FURNITURE AND CABINET-MAKING (Group 1)

A. Evidence for carcinogenicity to humans (*sufficient*)

Employment in the furniture-making industry has been associated with nasal adenocarcinoma; an increased risk for other nasal cancers has also been suggested[1]. Subsequent case reports[2-11] and epidemiological studies[12-18] have clearly corroborated an increased risk of nasal adenocarcinoma among workers in the furniture and cabinet-making industry.

A study was made of the incidence of and mortality from cancer in 5371 men employed in the Buckinghamshire, UK, furniture industry and followed for an average of 19 years since commencing work. The incidence of nasal adenocarcinoma was about 100 times that expected from the local population. For cancer of the bronchus, the standard registration ratio was 82 (95% confidence interval, 61-107), based on 53 cases, and the SMR (corrected for the Oxford region) was 79 (59-105). However, a significant trend of increasing SMR with increasing dustiness of work was found. A trend of increasing SMR for bronchial cancer with increasing duration of work (not significant) was also found. A sample of the workforce alive in 1969 contained a lower percentage of current smokers than the general population, and there were slightly fewer smokers among the men in the dustiest jobs than in the less dusty jobs[12]. However, an update of the same study at the end of 1982 found no

significant increase in mortality nor any trend towards increasing mortality with increased dustiness of work for cancer at any site apart from the nasal cavity[16].

A Swedish pilot case-control study found an odds ratio of 4.1 (1.6-10.6) for respiratory cancer other than nasal cancer in relation to wood work. This ratio was based on six exposed cases, four of which were in furniture workers (odds ratio, 6.0)[19]. In another Swedish study, 8141 furniture workers were followed for 19 years. Nasal adenocarcinoma was 63.4 times more common than expected, but no increased risk was found for laryngeal cancer, lung cancer or sinonasal cancer other than adenocarcinoma[17].

A cohort study of the Danish carpenters' and cabinet-makers' union[20] gives SMRs for lung cancer of 96 (68-114) in men aged 20-64 and 110 (92-127) in men aged 65-84.

Mortality from multiple myeloma among furniture workers was investigated in a US case-control study of 301 male cases and 858 controls who had died from other causes. Employment in the furniture industry was associated with a nonsignificant excess risk (odds ratio, 1.3) of multiple myeloma. The risk was somewhat higher for those who had died before age 65 (odds ratio, 1.7) and for those born before 1905 (odds ratio, 1.5), and was significantly elevated for those born before 1905 and who had died before age 65 (odds ratio, 5.4; based on five cases; $p < 0.05$)[21].

A proportionate mortality study showed an elevated risk for death from all cancers (PMR, 112; $p < 0.01$), stomach cancer (PMR, 128; $p < 0.01$) and non-Hodgkin's lymphoma (PMR, 139; $p < 0.05$) among woodworkers (including carpenters, cabinet-makers and furniture workers, lumber graders and scalers, sawyers in sawmills and woodworkers not classified elsewhere). In this mixed category, there was no death from sinonasal cancer[22].

Epidemiological data reported here and previously[1] thus provide sufficient evidence that nasal adenocarcinomas have been caused by employment in the furniture-making industry. The excess risk occurs (mainly) among those exposed to wood dust.

According to Acheson *et al.*[13], the fact that woodworking machinists (who saw timber) and cabinet- and chain makers (who shape, finish, sand and assemble furniture) experience similar risks makes it unlikely that the tumours are due to a chemical agent applied to the wood at a particular stage of the process, but that they are more probably due to a substance in wood itself. Beech and oak, especially, have been incriminated, but the possibility that other hardwoods are carcinogenic cannot be ruled out. The carcinogenic substances in hardwood are, however, unknown.

B. Evidence for carcinogenicity to animals (*inadequate*)

Among hamsters exposed by inhalation to fine particles of beech wood dust, one animal out of 22 had a nasal tumour. In these limited studies, inhalation of wood dust did not increase the incidence of nasal or respiratory-tract tumours induced by *N*-nitroso-diethylamine[23,24].

C. Other relevant data

A fraction of a methanol extract of beech-wood dust was mutagenic to *Salmonella typhimurium* in the presence of an exogenous metabolic system[25].

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