

## **Glyphosate: New epidemiological study finds no connection between cases of cancer and use of plant protection products containing glyphosate**

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Epidemiological studies are a central element of public discussion in the debate surrounding the carcinogenic potential of glyphosate. A publication that appeared in the USA in November examined whether there is a possible connection between the use of glyphosate-containing plant protection products and cases of cancer among people who work in agriculture using a significantly broader data base. To do so, the researchers evaluated as yet unpublished data from the Agricultural Health Study (AHS) in the USA, the observation period of which had been extended by eleven years. Through the extended follow-up of the AHS, they come to the conclusion that no significant connections could be established between applications of plant protection products containing glyphosate and the occurrence of cancer among the examined population group. This applies to cancers in general, as well as to special cancer types, such as non-Hodgkin lymphoma, which has been discussed in connection with the glyphosate assessment. The results suggesting a possible association with acute myeloid leukaemia (AML) are not statistically unambiguous and should be interpreted with caution.

The BfR has made an initial assessment of the new study, which was published in the Journal of the National Cancer Institute (djx233, <https://doi.org/10.1093/jnci/djx233>). The study was not taken into consideration by the IARC or in the concluded European health assessment of glyphosate presented in the course of the application for its re-approval as an active substance in plant protection products.

### The study

The study by Andreotti et al. (2017) is an evaluation of the Agricultural Health Study (AHS) in the USA, extended by an observation period of eleven years, on which De Roos et al. (2005, Environmental Health Perspectives 113:49–54) had already reported. Through the extended follow-up from the years 2012 to 2013, an n of 5,779 is now available for the updated evaluation as opposed to an n of 1,324 cases of cancer among glyphosate users in the first evaluation in 2005.

### Study results

In the comprehensive (n = 54,251 for statistical evaluation) prospective epidemiological study of pesticides/plant protection products users in Iowa and North Carolina reported on here, no statistical association could be recorded between the use of plant protection products containing glyphosate, according to users' own information, and the occurrence of cancers in general or leukaemias, including non-Hodgkin lymphomas (NHL) and multiple myeloma, in particular. The results are adjusted for confounding factors (age, smoking, alcohol, cases of cancer in the family, federal state, use of other pesticides/plant protection products) and are consistent for different quantifications of exposure (use of terciles or quartiles, consideration of cumulative exposure up to 5, 10, 15 or 20 years before the end of the observation).

It is also reported that compared to non-users, the users of glyphosate-containing plant protection products with the highest exposure levels (top quartile) show an increased but not statistically significant risk of acute myeloid leukaemia (AML). Non-uniform results are achieved in various statistical approaches for quantifying exposure (see above), including a

significant trend test when using terciles and paying consideration to cumulative exposure over 20 years.

#### Assessment of the study

The study results are relevant for an epidemiological appraisal of the cancer risk posed by the use of plant protection products containing glyphosate in people who use pesticides/plant protection products professionally. The study can be regarded as reliable due to:

- The high case numbers (n = 54,251 evaluated study participants, 5,779 cases of cancer among glyphosate users)
- The recruitment of the study participants from a group of persons who use pesticides/plant protection products, which was regarded as meaningful
- The adjustment for confounding factors (including the use of other pesticides/plant protection products)
- The advantages of a prospective epidemiological study design with collection of data on exposure when including the participants in the study (enrolment)
- The length of the observation period (enrolment 1993-1997, follow-up 2012-2013)

Restrictions result from limiting the study to participants from two federal states, asking about exposure via questionnaires and from the imputation<sup>1</sup> of missing exposure data, which could lead to a distortion of the effects estimation. The information on exposure relates to the period of time from the enrolment of the participants in the study to the year 2005 at the latest. The key statement of the study is that no significant association could be established between the use of glyphosate and the occurrence of cancers in general, or leukaemias, including non-Hodgkin lymphomas (NHL) and multiple myeloma, in particular. The results relating to acute myeloid leukaemia (AML) are interpreted – by the authors of the study too – with great caution, as the results are not statistically unequivocal. According to the latest level of available knowledge, AML has not played a part in the assessments of glyphosate conducted to date by the BfR, EFSA and ECHA. In the context of the other epidemiological studies which have been known up to now, the evidence for a carcinogenic effect of glyphosate under the given application conditions is therefore further weakened. The estimation of the BfR and responsible authorities of the European Union that, in accordance with current knowledge, glyphosate should not be classified as carcinogenic, is given additional support by the new epidemiological study.

#### More information on the topic of glyphosate at the BfR website

[http://www.bfr.bund.de/en/a-z\\_index/glyphosate-193962.html](http://www.bfr.bund.de/en/a-z_index/glyphosate-193962.html)



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Imputation is the name given to mathematical-statistical processes with which missing data in statistical surveys are completed by model-based values.

## References

Gabriella Andreotti, Stella Koutros, Jonathan N. Hofmann, Dale P. Sandler, Jay H. Lubin, Charles F. Lynch, Catherine C. Lerro, Anneclaire J. De Roos, Christine G. Parks, Michael C. Alavanja, Debra T. Silverman, Laura E. Beane Freeman; Glyphosate Use and Cancer Incidence in the Agricultural Health Study, JNCI: Journal of the National Cancer Institute, djx233, <https://doi.org/10.1093/jnci/djx233>

## About the BfR

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