The Need for Herbicides
The Need for Herbicides
The Need for Herbicides

- Image 1: Dust clouds on a road.
- Image 2: Dust clouds rolling over the prairies.
How Glyphosate Works

1. Shikimic Acid
2. Shikimic Acid-3-Phosphate
3. 5-Enolpyruvyl Shikimic Acid-3-Phosphate
4. Chorismic Acid
5. Anthranilic Acid
6. Phenylalanine
7. Tyrosine
8. Tryptophan

AMINO ACIDS (Nutrients for Plants)
How Glyphosate Works

Shikimic Acid

Shikimic Acid-3-Phosphate

GLYPHOSATE → EPSPS

5-Enolpyruvyl Shikimic Acid-3-Phosphate

Chorismic Acid

Anthranilic Acid

Phenylalanine

Trp

Try

AMINO ACIDS
(Nutrients for Plants)
Science on Glyphosate and Glyphosate Formulations

Human Studies

Animal Testing

Cell Testing

63
ABSTRACT  Raised death rates have been reported for non-Hodgkin’s lymphoma (NHL) and Hodgkin’s disease (HD) among white male residents of Hancock County, Ohio, United States, for 1960–79. As a surveillance activity, to assess the possibility of workplace exposures contributing to unremarkable. This small study adds to the growing body of reports linking farming and malignant lymphoma, particularly NHL.
### Cohort Studies

**Healthy Individuals**

**What Exposures?**

<table>
<thead>
<tr>
<th>Healthy</th>
<th>Disease / Exposure</th>
</tr>
</thead>
</table>

**Time**

**What Diseases?**
<table>
<thead>
<tr>
<th>Cases</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAVE THE DISEASE</td>
<td>DO NOT HAVE THE DISEASE</td>
</tr>
<tr>
<td>WHAT EXPOSURES?</td>
<td></td>
</tr>
</tbody>
</table>

What Exposures Does Each Group Have?
Confounding

Smoking

Coffee

LUNG CANCER
Cancer Incidence among Glyphosate-Exposed Pesticide Applicators in the Agricultural Health Study

Anneclaire J. De Roos,1 Aaron Blair,2 Jennifer A. Rusiecki,2 Jane A. Hoppin,3 Megan Svec,1 Mustafa Dosemeci,2 Dale P. Sandler,3 and Michael C. Alavanja2

Exposure (results not shown). No association was observed between NHL and glyphosate exposure in any analysis, including an analysis...

NAPP is funded by National Institutes of Health
## Proxy vs. Self Respondents

### OR (95% CI) for NHL Overall

<table>
<thead>
<tr>
<th>Glyphosate Use</th>
<th>Proxy and Self Respondents$^a$</th>
<th>Self Respondents Only$^b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never used</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ever used</td>
<td>1.13 (0.84, 1.51)</td>
<td>0.95 (0.69, 1.32)</td>
</tr>
</tbody>
</table>

---

**Notes:**
- ORs adjusted for age, sex, state/province, lymphatic or hematopoietic cancer in a first-degree relative, use of a proxy respondent, use of any PPE, use of 2,4-D, use of dicamba, use of malathion.
- ORs adjusted for age, sex, state/province, lymphatic or hematopoietic cancer in a first-degree relative, use of any PPE, use of 2,4-D, use of dicamba, use of malathion.
### Proxy vs. Self Respondents

**OR (95% CI) for NHL Overall**

<table>
<thead>
<tr>
<th>Glyphosate Use</th>
<th>Proxy and Self Respondents&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Self Respondents Only&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Lifetime days (# years x # days/year)</strong></td>
<td></td>
</tr>
<tr>
<td>0 and ≤7</td>
<td>0.87 (0.52, 1.45)</td>
<td>0.82 (0.46, 1.44)</td>
</tr>
<tr>
<td>&gt;7</td>
<td>1.08 (0.66, 1.77)</td>
<td>1.06 (0.62, 1.81)</td>
</tr>
</tbody>
</table>

---

<sup>a</sup> ORs adjusted for age, sex, state/province, lymphatic or hematopoietic cancer in a first-degree relative, use of any PPE, use of 2,4-D, use of dicamba, use of malathion.

