



Epidemiology of aluminosilicate wools  
(refractory ceramic fibers, RCF): Results to  
date and the influence of the PSP

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BOHS Meeting 27 April 2017

# BACKGROUND AND INTRODUCTION

# Background

- Aluminosilicate wool (ASW), also called *refractory ceramic fiber* (RCF), was discovered in the 1940s and commercialized during the 1950s
- Early studies with laboratory animals indicated that it was no more toxic than a “nuisance dust,” but later animal studies raised concerns over possible health effects

# Epidemiology studies

- Industry developed a *product stewardship program* (PSP) to identify and control any risks associated with use of RCF
- Epidemiology studies beginning in 1987 were one key component of the PSP
- Epidemiology studies were conducted in both Europe (*Institute of Occupational Medicine* [IOM], Edinburgh) and the United States (University of Cincinnati)

# Scope of epidemiology studies

Symptoms

- Collected data on respiratory symptoms

Spirometry

- Conducted periodic pulmonary function tests

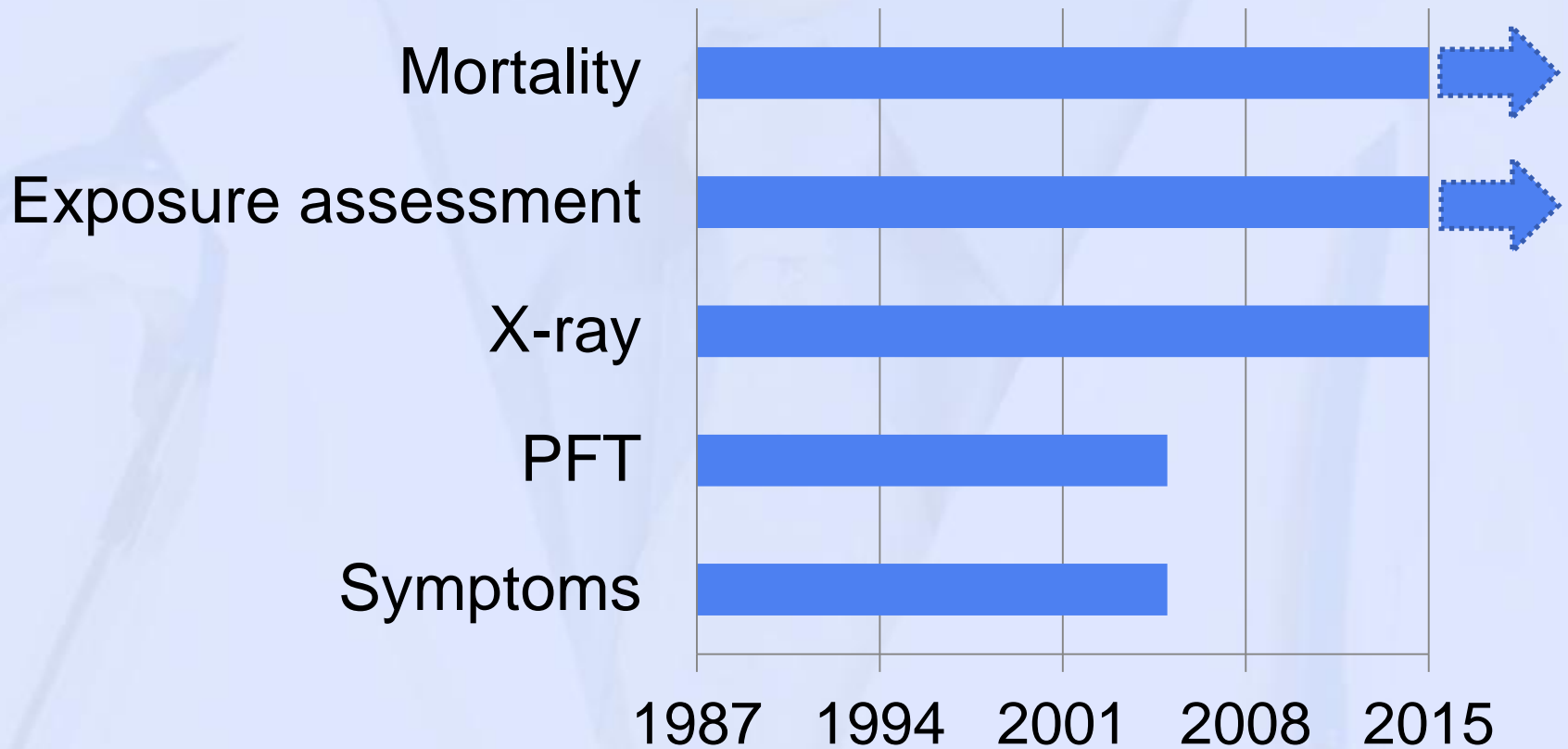
X-ray

- Collected chest radiographs

Mortality

- Analysed mortality data from plants in US

# Follow up for different endpoints



# FINDINGS

# Published studies

- Symptoms
  - Trethowan et al (1995; Europe)
  - Cowie et al (2001; Europe)
  - LeMasters et al (1998; US)
- Radiographic findings
  - Lockey et al (2012; US)
  - Cowie et al (2001; Europe)
- Lung function
  - McKay et al (2011; US)
  - Trethowan (1995; Europe)
  - Cowie (2001; Europe)
- Mortality
  - LeMasters et al (2003; US)



