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IARC researchers identify early blood protein markers of lung cancer that may improve early detection

Lyon, France, 1 June 2023 – Researchers from the International Agency for Research on Cancer (IARC) and partner institutions have identified protein markers in blood samples that are associated with future lung cancer diagnosis, and have developed an algorithm based on these markers to predict future lung cancer cases. These important complementary findings were published today as separate articles in *Nature Communications*¹ and the *Journal of the National Cancer Institute*².

Lung cancer is the most common cause of cancer death globally. Despite progress in treatment, the most promising strategy to improve long-term survival is advancing early detection. Screening with low-dose computed tomography, a procedure that uses an X-ray machine that gives off a low dose of radiation to image areas inside the body, enables diagnosis of early-stage disease so that patients can be offered treatment with curative intent. However, better strategies are needed to identify and reach those individuals who are most likely to benefit from screening.

“Cancer screening can save lives, but the benefits must be balanced with the harms. Blood biomarkers show strong potential to better identify people who will develop lung cancer in the future, allowing screening to be targeted to them,” says Dr Hilary Robbins, a scientist in the Genomic Epidemiology Branch at IARC and a co-leader of the studies.



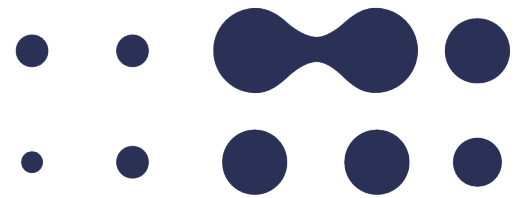
Dr Mattias Johansson and Dr Hilary Robbins, co-leaders of the studies.

The new studies used proteomics data from six prospective population cohort studies participating in the Lung Cancer Cohort Consortium (LC3). The LC3 is a large consortium initiative of 25 cohorts from around the world, which comprise data on 3 million research volunteers who have been followed up for many years.

The authors of the study published in *Nature Communications*, the first study of its kind to search for early protein markers of lung cancer in pre-diagnostic blood samples, measured up to 1200 proteins in samples collected from 731 people with a history of smoking who were subsequently diagnosed with lung cancer within

¹ The Lung Cancer Cohort Consortium (LC3). The blood proteome of imminent lung cancer diagnosis. *Nat Commun*. Published online 1 June 2023. <https://doi.org/10.1038/s41467-023-37979-8>

² Feng X, Wu WY, Onwuka JU, Haider Z, Alcalá K, Smith-Byrne K, et al. Lung cancer risk discrimination of pre-diagnostic proteomics measurements compared with existing prediction tools. *J Natl Cancer Inst*. Published online 1 June 2023. <https://doi.org/10.1093/jnci/djad071>



3 years after blood collection. The researchers compared proteins found in these samples with proteins found in blood samples from 731 people of similar age, sex, and smoking history who did not develop lung cancer within 3 years after blood collection.

“This resulted in the identification of 36 protein markers that are robustly associated with the risk of developing lung cancer,” says Ms Hana Zahed, a PhD student in the Genomic Epidemiology Branch at IARC and one of the lead authors of the study. “These biomarkers may be used to identify individuals who would benefit from lung cancer screening with low-dose computed tomography scans.”

The second new study, which was published in the *Journal of the National Cancer Institute*, was led by Dr Xiaoshuang Feng, a postdoctoral fellow in the Genomic Epidemiology Branch at IARC. In this study, the authors used the LC3 data to develop and validate a protein-based risk prediction algorithm. They then compared its performance with both a commercial autoantibody test and the most widely used questionnaire-based lung cancer risk model. The protein algorithm outperformed these tools in discriminating between individuals who went on to develop lung cancer and those who did not, demonstrating that the markers have strong potential to provide risk information beyond the existing prediction tools.

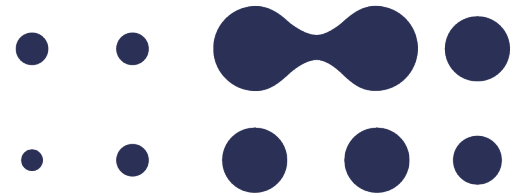
“The results from these studies are very promising and mark a major step towards our goal of developing a biomarker-based tool to improve clinical decision-making in lung cancer screening. We are now rapidly moving forward to develop and evaluate an assay that can be used in practice,” says Dr Mattias Johansson, a scientist in the Genomic Epidemiology Branch at IARC and a co-leader of the studies.

The findings of these two studies are important considering the urgent need to improve early detection to reduce the number of deaths from lung cancer. The research was conducted as part of the discovery phase of a project within the Integrative Analysis of Lung Cancer Etiology and Risk (INTEGRAL) programme, which is funded by the United States National Cancer Institute and aims to develop genomic biomarkers to improve lung cancer screening. The work was possible thanks to the long-standing global collaboration of the LC3, which involves more than 25 institutes from around the world.

About lung cancer

In 2020, an estimated 2.2 million new cases of lung cancer occurred globally and almost 1.8 million people died from lung cancer. IARC estimates have consistently ranked lung cancer as the most commonly occurring cancer type worldwide, until 2020, when the estimated number of new cases of female breast cancer slightly surpassed those of lung cancer. However, lung cancer has been and remains the most common cause of cancer death globally.

The principal risk factor for developing lung cancer remains tobacco smoking. Other common causes include exposure to outdoor and indoor air pollution, diesel engine exhaust, welding fumes, and asbestos. Most lung cancer cases and deaths occur in Asia, followed by Europe.



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The International Agency for Research on Cancer (IARC) is part of the World Health Organization. Its mission is to coordinate and conduct research on the causes of human cancer, the mechanisms of carcinogenesis, and to develop scientific strategies for cancer control. The Agency is involved in both epidemiological and laboratory research and disseminates scientific information through publications, meetings, courses, and fellowships. If you wish your name to be removed from our press release emailing list, please write to com@iarc.who.int.