Spray-free streets and parks - here's why it's so important

1. Glyphosate probably causes cancer

WHO International Agency for Research on Cancer declared glyphosate a probable carcinogen on 20 March 2015.

This was on the basis of 'limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals', supported by strong evidence that glyphosate and glyphosate-herbicides (GBH) are genotoxic (damage genes), and strong evidence that glyphosate and its metabolite AMPA, and GBHs cause oxidative stress; both oxidative stress and genotoxicity being key characteristics of carcinogens.

2. Glyphosate damages genes at sub-lethal concentrations

Professor Christopher Portier, one of the members of the IARC paper, stated: "Glyphosate is definitely genotoxic (damages genes). There is no doubt in my mind." Roundup is cytotoxic and DNA damaging to human cells. Roundup is more toxic than glyphosate, and scientists have discovered that the adjuvants can also be genotoxic, and sub-lethal concentrations can result in DNA damage. Oxidative damage has been found to be an important mechanism of genetic damage. It's not just humans, genotoxic damage has been observed in many aquatic species. Different formulations of pesticides can create a cocktail effect and increase the genotoxic impact of pesticides and pesticide mixtures.

3. Glyphosate is a hormone damaging endocrine disruptor at levels not studied in risk assessment

Glyphosate and its formulations can disrupt the way we make our sex hormones; effect reproduction; act as a xenoestrogen (Roundup can replace and work synergistically with estrogen); change the sex of water-based species; reduce progesterone and can induce hormone dependent breast cancer growth. GBH ingredients, (adjuvants) have also been found to effect the endocrine system.

The EPA considers 'the dose makes the poison' and dismisses effects if inconsistent with the dose – this is old science. We now know endocrine effects can happen at very low (ppt) levels not related to the dose.

4. Glyphosate contributes to infertility, birth defects & negative impacts on the reproductive system

Roundup can damage sperm; cause malformations in frog and chicken embryos at doses much lower than those used in agricultural spraying; glyphosate may disrupt the hormonal system controlling reproduction. A study on rats found glyphosate may cause disturbances in the reproductive development of rats during puberty.

5. Glyphosate contributes to digestive illness, gut disruption & nutrient deficiencies

As an organic phosphate chelator glyphosate immobilises essential nutrients- reducing nutrient availability. Glyphosate kills plants by disrupting the shikimate pathway. Humans contain a shikimate pathway in the gut which biosynthesizes essential amino acids. Low levels of Roundup can disrupt (poultry) gastrointestinal bacteria. Researchers are concerned as there is evidence that beneficial gut bacteria that keep microbiome populations healthy are susceptible to glyphosate, while highly pathogenic bacteria may resist glyphosate.

6. Glyphosate-based herbicides can exert worrying effects on antibiotics

"We found that exposure to some very common herbicides can cause bacteria to change their response to antibiotics. They often become antibiotic resistant, but we also saw increased susceptibility or no effect. In most cases, we saw increased resistance even to important clinical antibiotics." Prof. J Heinemann.

7. Glyphosate damages the nervous system at sub-lethal concentrations

Glyphosate inhibits AChE – a critical enzyme in brain functioning. Glyphosate can also negatively impact the substanta nigra area of the brain at low dose (sub-lethal) levels over a long time period; it can reduce dopamine levels - altering dopamine receptor functioning in the brain; and can activate cell pathways implicated in neurodegenerative diseases. Roundup might lead to excessive

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extracellular glutamate levels, glutamate excitotoxicity and oxidative stress in rat hippocampus.

8. Glyphosate affects organs: from damaged kidneys to arrhythmia

Ultra-low doses (ppt) of Roundup over the long term can result in liver and kidney damage. Researchers have observed an increased incidence of arrhythmias at different doses of Roundup with unknown adjuvants.

9. Glyphosate affects pollinators

Glyphosate can disrupt learning behaviours in honeybees and severely impair long-term colony performance. Glyphosate at concentrations found in agro-ecosystems due to standard spraying can reduce sensitivity to nectar reward and impair associative learning in honeybees.

10. Roundup is more toxic than glyphosate alone

A study of nine different glyphosate formulations found the formulations more toxic than glyphosate alone. Roundup was 1,000 times more toxic than glyphosate alone according to *time of exposure*. A different study found the herbicide Roundup GT+ (450g/L Glyphosate) – 125 times more toxic than the active chemical. Formulation ingredients - surfactants - help disrupt the integrity of the cellular barrier to enable glyphosate uptake.

11. Glyphosate's effect on groundwater

Many studies have found glyphosate occurs more widely in the environment than previously thought. Despite low mobility in soils, glyphosate does not fully break down before reaching groundwater; once in the dark – glyphosate breaks down much more slowly.

12. We don't know the safe level

Neither glyphosate nor glyphosate-based herbicides like Roundup have been assessed at sub-lethal concentrations. Scientists believe glyphosate-based herbicides may be toxic below the regulatory lowest observed adverse effect level.

Ignored by the EPA. What do independently published and peer reviewed scientific studies tell us about glyphosate & its formulations (e.g.Roundup)?

NZ EPA has not consulted recent peer reviewed and published science as part of risk assessment for 6 years

The toxicity studies supplied then by DowAgroscience are unpublished, secret studies and obtained directly from contracted laboratories that only work with industry – Product Safety Laboratories, Dow, ABC and Covance.

The toxicity studies are unavailable for review by public sector health representatives or individuals. Risk Assessment studies for acceptable exposure levels for workers (AOEL) are ancient private studies.

The studies proving safety were all provided by the applicant (chemical company). This is a conflict of interest.

The full formulation (e.g. Roundup) is much more toxic than glyphosate – but has not been considered by the EPA.

NZ Risk assessment: In 2009 DowAgroscience selected & supplied toxicity studies for the NZ EPA. ERMA New Zealand Evaluation and Review Report Application for Approval to Import or Manufacture GF-1280 for Release. ERMA200031

Green

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