



Lay Summary

The Environmental Protection Authority (EPA) commissioned Dr Wayne Temple, a toxicologist and former Director of the New Zealand National Poisons Centre, to undertake a review of the evidence relating to the possible carcinogenicity of glyphosate. This lay summary is to accompany the report he has produced "*Review of the Evidence Relating to Glyphosate and Carcinogenicity*". The report also had input from Dr Michael Beasley, a toxicologist at the National Poisons Centre.

Dr Temple's report was peer reviewed by toxicologists from the EPA and the Ministry for Primary Industries.

The review took into account studies reviewed in the International Agency for Research on Cancer (IARC) report, as well as additional studies that were not reviewed by IARC but have been assessed by overseas regulators including the European Food Safety Authority (EFSA), US Environmental Protection Agency (US EPA) and the Joint FAO/WHO meeting on Pesticide Residues (JMPR)¹.

What are the conclusions of the review?

The review concluded that glyphosate is unlikely to be carcinogenic to humans or genotoxic (damaging to genetic material or DNA) and should not be classified as a mutagen or carcinogen under the HSNO Act.

This conclusion was based largely on consideration of the results of studies on humans (epidemiology studies) and studies in laboratory animals, as well as genotoxicity studies conducted by a range of methods. More details are provided below.

Studies on humans

The majority of human studies did not show an association between exposure to glyphosate and cancer. Although a small number of studies with a limited number of participants found a weak association between glyphosate exposure and increased risk of non-Hodgkin lymphoma (NHL), other studies did not. The studies that found no association between glyphosate exposure and NHL included the largest and most reliable study, which included over 50,000 participants.

There were also a number of limitations to many of the studies. These included only a small number of people being assessed, people also being exposed to other pesticides, and methodological limitations with how the amount of glyphosate people were exposed to was measured.

Based on the inconsistency in the results of the studies on glyphosate exposure and NHL, and the lack of any association in the largest, most robust study, it was concluded that there is no convincing evidence of an association between glyphosate exposure and the development of cancer in humans.

1. The JMPR is an international expert scientific group administered jointly by the United Nations Food and Agriculture Organisation (FAO) and the World Health Organization (WHO). JMPR undertakes pesticide risk assessments for the purpose of establishing safe limits of pesticide residues in food.

Studies in laboratory animals

A small number of studies in laboratory animals found an increased incidence of cancers in rats or mice exposed to glyphosate. However, these findings were not considered to be reliable evidence of a carcinogenic effect by overseas regulators for a number of reasons including:

- There was a lack of dose response. Normally the incidence or severity of toxicological effects caused by chemicals increases as the amount of exposure to the chemical increases. This was not seen in the studies with glyphosate.
- In most cases tumours occurred only at very high doses which were at or above recommended maximum doses for animal studies so are not considered relevant for humans.
- The incidences of cancers in most studies were within the range of normal incidences of these cancers in the test animals.
- The carcinogenic effects seen in a small number of studies were not seen in other studies conducted in the same species at the same dose levels.

Therefore Dr Temple concluded that the overall weight of evidence indicates that glyphosate is not carcinogenic.

Genotoxicity studies

All studies done according to internationally agreed test guidelines did not find evidence of a genotoxic (damaging to DNA) effect of glyphosate. Some studies with pesticide formulations that contain glyphosate showed a genotoxic effect. However, in some cases these studies were conducted in test systems that have not been validated as relevant to assess genotoxicity. In addition, because genotoxic effects were not seen with glyphosate itself, it is possible that the effects were related to other components in the formulations that were tested.

It was concluded that the weight of evidence indicates that glyphosate is not genotoxic.

What does this mean?

Based on the information currently available, the EPA considers that glyphosate products approved in New Zealand are safe to use when following the instructions on the label.

Glyphosate is on the Chief Executive Initiated Reassessment (CEIR) programme list, which means that we are actively monitoring its status and international developments. If EPA staff consider a formal review is needed based on new information that becomes available, a reassessment may be initiated, but on the weight of evidence to date, glyphosate does not require classification under HSNO as a carcinogen or mutagen.

Where can I find out more about glyphosate?

If you need more information, visit www.epa.govt.nz/glyphosate or call 0800 HAZSUBS (0800 429 7827) or email: hazardous.substances@epa.govt.nz.