<sup>b</sup> ORs adjusted for age, sex, state/province, lymphatic or hematopoietic cancer in a first-degree relative, use of any PPE, use of 2,4-D, use of dicamba, use of malathion.

---

Def. Ex. 2851_0026
Glyphosate Use and Cancer Incidence in the Agricultural Health Study

Def. Ex. 2052_0001
Agricultural Health Study Collaborators

NIH NATIONAL CANCER INSTITUTE

NIH National Institute of Environmental Health Sciences
Your Environment. Your Health.

EPA United States Environmental Protection Agency

Promoting productive workplaces through safety and health research

NIOSH®
Journal of the National Cancer Institute Study (2018) Authors

**NIH NATIONAL CANCER INSTITUTE**

- Gabriella Andreotti
- Debra T. Silverman, Branch Chief, Occupational & Environmental Epidemiology
- Stella Koutros
- Jonathan D. Hofmann
- Catherine C. Lerro
- Laura E. Beane Freeman
- Jay H. Lubin
- Michael C. Alavanja

**DREXEL UNIVERSITY Dornsife School of Public Health**

Anneclaire J. De Roos, Associate Professor

**THE UNIVERSITY OF IOWA**

Charles F. Lynch, Medical Director and Principal Investigator, State Health Registry of Iowa / Iowa Cancer Registry

Source: Def. Ex. 2052_0001
Among 54,251 participants, 44,932 (82.8%) reported ever using glyphosate at enrollment or follow-up. Among the participants, pesticide use was ascertained prior to cancer diagnosis. Second, this AHS analysis includes only licensed pesticide applicators who have been shown to reliably report their pesticide use (28, 29).
In our study, we observed no associations between glyphosate use and NHL overall or any of its subtypes. This lack of associa-
Science on Glyphosate and Glyphosate Formulations

Human Studies

Animal Testing

Cell Testing

63

14
What is Evaluated?

Every Tissue

Heart, pancreas, stomach, adrenal gland, ileum, parathyroid gland, aorta, jejunum, peripheral nerve, testis, brain, kidney, pituitary, thymus, caecum, lacrimal gland, prostate, thyroid, cervix, liver, rectum, tongue, coagulating gland, lung, salivary gland, trachea, colon, lymph nodes, seminal vesicle, urinary bladder, duodenum, mammary gland, skeletal muscle, uterus, epididymis, upper respiratory tract, skin, ureter, eye, esophagus, spinal cord, urethra, femur with joint, olfactory bulb, spleen, vagina, gall bladder, ovary, sternum, bone marrow, Harderian gland

Every Animal

Each Group

For a rodent bioassay, pathologists grossly and microscopically examine approximately 40 tissues per animal per sex per group, meaning there are:

16,000 Diagnostic Interpretations
Rodents Are Not Tiny People

- Used in carcinogenicity studies primarily because cheap, plentiful, and short lifespans

- **Major biological differences** between rodents and people

- Although both rodents and humans get cancer, **some rodent tumors develop and progress differently** than human cancers
## Individual Rodent Studies

