

Opinion

The First and Longest Exposure of Mammals to A Pesticide

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Abstract

Recently, *Environmental Health* published a research demonstrating the health effects of the longest chronic exposure to a pesticide (Panzacchi et al., 2025). It was the main pesticide of the world. We agree with the authors on the carcinogenicity of glyphosate-based herbicides (GBH). However, we found the carcinogenicity is not only due to the molecule of glyphosate but to its full formulations. In fact, our group was the first one to test in a long-term toxicity experiment, on mammals, a GBH and a GMO modified to contain it, in 2012, and this was republished in 2014, after a huge controversy driven in secret (revealed by tribunals) by the Comapny Monsanto (now Bayer) commercializing the products and their allies. We investigated the real composition of pesticides by mass spectrometry and noticed they did present a mixture of undeclared compounds including in particular heavy metals, arsenic, chromium, cobalt, lead and nickel. These were able to induce the pesticide effects. In addition, we recently characterized also petroleum residues in pesticides, with carcinogenic polycyclic aromatic hydrocarbons, arising from petroleum distillation towers waste, and this was in all pesticide formulations we tested, including herbicides, insecticides and fungicides.

Opinion

Recently, *Environmental Health* published a research demonstrating the health effects of the longest chronic exposure to a pesticide (Panzacchi et al., 2025 [1]). It was the main pesticide of the world, used to dessicate cereals before harvest and present in food, a glyphosate-based herbicide. It is also the major pesticide spread on GMO cultures ; most of them are genetically transformed to become tolerant to it. They are thus impregnated with it, and classically it reaches significant levels in food and feed. We agree with IARC's highly debated report conclusion [2], and with the authors on the carcinogenicity of glyphosate-based herbicides (GBH). We found this is not only due to glyphosate but to its full formulation. We also agree on the urgent need for the international revision of NOAEL and ADI, but for pesticides in general, not only for isolated glyphosate.

Pesticides have in fact never been assessed for their long-term toxicity in commercial formulations by regulatory agencies or industries, as they are sold and used, especially in mammals ;

this is an omission that presents risks to human health and the environment. They have been assessed at this level only for their isolated and declared active principle, which is largely insufficient. In addition, the raw data of their shorter tests (less than two years) are not rendered available, but are kept secret even for scientists when they exist. It would be necessary to replace the proposed declared active substance by its commercial product for the toxicity assessment, at least the major commercially sold one. Even if these formulations are numerous, they have not yet been proven safe. This study and our own work proves in fact that they are toxic on a long term. That is what we recommend in a recently published review of 43 authors in this field from five continents [3].

In fact, our group was the first one to test in a long-term toxicity experiment, on mammals, a GBH and a GMO modified to contain it, in 2012, and this was republished in 2014 [4]. This step was after a huge controversy driven in secret (revealed by tribunals) by the Comapny Monsanto (now Bayer) commercializing the products and their allies. This was proven in court, with their fraud to hide the effects of the whole formulation, by putting the Monsanto

Papers in open source [5]. Over 100,000 patients complaining for cancers due to the product won in USA more than 10 billion dollars, but this was not followed by a modification in the system, for the assessment nor the products themselves worldwide.

Nonetheless, we followed the research to understand the mechanisms of these effects of GBH, and their tumorigenicity, carcinogenicity, and general toxic effects. We discovered by multiomics that the pathologies were linked to a multiple metabolic disturbance, in organonitrogen metabolism and fatty acid β -oxidation, but also we detailed an oxydative stress [6], including at liver and kidney [7] levels. This occurred at concentrations of GBH (0.1 ppb of GBH) at low but realistic environmental levels, below ADI and NOAEL.

We then investigated the real composition of pesticides by mass spectrometry, and we noticed they did present a mixture of undeclared compounds including heavy metals but not only : arsenic, chromium, cobalt, lead and nickel [8]. These were able to induce the pesticide effects.

Moreover, we recently characterized in addition petroleum residues in them, with carcinogenic polycyclic aromatic hydrocarbons [9], arising from petroleum distillation towers waste. This was in all pesticide formulations we tested, including herbicides, insecticides and fungicides. We even proposed in 2022 in this journal [10] that polycyclic aromatic hydrocarbons could be a marker of food pollution and multiple pesticides, because non organic sausages contained high levels of them in comparison to organic ones. In fact, sausages bioaccumulate all pesticides in comparison to vegetables, since the meat is coming from animals eating a lot of vegetables and cereals.

We knew then that the formulations of pesticides were a lot more toxic than the isolated proposed declared active substances by industries [9], on human cells when we began the research, and even on plants with glyphosate alone being inefficient for herbicidal activity, but well soluble at low recommended doses [8].

The benefit of the Panzacchi paper [1] is to begin the study during the pregnancy of the mothers and then to follow the descendants during their life ; there is most probably a transgenerational and epigenetic effect. Also, it studied carcinogenicity that our long-term toxicity study did not, and was not designed to do. This is why we had less animals per group. The result of Panzacchi et al. was to evidence and detail the multiple organs disruptions towards organic-nourished controls (devoided of synthetic pesticides as much as possible), but this was from ADI levels, instead of lower levels from 0.1 ppb, that we accomplished. Anyway, the explanation of the effects appears now clear.

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