Pneumoconiosis

Four Deaneries
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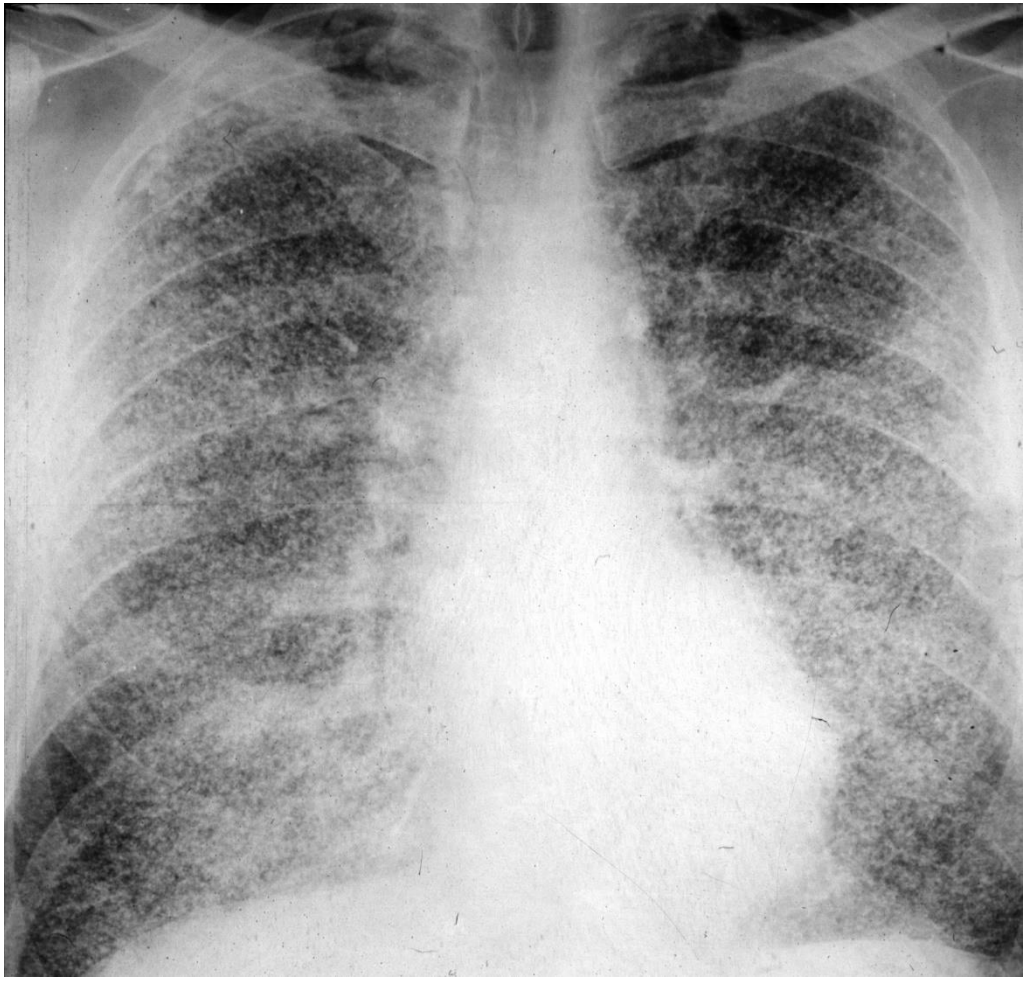
Four times a day, this laptop switches itself off - without warning; if I disappear it takes me about a minute to get back …

… the Jo's will amuse you in the meantime.

Apologies!

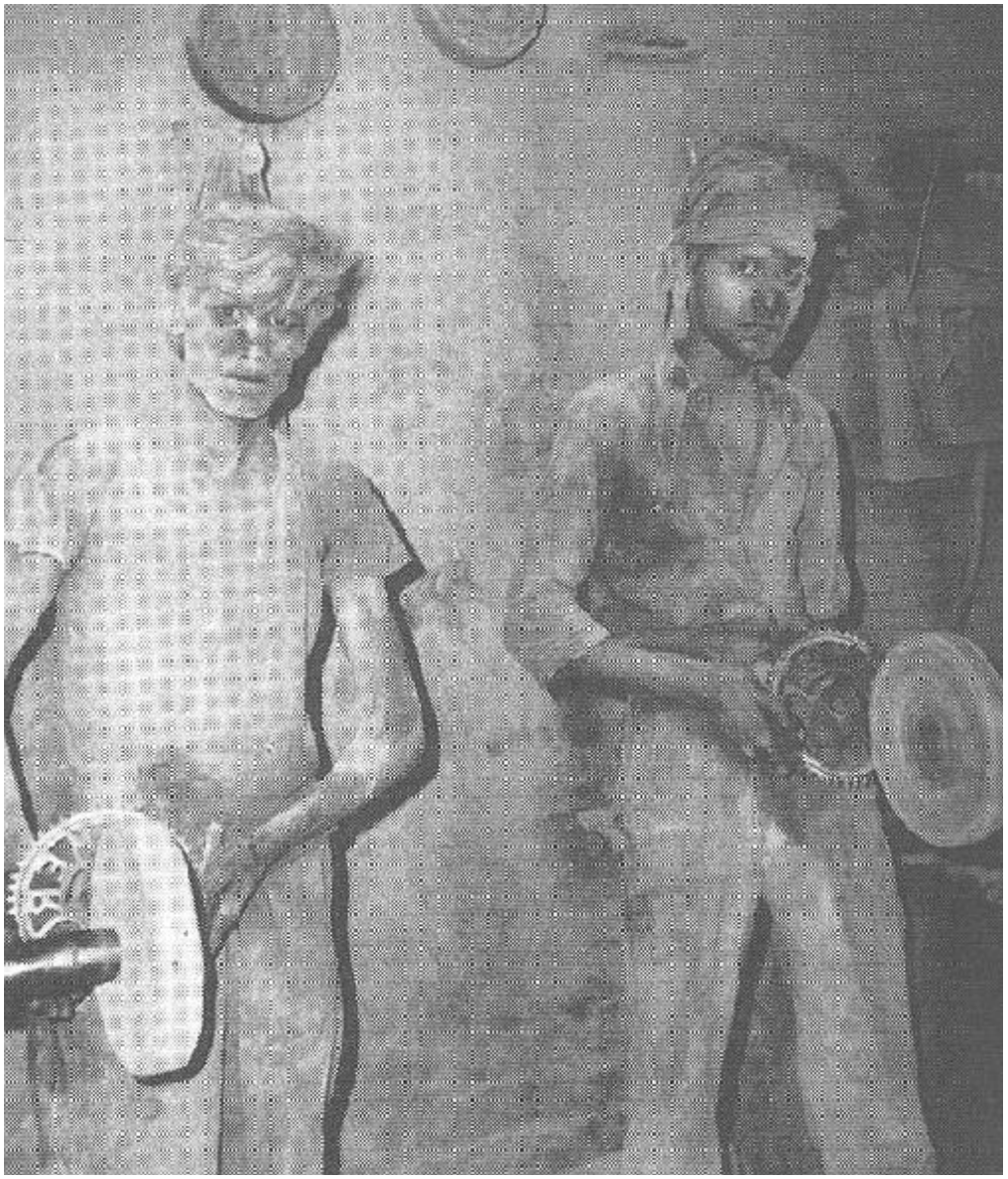
LUNGS AT WORK
www.lungsatwork.org.uk

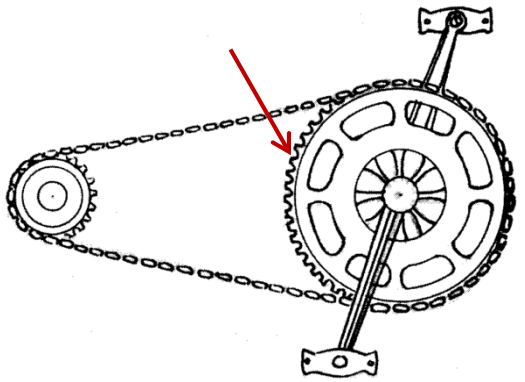


stannosis: tin smelter (Cornwall)

the pneumoconioses: a classification

inert*		mixed*	fibrogenic	granulomatous
high radiodensity	low radiodensity			
tin iron talc fibreglass titanium zirconium antimony barium	cement limestone chalk gypsum marble	coal kaolin slate	cystalline silica asbestos fibrous clays zeolite (±man-made mineral fibres)	beryllium
* beware silica ‘contamination’				

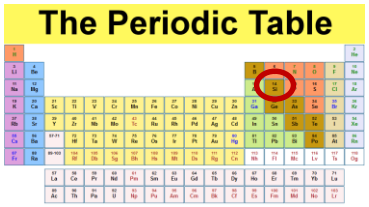




silica exposure: sandstone c.80% silica

What causes silicosis?

