

## Food safety

### Frequently asked questions

JMPR secretariat

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#### **What are the health risks associated with pesticide residues in food?**

Pesticides are chemicals used in agriculture to protect crops against insects, fungi, weeds and other pests. In addition to their use in agriculture, pesticides are also used to protect public health in controlling the vectors of tropical diseases, such as mosquitoes.

But pesticides are also potentially toxic to humans. They may induce adverse health effects including cancer, effects on reproduction, immune or nervous systems. Before they can be authorized for use, pesticides should be tested for all possible health effects and the results should be analysed by experts to assess any risks to humans.

#### **“Hazard” and “risk”: what is the difference?**

Scientific studies of the potential health effects of hazardous chemicals, such as pesticides, allow them to be classified as carcinogenic (can cause cancer), neurotoxic (can cause damage to the brain), or teratogenic (can cause damage to a fetus). This process of classification, called “hazard identification,” is the first step of “risk assessment”. An example of hazard identification is the classification of substances according to their carcinogenicity to humans carried out by the International Agency for Research on Cancer (IARC), the specialized cancer agency of WHO.

The same chemical can have different effects at different doses, which depends on how much of the chemical a person is exposed to. It can also depend on the route by which the exposure occurs, e.g. ingestion, inhalation or injection.

#### **Why does WHO have 2 distinct processes for “hazard identification” and “risk assessment”?**

“Hazard identification”—in particular the IARC classification of substances in terms of their carcinogenicity—is the first step of the “risk assessment” process. Classification of an agent as a carcinogenic hazard is an important indication that some level of exposure, for example from occupation, environment, food, etc., could result in an

increased risk of cancer.

Risk assessment for pesticide residues in food, as conducted by the Joint FAO/WHO Meeting on Pesticide Residues (JMPR), establishes a safe intake level after assessing the level of risk.. Acceptable daily intakes (ADIs) are used by governments and international risk managers, such as the Codex Alimentarius Commission, to establish maximum residue limits (MRLs) for pesticides in food. MRLs are enforced by national authorities to ensure that the amount of pesticide residues consumers are exposed to through eating food over a lifetime will not have adverse health effects.

IARC's hazard identification can inform the JMPR's risk assessment, and thus the two processes can be complementary. For example, IARC may identify new evidence from scientific studies on the carcinogenicity of a chemical and, when necessary, JMPR conducts an evaluation or a re-evaluation of the safety of that chemical as it is used in agriculture and occurs in food.

### **How are JMPR experts selected? How many experts participate in a meeting?**

All JMPR experts are selected based on their scientific excellence as well as on their experience in the field of pesticide risk assessment and are selected from the JMPR roster of experts following their expression of interest to an open call. Depending on the number of compounds and the range of expertise needed, approximately 15 to 35 experts participate in one JMPR meeting.

### **How does JMPR consider issues of conflict of interest?**

WHO and FAO involve competent experts from Member States in the JMPR process. All are specialists who either work in academia or national agencies.

All experts, including those who are working in governmental agencies, are contributing to JMPR in their own individual capacity, and not as representatives of their government or organization. Experts who have been in charge of a dossier at national level are not put in charge of the same dossier for JMPR.

Experts working for universities frequently receive grants from industry to support research projects. WHO is carefully checking the Declaration of Interests of all experts and excludes those having done consultancy in relation with compounds on the JMPR's agenda or having other forms of economic relations that may undermine neutrality of experts.

### **Are the JMPR conclusions on diazinon, glyphosate and malathion published in May 2016 contradictory to the IARC hazard classification published in 2015?**

No. JMPR, in its assessment, has taken the IARC review of these three

compounds into account by taking their data and interpretations into consideration.

The work by IARC and JMPR are different, yet complementary, and their respective functions can be seen as part of a continuum where potential hazards to public health are identified, and the level of risk associated with any such hazards is subsequently assessed.

IARC reviews published studies to identify potential cancer hazards. It does not estimate the level of “risk” to the population associated with exposure to the hazard. In contrast, JMPR reviews both published and unpublished studies to assess the level of health risk to consumers associated with dietary exposure to pesticide residues in food.

In the case of diazinon, glyphosate and malathion, IARC’s Monograph Volume 112 classified the three compounds as “probably carcinogenic” from the perspective of hazard. The IARC Monographs did not estimate the cancer risks of these compounds from specific exposure routes or levels of exposure.

JMPR’s risk assessment found that based on the weight-of-evidence approach these compounds are unlikely to cause cancer in people via dietary exposure. This means it is possible to establish safe exposure levels – acceptable daily intakes (ADI) – for consumers. In order to ensure people are not exposed to levels above acceptable daily intakes of these residues, maximum residue limits are set by governments for the combination of pesticides and relevant food commodities, often following the maximum residue limits recommended by the Codex Alimentarius Commission.

**IARC found the three compounds were probably carcinogenic also supported by their genotoxic potential, while JMPR found there was no genotoxicity. Why is there a difference?**

A chemical that is considered genotoxic is one that changes the genetic information in cells that can then lead to cancer.

IARC’s Monograph Volume 112 considered all available published studies on genotoxicity, some of which had different levels of relevance for humans and dietary exposures.

JMPR, in evaluating the health risks associated with dietary exposure to the three compounds, from the very large number of studies available, gave greater weighting to those most relevant to humans and to oral exposure, namely those that investigate effects of oral exposures to these compounds on living (“in vivo”) mammalian species. JMPR gave less weighting to studies on species far removed from humans, like caiman, and other than oral exposures. This review led to the conclusion that the compounds are unlikely to be genotoxic at anticipated dietary exposures.

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## Related links

[Joint FAO/WHO Meeting on  
Pesticide Residues \(JMPR\)](#)

 [JMPR 2016: summary report  
\(9-13 May\)](#)  
pdf, 775kb