<table>
<thead>
<tr>
<th>RAT STUDIES</th>
<th>Compound-related tumors?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lankas (1981)</td>
<td>YES</td>
</tr>
<tr>
<td>Stout and Ruecker (1990)</td>
<td>YES</td>
</tr>
<tr>
<td>Brammer (2001)</td>
<td>YES</td>
</tr>
<tr>
<td>Wood (2009a)</td>
<td>YES</td>
</tr>
<tr>
<td>Atkinson (1993)</td>
<td>YES</td>
</tr>
<tr>
<td>Suresh (1996)</td>
<td>YES</td>
</tr>
<tr>
<td>Enemoto (1997)</td>
<td>YES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MOUSE STUDIES</th>
<th>Compound-related tumors?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knezevich and Hogan (1983)</td>
<td>YES</td>
</tr>
<tr>
<td>Atkinson (1993)</td>
<td>YES</td>
</tr>
<tr>
<td>Sugimoto (1997)</td>
<td>YES</td>
</tr>
<tr>
<td>Wood (2009b)</td>
<td>YES</td>
</tr>
<tr>
<td>Kumar (2001)</td>
<td>YES</td>
</tr>
</tbody>
</table>
Danger of Misinterpretation of False Positive Data

**Improperly assumes** statistically significant difference in number of tumors between groups shows compound-mediated effect

**Scientifically invalid** to ignore other factors necessary to assess whether tumors are compound-mediated

**Creates misleading interpretations of data** given expectation of false positives
Function of Surfactants

No Surfactant

Surfactant
Science on Glyphosate and Glyphosate Formulations

Human Studies: 63
Animal Testing: 14
Cell Testing: 140+
The Curse of Multiple Testing

JELLY BEANS CAUSE ACNE!

SCIENTISTS! INVESTIGATE!

BUT WE'RE PLAYING MINECRAFT!

...FINE.

WE FOUND NO LINK BETWEEN JELLY BEANS AND ACNE (P > 0.05).

THAT SETTLES THAT.

I HEAR IT'S ONLY A CERTAIN COLOR THAT CAUSES IT.

SCIENTISTS!

BUT MINECRAFT!
The Curse of Multiple Testing
The Curse of Multiple Testing

News

Green jelly beans linked to acne!

95% confidence

Only 5% chance of coincidence!

Scientists...
## Glyphosate Animal and Cell Studies Considered by EPA

<table>
<thead>
<tr>
<th></th>
<th>1970s</th>
<th>1980s</th>
<th>1990s</th>
<th>2000s</th>
<th>2010s</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cell Testing</strong></td>
<td>Flowers and Kier (1975)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ames Tests</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## In Vitro Tests for Chromosomal Abnormalities and Micronuclei Induction in Mammals

|                      |                |                |                |                |                |
|                      |                |                |                |                |                |
A large database is available for evaluating the carcinogenicity potential of glyphosate.

The glyphosate dossier consists of an exceptionally large database, therefore the toxicological evaluation adopted by the RMS and agreed during the peer review rely on a magnitude of valid studies rather than on one ‘key study’ for each endpoint.
Glyphosate Issue Paper: Evaluation of Carcinogenic Potential

EPA’s Office of Pesticide Programs
September 12, 2016

Based on all of the available data, the weight-of-evidence clearly do not support the descriptors “carcinogenic to humans” and “likely to be carcinogenic to humans” at this time. According to the 2005 Cancer Guidelines, “carcinogenic support this cancer descriptor. The strongest support is for “not likely to be carcinogenic to humans” at doses relevant to human health risk assessment.

Def. Ex. 2482_0135

Def. Ex. 2482_0141
A cancer ‘hazard’ is an agent that is capable of causing cancer under some circumstances, while a cancer ‘risk’ is an estimate of the carcinogenic effects expected from exposure to a cancer hazard. The *Monographs* are an exercise in evaluating cancer hazards, despite the historical presence of the word ‘risks’ in the title. The distinction between hazard and risk is important, and the *Monographs* identify cancer hazards even when risks are very low at current exposure levels, because new uses or unforeseen exposures could engender risks that are significantly higher.
I agree that IARC carries out an important role in the screening assessment of the carcinogenic potential of agents. However, we should not compare this first screening assessment with the more comprehensive hazard assessment done by authorities such as EFSA, which are designed to support the regulatory process for pesticides in close cooperation with the Member States in the EU.
IARC: Only One “Probably Not Carcinogenic” Classification