~~*A. silicon*~~ **(the name of the element, Si)**



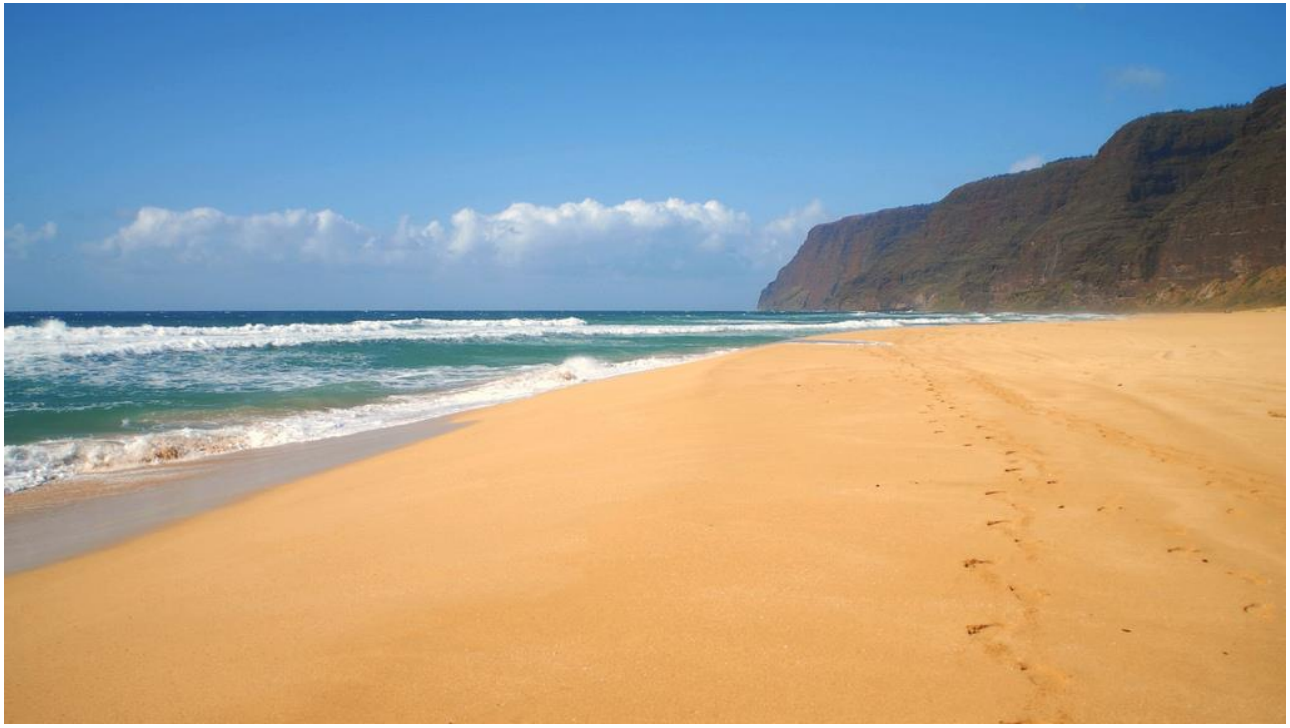
~~*B. silicone*~~ **(a polymer of Si and O; mastic and baking trays)**

C. silica **(SiO_2)**

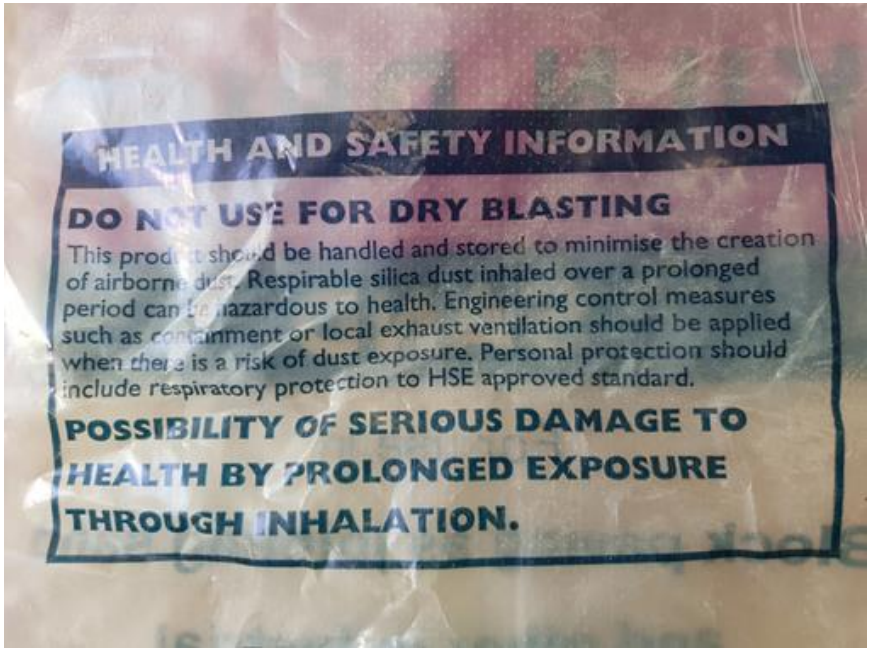
- respirable, crystalline silica ('rcs')

- especially when 'freshly fractured'

Why don’t you get silicosis from lying on the beach?



Do not do this at work …



ILD clinic:
'early silicosis'

'patient not keen to stop work; advised to wear a mask'

discharged

Who's at risk?

stonemasons
kitchen fitters
quarry workers
brick makers
pottery workers
construction workers • tunnellers • concrete workers • paviers

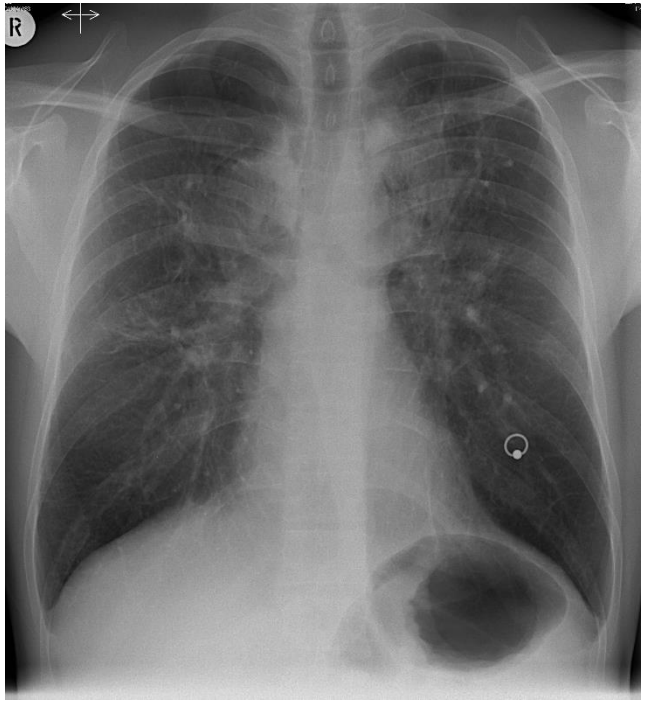
'engineered stone'	95%
sandstone	70-90%
concrete/mortar	25-70%
tile	30-45%
granite	30%
slate	30%
brick	up to 30%
limestone	<2%
marble	<2%

Case 1

35 year old man

- **2014**
  - **cough**
  - **→GP**
  - **→DGH: ‘sarcoidosis’**
  - **no response to treatment**
  - **discharged 2017**

Case 1



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  - **referred**

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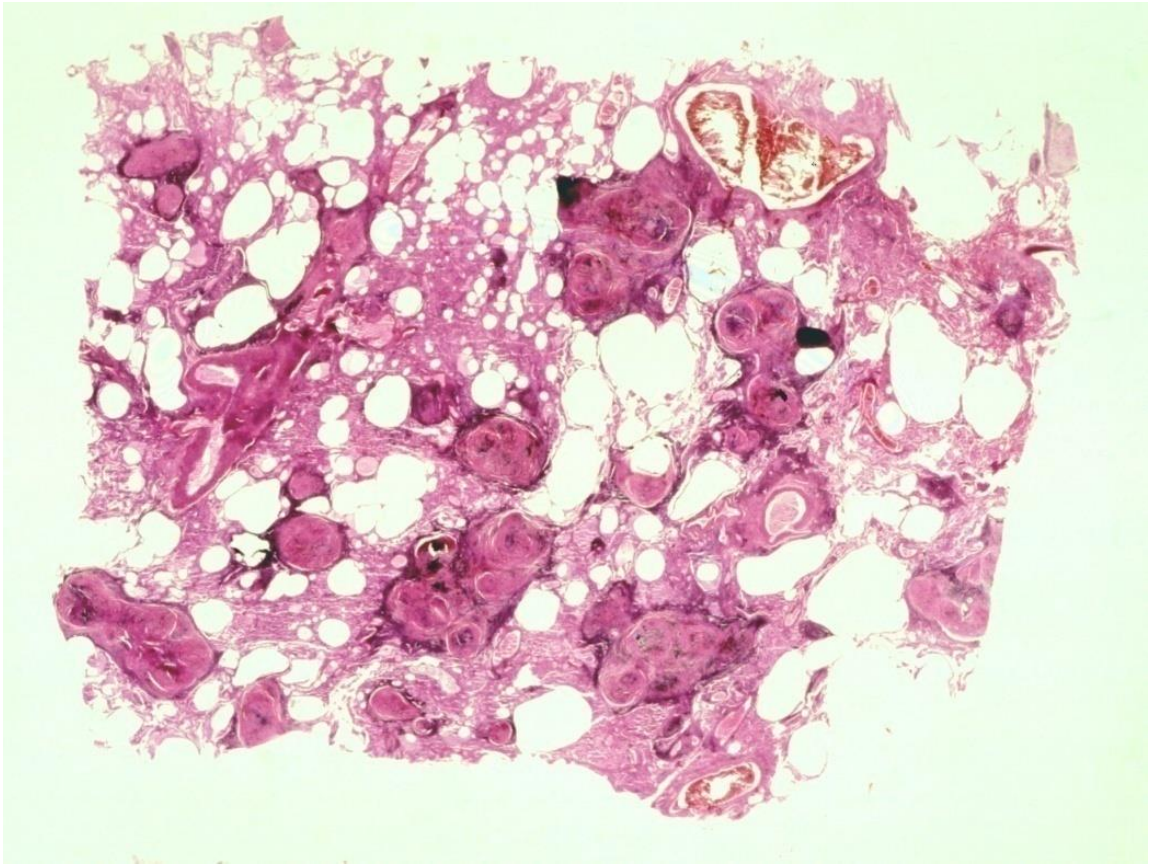
- **stonemason since 2001: quarries, restoration, fabrication**
- **currently limestone**
- **= ‘*complicated*’ silicosis (PMF)**



