

# Air pollution causes lung cancer by ‘waking’ mutant cells.

*Eleanor Hayward, Health Correspondent, The Times. 6th April 2023*

Air pollution causes lung cancer by “waking up” dormant mutant cells that grow into tumours, scientists have discovered.

After a decade of research, a team at the Francis Crick Institute and University College London solved the mystery of why so many non-smokers develop cancer.

They discovered that outdoor air pollution — which causes one in ten lung cancer cases — triggers cancer in a different way from smoking, meaning that the tumours found in non-smokers tend to have a different genetic profile.

While tobacco directly mutates the DNA in healthy cells, which can then divide uncontrollably, pollutants activate cells with cancerous mutations that are found in everyone but usually remain harmless.

Exposure to tiny PM2.5 pollutant particles from traffic fumes causes inflammation in the lungs, which increases the likelihood of these mutated cells “waking up” and becoming cancerous.

The study, funded by Cancer Research UK, is the first to identify the pathway for how air pollution causes lung cancer, which had puzzled scientists.

The authors said the “game changing” research could apply to other types of cancer, and help explain why chronic inflammation linked to lifestyle factors such as obesity or drinking alcohol can cause many types of cancer. This in turn could lead to a new wave of preventative medications that stop cancer developing by dampening inflammation.

Lung cancer is the deadliest cancer in the UK, with 48,000 cases and 35,000 deaths a year. About 6,000 of the deaths are in people who have never smoked.

Lead author Professor Charles Swanton, chief clinician at Cancer Research UK, said: “Our study has fundamentally changed how we view lung cancer in people who have never smoked.

“Cells with cancer-causing mutations accumulate naturally as we age, but they are normally inactive. We’ve demonstrated that air pollution wakes these cells up in the lungs, encouraging them to grow and potentially form tumours.

“The mechanism we’ve identified could ultimately help us to find better ways to prevent and treat lung cancer in never smokers. If we can stop cells from growing in response to air pollution, we can reduce the risk of lung cancer.”

Swanton said that smoking increased the risk of lung cancer by about 30 times, while exposure to air pollution roughly doubled the risk, adding: “Of course, many more people are exposed to environmental air pollution than to tobacco, and of course, we have no choice over the air we breathe.”

As part of the study, which received £14 million in funding from Cancer Research UK, the scientists examined data from more than 400,000 people from the UK, South Korea and Taiwan, which found higher rates of cancer in regions with high air pollution.

William Hill, the lead author, said: “Air pollution needs to wake up the right cells, at the right time, for lung cancer to start and grow.

“Finding ways to block or reduce inflammation caused by air pollution would go a long way to reducing the risk of lung cancer in people who have never smoked, as well as urgently reducing people’s overall exposure to air pollution.”

Previous research has shown air pollution also causes dementia, heart disease and respiratory conditions including asthma. **The Clean Air for All** campaign, launched by The Times in 2019, is **calling for tighter pollution limits in the UK based on World Health Organisation guidelines.**

Sarah Woolnough, chief executive of Asthma + Lung UK, said: “This important research is further evidence of air pollution having a role in causing lung cancer, the deadliest cancer in the UK, in non-smokers. It also helps us to challenge and change attitudes around lung cancer, that only smokers can get this debilitating disease. The truth is, air pollution affects everyone’s lungs and is responsible for worsening existing lung conditions and creating new ones in healthy people.

“Up to now the government has failed to match the ambition that’s needed to tackle this problem. We need to see bold action including plans to get the most polluting vehicles off our roads if we are to reduce toxic air and protect people’s health.”