

Expert Group Pack B: Occupational Lung Diseases

What are Occupational Lung Diseases?

Occupational lung diseases are chronic respiratory conditions caused by inhaling dusts, chemicals, fumes, or other harmful substances in the workplace. They are entirely preventable – but once established, most are irreversible and progressive.

The umbrella term covers several specific conditions, classified by what is inhaled:

- Pneumoconiosis ("dusty lung") – caused by mineral dust inhalation
 - Coal workers' pneumoconiosis (CWP / 'black lung') – coal dust
 - Silicosis – silica dust (quarrying, sandblasting, construction)
 - Asbestosis – asbestos fibres
- Occupational asthma – caused by workplace allergens or sensitisers
- Occupational COPD – chronic airflow limitation from workplace dust/fume exposure
- Hypersensitivity pneumonitis (extrinsic allergic alveolitis) – from organic dusts (farmer's lung, bird fancier's lung)

Prevalence

UK: Occupational factors account for ~15% of COPD and ~9–15% of asthma cases in working-age adults. NICE estimates occupational exposure is responsible for 20% of COPD cases overall (30% in lifelong non-smokers).

Wales: The coal mining legacy means Wales has a disproportionate historical burden of pneumoconiosis. At peak, ~270,000 people worked in Welsh coal mines. Around 2,000 people in Wales die early every year due to air pollution (Asthma + Lung UK).

Global trend: While traditional occupational lung diseases (mining, asbestos) are declining in the UK due to workplace regulations, new forms are emerging (e.g. silicosis in artificial stone benchtop fabrication).

Aetiology & Pathology

The common mechanism: Inhaled particles deposit in the lungs → macrophages attempt to engulf them → particles are too large or chemically inert to be broken down → macrophages die → more macrophages recruited → chronic inflammation → fibrosis (scarring) → progressive loss of lung function.

Coal Workers' Pneumoconiosis (CWP):

- Simple CWP: small coal dust deposits (coal macules) surrounded by minimal fibrosis. Often asymptomatic.
- Complicated CWP / Progressive Massive Fibrosis (PMF): large masses of fibrotic tissue develop, destroying lung architecture. Severely disabling and can be fatal.
- Key fact: CWP can develop and progress even after exposure stops – the dust remains in the lungs.

Silicosis: Silica is particularly toxic because it damages the membranes of macrophages that try to engulf it, releasing enzymes that cause intense fibrosis. Silicosis progresses faster and more aggressively than CWP.

Asbestosis: Asbestos fibres are needle-like and too long for macrophages to engulf. They cause chronic irritation and fibrosis, primarily in the lower lobes. Asbestosis also massively increases the risk of mesothelioma and lung cancer.

Signs and Symptoms

- Progressive breathlessness – develops after 10–20+ years of exposure
- Chronic cough – productive or dry depending on condition
- Black sputum (melanoptysis) – characteristic of coal workers
- Chest tightness and wheeze
- Finger clubbing (asbestosis and advanced fibrosis)
- Fine crackles on auscultation (asbestosis)
- Recurrent chest infections
- Advanced: cyanosis, cor pulmonale (right-sided heart failure), respiratory failure

Risk Factors

- Duration and intensity of exposure (dose-response relationship)
- Type of dust (silica more fibrogenic than coal dust)
- Particle size (smaller = penetrate deeper into lungs)
- Concurrent smoking (multiplies risk, especially with asbestos)
- Inadequate respiratory protection (no masks, poor ventilation)
- Specific occupations: mining, quarrying, construction, sandblasting, foundry work, farming, baking

Impact on Quality of Life

- Progressive disability often affecting people in their 50s–70s – when they should be enjoying retirement
- No cure – management is supportive only
- Complex compensation claims process adds stress
- Community impact: entire villages and towns affected (mining communities, factory towns)
- Psychological: anger about preventability, guilt, grief for lost health
- Mesothelioma: median survival after diagnosis is only 12–18 months