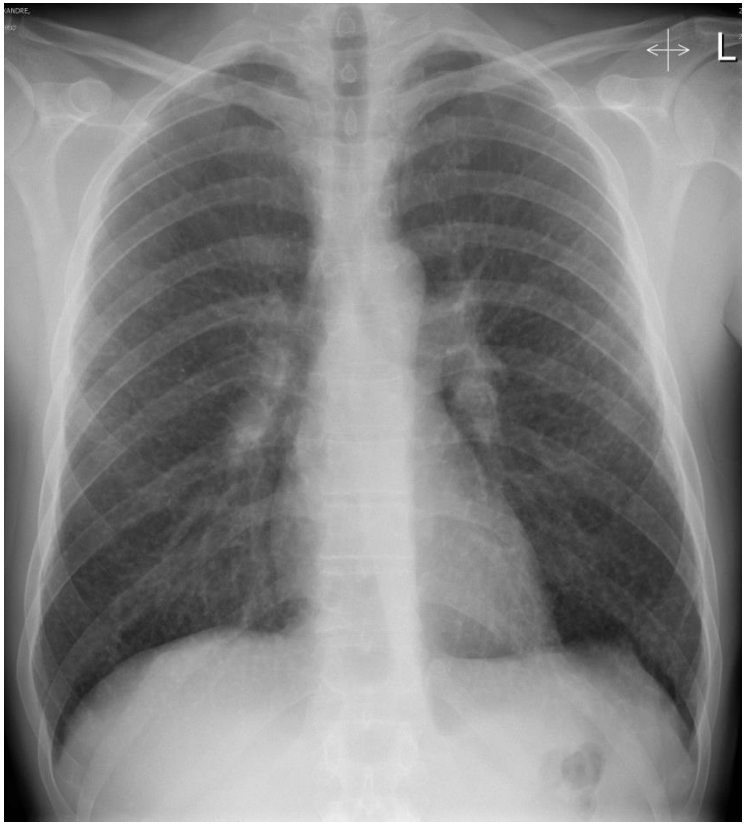
Lesson 1

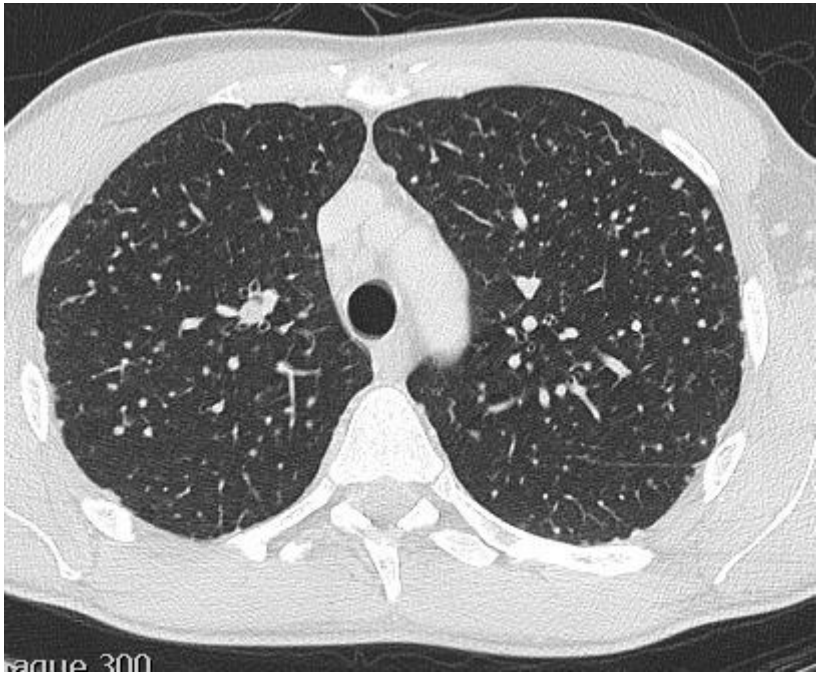
- **‘sarcoidosis’ in a stonemason might not be …**

- **they’re not easily distinguished**
- **occupational history**
- **alert radiologist/pathologist**

- **will his disease progress if he stops working?**
- **will his disease progress if he carries on working?**

