

RECOGNITION OF OCCUPATIONAL HEALTH HAZARDS

510

COURSE MANUAL VOLUME I

LAM021570

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service Center for Disease Control
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
Division of Training

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NOTES	INSTRUCTION
Formula	The use of ppm only permits a comparison of gases with the same molecular weights. The relationship between ppm and mg/m^3 is expressed by the following formula: $\text{ppm} = \frac{\text{mg}/\text{m}^3 \times 24.7}{\text{molecular weight of gas}} \text{ at } 25^\circ\text{C and } 760 \text{ mm of Hg}$
Significance of size	B. 2. Particulate concentration is expressed in number of particles per unit volume of air or mass per unit volume. For dusts which produce pneumoconiosis, it has been necessary to express dust concentrations in particles per unit volume of air. However, since only those particles less than 5 microns in size have hygienic significance, the value relates to particles of this size and smaller unless otherwise specified.
USA	In the United States, dust concentrations may be expressed in million particles per cubic foot of air (25°C and 760 mm of Hg). The unit is generally abbreviated as mppcf.
Europe	In Europe, the preferred unit is particles per cubic centimeter or pcc. With new instrumentation and the development of different pathologic concepts, it is becoming customary to express pneumoconiosis-producing dust as mg/m^3. In this case, however, specification of the size range is essential. When the term "total dust" is used, it refers to all airborne dust. The expression "respirable dust" means airborne dust less than 5 microns. Particulates, other than pneumoconiosis-producing dusts are expressed in mg/m^3 whether they exist as dusts, mists, or fumes.
Asbestos is exception.	Asbestos is the exception to the above rule, as the standard nomenclature specifies number of fibres greater than 5 microns (longest dimension) per cubic centimeter of air.

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MODULE	Pathology of Occupational Diseases	NO. 5
NOTES	INSTRUCTION	
<u>Frame 33</u>	<u>FRAME 33</u> Another serious lung disease is asbestosis, caused by asbestos. In recent decades, scientists have determined that asbestos will also cause cancer of the lung and a rare form of cancer in the chest cavity - mesotheloma. A combination of cigarette smoking and exposure to asbestos is especially dangerous, since the two factors contribute to the development of lung cancer.	
<u>Frame 33a(5)</u>	<u>FRAME 33a(5)</u>. Not in the filmstrip. This shows a normal lung. It is a thin section of the lung, prepared by a procedure known as the Gough technique, after its developer.	
<u>Frame 36</u>	<u>FRAME 36</u> This is a lung section of a coal miner— the pathology is due to a disease known as coal workers' pneumoconiosis. Compare this to the preceding slide.	
<u>Frame 39</u>	<u>FRAME 39</u> Organic dusts also cause lung changes. These are reversible changes, as compared to irreversible changes due to mineral dust. One is a worker with bagassosis from the dust of moldy bagasse - the residue of sugar cane. The other is farmer's lung, the result of inhaling moldy hay. The changes in this film are due to numerous fungal spores and result in a low-grade inflammatory response.	

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MODULE Pneumoconiosis		NO. 12
NOTES	INSTRUCTION	
Non-disabling pneumoconiosis	silicates, calcined diatomaceous earths, coal dust, and beryllium. C.2. Other dusts may cause a non-disabling pneumoconiosis. Non-disabling or benign pneumoconiosis is produced by physiologically inert dusts. The condition is apparent on a chest X-ray, especially when the dust is radiopaque. Inert dusts do not have predisposing effects on tuberculosis or other infections and do not cause impaired lung function. Included in the inert dusts of industrial significance are carbon (except coal), calcium compounds (such as cement, marble, and gypsum), iron dust and fume, artificial abrasives (such as carborundum, emery, and aluminum oxide), and other metals, such as barium and tin. Because of their radiopaque properties, iron, barium, and tin produce distinctive patterns on a chest X-ray.	
Classification of the various pneumoconioses	C.3. The various kinds of pneumoconiosis are classified according to their causative agent. Because the term "pneumoconiosis" is non-specific, most forms of the disease have a precise designation which relates to the causative agent. For example, silicosis is a pneumoconiosis caused by silica dust. Other examples include asbestosis (asbestos), talcosis (talc), diatomaceous earth pneumoconiosis, and coal pneumoconiosis. Visual 12-1 gives a more detailed listing of the types of pneumoconiosis and whether they are disabling or benign.	
Visual 12 -1		

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NOTES	INSTRUCTION
Role of tuberculosis	Until recent years, tuberculosis was a common complication of silicosis, and it was believed by many investigators that the tubercle bacillus had a role in the etiology of silicosis. However, with the decline of tuberculosis in the general population, it is observed much less frequently in silicotic patients. Tuberculosis is now generally accepted as being a possible complication of silicosis, as well as of other pneumoconioses, but with no specific etiologic role.
Coal mine dust	Coal mine dust produces a disease similar in many respects to silicosis. From its appearance on an X-ray film, a radiologist would have difficulty in distinguishing between the two diseases. Pathologically, however, the two forms of pneumoconiosis are quite different. An infectious process other than tuberculosis appears to be an essential feature of coal pneumoconiosis. In its complicated form, huge areas of lung cavitation occur, which prevents the lungs from performing their physiologic function. Many investigators believe that silica plays an essential role in the disease process, while others regard it as having little significance. One major fact which supports the silica theory is the greater incidence and severity of the disease in anthracite coal workers. Anthracite coal contains significantly higher percentages of silica.
Asbestos	Asbestos is one of the few silicates (SiO_2) which causes a disabling pneumoconiosis. The pathologic action probably results from irritation of the lung tissue by the asbestos particle, since collagen formation is not characteristic of asbestosis. In recent years asbestos has also been implicated as a cause of lung cancer and mesothelioma, a rare form of cancer of the pleural lining of the chest wall. Although silica and coal dusts have been suspected by some investigators as being causes of lung cancer, there is little evidence to support this concept.