

Air Pollution and Breast Cancer Risk: Residential and Workplace Exposure

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Women living and working in places with higher levels of fine particle air pollution are more likely to get breast cancer than those living and working in less polluted areas. Results of a study looking at the effects of both residential and workplace exposure to air pollution on breast cancer risk will be presented by Fervers et al at the European Society for Medical Oncology (ESMO) Congress 2023 ([Abstract 238MO](#)).

“Our data showed a statistically significant association between long-term exposure to fine particle air pollution, at home and at work, and risk of breast cancer. This contrasts with previous research which looked only at fine particle exposure where women were living, which showed small or no effects on breast cancer risk,” said **Béatrice Fervers, MD, PhD**, Head of the Prevention Cancer Environment Department at Léon Bérard Comprehensive Cancer Centre.

Study Details

In the study, home and workplace exposure to pollution in 2,419 women with breast cancer was compared to exposure in 2,984 women without breast cancer from 1990 to 2011. The results showed that breast cancer risk increased by 28% when exposure to fine particle (PM_{2.5}, particulate matter 2.5 µm in diameter) air pollution increased by 10 µg/m³—approximately equivalent to the difference in PM_{2.5} particle concentration typically seen in rural vs urban areas of Europe. Smaller increases in breast cancer risk were also recorded in women exposed to high levels of larger particle air pollution (PM₁₀ and nitrogen dioxide). Dr. Fervers and colleagues now plan to investigate the effects of pollution exposure during commuting to get a complete picture of effects on breast cancer risk.

Related Research in Lung Cancer

Charles Swanton, MD, PhD, of the Francis Crick Institute in London—[whose research suggesting how PM_{2.5} particles may trigger lung cancer in nonsmokers was presented at the ESMO Congress 2022](#)—stressed the importance of the new findings in patients with with breast cancer.

“These very small particles can penetrate deep into the lung and get into the bloodstream, from where they are absorbed into breast and other tissues. There is already evidence that air pollutants can change the architecture of the breast [papers published by Niehoff et al in [Breast Cancer Research](#) and Kotake et al in [Environmental Science and Pollution Research](#)]. It will be important to test if pollutants allow cells in breast tissue with preexisting mutations to expand and drive tumor promotion possibly through inflammatory processes—similar to our observations in nonsmokers with lung cancer,” he said. “It is very concerning that small pollutant particles in the air—and microplastic particles of similar size—are getting into the environment when we don’t yet understand their potential to promote cancer. There is an urgent need to set up laboratory studies to investigate the effects of these small air pollutant particles on the latency, grade, aggression, and progression of breast tumors,” Dr. Swanton concluded.

“There is now strong epidemiological and biological evidence for the link between PM2.5 particle exposure and cancer, and there are good clinical and economic reasons for reducing pollution in order to prevent cancers,” said **Jean-Yves Blay, MD, PhD**, ESMO Director of Public Policy.

Effects on European Policy

Following on a proposal from the European Commission in October 2022 to reduce the limit for PM2.5 particles in the air from the current 25 µg/m³ to 10 µg/m³ by 2030, ESMO urged a reduction in the PM2.5 limit still further to 5 µg/m³—[in line with the World Health Organization’s air quality guidance](#).

“Reducing PM2.5 particles in the air to the WHO recommended level is critical because of their association with a variety of tumor types, including breast cancer,” Dr. Blay added. “We have a responsibility to push for this change, not only for people in Europe, but worldwide, where there are big variations in the pollution landscape.”

The lower limit was indeed adopted by the European Parliament’s Environment, Public Health, and Food Safety Committee in June 2023.

More recently, in September 2023, the European Parliament adopted in plenary session its report on the [ongoing revision of the European Union \(EU\) Ambient Air Quality Directives](#), which reflects ESMO’s recommendations to set the annual limit value for PM2.5 at 5 µg/m³. This adoption opens interinstitutional negotiations between the co-legislators—the [European Parliament](#), European Commission, and EU Council—to agree on the final text of the directive.

“By supporting our requests with solid scientific evidence, we are offering a new dimension to health public policy. The work is not over, and change will not happen overnight, but we are moving in the right direction,” Dr. Blay concluded.

Disclosure: For full disclosures of the study authors, visit cslide.ctimeetingtech.com/esmo2023.

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