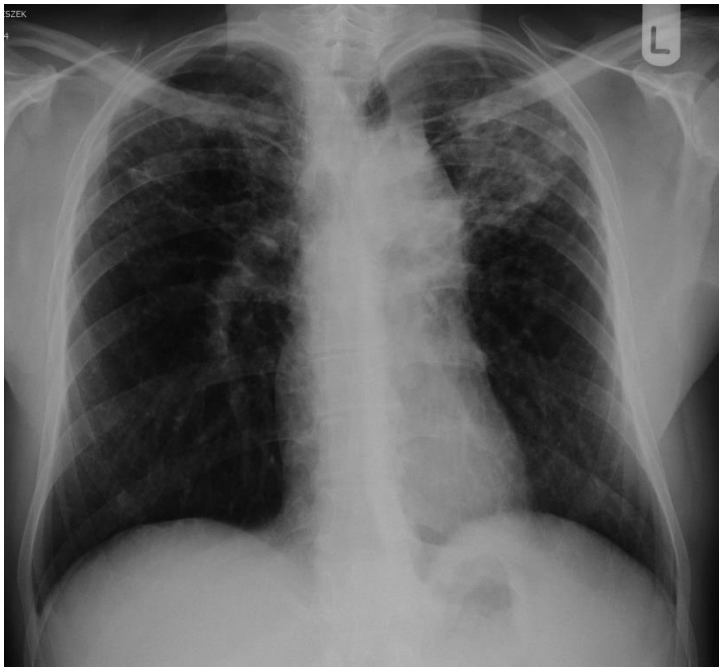
‘Simple’ silicosis

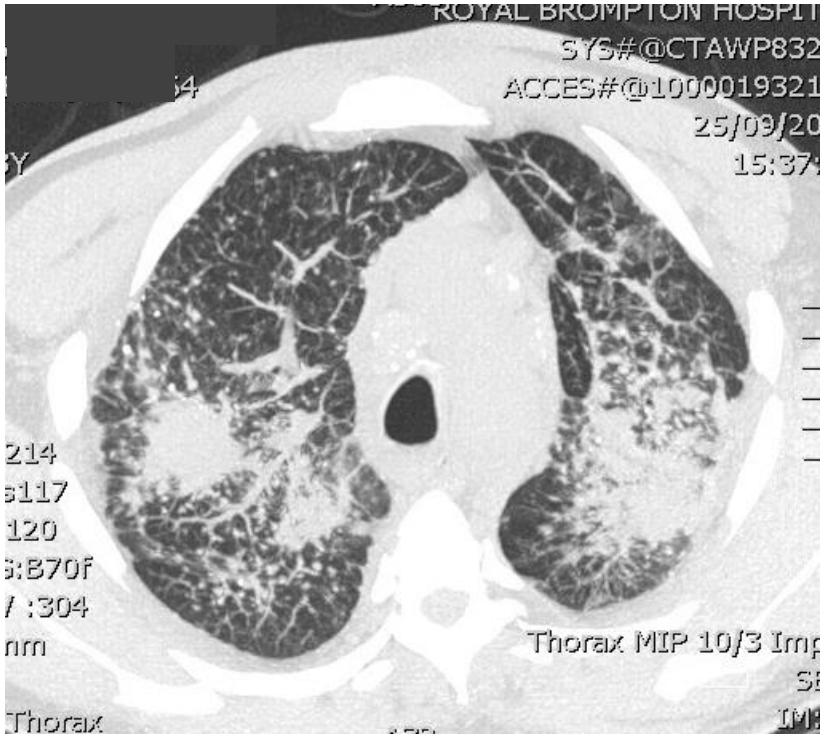




Portugese stonemason
- asymptomatic/normal lung function

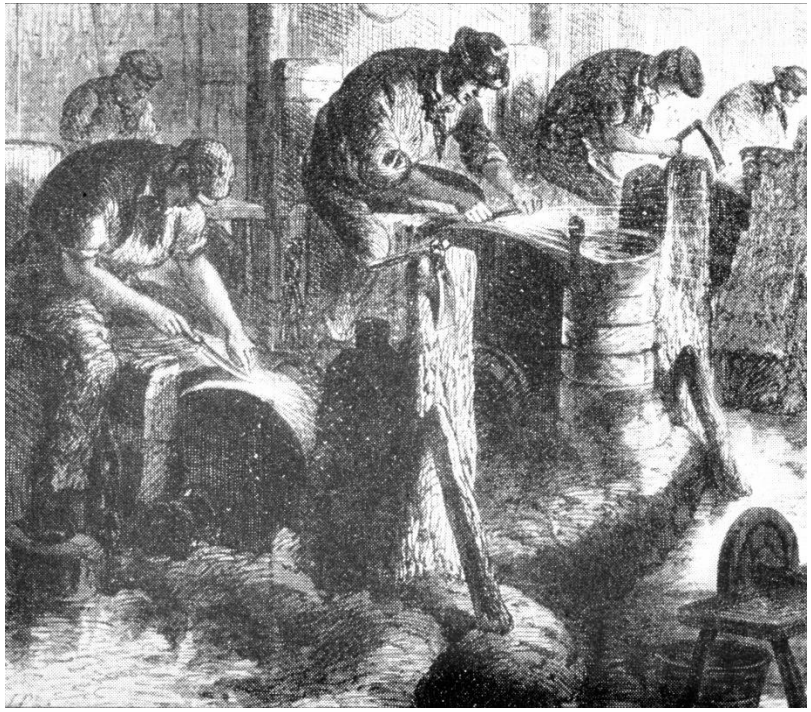
Case 2





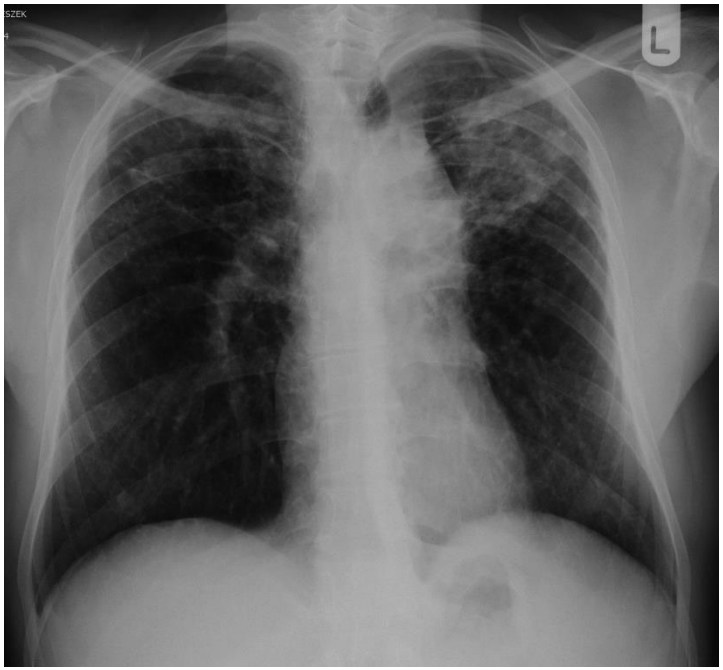
Polish stonemason
- claims no breathlessness

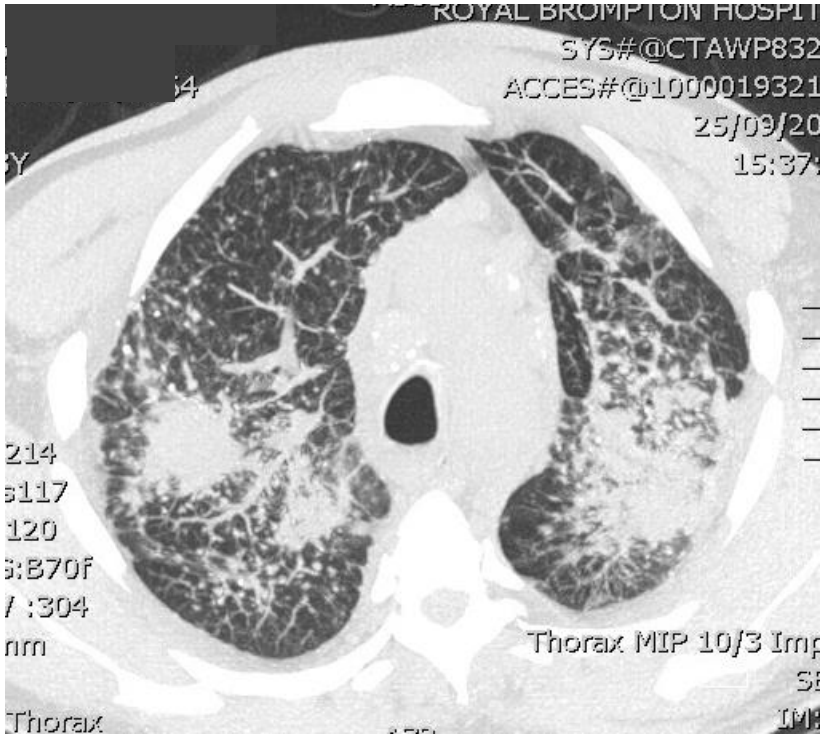
fork grinders: Sheffield 1843



age	Sheffield men (n=549)	fork grinders (n=1000)
20-29	160	475
30-39	136	410
40-49	126	115
50-59	127	**0**

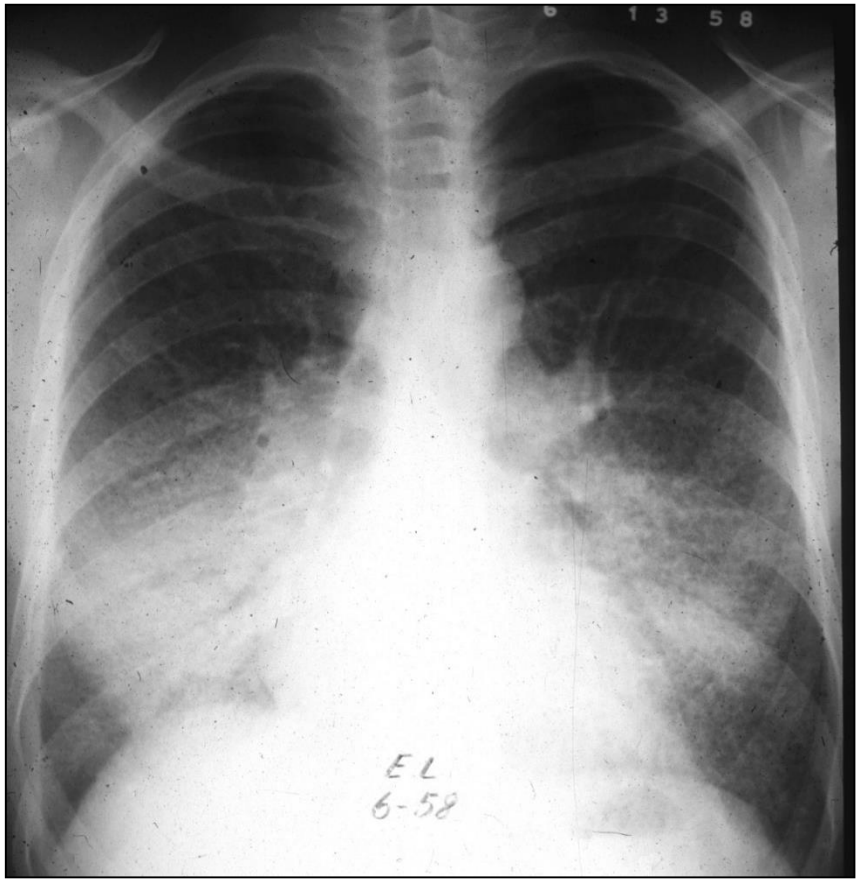
Case 2





'complicated' silicosis (PMF):
- claims no breathlessness
- **night sweats**

Small print: alveolar proteinosis: respirable crystalline silica in sand blaster



sandblaster

More weirdly

There are quite strong epidemiological associations between silica exposure and:

- **RA**
- **SLE**
- **scleroderma**

Hence, silica

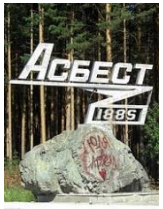
‘simple’ silicosis
‘complicated’ silicosis

tuberculosis

PAP

RA/SLE/scleroderma

lung cancer
(COPD)

