

ORIGINAL ARTICLE

Lung cancer mortality among chromate production workers

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Aims: To assess mortality in 1997 among 493 former workers of a US chromate production plant employed for at least one year between 1940 and 1972.

Methods: Cohort members were followed for mortality to 31 December 1997. Standardised mortality ratios (SMRs) were calculated for selected cause specific categories of death including lung cancer. Lung cancer mortality was investigated further by calculation of SMRs stratified by year of hire, duration of employment, time since hire, and categories of cumulative exposure to Cr(VI).

Results: Including 51 deaths due to lung cancer, 303 deaths occurred. SMRs were significantly increased for all causes combined (SMR = 129), all cancers combined (SMR = 155), and lung cancer (SMR = 241). A trend test showed a strong relation between lung cancer mortality and cumulative hexavalent exposure. Lung cancer mortality was increased for the highest cumulative exposure categories (≥ 1.05 to <2.70 mg/m³-years, SMR = 365; ≥ 2.70 to 23 mg/m³-years, SMR = 463), but not for the first three exposure groups. Significantly increased SMRs were also found for year of hire before 1960, 20 or more years of exposed employment, and latency of 20 or more years.

Conclusions: The finding of an increased risk of lung cancer mortality associated with Cr(VI) exposure is consistent with previous reports. Stratified analysis of lung cancer mortality by cumulative exposure suggests a possible threshold effect, as risk is significantly increased only at exposure levels over 1.05 mg/m³-years. Though a threshold is consistent with published toxicological evidence, this finding must be interpreted cautiously because the data are also consistent with a linear dose response.