

function impairment (96, 97, 172). If all 5 criteria would generally be met for most compensation criteria, there is less

exposure history, or if considered too short to disease present, a tissue for, particularly in which attributability is an open lung biopsy (183), changes are minimal. It should be critically examined for pathologic features, and by the presence of uncoated extraction procedure, occasionally, the in the sputum (117-119) in the possibility of an appropriately exposed source of exposure of course, commonly heavy and current

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person with asbestosis has died considerably during the past 67 years and in North death, years of exposure, years of survival after exposure, conspicuously in most cases of premature death due to exposure, exposure to be confined exposure (McDonald,

greater survival period, now surviving into premature deaths from this greater importance exposure). In addition, it exposure is becoming a exposure in the general

asbestosis is restricted exposure given to subjects exposure ever the cause. The exposure advocated, because exposure is known, fixed in exposure treatment of inter-

current infections may be particularly important in view of the suggestion that nonspecific inflammation may contribute to progression of fibrosis (Ashcroft, 7, p. 236). There is no real evidence to suggest that the only possible effective therapeutic intervention, namely, to remove the person from exposure, has any real influence on the outcome of the case. One assumes that removal might halt further progression, a hypothesis for which there is some evidence (62). It is also known, however, that disease can both appear and progress many years after removal from exposure (63); thus, research should be directed at possible ways of determining what factors determine this future progression and whether it is possible to define the stage or level of exposure at which removal might be an effective preventive measure.

Pre-employment evaluation of lung function to screen out high-risk persons is, in theory, the most important area of future health protection; yet, this is also the area in which there is no systematic evidence to indicate what type of person to screen in or screen out. Attention has been directed toward the pre-employment detection of obstructive lung disease, acute or chronic, on the assumption that such persons are at high-risk of developing asbestosis (Hunt, 5, p. 406). The smoking habit, certainly the greatest risk factor for bronchogenic cancer, does not usually constitute grounds for refusing a recruit. Its role in the development of fibrosis is less clear, there being some evidence to suggest a synergistic effect with dust (185), and some evidence to the contrary.

An interesting possibility, as yet completely unexplored, is that certain physiologic characteristics, for instance, the relative size of airways to air spaces (184), may constitute risk factors and might, for example, be the basis for exclusion of certain types from dust hazard. Finally, it is possible that pre-employment and annual measurements of lung function, particularly FVC, might also prove to be a useful tool in the health care of the worker (87); however, this, too, should be introduced only in a way that permits a critical evaluation of the effectiveness of such a procedure.

#### Malignant Mesothelioma of the Pleura and Peritoneum

Primary malignant mesotheliomas arise from the pluripotential mesothelial cells (of the pleura, peritoneum, and pericardium) and in conse-

quence, may present with widely varying histologic features. Nevertheless, they have been considered a pathologic entity (10, 185), albeit rare, for some time; their association with asbestos exposure was mentioned as early as 1946 in an individual case report (10). This association was dramatically brought to the attention of the medical public by Wagner and colleagues (27) in a report of 33 cases with occupational and/or environmental and/or domestic exposure in the crocidolite mining area of the Northwest Cape, South Africa. The association with asbestos exposure has now been confirmed from many parts of the world (table 6).

#### Pathology

A characteristic feature of the macroscopic appearance of the malignant variety is the tendency to spread along serosal membranes (186), encasing the lung by a bulky, lobulated mass that usually invades the fissures. Areas of necrosis within the tumor may give rise to cystic spaces filled with glutinous fluid, a distinctive feature of this tumor, although not necessarily a specific one, because it is also seen in adenocarcinoma (10). Local metastases to chest wall, mediastinum, and pericardium, rather than remote metastases, declare malignancy of the tumor; however, metastases to hilar and abdominal lymph nodes are not uncommon, and, occasionally, more distant sites, such as liver, thyroid, adrenals, bone, and brain are involved (10, 186). It has been emphasized, however, that the diagnosis is one of exclusion, and that all potential sites for primary growth (particularly lung, pancreas, intestine, and ovary) must be examined; consideration must also be given to the possibility that the primary tumor has already been removed (McCaughy, 5, p. 603). The peritoneal tumors present a similar appearance, but do not tend to engulf the abdominal organs to the same extent as the pleural tumors. Glutinous ascitic fluid, however, is a common feature (10). Primary pericardial tumors do not appear to be associated with asbestos exposure.

Microscopically, 4 varieties are recognized according to the dominant cell types (186, 187). *Epithelial*, or tubulopapillary, tumors are characterized by branching acini, lined by columnar or cuboidal cells, often containing mucin and having a tendency to spread. *Mesenchymal*, or sarcomatous, tumors range in appearance from cellular fasciculated fibrosarcoma to myxoma, with the amount of associated collagen in the tumor varying considerably. The *undifferentiated*