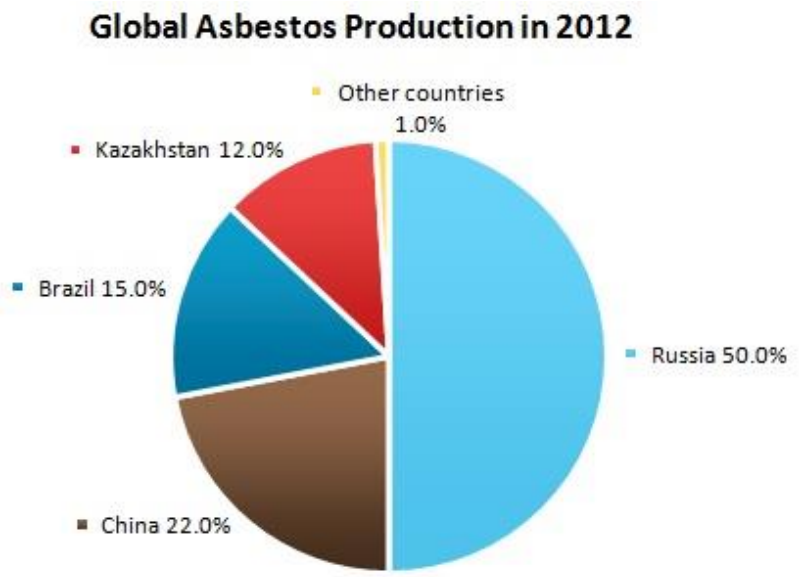


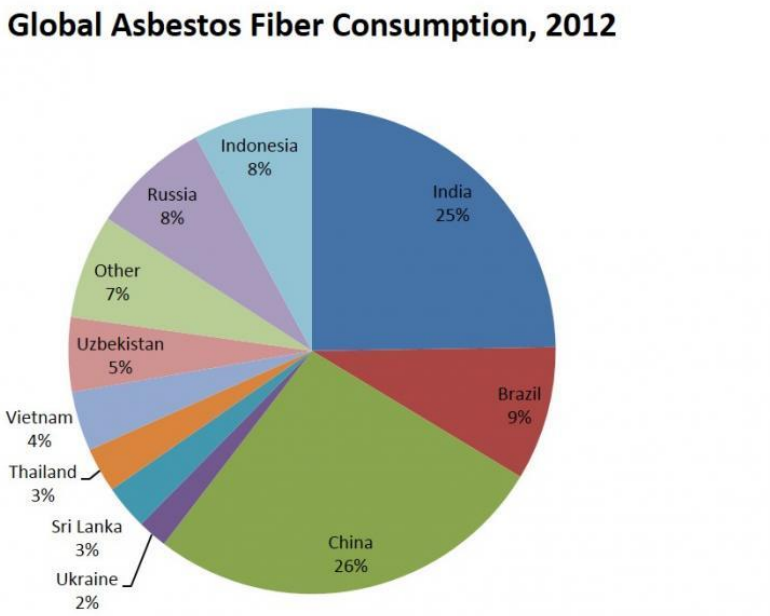
石绵矿 (China)

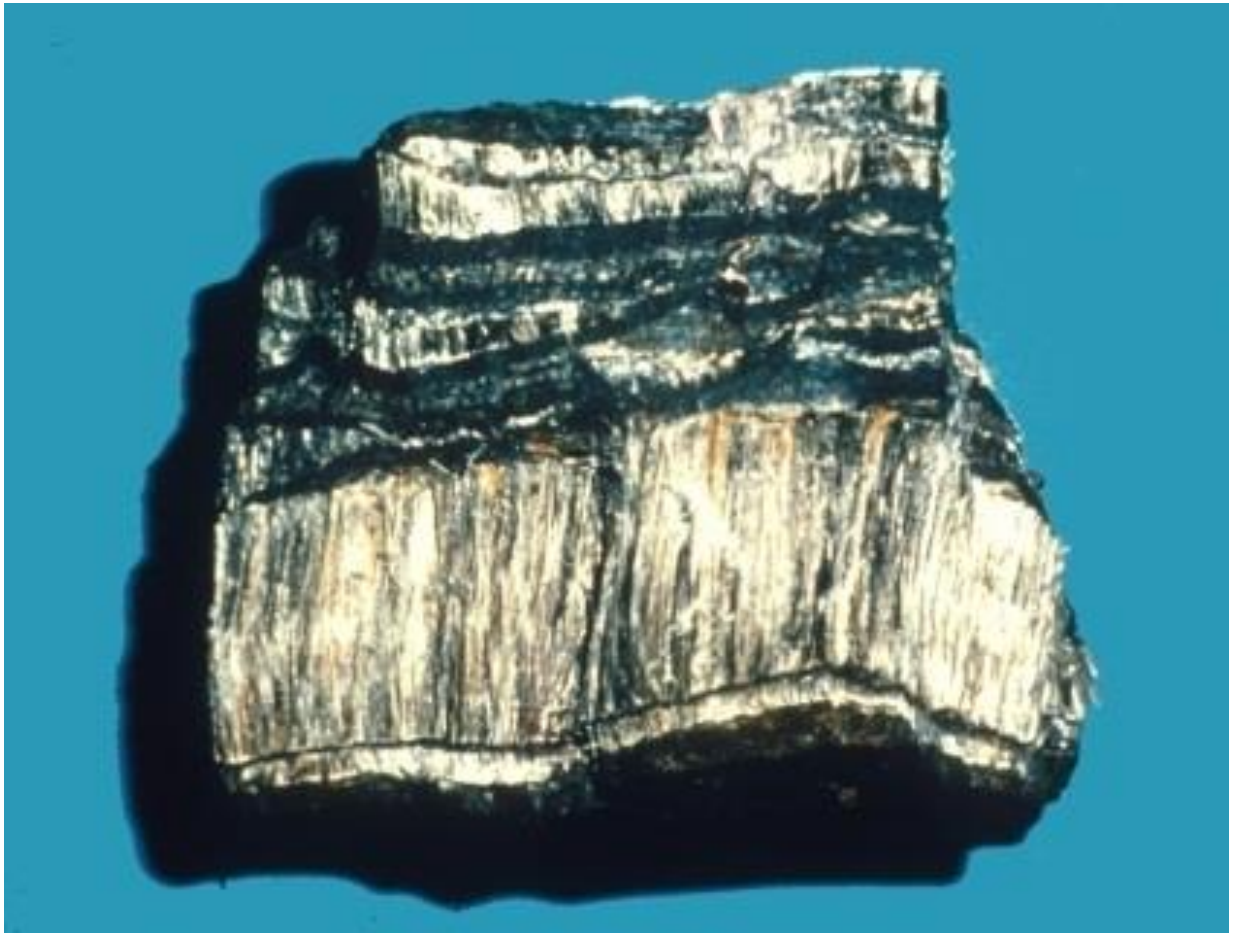
Жітіқара (Kazakhstan)

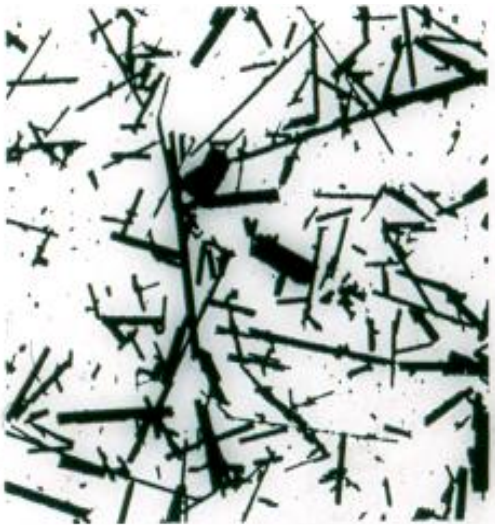
Cana Brava (Brazil)

