

5 February 2021

Pesticides Not Associated with Five Cancer Types Most Often Evaluated in Farmers

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Cancer affects about 20 million people globally, accounting for one in six deaths ([World Health Organization 2020](#)). As we age, our individual risk of acquiring cancer increases. Farmers are no exception despite having lower cancer rates overall than the general population ([Agricultural Health Study](#) and [AGRICAN](#)). The good news is that decades of scientific research have identified new treatments, improved our knowledge about prevention, and better defined cancer as a disease. Hurray! For example, we know that healthy lifestyle factors such as eating fruits and vegetables, avoiding tobacco, maintaining normal body weight and being physically active help keep cancer and other ailments at bay. However, what do we know about exposure to pesticides in the environment? Does occupational exposure to them increase the risk of farmers getting cancer? What does the science say?

You may know from reading the news that from time to time one or more pesticides have been linked to cancer in human epidemiology studies. Importantly, although less known, every pesticide undergoes cancer evaluation in animal toxicology laboratory studies. Regulatory authorities around the world will only grant a registration for legal pesticide use if it does not pose a cancer risk to humans. How do these epidemiology and toxicology studies compare?

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To answer these questions, we assessed 30 published reviews of epidemiology studies in the past 10 years involving occupational exposure to pesticides and five specific cancer types. The cancers were prostate, breast, lung, non-Hodgkin lymphoma and colorectal – those most common globally and often evaluated with pesticide exposure. We then looked at animal cancer data from regulatory studies to see if there was consistency in the findings. The full details of this review, entitled “[Cancer and Occupational Exposure to Pesticides: An Umbrella Review](#),” were published online 25 January 2021 by *International Archives of Occupational and Environmental Health*.

Among the more than 100 underlying studies that were reviewed, several common challenges emerged. They included the difficulty in collecting information from the distant past (such as which pesticides were used and how often), accounting for competing lifestyle factors that also lead to cancer (such as smoking and unhealthy diet), and studying enough farmers to account for random findings. Importantly, another challenge was the difficulty of researchers

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to separate exposure to one pesticide from another among farmers who apply many crop protection products over their career.

Just as cancer is not a unique disease, exposures to “pesticides” and “farming” are similarly diverse. Interpretations are most informative when assessed by specific cancer type and active ingredient (the chemical responsible for pest control). However, only a few epidemiology studies looked at a link between one pesticide and one cancer. We concluded there was neither strong nor consistent data supportive of a positive association between occupational pesticide exposure and the five types of cancer. Further, the animal toxicology study findings did not correspond to the few epidemiology studies that suggested a link. Simply put, these cancers were most likely not caused by pesticides. Note that lindane, which has been classified as cancer-causing by the International Agency for Research on Cancer, was not used by farmers in the reviewed studies.

So now what? Cancer remains a major health problem. How do we reduce our risk to it? We still need to walk more, eat less and stop smoking. The good news is that eliminating exposure to pesticides does not make the list of most needed actions. There is a great deal of information on the biology of each cancer as well as chemical properties of individual pesticides.

But for the scientists who want to study cancer and pesticides, they face important challenges. Epidemiologists will need to use creative approaches to better estimate exposure to pesticides among users. Toxicologists will need to innovate in order to study exposure to pesticide mixtures that match the human experience more closely. And both disciplines should continue to understand biological plausibility as they relate to reported findings. If epidemiologists and toxicologists work together, their findings will be more informative.

Our conclusion: While a specific pesticide may be sporadically associated with a specific cancer, overall, the data are not supportive of a positive association between pesticide exposure in occupational settings and the five cancers examined. Other published reviews have revealed inconsistencies between studies of pesticide exposure and cancer in humans.

In addition, toxicology studies in laboratory animals have not revealed cancer outcomes that were concordant with reported epidemiology study findings. Farmers and their families can rest assured that using legally registered pesticides according to label practices will not increase their risk of prostate, breast, lung, non-Hodgkin lymphoma or colorectal cancer.

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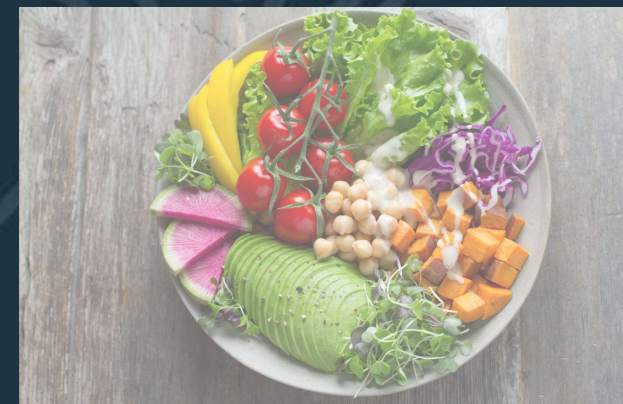
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