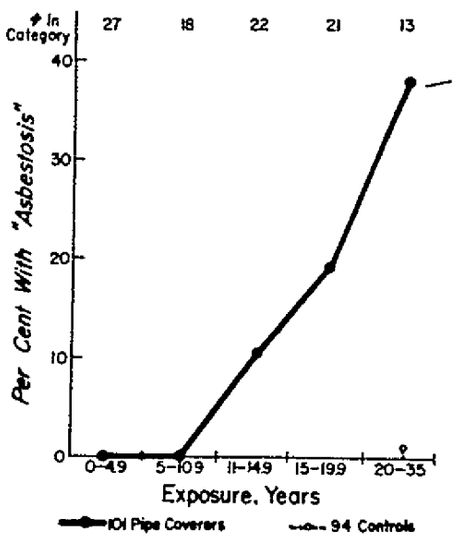

Figure 3. Relation of "Asbestosis" to Duration of Exposure.

"Asbestosis" was never diagnosed in persons with less than 10 years of cumulative exposure, and the prevalence was 38 per cent in those exposed for more than 20 years. One member of the control group had "asbestosis."

dangerous occupation. More recently, Marr[3] reported five cases of disability among 60 to 80 shipyard pipe coverers; he questioned whether this was caused by massive exposure during removal of old insulation or from many years of exposure by susceptible persons during all types of insulation work.

Our principal objective was to determine the prevalence of asbestosis in pipe coverers who had not engaged in repair work. Diagnostic criteria were based on recognized symptoms and signs of this disease because an exact assessment would have required pathological material. These signs and symptoms have been reported in other defined populations of asbestos workers with similar frequency.[18,21,22,24]

The prevalence of shortness of breath among our pipe coverers (Table 2) was similar to the 12 to 26 per cent in other asbestos workers.[1,21,22,24] In unexposed North American populations this percentage has ranged between 2.6 and 5.7[7,18,25,26] — quite comparable to our own control group with 6.4 per cent.

Rales in two or more sites were found in 15.8 per cent of the pipe coverers — a rate not very different from the 13 to 14 per cent reported by others in asbestos workers.[21,22]

In our study the observer was unaware of the roentgenographic findings at the time of auscultation. Nevertheless, 33 per cent of workers with codes 5 and 6 roentgenograms had rales in two or more sites. Dreessen et al.[21] reported rales or other adventitious sounds in 49 per cent of those with "ground-glass" markings, whereas Vigliani[22] heard such sounds in 70 per cent of workers with abnormal roentgenograms.

Clubbing of the fingers in 19.8 per cent of pipe coverers was more frequent than that in other studies[21,24]; also, the 5.3 per cent prevalence in the controls was slightly larger than in other normal groups.[27] However, the mean hyponychial angle of controls considered clubbed was only 200° as compared to that of the clubbed pipe coverers, which was 208°.

Vital-capacity measurements were usually lacking in the earlier surveys.[1,21,22] Kleinfeld[24] reported an average FVC of 81 per cent of predicted in 56 workers exposed for more than 14 years, but he used different prediction formulas. The mean FVC of 4.0 liters in 21 Australian asbestos workers did not differ much from that of our pipe coverers. Hunt's exposed population[28] is difficult to compare because knowledge of the diffusing capacity is required for interpretation. Our regression equations were derived from a population survey.[14] Since such surveys include disabled people, they generally yield lower values than surveys of industrial workers. For example, our pipe coverers had an average FVC of 92.7 per cent based upon our population survey, whereas it was only 75.2 per cent with the use of normal values from 2770 persons engaged in heavy labor and mining.[29] Pipe coverers over the age of 55 had a mean FVC that placed them in the same category as workers with advanced silicosis.[30] The FVC of all pipe coverers was also lower than the mean of paper-mill, flax and polyurethane-foam workers.[25,26,28]

Concerning radiographic findings, some observers have considered early changes evidence of asbestosis,[1,21,22] whereas others have not.[21,23,25,24] At any rate, our 19.9 per cent prevalence of moderately advanced or advanced asbestosis (codes 5 and 6) was much higher than the 0.27 per cent in the only other survey of shipyard pipe coverers engaged in new vessel construction,[3] but it was about the same as in building-insulation workers.[1]

Effect of Duration of Exposure and Age

The prevalences of clinical signs and symptoms of "asbestosis" increased with duration of exposure (Fig. 4). The prevalences also rose with age (Fig. 5), and therefore the association between age and cumulative years of exposure was high (r equal to 0.7, p equal to 0.001). The advantage unique to this study was that the control group allowed examination of the relative importance of age. In the control there was no clear association between age and these abnormalities except in vital capacity (Fig. 5).

Accuracy of Diagnosis

How likely is it that the 11 workers considered to have "asbestosis" did indeed have this disease? They were offered a medical examination, including