Occupational causes of lung cancer:
Current and emerging trends and promoting prevention

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Introduction

Lung cancers caused by work present a £90 million burden to the medical professions and the NHS.

Every year around 6,000 incidents of lung cancers - around 13% of the UK's total lung cancer cases - result from workplace exposures to carcinogens.

By understanding current and emerging trends in occupational lung cancer risks medical professionals can fully consider a patient's working history and associated exposures to lung carcinogens when assessing and considering likely diagnosis.

Methods

An analysis of available literature was undertaken to identify trends in current and emerging causes of occupational lung cancer.

Only those substances or professions classified as being Category 1 or 2A carcinogens by the International Agency of Research on Cancer (IARC) were considered. Consideration was also given to the effect of ever tightening legislation and increasing knowledge and how these may affect current and future incidents of lung cancer.

Results

Table 1. Current and emerging causes of occupational lung cancer in the UK

Historically, exposures to asbestos dust have been a major contributor to the development of occupational lung cancer (and mesothelioma), along with exposures to tobacco smoke from passive smoking in workplaces. Discounting mesothelioma, in 2023 occupational lung cancer attributable to exposures to substances other than asbestos in the workplace account for approximately 55% of occupational lung cancer deaths.

The important role of specific occupational exposures in the aetiology of lung cancer is well established as a result of exposures to substances and agents across a number of industries and occupations. The responsible agent(s) have been identified for several, but not all, of these high-risk workplaces. IARC have assessed the carcinogenicity of a number of substances and occupational circumstances with those classified as Group 1 having sufficient evidence in humans and those classified as Group 2A having limited evidence in humans.

A summary of some of the main recognised current causes of occupational lung cancer, as identified over a number of sources, and the corresponding industries of interest are identified in Table 1 opposite.

Table 2. Factors perceived as influencing trends in the prevalence and/or diagnosis of occupational cancer

The number of occupational lung cancer cases reported appears to roughly have remained stable from around 2012, with the majority of cases being as a result of exposures occurring in the construction, manufacturing and agricultural industries. In 2012, there were 5,442 registrations of lung cancer where causation was attributable to exposure to agents in the workplace. In 2023, there were approximately 5,600 cases of occupational lung cancer diagnosed in the UK. This is likely to be an underestimation as many causes of workplace cancer go unrecognised.

It is estimated that the cost of primary and secondary medical care attributable to each lung cancer case is around £16,200, with 95% of this attributable to secondary care. On this basis, the cost to the NHS in 2023 alone due to occupational lung cancer (not including community care) is likely to have been of the order of £90M.

It is predicted that, despite 13% of total lung cancer cases being attributable to occupational exposures, only a 2% decrease in all lung cancer cases (occupational and idiopathic) is expected over the next 10 years. This is despite long standing availability of legislation and authoritative guidance aimed at reducing exposures to carcinogens in workplace and occupational settings.

Table 2 presents an overview of factors likely to contribute to this situation.

Table 1

Substance	IARC Category	At risk industries/ occupations
Beryllium	1	Aerospace
Cadmium and cadmium compounds	1	Metal plating, welding, soldering, dyed/ pigments, demolition
Chromium (VI) compounds	1	Metal electroplating, welding on stainless steel, use in current/historic dyes/paints
Ionising radiation	1	Medical, nuclear, aircraft crew
Mineral oils (in particular natural)	1	Metal workers, machinists, maintenance engineers
Nickel compounds	1	Metalworking, use as a catalyst in chemical processes, jewellery making, welding and soldering of stainless steel
Polycyclic aromatic hydrocarbons (PAHs) and soots	1	Any work involving combustion of organic matter; foundries, fire-fighting, etc
Crystalline silica	1	Stone cutting, construction, brisk making, pottery making, quarrying, paper manufacture
Dioxins	1	Manufacture of herbicides; waste incineration; some chemical manufacture; paper bleaching
Undefined	1	Aluminium production
Undefined	1	Painter
Undefined	1	Welding (regardless of type of welding or base or consumable components)
Diesel engine exhaust emissions (DEEE)	2A	Railroad workers, professional drivers, dock workers, mechanics, warehouse operatives
Epichlorohydrin	2A	Production and use of resins, glycerine and propylene based rubbers
Inorganic lead	2A	Smelters, plumbers working historically with lead piping, recycling, construction and demolition
Rubber	2A	Rubber manufacture and processing industries

Table 2

Positive factors expected to result in decrease	Negative factors expected to result in increase
+ Increasing awareness in workers and industry due to ease of access to information	− Increase in general population resulting in numbers exposed
+ Improvements in diagnostic techniques resulting in earlier detection and diagnosis	− Increased pressure on NHS and medical services resulting in reduced face to face time with practitioners
+ Reduction in exposure to historic causative agents, such as asbestos and smoking	− Emergence and identification of new causative agents and processes, such as nanotechnologies, welding fume, DEEE
+ Advances in technologies to control workplace exposures	− Costs associated with new technologies in control
+ Increased regulatory checks on workplaces where exposures may occur	− Economic and resource issues on regulators

Conclusions

Occupational lung cancers are 100% preventable. Despite legislation aimed at controlling exposures to carcinogens in the workplace, occupational cancer will continue to make a significant contribution to the prevalence of UK lung cancer. A review of available literature has identified a range of perceived issues that contribute to insufficient control of occupational exposures to existing and emerging carcinogens and barriers to diagnosis.

A multi-disciplinary approach with ongoing open communication between medical professionals, occupational hygienists, toxicologists and others may assist in devising strategies to increase the awareness and control of exposures to carcinogens in the workplace; ensure that appropriate health surveillance techniques are implemented; and allow for earlier consideration of a potential diagnosis where occupational exposure may increase the risk of causation of lung cancer.

The potential advantages of a united approach to identifying lung cancers caused in the workplace include a significant reduction to the burden, both monetary and resource based on the UK medical profession.

References
A wide range of literature and sources were considered with extracted information being collated for the purposes of reporting within this poster. A full list of literature and other sources considered can be provided upon request.

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