International Agency for Research on Cancer

Only 1 classified as “probably not carcinogenic”
IARC: Probable Carcinogens

Very Hot Beverages (coffee, tea)

Night-Shift Workers

Emissions from Combustion of Biomass (wood)
<table>
<thead>
<tr>
<th></th>
<th>1970s</th>
<th>1980s</th>
<th>1990s</th>
<th>2000s</th>
<th>2010s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell Testing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
#Glyphosate Studies Considered by Working Group 112

<table>
<thead>
<tr>
<th></th>
<th>1970s</th>
<th>1980s</th>
<th>1990s</th>
<th>2000s</th>
<th>2010s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell Testing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ames Tests</td>
<td>Flowers and Kier (1973)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Vitro Mammalian Gene Mutation Assays</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Vitro Tests for Chromosomal Abnormalities and Micronuclei Induction in Mammals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Vivo Tests for Chromosomal Aberrations and Micronuclei Induction in Mammals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assays for Detecting Primary DNA Damage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Glyphosate Use and Cancer Incidence in the Agricultural Health Study


Abstract

Background: Glyphosate is a commonly used herbicide that is associated with bladder cancer. A case-control study was conducted in the Agricultural Health Study (AHS), which is a large study of pesticide exposure and cancer risk. The study included 74,000 farmers and farm workers in Iowa and North Carolina, and the results were recently published in the New England Journal of Medicine. In this study, the researchers found a statistically significant increase in the risk of bladder cancer associated with exposure to glyphosate, with the highest risk seen in those with the highest exposure.

Method: The AHS is a prospective cohort study of pesticide exposure and cancer risk. The study was conducted in Iowa and North Carolina, and included 74,000 farmers and farm workers. The study was designed to evaluate the association between exposure to glyphosate and bladder cancer risk. The study used self-reported exposure data, which was validated through interviews and job descriptions. The study also used cancer registry data to identify cases of bladder cancer.

Results: The study found a statistically significant increase in the risk of bladder cancer associated with exposure to glyphosate, with the highest risk seen in those with the highest exposure. The study also found a statistically significant increase in the risk of non-invasive bladder cancer associated with exposure to glyphosate, with the highest risk seen in those with the highest exposure.

Conclusion: The study suggests that exposure to glyphosate is associated with an increased risk of bladder cancer, with the highest risk seen in those with the highest exposure.

Def. Ex. 2052_0001
Overall, there is remarkable consistency in the database for glyphosate across multiple lines of evidence. For NHL, observed associations in epidemiological studies were non-statistically significant and were of relatively small magnitude. Chance and/or bias cannot be excluded as an explanation for the observed associations. For all other cancer types, there were no associations found; however, only one or two studies were available for evaluation of most cancer types. Across species, strain, and laboratory, tumor incidence was not increased at doses <500 mg/kg/day, except the testicular tumors which were only seen in one study. Observed tumors were not reproduced in other studies, including those conducted using the same strain at similar or higher doses. The genotoxicity studies demonstrate that glyphosate is not directly mutagenic or genotoxic in vivo.

