

What Does “Low Dose” Mean When It Comes to Exposure to Toxic Chemicals?

A major study reveals how exposure over 80 different chemicals could have synergistic impacts on the development of cancer.

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The chemicals that we’re exposed to in our daily lives are often approved by the government under the assumption that they’re safe in small doses, even over a long period of time. For years, regulators relied on the old adage “the dose makes the poison” to try to explain their logic. While that might have appeared true for certain chemicals for many years, we now live in a world where exposure to a large variety of chemicals is unavoidable and it’s finally becoming clear that we can’t evaluate these chemicals in isolation.

Think about a simple picnic in a city park. The air you breathe is filled with particulate matter from car exhaust, the landscaping was likely treated with chemical fertilizers and Roundup or another weedkiller, the plastic surrounding your food or drink items might contain BPA or phthalates, your drinks could contain preservatives, the antibacterial spray you use on your hands after eating might contain triclosan and the sunscreen you apply on your skin probably contains nanomaterials. Now extrapolate that scenario to each and every activity you partake in on a daily basis.

The agriculture sector experiences this chemical cocktail at a more extreme level. The inputs that may go onto a farm in a growing season could include nitrogen, phosphorus and potassium-filled fertilizers, herbicides, insecticides and fungicides. These chemicals have individual limits to how much can be used in a season, but these limits don’t take into account all of the other chemicals that will be applied throughout the year. Herbicide use has [gone up](#) as weeds have become resistant to the most popular herbicide, glyphosate (Roundup), requiring the use of older, more toxic herbicides like 2,4-D and dicamba. In effect, agricultural workers, farmers and surrounding communities are exposed to a mix of chemicals, the combined, or “synergistic,” effects of which have never been studied.

But this month, a [study](#) by 174 scientists from 28 countries was released that, for the first time, looked at how low levels of exposure to 85 different chemicals over time could have synergistic impacts on the development of cancer. All of the chemicals were selected because they are ubiquitous in the environment and are not classified as human carcinogens on their own. However, because each of these chemicals disrupts different pathways and mechanisms in people, the authors hypothesized that interactions between different chemicals and pathways could elevate the risk of cancer.

The teams found that 50 out of 85 of the chemicals could impact cancer-causing pathways at low doses that are realistic in the environment. The research is compelling but

preliminary, and calls on regulators to change their risk assessments to consider the impacts of chemical mixes and conduct more research on environmental triggers of cancer and on different chemical mixes and their effects on various cancer-related disruptions.

You may [remember](#) that The World Health Organization's cancer research arm, the International Agency for Research on Cancer (IARC) recently issued an evaluation of Roundup that determined that it should be classified as a 2A carcinogen, meaning it is "probably carcinogenic to humans." This week, the IARC reviewed 2,4-D and did not alter its opinion on the chemical (it remains classified as group 2B, "[possibly carcinogenic to humans](#)"), though they found that there was evidence of its ability to create genetic mutations and to negatively impact the human immune system. It is important to add that although the IARC task force did not find 2,4-D to be carcinogenic, it's possible that the presence of [Dow](#) (the maker of 2,4-D) representatives and other agribusinesses on the panel influenced the majority opinion. Earlier this month, Food & Water Watch and other coalition groups [raised concerns](#) about conflicts of interest within WHO taskforces.

Since Dow's Enlist 2,4-D and glyphosate tolerant corn and soybeans were approved, the probable and possible carcinogens are now being used together on farms, yet the two chemicals' interactions have never been studied. However, there is emerging research on some of the impacts of other chemical interactions possible in agriculture. For example, a [study](#) published in mBio showed that the presence of glyphosate, 2,4-D or dicamba at application levels recommended to farmers, can induce the ability of bacteria to develop resistance to antibiotics. There is also [evidence](#) that certain fungicides can actually amplify the toxicity of some neonicotinoids (an insecticide class) to honey bees. These are just a couple of examples of research that have only scratched the surface of the interactions that can occur between mixtures of chemicals, let alone all of the chemical cocktails present in the environment.

Just this week, Food & Water Watch submitted comments to the USDA because it is planning to make changes to its biotechnology regulations. We urged the department to consider the herbicides used with GMOs as they decide whether or not to approve a new crop. This kind of approach could lead to a decision to reject a new GMO crop due to the risks associated with the chemicals that are used to grow that crop.

Stay tuned for ways to weigh in on USDA's approval process and the fight to get meaningful evaluations of the safety of GMO crops and the chemicals that come with them.

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