

- Lung cancer

Scientists discover how air pollution triggers lung cancer

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Paris: Scientists said they had identified the mechanism through which air pollution triggers lung cancer in non-smokers, a discovery one expert hailed as “an important step for science – and for society”.

The research illustrated the health risk posed by the tiny particles produced by burning fossil fuels, sparking fresh calls for more urgent action to combat climate change.

It could also pave the way for a new field of cancer prevention, according to Charles Swanton of the UK'S Francis Crick Institute.

Swanton presented the research, which has not yet been published in a peer-reviewed journal, at the European Society for Medical Oncology's annual conference in Paris.

Air pollution has long been thought to be linked to a higher risk of lung cancer in people who have never smoked.

“But we didn't really know whether pollution was directly causing lung cancer – or how,” Swanton said.

Traditionally it has been thought that exposure to carcinogens, such as those in cigarette smoke or pollution, causes DNA mutations that then become cancer.

But there was an “inconvenient truth” with this model, Swanton said: previous research has shown that the DNA mutations can be present without causing cancer – and that most environmental carcinogens do not cause the mutations.

His study proposes a different model.

The research team from the Francis Crick Institute and University College London analysed the health data of over 460,000 people in England, South Korea and Taiwan.

They found that exposure to tiny PM2.5 pollution particles – which are less than 2.5 microns across – led to an increased risk of mutations in the EGFR gene.

In laboratory studies on mice, the team showed that the particles caused changes in the EGFR gene and in the KRAS gene, both of which have been linked to lung cancer.

Finally, they analysed nearly 250 samples of human lung tissue never exposed to carcinogens from smoking or heavy pollution.

Even though the lungs were healthy, they found DNA mutations in 18% of EGFR genes and 33% of KRAS genes.

“On their own, they probably are insufficient to drive cancer,” Swanton said.

But when a cell is exposed to pollution it can trigger a “wound-healing response” that causes inflammation, he added. And if that cell “harbours a mutation, it will then form a cancer.”

“We've provided a biological mechanism behind what was previously an enigma.”