Def. Ex. 2482_0131
Overall, there is remarkable consistency in the database for glyphosate across multiple lines of evidence. For NHL, observed associations in epidemiological studies were non-statistically significant and were of relatively small magnitude. Chance and/or bias cannot be excluded as an explanation for the observed associations. For all other cancer types, there were no associations found; however, only one or two studies were available for evaluation of most cancer types. Across species, strain, and laboratory, tumor incidence was not increased at doses <500 mg/kg/day, except the testicular tumors which were only seen in one study. Observed tumors were not reproduced in other studies, including those conducted using the same strain at similar or higher doses. The genotoxicity studies demonstrate that glyphosate is not directly mutagenic or genotoxic in vivo.
Overall, there is remarkable consistency in the database for glyphosate across multiple lines of evidence. For NHL, observed associations in epidemiological studies were non-statistically significant and were of relatively small magnitude. Chance and/or bias cannot be excluded as an explanation for the observed associations. For all other cancer types, there were no associations found; however, only one or two studies were available for evaluation of most cancer types. Across species, strain, and laboratory, tumor incidence was not increased at doses <500 mg/kg/day, except the testicular tumors which were only seen in one study. Observed tumors were not reproduced in other studies, including those conducted using the same strain at similar or higher doses. The genotoxicity studies demonstrate that glyphosate is not directly mutagenic or genotoxic in vivo.
Overall, there is remarkable consistency in the database for glyphosate across multiple lines of evidence. For NHL, observed associations in epidemiological studies were non-statistically significant and were of relatively small magnitude. Chance and/or bias cannot be excluded as an explanation for the observed associations. For all other cancer types, there were no associations found; however, only one or two studies were available for evaluation of most cancer types. Across species, strain, and laboratory, tumor incidence was not increased at doses <500 mg/kg/day, except the testicular tumors which were only seen in one study. Observed tumors were not reproduced in other studies, including those conducted using the same strain at similar or higher doses. The genotoxicity studies demonstrate that glyphosate is not directly mutagenic or genotoxic \textit{in vivo}.
ECHA's Committee for Risk Assessment (RAC) agrees to maintain the current harmonised classification of glyphosate as a substance causing serious eye damage and being toxic to aquatic life with long-lasting effects. RAC concluded that the available scientific evidence did not meet the criteria to classify glyphosate as a carcinogen, as a mutagen or as toxic for reproduction.
are identified. Following a second mandate from the European Commission to consider the findings from the International Agency for Research on Cancer (IARC) regarding the potential carcinogenicity of glyphosate or glyphosate-containing plant protection products in the on-going peer review of the active substance, EFSA concluded that glyphosate is unlikely to pose a carcinogenic hazard to humans and the evidence does not support classification with regard to its carcinogenic potential according to Regulation (EC) No 1272/2008.

In contrast to the IARC evaluation, the EU peer review experts, with only one exception, concluded that glyphosate is unlikely to pose a carcinogenic hazard to humans and the evidence does not support classification with regard to its carcinogenic potential according to Regulation (EC) No 1272/2008 on classification, labelling and packaging (CLP Regulation).
exclude the possibility that it is carcinogenic in mice at very high doses. In view of the absence of carcinogenic potential in rodents at human-relevant doses and the absence of genotoxicity by the oral route in mammals, and considering the epidemiological evidence from occupational exposures, the Meeting concluded that glyphosate is unlikely to pose a carcinogenic risk to humans from exposure through the diet. The Meeting reaffirmed the group ADI for the sum of glyphosate and its metabolites...
Dermal Penetration Studies: Less Than 3%

Wester 1991
Def. Ex. 3099_0001

Ward 2010a
Def. Ex. 3084_0001

Ward 2010b
Def. Ex. 3085_0001

Ward 2010c
Def. Ex. 3086_0001
its low vapor pressure, inhalation exposure to glyphosate is expected to be minimal. Dermal penetration has also been shown to be relatively low for human skin (<1%) indicating dermal exposure will only contribute slightly to a systemic biological dose. Furthermore, in route-

For example, when an aqueous solution of 1% glyphosate was applied in an in-vitro human skin model, only 1.4% of the applied dose was absorbed through the skin. Glyphosate is typically formulated as an isopropylamine salt, and is dissolved in a water-based vehicle, while the
Declaration of interest

The employment affiliation of the authors is as shown on the cover page. However, it should be recognized that each individual participated in the review process and preparation of this paper as an independent professional and not as a representative of their employer. This expert panel evaluation was organized and conducted by Intertek Scientific & Regulatory Consultancy. Funding for this evaluation was provided by Monsanto Company, which is a primary producer of glyphosate and products containing this active ingredient. The authors had sole responsibility for the content of the paper, and the interpretations and opinions expressed in the paper are those of the authors.