Global asbestos production and use …









AMOSITE

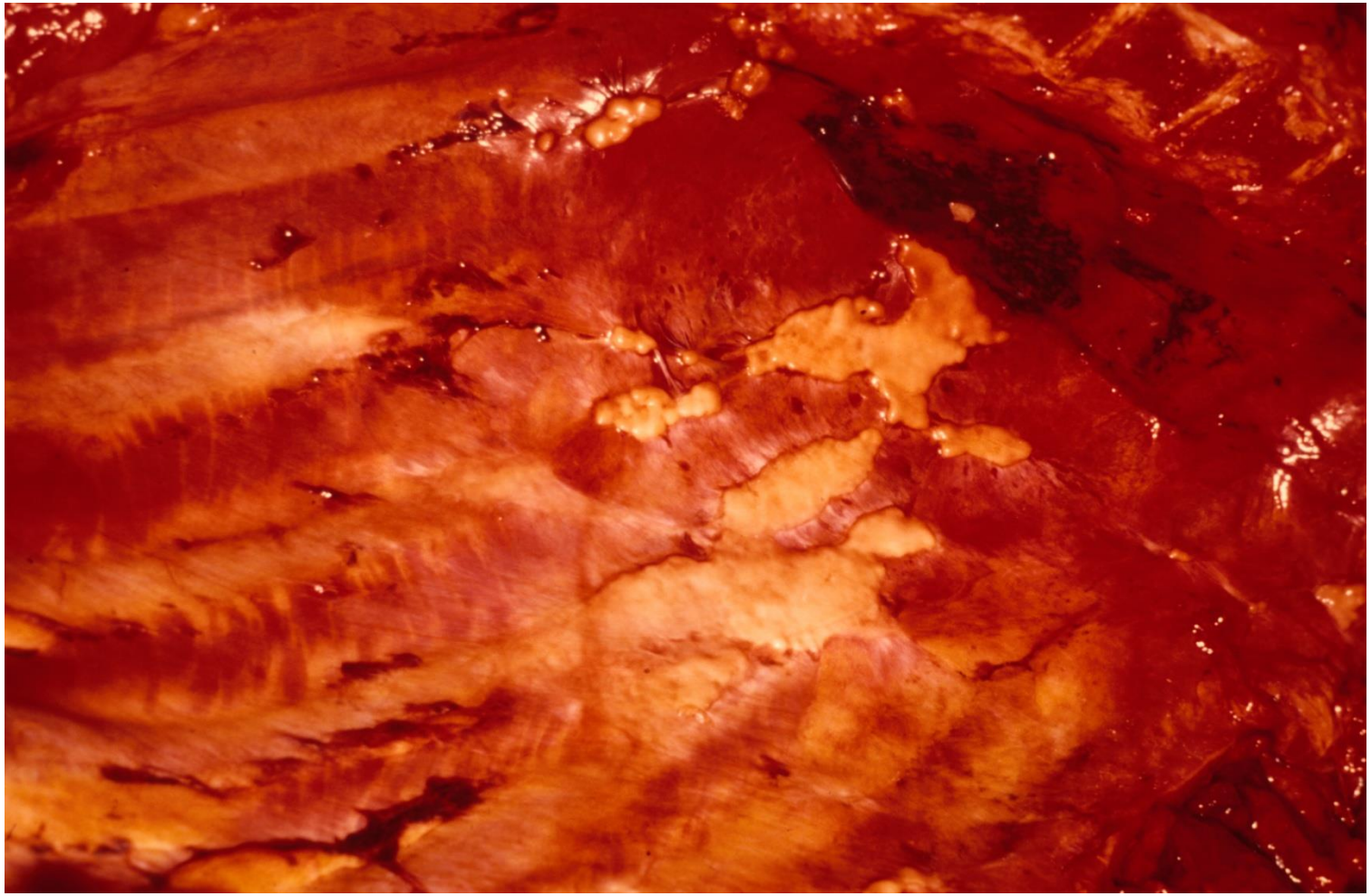
CROCIDOLITE

‘amphiboles’

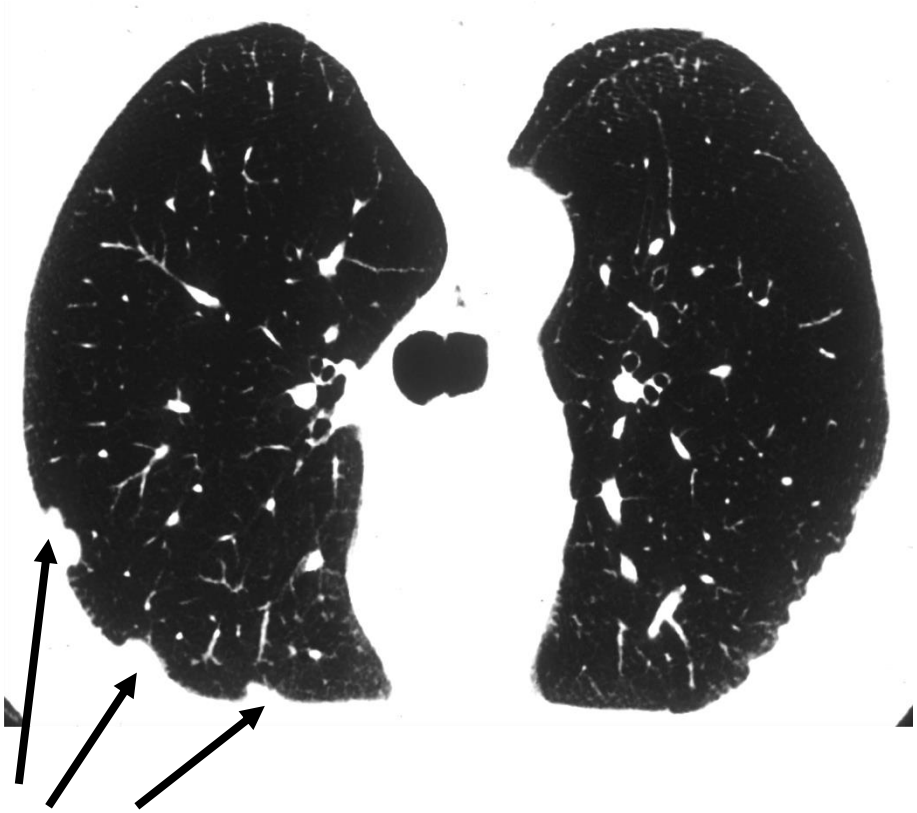
‘serpentine’

CHRYSOTILE

TREMOLITE



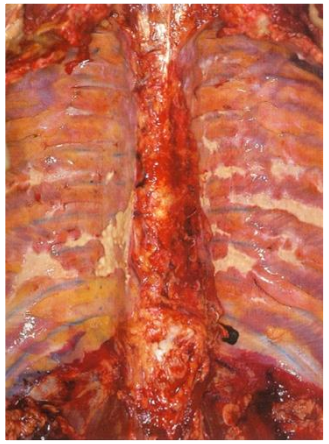
pleural plaques (asbestos): parietal



plaques

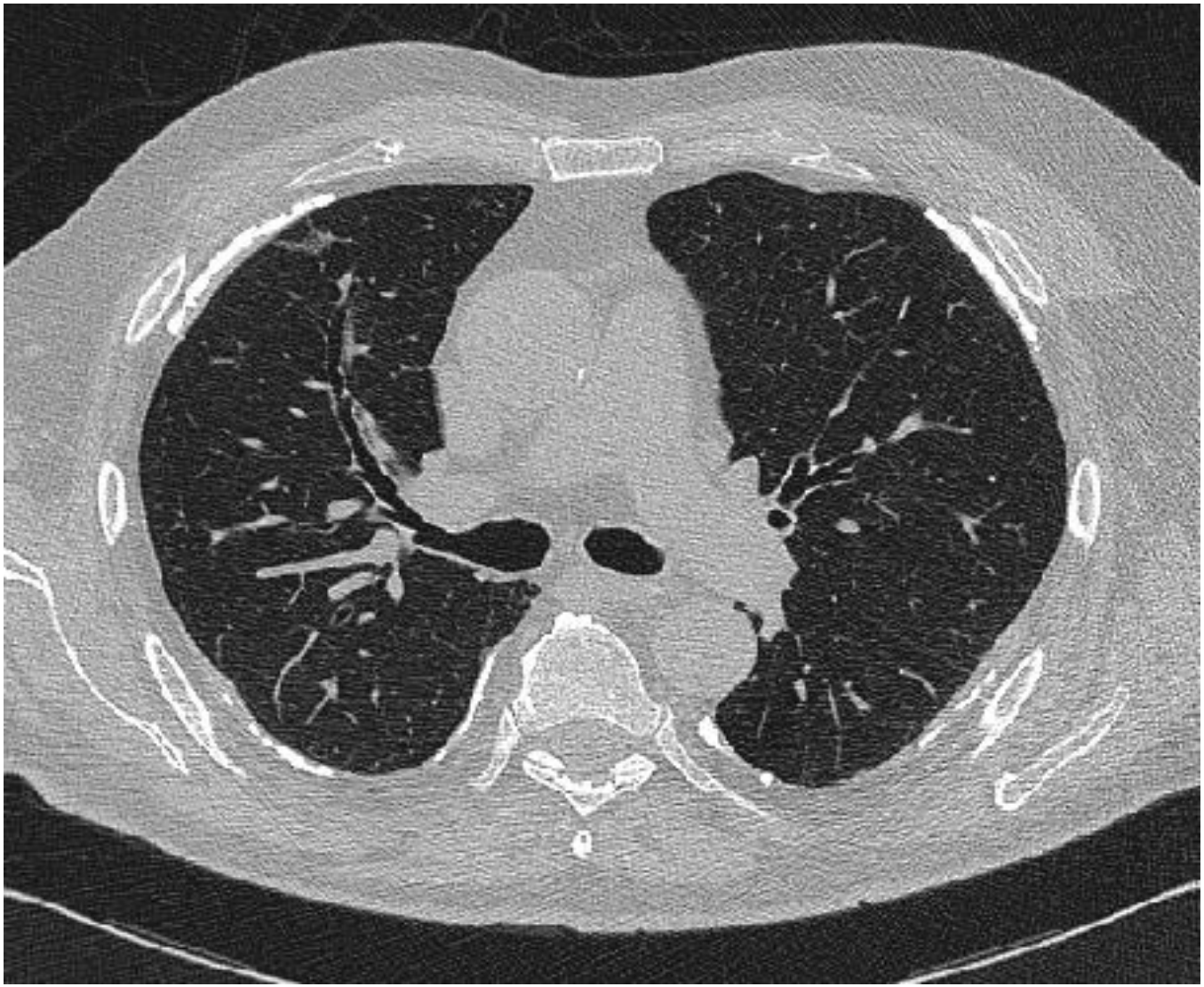
sharp edges

pleural plaques and personal injury



no IIDB

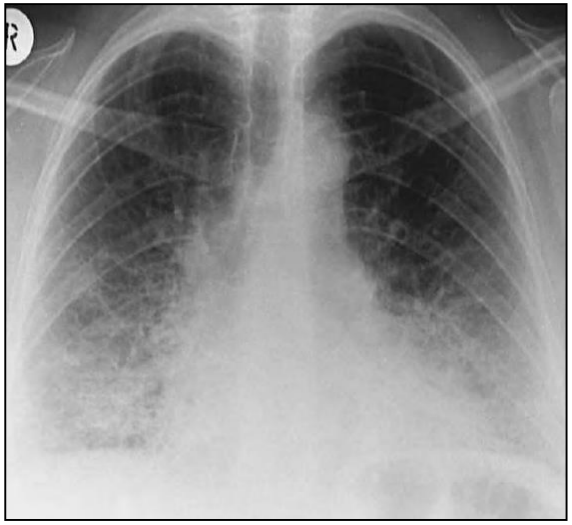
<2005	case-by-case	Yes (c.£10,000)
2005	Manchester10 (Justice Holland)	Yes (£4,000)
2006	Zurich/Norwich (Court of Appeal)	No
2007	‘Johnston Appeal’ (House of Lords)	No
2009	Scottish Parliament	Yes
2009	appeal	No
2010	appeal failed ...	(Yes)



