Does glyphosate cause cancer?

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In its recent evaluation from March 2015, the International Agency for Cancer Research (IARC), as the specialized cancer agency of the World Health Organization (WHO), came to the conclusion that glyphosate should now be classified as a carcinogenic substance in Group 2A (probably carcinogenic to humans), based on “limited evidence” in human-experiments and ”sufficient evidence” in animal-experiments. This classification was published in a short report in the "Lancet" journal on 20 March 2015.
As the ”Rapporteur Member State” for the active substance glyphosate within the framework of EU re-evaluation, the Federal Institute for Risk Assessment (BfR) was responsible for the human health risk assessment and has assessed glyphosate as non-carcinogenic. This was supported by competent national, European and other international institutions for health assessment including the WHO/FAO Joint Meeting on Pesticide Residues (JMPR). BfR is therefore issuing its comments on this classification by IARC based on the published short report.

The International Agency for Research on Cancer (IARC) is the specialized cancer agency of the World Health Organization. The main objective of the IARC is to promote international collaboration in cancer research. The evaluations of carcinogenic risk are made by international working groups of independent scientists and are qualitative in nature. No recommendation is given for regulation or legislation. For this reason, 17 experts from 11 countries met at the International Agency for Research on Cancer (IARC; Lyon, France) in March 2015 in order to assess the carcinogenic or potentially carcinogenic effects of 4 organophosphates and glyphosate. The working group classified glyphosate as “probably carcinogenic to humans”. This assessment will be published as volume 112 of the IARC Monographs.

In the opinion of BfR, the classification of glyphosate as "carcinogenic in Group 2A" (probably carcinogenic to humans) as published in the 20 March 2015 issue of the "Lancet" journal comes as a surprise, since other evaluations performed by supranational bodies such as the WHO-Panel of the Joint Meeting of Pesticide residues (JMPR, 2004), and also by national regulatory agencies such as the U.S.EPA had concluded the contrary, i.e., that glyphosate was not carcinogenic. Unfortunately, the database on which the IARC evaluation is based is not known, since a background monograph that is usually produced by IARC following the evaluation meetings has not yet been released. Therefore, a comprehensive and scientifically sound consideration of the data and arguments that led to the IARC- conclusion is simply not possible at the moment.

In addition, Germany is the ”Rapporteur Member State” in the ongoing re-evaluation process of glyphosate in the EU. For this purpose, an extensive ”Renewal Assessment Report” (RAR) was provided in 2013 and has been revised in 2014 and again in 2015. The 2013 report was circulated by EFSA to the EU Member States and was made available for public consultation in 2014. Revisions were made to take into account the several hundred comments and remarks. The toxicological and residue chapters of the report have been prepared by the Federal Institute for Risk Assessment (BfR). For this purpose, BfR has compiled the most comprehensive toxicological database, presumably worldwide, for glyphosate. This database comprises hundreds of studies that were performed by or on behalf of the many manufacturers of glyphosate and thousands of references from the open literature. This huge amount of data makes glyphosate nearly unique among the active substances in plant protection products. BfR thinks that the entire database must be taken into account for toxicological evalua-

tion and risk assessment of a substance and not merely a more or less arbitrary selection of studies.

In the absence of more reliable information from IARC, BfR has tried to allocate the findings that are mentioned in the brief “Lancet” publication to certain studies in our database and, by doing that, to put them into perspective.

The new IARC classification for glyphosate as a carcinogenic substance is based firstly on “limited evidence” in humans. This risk is derived from three epidemiological studies in the USA, Canada and Sweden based on a statistical correlation between exposure to glyphosate and an increased risk of non-Hodgkin lymphoma. However, this assessment was not confirmed in a very large cohort of the also cited "Agricultural Health Study" or in other studies. A recent publication from 2012 has reviewed the epidemiologic literature to evaluate whether exposure to glyphosate is associated causally with cancer risk in humans and the relevant methodological and biomonitoring studies of glyphosate. The review found non-consistent patterns of positive associations indicating a causal relationship between total cancer or any site-specific cancer and exposure to glyphosate. The current report of BfR to the EU based on the evaluation of over 30 epidemiological studies came to the overall assessment that there is no validated or significant relationship between exposure to glyphosate and an increased risk of non-Hodgkin lymphoma or other types of cancer.

Secondly, IARC points to findings of studies based on animal experiments submitted by the producers of glyphosate as evidence for the carcinogenic effect of glyphosate. All these findings were also considered in the glyphosate assessments of BfR, which did support the conclusion of the Joint Meeting on Pesticide Residues (JMPR) of the FAO/WHO responsible for the assessment of active substances in pesticides: “In view of the absence of a carcinogenic potential in animals and the lack of genotoxicity in standard tests, the Meeting concluded that glyphosate is unlikely to pose a carcinogenic risk to humans”. BfR does not have any information as to how many of the 11 long-term studies on rats and mice that were assessed as valid were available to IARC.

Moreover, IARC concluded that a glyphosate formulation promoted skin tumours. In general, testing of formulations should not be used for toxicological evaluation of active substances because co-formulants may alter the outcome to a large extent. Therefore, the claim, based on this 2-stage cancer model in mice, that a highly concentrated, skin-irritating formulation containing the active substance promotes skin tumours is not considered by the institutions in the EU to be evidence for the carcinogenic properties of glyphosate.

It is not possible to fully examine the indications for the genotoxic potential of glyphosate based on the short report published by IARC, in particular due to the fact that the assessment included studies using formulations that are not specified in any detail.
The fact that different bodies assess issues differently due to differing information and assessments of experimental data is part and parcel of the risk assessment process. BfR will therefore perform a thorough review of the classification issued by IARC once the monograph becomes available.