...ties and small bundles, the greater ... risk. There is also ...od evidence of a dose response relationship for asbestosis ...d bronchial cancers and thus, if the dust levels are kept ...ithin the new standards, the risks of asbestosis and bron...ial cancers in the future should be very small.

The risk of developing mesotheliomas has a different ...lation to fibre type. It is probably highest with crocidolite ...d lowest with chrysotile. No cases clearly related to ...thophyllite alone have been reported, despite careful ...arch. The risk with amosite probably lies between ...ocidolite and chrysotile. The evidence for a dose response ...lationship is less clear in the case of mesotheliomas and ...nce the threshold limit value is more difficult to assess. ... the Asbestos Regulations 1969[15] the standard for ...ocidolite is set at one-tenth of that for other types of ...bestos.

COMPARISON OF OCCUPATIONAL RISKS

What is the magnitude of the risk of developing ill-health from asbestos? No single index provides a satisfactory measure of injury to health.

Thus the excess risk of death before a specified age may ...e a useful index for those diseases causing sudden or rapid ...eath, but it is an inappropriate index for diseases causing ... long period of disability but little shortening of life. The ...ancers associated with asbestos exposure fall into the first ...roup and asbestosis the second group. In different occu...pational groups comparisons of mortality are easier to make ...han those of illness. But even for mortality the compari...sons are not straightforward. For example, the more the ...election is limited to a definable group with a high past ...xposure, the worse the risk will appear. Allowance has also to be made for the effects of age, length of exposure, and how long the occupational group has been followed.

When such allowances are made the excess mortality from 'all causes' in groups of workers heavily exposed to the more damaging types of asbestos dusts in the past is closely comparable to that of coalminers who have developed the severer form of coalworkers' pneumoconiosis or that of deep-sea fishermen who have the highest rates of accidental deaths of any occupation. However, the excess mortality from 'all causes' in these occupational groups is less than that of male smokers of twenty cigarettes and more a day compared with non-smokers.

This is the position for deaths from 'all causes', but deaths from [illegible] causes, such as mesotheliomas, asbestosis, or lung cancers relative to that of the general public, are of course proportionately much more increased. This is because mesotheliomas and asbestosis are extremely rare in those who have not worked with asbestos. Confusion sometimes [illegible] between the proportion of individuals exposed who develop a disease and the excess risk of a particular disease in exposed individuals compared with the general public. The first may be relatively small and the second extremely high.

THE FUTURE

As in many [illegible] diseases proof of the efficacy of new preventive measures [illegible] the validity of the current [illegible] can only come from linking information [illegible] the manufacturing process and the type of [illegible] other materials used, the measurements of exposure, the medical records of those exposed. Computers now make it easy to store this information, but we still need the foresight and administration to see that it is achieved. If it is not done we may still in 20 years or so be in no better position to answer important questions which are at present unanswerable because of the paucity of past records.

CONCLUSION

The recent increase in the number of cases of asbestosis and other diseases related to past exposure to asbestos is the result of relatively heavy exposures to the dust, particularly in parts of the asbestos industry not covered by the 1931 Asbestos Regulations.

Much new information about the biological effects of asbestos has been acquired recently. The new Asbestos Regulations 1969 based on this information, if correctly applied, should greatly reduce the risks in the future.

The selection of which types of asbestos to use in new processes should take into account their biological effects if the risk of dust exposure is likely to occur during manufacture or in the use of the products.

When working with extremely fine fibres of any material which may become airborne, caution is needed. An examination of the possible biological effects is required if the product is to be widely used and risks of damage to health are to be avoided in the future.

Proof of the efficacy of present preventive measures depends on much better record keeping than has been the case in the past.

REFERENCES

1 Noro Leo, *American Industrial Hygiene Association Journal, Vol 29, p 195 (1968)*
2 Merewether E. R. A. and Price C. W., 'Report on the effects of asbestos dust on the lungs and dust suppression in the Asbestos Industry'. London, HMSO (1930)
3 Dreessen W. C., Dallavalle J. M., Edwards T. I., Miller J. W., Sayers R. R., 'A study of asbestosis in the asbestos textile industry'. US Treasury Department, Public Health Service, Public Health Bulletin No 241 (August 1938)
4 Merewether E. R. A. Annual Report, Inspector of Factories. London, HMSO (1947)
5 Doll Richard, *British Journal of Industrial Medicine, Vol 12, p 81 (1955)*
6 Knox J. F., Holmes S., Doll R., and Hill I. D., *British Journal of Industrial Medicine, Vol 25, p 293 (1968)*
7 Selikoff I. J., *Journal of the American Medical Association, Vol 204, p 104 (1968)*
8 Wagner J. C., Gilson J. C., Berry G., and Timbrell V., *British Medical Bulletin Vol 27, p 71 (1971)*
9 Gilson J. C., 'Asbestos health hazards', in Shapiro, H. A. (editor), 'Pneumoconiosis', Proceedings of the International Conference, Johannesburg, 24 April–2 May 1969, p 173. Cape Town etc., Oxford University Press (1970)
10 Webster I., 'Asbestos exposure in South Africa', *ibid*, p 120
11 Cunningham H. M. and Pontefract R., *Nature, Vol 232, p 332 (1971)*
12 Becklake Margaret R., Fournier-Massey Gisele, McDonald J. C., Siemiatycki J., and Rossiter C. E., *Bulletin de Physio-Pathologie Respiratoire, Vol 6, p 637 (1970)*
13 McDonald J. Corbett, McDonald Alison D., Gibbs Graham W., Siemiatycki Jack, and Rossiter Charles E., *Archives of Environmental Health Vol 22, p 677 (1971)*
14 Jodoin Gilles, Gibbs G. W., Macklem P. T., McDonald J. C., Becklake Margaret R., *American Review of Respiratory Diseases, Vol 104, p 525 (1971)*
15 Statutory Instruments 1969 No 690, Factories, The Asbestos Regulations 1969. London, HMSO (1969)