This study substantiated the widely held notion that those who smoke and have asbestos exposure incurred risk of lung cancer to an extent greater than the risk for those who only smoke or those who only have asbestos exposure.

To investigate the interaction between asbestos exposure and smoking on lung cancer, 1,878 deaths from lung cancer were examined using the Synergy (S) and Multiplicativity (V) indices, which test the hypotheses of additive and multiplicative interaction, respectively. The combined effect was greater than additive and multiplicativity could not be rejected.

Frost G, Darnton A, Harding A


Objectives: Workers in the asbestos industry tend to have high smoking rates compared to the general population. Both asbestos exposure and cigarette smoking are recognized risk factors for lung cancer mortality, but the exact nature of the interaction between the two remains uncertain. The aim of this study was to examine the effect of smoking and smoking cessation among asbestos workers in Great Britain (GB) and investigate the interaction between asbestos exposure and smoking.

Methods: The study population consisted of 98,912 asbestos workers recruited into the GB Asbestos Survey from 1971, followed-up to December 2005. Poisson regression was used to estimate relative risks of lung cancer mortality associated with smoking habits of the asbestos workers and to assess whether these effects differed within various categories of asbestos exposure. The interaction between asbestos exposure and smoking was examined using the Synergy (S) and Multiplicativity (V) indices, which test the hypotheses of additive and multiplicative interaction, respectively. The proportion of lung cancers among smokers attributable to the interaction of asbestos and smoking was also estimated.

Results: During 1,780,233 person-years of follow-up, there were 1,878 deaths from lung cancer (12% of all deaths). Risk of lung cancer mortality increased with packs smoked per day, smoking duration, and total smoke exposure (pack-years). Asbestos workers who stopped smoking remained at increased risk of lung cancer mortality up to 40 years after smoking cessation compared to asbestos workers who never smoked. The effects of smoking and stopping smoking did not differ by duration of asbestos exposure, main occupation, age at first asbestos exposure, year of first exposure, or latency period. The interaction between asbestos exposure and smoking for asbestos workers was greater than additive [S 1.4, 95% confidence interval (CI) 1.2-1.6], and the multiplicative hypothesis could not be rejected (V 0.9, 95% CI 0.3 -2.4). For those asbestos workers who smoked, an estimated 26% (95% CI 14-38%) of lung cancer deaths were attributable to the interaction of asbestos and smoking.

Conclusions: This study emphasizes the importance of smoking prevention and cessation among those who work in the asbestos industry.
Fact 1
This study investigated the interaction between asbestos exposure and smoking on lung cancer. After adjustment for age, calendar period, sex, main occupation, and length of occupational exposure to asbestos, both current and former smokers had significantly elevated risks of lung cancer mortality compared to never-smokers (RR 14.7; 10.5-20.6 and RR 4.6; 3.3 -6.6, respectively).

Fact 2
The risk of mortality from lung cancer for never-smokers with high asbestos exposure was greater than never-smokers with low asbestos exposure but this was not statistically significant (RR 1.6; 0.6-4.2).

Fact 3
For those asbestos workers who smoked, an estimated 2% (-3 to 7%) of lung cancer deaths were attributable to asbestos only, 68% (57 to 79%) to smoking only, and 26% (14 to 38%) to the interaction of asbestos and smoking.

Fact 4
The estimated fraction of lung cancer deaths prevented; 1) if workers had not smoked (risk attributable to smoking in the presence of asbestos) was 94%; 2) if workers had not been exposed to asbestos (risk attributable to asbestos in the presence of smoking) was 28%; 3) if neither exposure had occurred (risk attributable to the combined effect of asbestos and smoking) was 96% among asbestos workers who smoked.

Fact 5
The interaction between asbestos exposure and smoking for asbestos workers was greater than additive (each factor acts independently) (Synergy 1.4; 1.2-1.6), and the multiplicative (the effect of asbestos exposure on lung cancer risk proportional to the effect of smoking) hypothesis could not be rejected (V; multiplicativity 0.9; 0.3-2.4).

References