International Agency for Research on Cancer

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Global lung cancer incidence according to subtype: new study highlights rising adenocarcinoma rates linked to air pollution

Lyon, France, 3 February 2025 – In the run-up to World Cancer Day, scientists from the International Agency for Research on Cancer (IARC) analyse global variations in lung cancer incidence in 2022 and over time according to histological subtype. Published today in *The Lancet Respiratory Medicine*,[1] the study focuses on four main lung cancer subtypes: adenocarcinoma, squamous cell carcinoma, small-cell carcinoma, and large-cell carcinoma.

Drawing mainly on national (GLOBOCAN) incidence estimates for 2022 included in the IARC Global Cancer Observatory and recorded data included in successive volumes of the *Cancer Incidence in Five Continents* series (Volumes VII–XII), the study shows that lung adenocarcinoma has emerged as the predominant subtype in recent years, with increasing risks observed among younger generations, particularly females, in most countries assessed. The study also highlights that the largest burden of lung adenocarcinoma attributable to ambient particulate matter (PM) pollution was estimated in East Asia, particularly China.

“This population-based study seeks to better understand variations in lung cancer incidence by place and time according to its constituent subtypes. We examine changes in risk in different countries across successive generations and assess the potential burden of lung adenocarcinoma linked to ambient PM pollution,” says Dr Freddie Bray, Head of the Cancer Surveillance Branch at IARC and lead author of the article. “The results provide important insights as to how both the disease and the underlying risk factors are evolving, offering clues as to how we can optimally prevent lung cancer worldwide.”

Results

In 2022, there were an estimated 2 480 675 new cases of lung cancer worldwide. Of the estimated 1 572 045 new cases among men (63.4% of the total lung cancer burden in both sexes), 717 211 (45.6% of the male lung cancer burden) were adenocarcinoma, 461 171 (29.4%) were squamous cell carcinoma (SCC), 180 063 (11.5%) were small-cell carcinoma, and 101 861 (6.5%) were large-cell carcinoma.

[1] Luo G, Zhang Y, Rumgay H, Morgan E, Langselius O, Vignat J, et al. (2025). Estimated worldwide variation and trends in incidence of lung cancer by histological subtype in 2022 and over time: a population-based study. *Lancet Respir Med*. Published online 3 February 2025; https://doi.org/10.1016/S2213-2600(24)00428-4

Among women, there were an estimated 908 630 new cases of lung cancer worldwide (36.6% of the total lung cancer burden in both sexes), of which 541 971 (59.7% of the female lung cancer burden) were adenocarcinoma, 155 598 (17.1%) were SCC, 87 902 (9.7%) were small-cell carcinoma, and 59 271 (6.5%) were large-cell carcinoma.

Geographical variations in 2022

In men, the highest age-standardized incidence rates (ASRs) were in East Asia for adenocarcinoma (27.12 per 100 000 people), in eastern Europe for SCC (21.70 per 100 000 people) and small-cell carcinoma (9.85 per 100 000 people), and in North Africa for large-cell carcinoma (4.34 per 100 000 people).

Among women, the highest ASRs were in East Asia for adenocarcinoma (19.04 per 100 000 people), in North America for SCC (5.28 per 100 000 people) and small-cell carcinoma (4.28 per 100 000 people), and in northern Europe for large-cell carcinoma (2.87 per 100 000 people).

At the global level, an estimated 114 486 adenocarcinoma cases among men and 80 378 adenocarcinoma cases among women were attributable to ambient PM pollution, corresponding to ASRs of 2.35 per 100 000 men and 1.46 per 100 000 women.

Global cancer burden and context

Lung cancer is the leading cause of cancer incidence and mortality worldwide. In 2022, about 2.5 million people were diagnosed with lung cancer worldwide, corresponding to an ASR of 23.6 cases per 100 000 people.

The patterns of lung cancer incidence by subtype have changed markedly during the past few decades. While lung cancer incidence rates among men have generally decreased in most countries during the past 30–40 years, rates among women have tended to continue to rise.

Changes in cigarette manufacturing and smoking patterns during the past several decades have influenced the trends in lung cancer incidence by subtype, and there is accumulating evidence of a causal link between ambient PM pollution and an increased risk of adenocarcinoma.

“Changes in smoking patterns and exposure to air pollution are among the main determinants of the changing risk profile of lung cancer incidence by subtype that we see today,” says Dr Bray. “The diverging trends by sex in recent generations offer insights to cancer prevention specialists and policy-makers seeking to develop and implement tobacco and air pollution control strategies tailored to high-risk populations.”

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