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World Health Organization

16th of December 2019

Dear Mr. Gordon,

We, the undersigned 33 scientists and health professionals, are writing to urge you to revise the World Health Organization (WHO) drinking-water guideline value for the herbicide atrazine.

In 2011 WHO raised its limit for atrazine in drinking water 50-fold, from 2 to 100 micrograms of atrazine per litre of water ($\mu\text{g}/\text{l}$) (WHO 2011a), as a result of an evaluation by the Joint Meeting on Pesticide Residues (*JMPR*) in 2007.

However, the evaluation performed by JMPR is outdated, insufficiently protective, and neglected evidence of toxicity that existed even at the time it was conducted, as documented in the attached report, 'WHO Guideline Value for Atrazine in Drinking Water: A Critical Review' by Dr. Peter Clausing.

This current guideline value of 100 $\mu\text{g}/\text{l}$ needs to be revised because of substantial scientific evidence documenting the potential for serious adverse effects on human health, including endocrine and reproductive effects and potential cancer risks, as documented in Dr. Clausing's report.

Selected relevant new evidence, reviewed and summarized in the above-mentioned report include:

- Epidemiological evidence for an increased risk of thyroid cancers associated with atrazine exposure (Beane Freeman et al. 2011);
- Evidence that atrazine binds to the G protein-coupled receptor 30, GPR30 (Albanito et al. 2015), thereby exerting estrogen-like activity without binding or activating the classical nuclear estrogen receptor (Connor et al. 1996, Tennant et al. 1994) which may provide an explanation why atrazine is able to up-regulate aromatase activity in cancer cells (Sanderson et al. 2001);
- Concerns of the US Environmental Protection Agency committee of independent science advisors, the Scientific Advisory Panel, that there is "suggestive evidence of carcinogenic potential" for ovarian cancer, positive evidence for Non-Hodgkin's lymphoma in studies other than the Agricultural Health Study cohort, and that two French studies "provide sug-

gestive evidence for a causal association between triazines and hairy-cell leukemia” (SAP 2011);

- New and/or neglected evidence for genotoxic effects of atrazine in fruit flies, zebrafish and mice (Torres et al. 1992, Zhu et al. 2010, Adeyemi et al. 2015, Wirbisky et al. 2016, Gao et al. 2016);
- New epidemiological findings demonstrating an association between atrazine exposure and birth defects (Agopian et al. 2013a, 2013b) and a significantly increased risk of adverse pregnancy outcomes at concentrations much lower than 100 µg atrazine/L water (e.g. Almberg et al. 2018), adding to the already existing knowledge in this regard;
- A large body of evidence that atrazine acts as an endocrine disruptor that targets the hypothalamus-pituitary-gonadal axis (cf. Wirbisky and Freeman 2015, Pogrmic-Majkic et al. 2016); accordingly, U.S. EPA (2018) concluded that exposure to atrazine (and other triazines) “results in reproductive and developmental effects in laboratory animals that are considered relevant to humans”; and
- Neglected evidence for the disruption of the estrus cycle in species other than rats, i.e. in pigs at doses as low as 1 mg/kg body weight (Gojmerac et al. 1996, 1999, 2004).

Based on this assessment, the WHO drinking water limit of 100 µg/l for atrazine is insufficiently protective and may put large numbers of people at risk of adverse health harms.

We kindly ask you to address the information raised in Dr. Clausning's report and urge you to revise the WHO Guideline value so as to provide sufficient protection for all individuals, including pregnant women and children, people with estrogen-sensitive cancers like breast cancer, and farm-workers and their families who are frequently exposed to multiple agrochemicals in addition to atrazine, and others.

Signatures of support

Note: Academic affiliation provided for identification purposes only and does not imply institutional endorsement.

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