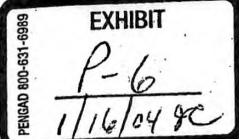


Fig. 2
Scale diagram of respiratory channels of human lung.
Reproduced from *The British Journal of Industrial Medicine*, 1948, vol. 5, p. 248.

into smaller tubes — the bronchioles. The latter lead to the air sacs in the lower lung (alveoli), the area of the lungs in which oxygen passes into the blood stream.

Particles deposited in the deeper lung areas are removed by a moving blanket of mucus. This mucus covers the air passages and constantly moves the particles in an upwards direction towards the throat. Movement of this mucus blanket is aided by millions of hair-like processes, or cilia, found on the surface of the cells lining the bronchi, or air passages. Particles may also be expelled by coughing and sneezing or be engulfed and removed by scavenger cells or phagocytes.

It is only when these defences are damaged or overwhelmed by high concentrations and repeated exposure to harmful substances in our environment that changes from the normal occur.



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