Ratio AMPA vs glyphosate and relevance of AMPA for risk assessment

Feedback from HBM4EU

Vol. 1, 2.6.9, Summary of medical data and information, p. 473-474.
Vol. 1, 2.6.10, Toxicological end point for assessment of risk following long-term dietary exposure – ADI (acceptable daily intake), p.487.
Vol. 3, B.6.9.8, Literature data – medical data / treatment / poisoning / exposure, p. 645-707.

Human biomonitoring results of AMPA in urine for children and adults were included as information but not actually used for human health risk assessment in the **draft Risk Assessment Report (dRAR), Vol. 1, 2.6.9, p. 473; Vol. 3, B.6.9.8.**

AMPA has been found in various human biomonitoring (HBM) studies, some of which have been included in the dRAR. Quite recently, various additional HBM studies that are not included in the dRAR determined AMPA levels in human urine, e.g. Stajnko (2020), Lemke (2021), Faniband (2021) and Ruiz (2021). We advocate to include them because AMPA seems to be of additional relevance for human health risk assessment as such.

In addition, in HBM4EU, urine samples from children collected in Cyprus (2017), Germany (2015-2017), Belgium (2019-2021) and Slovenia (2017) were analysed for glyphosate (GLY) and AMPA (unpublished results). If only samples with creatinine adjusted biomarker concentrations above the limit of quantification (LOQ) were considered (n=227), the AMPA/GLY ratio varied between 0.1 and 18.1 with an average value of 1.6. In total 136 samples of the 227 had an AMPA/GLY ratio higher than 1. When regressing AMPA (µg/g creatinine) on the Y-axis against GLY (µg/g creatinine) on the X-axis, the slope of the linear fit is smaller than 1. The resulting trendline crossed the linear 1:1 line at some point. Samples below that point (further to the left on the X-axis with the GLY concentrations) on average have higher AMPA then GLY concentrations. For samples beyond that point, GLY concentrations on average exceed AMPA concentrations.

This seems to confirm the existence of 'autonomous' origins of AMPA (independent of GLY) as suggested earlier (Grandcoin, 2017). GLY-dependent AMPA is formed by metabolism in GLY-sprayed crops as well as by microorganisms in the environment. AMPA in the environment not only originates from GLY but also from the massive use of amino-polyphosphonate (Grandcoin, 2017).

Important additional information that is valuable for the dRAR comes from a human volunteer study that has not yet been included in the dRAR either (Zoller, 2020). In this study volunteers were given GLY and AMPA (known levels present in food). AMPA was present in that food 2 orders of magnitude lower than GLY. However, the urinary levels of GLY and AMPA differed only a factor of 4, approximately. The authors concluded that on average 1% of the GLY dose was excreted in urine. For AMPA, 23% of the dose was excreted in urine, assuming that no metabolism of glyphosate to AMPA occurred. This implies that oral absorption of AMPA is at least 23%.

Importantly, AMPA has a similar toxicological profile as GLY (EFSA, 2015; JMPR, 2019) and this should be considered in the RAR. The combined exposure to both should be considered as was also suggested by the JMPR, proposing a group-ADI for GLY+AMPA (JMPR, 2011).

References

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