LAY ABSTRACT

TITLE: Rethinking the microenvironment's role in chemical-induced malignancy

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AUTHORS: William H Bisson[1*], Richard A Currie[2*], Emilia L Lim[3], Coraline Mlynarczyk[4], Erik J Tokar[5], Annamaria Colacci[6,7], Justin A Colacino[8,9*]

*Corresponding authors

INSTITUTIONS:
1 Integrative Toxicology and Cancer Prevention, Research Triangle Park, NC 27560, United States
2 Syngenta Jealott's Hill International Research Centre, Bracknell RG42 6EY, United Kingdom
3 Department of Biochemistry and Molecular Biology & Edwin SH Leong Centre for Healthy Aging, University of British Columbia, Vancouver, BC V6T 1Z3, Canada
4 Yale Cancer Center and Department of Internal Medicine, Yale University, New Haven, CT 06520, United States
5 Division of Translational Toxicology, National Institute of Environmental Sciences, Research Triangle Park, NC 27560, United States
6 Agency for Prevention, Environment and Energy, Emilia-Romagna (Arpae), Bologna 40122, Italy
7 Alma Mater Institute on Healthy Planet, University of Bologna, Bologna 40138, Italy
8 Department of Environmental Health Sciences, University of Michigan School of Public Health, Ann Arbor, MI 48109, United States
9 Department of Nutritional Sciences, University of Michigan School of Public Health, Ann Arbor, MI 48109, United States

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For a long time, scientists thought cancer happened when chemicals damage a cell's DNA like causing a "glitch" in computer code. However, scientists around the world have been working together and found that cancer isn't just about one damaged cell. Instead, cancer is about the environment around that cell.

Think of a cell like a house in a neighborhood. Historically, we only considered the state of the house. But now, even if a house is in good shape, if the neighborhood becomes polluted, noisy, or loses its resources, the house will eventually fall into disrepair. In our bodies, the "neighborhood" around a cell is called the microenvironment. When certain chemicals (carcinogens) enter our bodies, they can change this microenvironment.

The scientists found that some chemicals can cause inflammation that creates a microenvironment that helps tumors develop and grow. Some chemicals can create

"immune tolerance," which makes the body’s immune system less sensitive, and it cannot find and remove damaged cells. Other chemicals can lead to "neo-angiogenesis," which is when the body builds new blood vessels that feed a growing tumor. The scientists also found that some chemicals can even revert healthy adult cells back to looking like stem cells and they start growing very quickly, leading to cancer.

These findings help scientists better understand the cell microenvironment and can help research move beyond current cancer testing methods. This research may help scientists spot early warning signs of cancer by seeing if a cell microenvironment is likely to form a tumor. The research can also help the government make better decisions about which chemicals are safe to have in our air, water, and products. Finally, this research can also help to improve cancer tests and treatments.