### 63. Lung fiber burden in the Nottingham gas mask cohort

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#### Introduction

A unique study to follow-up a cohort of 1,154 employees, mainly women, who had worked 1940-1945 on the manufacture of military gas masks using filter pads containing 20% crocidolite, traced through 2003. Mesothelioma deaths in Asian countries continue to increase because of heavy use of asbestos in this region.

#### Asian context

In this cohort 65 were known to have died from mesothelioma. Researchers investigated the lung fiber content of 50 cases who died from mesothelioma and 20 cases who died from other causes. The authors estimated a 7.5% annual rate of elimination of crocidolite, corresponding to a half life of 9.2 years.

#### Critical appraisal

In this cohort 65 were known to have died from mesothelioma. Researchers investigated the lung fiber content of 50 cases who died from mesothelioma and 20 cases who died from other causes. The authors estimated a 7.5% annual rate of elimination of crocidolite, corresponding to a half life of 9.2 years.

#### Unique keywords

Military gas mask, lung fiber, mesothelioma, asbestos worker

#### Abstract

A cohort of 1,154 employees, mainly women, who had worked 1940-1945 on the manufacture of military gas masks using filter pads containing 20% crocidolite, was traced through 2003, by which time 65 were known to have died from mesothelioma. The last known death with mesothelioma was in 1994, whereas a further 5 cases would have been expected in those with known duration of exposure. Lung tissue samples, from 50 deaths from mesothelioma and 20 other causes, had been analyzed for mineral fiber content. For ten of the mesothelioma cases data on fiber size were collected. Crocidolite fiber concentrations were analyzed in relation to exposure by time and duration. Fiber concentrations overall fell fairly steadily by decade of death, and increased with length of exposure up to 36 months and then fell sharply. The annual rate of elimination estimated by regression was 7.5% corresponding to a half life of 9.2 years. The proportion of fibers longer than 6µm increased over time implying that the shorter fibers were eliminated more rapidly than the longer ones. The decline in concentrations with time confirms the hypothesis that crocidolite and, by inference, other amphibole fibers are slowly removed from the lung, but since the longer more carcinogenic fibers were cleared more slowly it is unclear to what extent this clearance explains the slowing down of the increase in mesothelioma mortality from about 40 years from the most recent exposure. The exact biostatistical models which most closely conform with the data remain open to question.
In a follow-up study of a cohort of 1,154 employees, mainly women, who had worked 1940-1945 on the manufacture of military gas masks using filter pads containing 20% crocidolite, the crocidolite counts ranged from 0 to 1,949 (mean 234, median 47) fibers/µg dry lung among the former employees.

The rate of decline of crocidolite was 7.5% per year, corresponding to a half-life of 9.2 years.

The risk of mesothelioma mortality was fairly stable between 35 and 55 years after exposure which suggests that mesothelioma mortality is unlikely to be significantly increased after about 40 years from most recent amphibole exposure.