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DEFINITION AND CLASSIFICATION OF TERMS PERTAINING TO PNEUMOCONIOSIS

I shall discuss the questions put to me by Dr. Forwald in ^{his} letter.

The Significance of the word Pneumoconiosis

Strictly, pneumoconiosis means a "process in the lungs caused by dust" and is theoretically initiated when the first dust particles become lodged in the lung parenchyma and cause any reaction. For practical purposes the definition of pneumoconiosis proposed by the International Conference of the I.L.C. in Sydney in 1950 is reasonable: "Pneumoconiosis is a diagnosable disease of the lungs produced by the inhalation of dust, the term 'dust' being understood to refer to particulate matter in the solid phase but excluding living organisms". The term 'diagnosable' here implies the presence of signs or symptoms, but not always loss of function (p. ras. 5 and 27 of the report of the Conference). To me the word 'disease' here implies any abnormal condition of the lungs. It is always difficult to define just where normality ends and abnormality begins. No sharp distinction can be drawn between the accumulation of soot or dust in a town dweller's lung and the earliest changes of coal pneumoconiosis, or even silicosis (1,2). It would be reasonable in some cases to speak of "town dweller's pneumoconiosis". In scientific medicine the diagnosis of pneumoconiosis should thus be made as soon as any characteristic change can be detected, whether this be clinical or radiological during life, or histological after death, so long as this change can be reasonably attributed to the presence of dust. In most forms of pneumoconiosis histological changes are the first to appear, and radiological abnormality precedes the appearance of clinical or functional changes by many years (although in some forms of pneumoconiosis such as asbestosis and byssinosis the reverse is true). These radiological changes are due to dust in the lung and must for scientific and logical reasons be regarded as constituting pneumoconiosis.

I feel there is some danger in using a definition based upon histological examination of lungs because it may encourage men to undergo lung biopsy in order to obtain histological proof. Without lung biopsy a histological definition cannot be logically applied during life.

The only objection to applying the term pneumoconiosis to cases without disability is psychological. A man may be told that he has pneumoconiosis on the grounds of radiological evidence, and may then be disgruntled if he be not granted compensation: or, in an area such as South Wales where large numbers of men are seriously affected by the disease, he may be alarmed by the diagnosis and develop an anxiety state. From this point of view it would be advantageous to have a separate term which would be used for non-disabling pneumoconiosis, but since non-disabling and disabling pneumoconiosis are usually but different stages of a single pathological process, it would be illogical in scientific medicine to use separate terms. Moreover, radiologists or pathologists, as they classify radiographs or sections of lungs, cannot distinguish the disabled from the non-disabled and must apply the term pneumoconiosis to every case in which they find abnormality attributable to dust.

In the Pneumoconiosis Research Unit we have not found it difficult to explain to a man that his radiograph "shows that he has been a miner, but does not show enough dust to do any harm" and that he cannot therefore expect compensation. In border-line cases also we have found no difficulty in explaining that doctors may disagree with one another in assessing the severity of the disease so that in such cases, while application for compensation may be worth making, the man must not be surprised if it fails despite our own diagnosis of pneumoconiosis. (We have found that the Welsh coal miner is much more ready to accept the existence of observer error among doctors than are members of the medical profession themselves!) For this reason I do not think that there is any need to introduce a new term for non-compensatable pneumoconiosis.

For purposes of compensation it may be necessary to define a limit of acceptable abnormality (whether clinical or radiological) below which an official diagnosis of pneumoconiosis will not be made, and which may lie above the lowest limit recognised by special investigators. It is for legislators to decide what they want to have compensated - disability, loss of earning capacity, shortening of life expectancy or what they will. It is then up to doctors to attempt to devise means of measuring the factor that is to be compensated, and to show the degree of accuracy with which it can be measured. At present legislators often demand, and doctors are prepared to give, expressions of opinion which cannot be supported by scientific evidence, particularly in relation to respiratory disability.

