

**LEATHER INDUSTRIES:  
BOOT AND SHOE MANUFACTURE AND REPAIR (Group 1)**

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

Nasal adenocarcinoma has been caused by employment in boot and shoe manufacture and repair. Relative risks well in excess of ten fold have been reported from studies in the boot and shoe manufacturing industry in England and in Italy. There is also evidence that an increased risk exists for other types of nasal cancer<sup>1-3</sup>. A far higher risk of nasal cancer was found for people who worked in the dustiest operations, and for those classified into the category of 'heavy' exposure to leather dust, strongly suggesting a role for exposure to leather dust<sup>2,3</sup>. Thus, in comparison with the 'nonexposed' category, the sex-adjusted standardized odds ratio for the 'uncertain or light exposure' category was 7.5, and for the 'heavy exposure' category, 121.0. A similar, highly significant pattern was noted when only adenocarcinomas were considered. Exposure to solvents or to tobacco smoking could not account for the noted increased risk<sup>3</sup>. A mortality study of over 5000 men known to have been employed in the boot and shoe manufacturing industry in three towns in the UK in 1939 showed a large, significant excess of deaths from nasal cancer (10 observed, 1.9 expected). An observed:expected ratio of 14 was found among workers in the finishing room<sup>4</sup>. The elevated nasal cancer risk was almost totally confined to employees in the preparation and finishing rooms, where most of the dusty operations occurred. It was

estimated that the risk to those men was 4.5 relative to that in other operations, and 9.8 relative to that of men resident in the area who had never been employed in the footwear industry<sup>2</sup>.

Case reports have also suggested an association between exposure to leather, including during shoe manufacture, and mucinous adenocarcinoma of the nose and ethmoidal cancer in Switzerland and France, respectively<sup>5,6</sup>.

One mortality study conducted in London, UK, showed no association between nasal cancer deaths occurring between 1968 and 1978 and occupation in the boot and shoe industry, as recorded on death certificates<sup>7</sup>. A proportionate mortality analysis of 3754 deaths among US shoeworkers revealed no death from nasal cancer, whereas 2.2 were expected on the basis of data for the general population<sup>8</sup>. Similar results were obtained from a study of 2798 deaths between 1954 and 1974 in a shoe and leather industry area in Massachusetts, USA; detailed occupational information was available, however, for only 289 of the deceased<sup>9</sup>.

Early death certificate surveys showed an increased risk of bladder cancer among shoemakers and repairers. Later studies provided evidence of an increased risk associated with employment in the leather industry. Although boot and shoemakers were included in these studies, it was not possible to determine whether the risk was related to them in particular<sup>1</sup>. A nonsignificant increased risk for bladder cancer was reported in association with work in the boot and shoe industry in a case-control study based on deaths of male residents in certain London boroughs from 1968-1978. When data for these workers were combined with those for leather workers, the estimated risk became significant<sup>7</sup>. A significant association of leather work (leather or tanning industry, manufacture of leather goods, or shoemaking) with cancer of the lower urinary tract was found in a collaborative case-control study in the USA and the UK, but not in Japan<sup>10</sup>. A statistically significant increase was found among female shoe workers (7 deaths observed and 2.8 expected) in another, independent study in the USA. Male shoeworkers and leather workers showed no excess of bladder cancer in this study<sup>9</sup>. In Sweden, an increase in the incidence of bladder cancer (22 cases observed, 14.5 expected) was reported among shoe factory workers<sup>11</sup>. An elevated risk that was not statistically significant was also found among boot and shoe repairers in a British county. Smoking did not appear to account for the increase<sup>12</sup>. In another study in the UK, in a cohort of 5108 boot and shoe workers, 32 deaths from bladder cancer were observed, with 39.2 expected<sup>13</sup>.

A possible increase in risk for kidney cancer among shoe workers was suggested by a study in Sweden<sup>11</sup>. However, a large cohort study among boot and shoe workers in the UK did not support this hypothesis<sup>13</sup>. Three cases of mesothelioma were reported among 3806 deaths in shoe workers<sup>14</sup>; it has further been reported that a female shoemaker (whose husband was also a shoemaker) died of mesothelioma<sup>15</sup>.

The occurrence of leukaemia among shoemakers exposed to benzene (see p. 120) has been well documented<sup>1,16</sup>, and this association has been supported further by a recent mortality study in one town in the UK<sup>4</sup>.

Surveys conducted in the The Netherlands, the UK and the USA have suggested positive associations between boot and shoe manufacture/repair and cancers of the lung, oral cavity

and pharynx and stomach<sup>1</sup>. These suggestions were later confirmed by a mortality survey in the USA, which also showed a significant increase in the proportion of deaths due to cancers of the rectum and of the liver and gall-bladder, in people of each sex<sup>8</sup>. Excess mortality from rectal cancer was also found among boot and shoemakers in two towns in the UK; the excess was significant for workers in the lasting and making room, who were probably exposed to solvents, glues and leather dust<sup>4</sup>. Exposure to solvents, dyes or metallic compounds in the footwear industry, among nonfactory shoemakers and repairers and among operatives making leather and leather products, was deemed to be associated with the increased risk of bowel cancer noted in a US study<sup>17</sup>. An increased proportion of cancer of the digestive tract among male shoeworkers was found in another US study; however, it was suggested that factors other than their occupation could have been responsible for the excess noted<sup>9</sup>. In a study of gall-bladder cancer occurring in Sweden between 1961 and 1969, in which information on occupation was drawn from 1960 census data, the incidences of cancers of the gall-bladder and of the biliary tract were found to be significantly elevated among men employed in shoemaking and repair<sup>18</sup>. In view of the exploratory nature and design of these studies, the findings were considered to be inadequate for a definite evaluation.

No indication of a link between Hodgkin's disease and work in 'textile, shoes, leather' industries emerged from investigations in Italy<sup>19</sup>.

## References

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