# Populations studied

- Europe – Cross-sectional studies
  - Trethowan et al (1995) – 628 workers
  - Cowie et al (2001) – 774 workers
- US – Longitudinal studies
  - LeMasters et al (1998, 2003) - 942 workers
  - McKay et al (2011) – 1396 workers
  - Lockey et al (2012) – 1323 workers

# Findings overview

## Symptoms

- Similar to other dust-exposed populations

## X-rays

- Dose related pleural plaques (US study)

## X-rays

- No interstitial fibrosis

## Spirometry

- Some effects seen, but not in longitudinal study

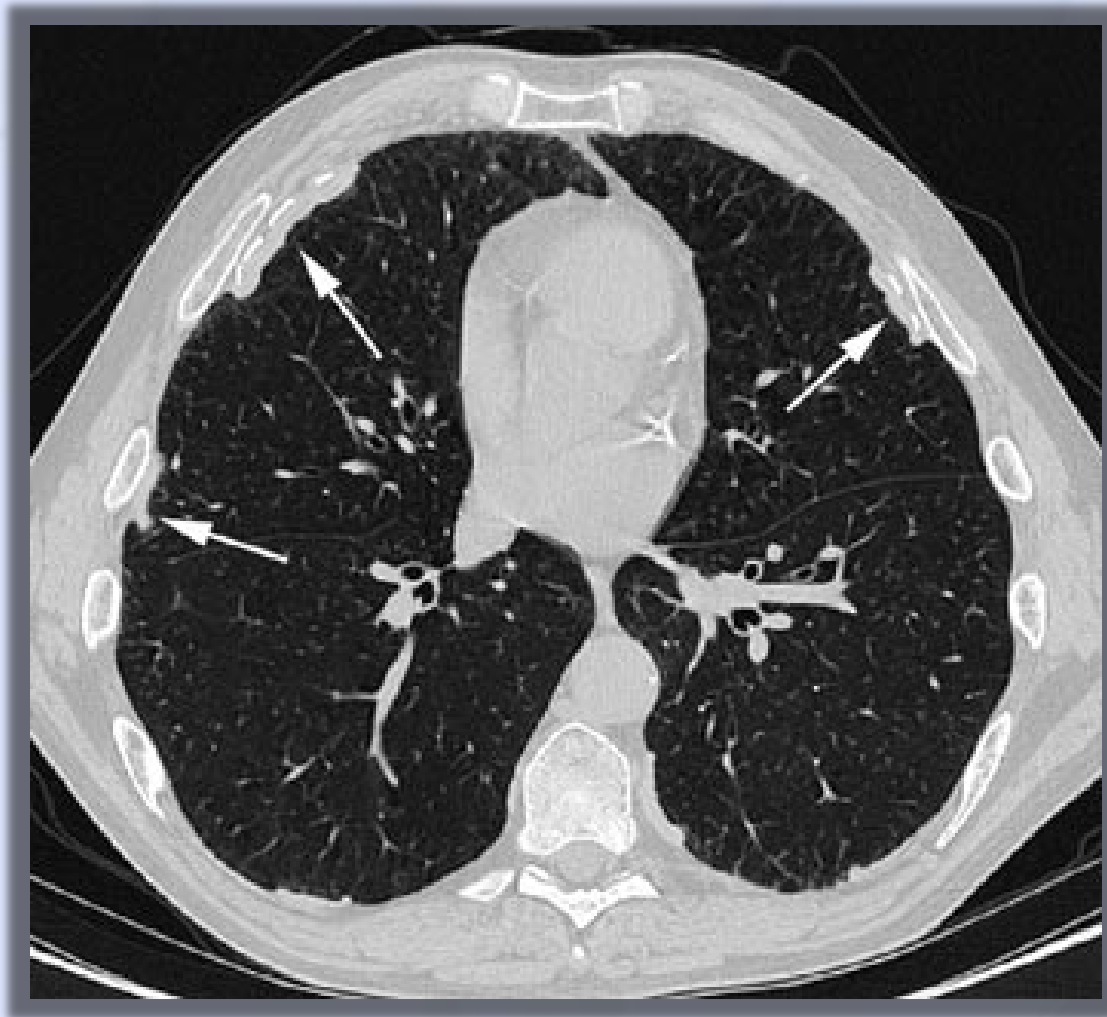
## Mortality

- US: No mesothelioma or excess lung cancer

# What are pleural plaques?

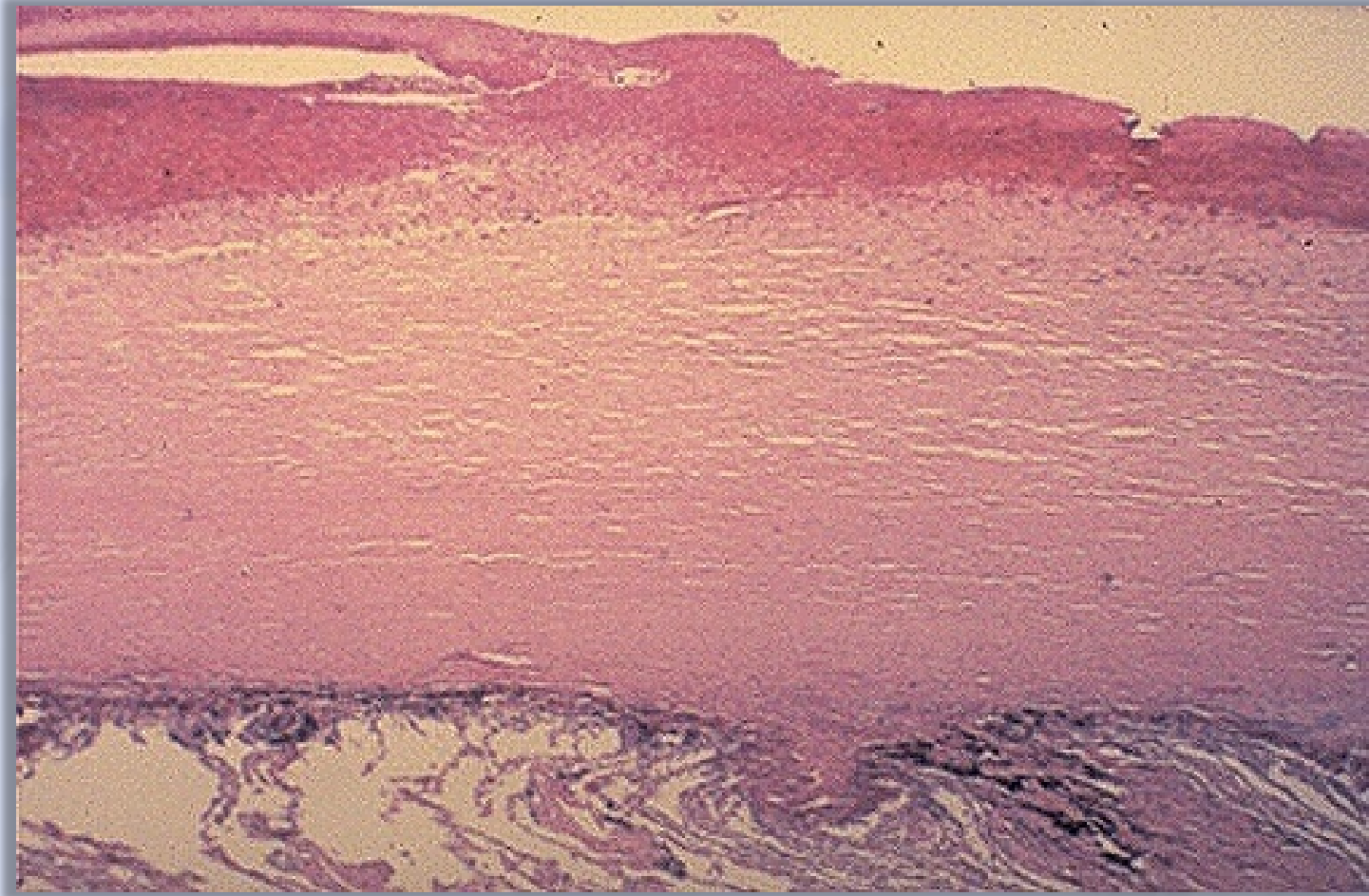
- Collagenous thickening of parietal pleura
- Found in the lateral and lower-half of the pleural cavity
- Plaques almost always bilateral with well-defined borders
- Latency reported to be 15-40 years
- Commonly associated with exposure to asbestos, but also occur spontaneously

# Plaques as shown in *computed tomography* (CT)



Arrows show pleural plaques

Microscopically, the pleural plaque is composed of dense layers of collagen



# Clinical significance of plaques

- No evidence that plaques are precursor lesions for either lung cancer or mesothelioma
- Plaques are viewed as evidence of (fibre) exposure, and it is this exposure that is of possible importance for future health
- Plaques are not associated with symptoms or clinically significant loss of lung function
- Plaques not likely an independent risk factor for tumours

# What is the incidence of plaques?

- Incidence varies with population:
  - Urban incidence greater than rural
  - Males typically higher than females
  - General populations 0.5 – 8%
  - Occupationally exposed cohorts 0.1 – 69%
- Overall incidence in US RCF population: 2.7% (no asbestos exposure) to 4.6% (asbestos)
  - Incidence varies with latency, duration, and cumulative exposure.
  - Currently stable at 2.5 – 3%

# CONCLUSIONS



# Key findings

- Symptoms in RCF workers similar to other dust-exposed groups
- No increase in interstitial fibrosis
- No increased malignancy of respiratory tract; no mesotheliomas
- No accelerated decline in lung function
- Pleural plaques statistically significant, but thought to be indicator of exposure rather than precursor of disease
- No evidence supporting findings from the early rat carcinogenicity studies

# Continuing studies under the PSP

- The US mortality and exposure study will continue.
- Companies will continue with respiratory health surveillance in line with the principles of the PSP.