We have also to consider whether a man can be disabled by pneumoconiosis without developing characteristic radiological signs. In South Wales Professor Gough has occasionally demonstrated coal miners' lungs with severe focal emphysema which must have been the cause of pulmonary disability during life but which were unassociated with the radiological abnormality characteristic of pneumoconiosis. Such cases, however, are very uncommon. Pulmonary disability attributable to dust inhalation may also arise in byssinosis and asbestosis without any characteristic radiological changes. Dr. Hugh Jones will show in his paper tomorrow that, in the sample of miners and non-miners that we have studied, the miners without any radiological signs of pneumoconiosis appeared on the average to have impaired ventilatory capacity when compared with non-miners of the same age. This impairment was in some cases associated with a tendency to bronchial spasm. Whether this disability is attributable to dust inhalation we cannot yet say. The sample was a small one and the results may not be generally applicable. Further studies of such larger samples of miners and men working in other dusty and non-dusty occupations will be required to establish whether coaldust inhalation can disable without causing radiological changes.

Our preliminary findings do suggest that we may at present rely too much upon the radiological changes in deciding compensation for disability in simple pneumoconiosis. Until we know more about the relationship between disability and severity of radiological change from studies on large populations of miners and ex-miners (not on hospital populations, men applying for compensation or working populations, which are biased in relation to disability) we shall not be able to say what emphasis should be placed on disability measured by clinical or physiological methods and what emphasis should be placed on the radiological picture.

Active and Inactive Dusts

The pathological activity of a dust depends not only on its chemical nature but also on its physical characteristics, such as size distribution, and upon the dose administered, so that no simple classification of dusts into active and inactive is possible. For example, a given quantity of 20 Angstrom silica may be highly active if given in a single large dose, but the same quantity may have no effect at all if administered in small concentrations over a longer period.

It might be possible to reach a theoretically sound classification of dusts according to their activity on the basis of the relationship between the amount of material retained in the lung and the degree of pathological change.

Thus, an active dust would be one in which the degree of pathological reaction to its presence in the lung is great in relation to the amount of retained material (e.g. silica and beryllium) and an inactive dust would be one in which the pathological change is relatively small (e.g. coal and iron), but here we meet the difficulty that dusts such as coal which would be classified as inactive per se may, in combination with tuberculous infection, produce gross pathological changes.

Any classification of dusts into active or inactive on the basis of animal experiments may be dangerously misleading. Coal dust was for years regarded as harmless in Great Britain and is still so regarded in Germany, largely because animal lungs do not show any fibrotic response to inhaled coal dust, and yet the inhalation of coal dust has disabled more than 20,000 coal workers in South Wales during the last twenty years.

Silicosis

Dr. Vorwald asked me whether silicosis is a "disease" or a "condition". I don't see any difference in the meaning of these two words. I regard any pathological change attributable to free silica as a form of silicosis. I distinguish the formation of uniformly distributed concentric collagenous fibrotic nodules by the term "Classical nodular silicosis".

Terms for Specific Entities

The word silicosis should only be used when it has been clearly demonstrated that the pathological changes in the lung are attributable to the action of silica. So far as I know this can only be done where the dust exposure is to pure silica or where the reaction in the lung is of the classical type. For all other pulmonary disease due to dust the word pneumoconiosis should be used, preceded by the name of the dust or occupation by or in which the disease is caused. The term "anthraco-silicosis" should be applied only to those cases of classical silicosis in which there are also deposits of coal in the lungs (for example, rock workers in coal mines) but should not be applied to the ordinary coal workers' pneumoconiosis in which there is no evidence that silica is responsible for the fibrosis.

Clarity is gained in referring to the pulmonary conditions attributable to specific dusts by using prefixes to the word pneumoconiosis, e.g. soot pneumoconiosis, talc pneumoconiosis etc.

1. Davson J. and Susan, W. (1937), J. Path. Bact., 45, 557.
2. Harding, H.E. (1945) Proc. 9th Int. Congr. Industr. Med. 1945 Lond. p.692.