diffuse pleural thickening with calcification

- probably follows ‘benign’ pleural effusion

asbestosis



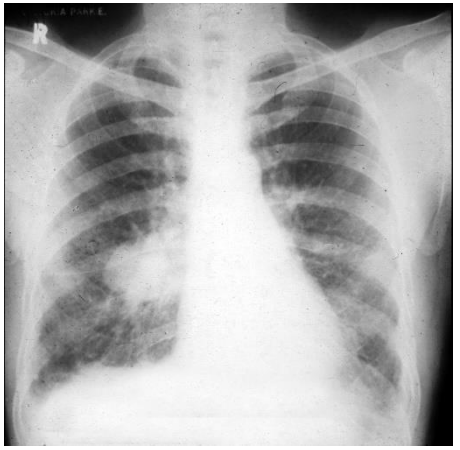
pneumoconiosis panel: mortality of certified cases of asbestosis

study group:	665 men (283 deaths)	
	certified between 1952 and 1976	
causes of death:	lung cancer	39%
	mesothelioma	9%
	asbestosis	20%
O/E deaths:	all causes	2.6
	lung cancer	9.1

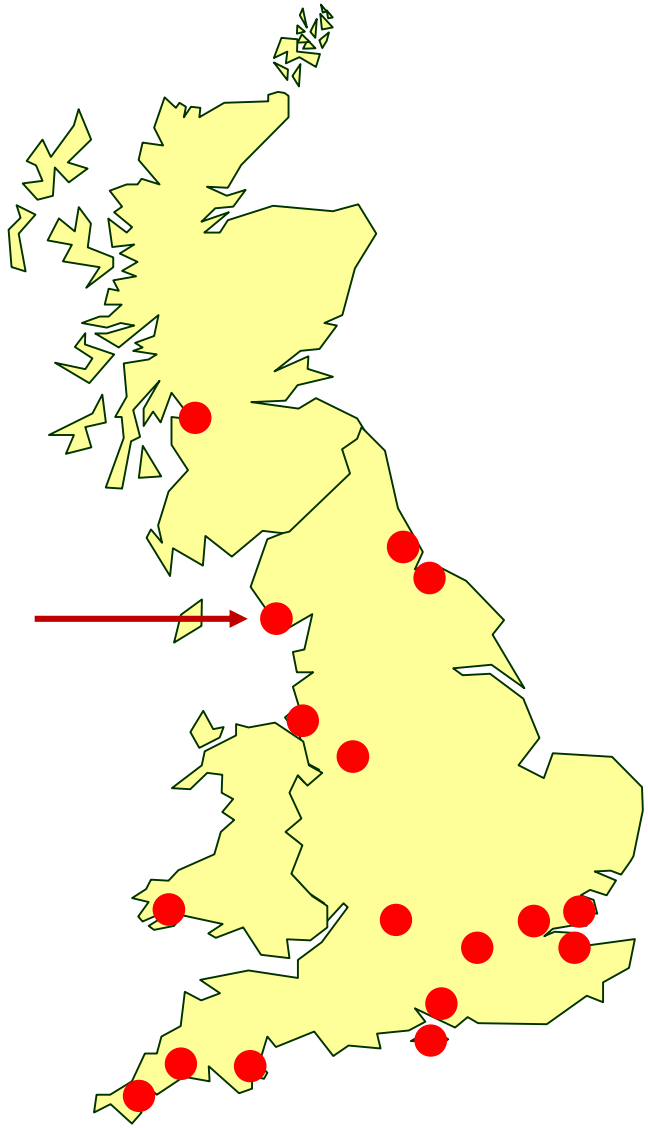
lung cancer and asbestos

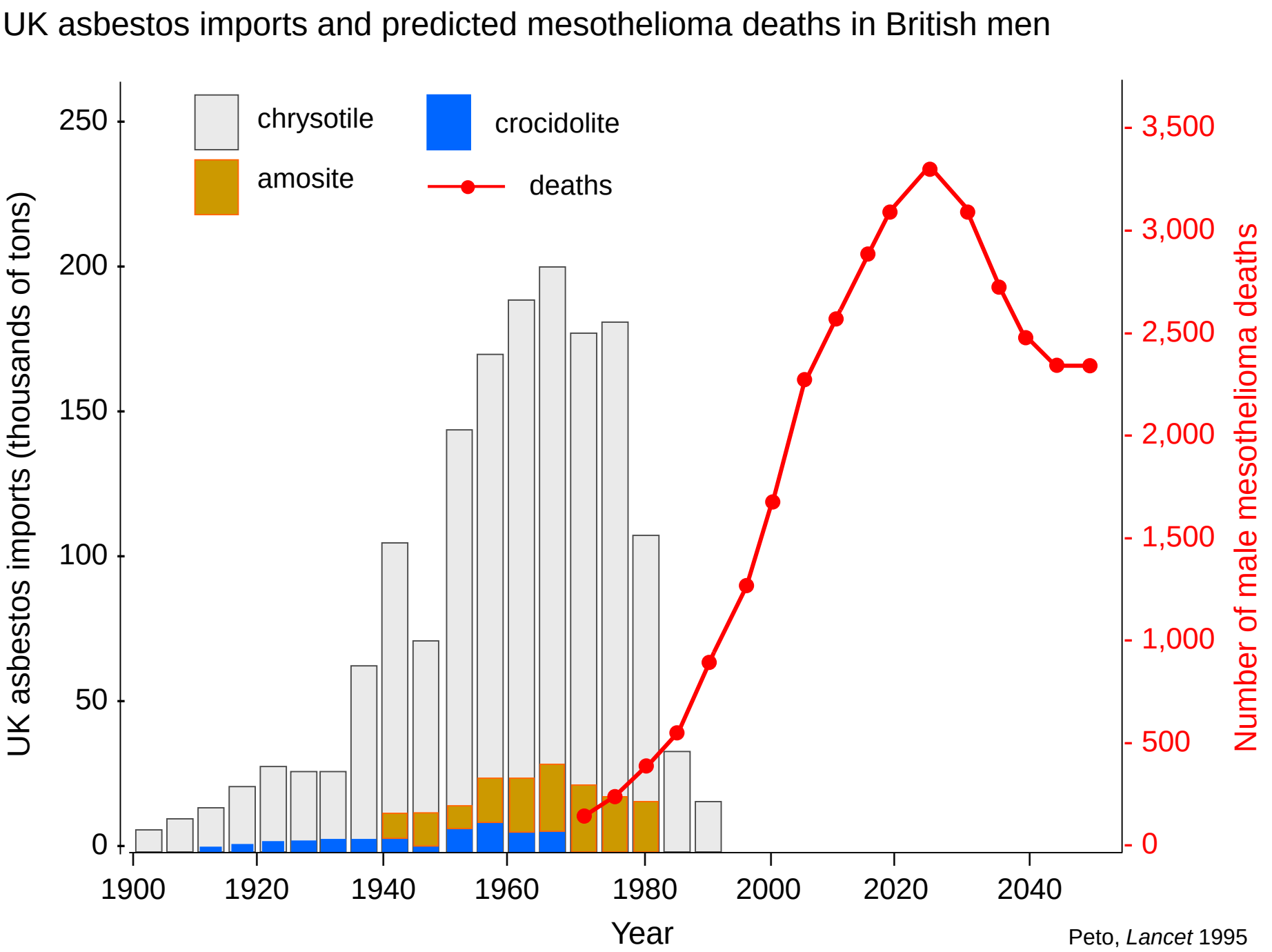
- synergy with smoking

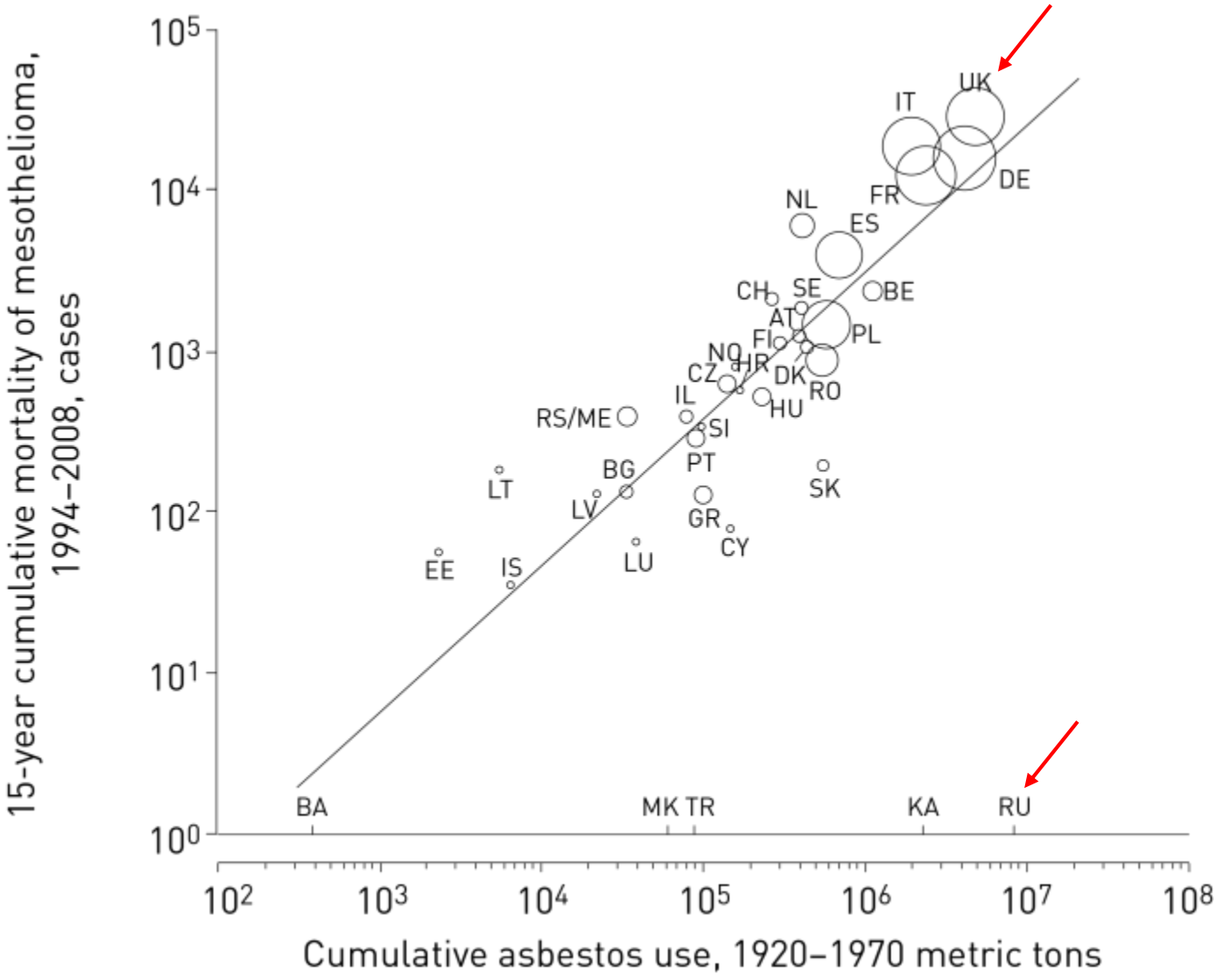
		asbestos exposure	
		no	yes
smoking	no	1	5
	yes	10	50



- **lung cancer is prescribed in cases of *asbestosis***
- **workers with lung cancer without asbestosis, but who have a history of *substantial asbestos exposure* have been added to the terms of prescription:**
  - **workers in asbestos textile manufacture**
  - **asbestos sprayers**
  - **asbestos insulation workers, including those applying and removing asbestos-containing materials in shipbuilding.**
- **for exposures occurring before 1975 workers should have been in the occupations listed for at least 5 years. For exposures occurring after 1975 workers should have been in the occupations listed for at least 10 years.**
- **now no reference to pleural thickening in the terms of prescription.**



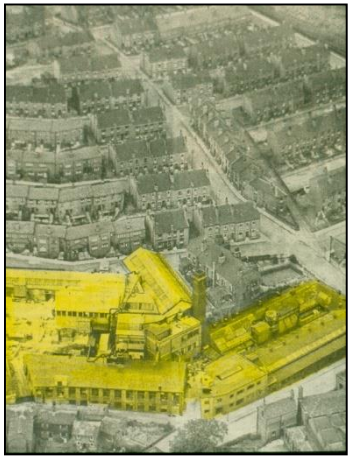

UK asbestos imports and predicted mesothelioma deaths in British men
chrysotile
crocidolite
amosite
deaths
UK asbestos imports (thousands of tons)
Number of male mesothelioma deaths
Year
0
50
100
150
200
250
0
500
1,000
1,500
2,000
2,500
3,000
3,500
1900
1920
1940
1960
1980
2000
2020
2040
Peto, *Lancet* 1995


15-year cumulative mortality of mesothelioma, 1994–2008, cases
10^5
10^4
10^3
10^2
10^1
10^0
UK
IT
DE
FR
NL
ES
BE
CH
SE
AT
PL
FI
NO
HR
CZ
DK
RO
IL
HU
RS/ME
SI
PT
BG
LT
LV
SK
GR
CY
EE
IS
LU
BA
MK TR
KA
RU
10^2
10^3
10^4
10^5
10^6
10^7
10^8
Cumulative asbestos use, 1920–1970 metric tons

mesothelioma in contemporary UK

	OR
high risk (non-construction) • asbestos factory • lagging • shipbuilding/dockyard • Navy	16.8
carpenter	**36.0**
plumber, electrician, painter/decorator	**14.6**
other construction	7.9

unexplained:
14% of male cases
62% of female cases



hence, asbestos:

pleural plaque
diffuse pleural thickening
mesothelioma
pleural effusion

pneumoconiosis (asbestosis)

lung cancer

laryngeal cancer
ovarian cancer

welding

welders vs. people who weld

gas
stick
arc (MIG, TIG)

- mild steel
- stainless steel
- ‘galvanised’ steel
- aluminium

welding fume:

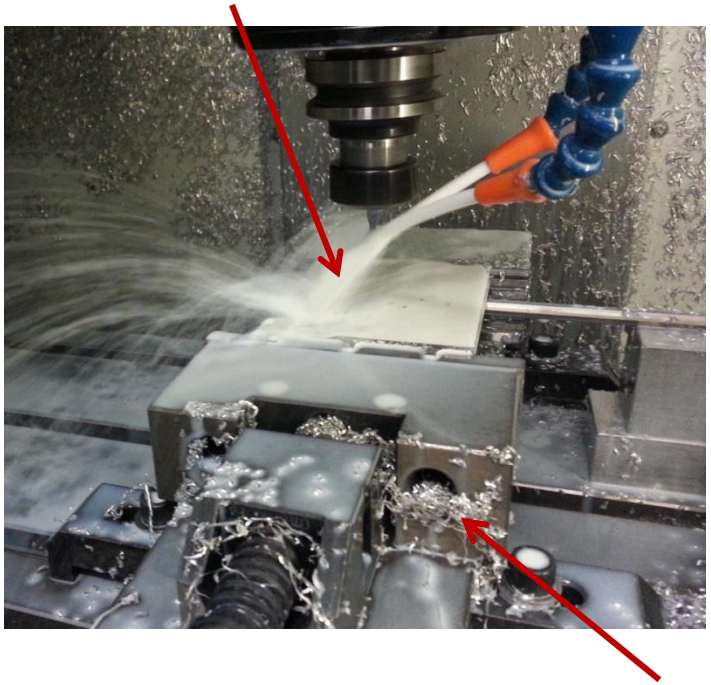
- metal oxides
- NO CO NO_2 CO_2 O_3
- coating materials

welding and lung disease

- **metal fume fever**
  - galvanised steel (zinc oxide)
  - brass
- **pneumonia**
  - all metal fumes
  - pneumococcal
  - vaccination?
- **occupational asthma**
  - stainless steel (chrome VI)
- **RBILD/DIP**
  - long, high exposures
  - rare
- **lung cancer**
  - all welding
- COPD?

Metal turning

metal working fluid (MWF)



swarf

aerosolisation

Metal turning with MWF

computer numeric control (CNC)

Metal working fluid
coolant
suds

CNC operator
machinist
tool setter
lathe setter
metal turner
tool maker
tool grinder
miller
driller
tapper

beware

- ‘engineer’
- ‘works in factory’

‘Metal turner’s lung’
HP (extrinsic allergic alveolobronchiolitis) in MWF workers

- **‘synthetic’ MWF**
  - **water-based**
  - **contaminated**
  - **MWF ‘management systems’: dipsticks and biocides**

- **outbreaks (>100)**
  - **time**
  - **place**

- **pseudomonas?**
- **fungi?**
- **NTM?**

prescribed respiratory diseases (IIDB)

B6	Extrinsic allergic alveolitis	D6	Nasal adenocarcinoma (wood, leather)
C4	Primary lung cancer (arsenic)	D7	Occupational asthma
C17	Chronic beryllium disease	D8	Primary lung cancer asbestos: - with asbestosis and/or - high exposure
C18	Emphysema (cadmium)	D9	Diffuse pleural thickening
D1	Pneumoconiosis	D10	Primary lung cancer (tin, some chemicals, coke oven)
D2	Byssinosis	D11	Primary lung cancer with silicosis
D3	Mesothelioma	D12	COPD (coal mine dust)
D4	Allergic rhinitis		

Pandemic quiz: what do these have in common?