JA worked for Monsanto from 1989 through 2004 and is a consultant on a legal case unrelated to glyphosate that involves a former Monsanto industrial chemical plant. DG serves on a scientific advisory board to Dow Agro Sciences, which markets pesticides including glyphosate, and has consulted on behalf of Bayer Corp. on litigation matters concerning glyphosate and leukemia. GM has no additional declarations. TS has received consultancy fees and travel grants from Monsanto Europe SA/NV as a member of the European Glyphosate Toxicology Advisory Panel and participated in the IARC Monograph Meeting for volume 112, as an Observer for the Monsanto Company. In addition, TS has consulted for Monsanto on litigation matters involving glyphosate. DW has consulted on litigation matters concerning Monsanto that did not involve glyphosate.

This article is part of a supplement, sponsored and supported by Intertek Scientific & Regulatory Consultancy. Funding for the sponsorship of this supplement was provided to Intertek by the Monsanto Company, which is a primary producer of glyphosate and products containing this active ingredient.
ACKNOWLEDGMENTS

The authors acknowledge the assistance of individuals who participated in the preparation of this document. First, we are grateful to those who gathered and made available the large amount of information used to write the manuscript for this document. Second, we thank the toxicologists and other scientists at Monsanto who made significant contributions to the development of exposure assessments and through many other discussions. The authors were given complete access to toxicological information contained in the great number of laboratory studies and archival material at Monsanto in St. Louis, Missouri, and elsewhere. Key personnel at Monsanto who provided scientific support were William F. Heydens, Donna R. Farmer, Marian S. Bleeke, Stephen J. Wratten, and Katherine H. Carr. We also acknowledge the participation and assistance of Douglass W. Bryant and Cantox Health Sciences International for scientific and logistical support in the preparation of the final manuscript.
There is no information contained within the “Monsanto papers” or that EFSA is otherwise aware of that indicates that industry attempted to falsify or manipulate the findings and raw data of the regulatory guideline studies used in the glyphosate assessment. If new information were to become available in the future that gave EFSA...
Keep out of reach of children.  
CAUTION!  
CAUSES EYE IRRITATION.  
Avoid contact with eyes or clothing.

FIRST AID: Call a poison control center or doctor for treatment advice.

IF IN EYES  
• Hold eye open and rinse slowly and gently with water for 15 - 20 minutes.  
• Remove contact lenses if present after the first 5 minutes then continue rinsing eye.

• Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

• You may also contact (314) 694-4000, collect day or night, for emergency medical treatment information.

• This product is identified as Ranger PRO® herbicide, EPA Registration No. 524-517.

ATTENTION:  
This label is a part of a United States government publication.
Importance of droplet size

The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see the Wind, Temperature and Humidity, and Temperature Inversion sections of this label).

Wind

Drift potential is lowest between wind speeds of 2 to 10 miles per hour. However, many factors, including droplet size and equipment type determine drift potential at any given speed. Application must be avoided below 2 miles per hour due to variable wind direction and high inversion potential. **NOTE:** Local terrain can influence wind patterns. Every applicator must be familiar with local wind patterns and how they affect drift.
PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and other handlers must wear: long-sleeved shirt and long pants, shoes plus socks. Follow manufacturer’s instructions for cleaning/maintaining Personal Protective Equipment. If there are no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product’s concentrate. Do not reuse them.
User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
Mr. Johnson’s Personal Protective Equipment

- Tyvek Suit
- Chemical resistant gloves
- Mask
- Goggles
- Sweatshirt with hoodie
- Chemical resistant boots
Mr. Johnson’s Backpack Sprayer
Non-Hodgkin Lymphomas

**B-cell neoplasms**

- Precursor B-cell lymphoblastic leukemia/lymphoma, NOS
- Precursor B-cell lymphoblastic leukemia/lymphoma, with recurrent genetic abnormalities
- Chronic lymphocytic leukemia/small lymphocytic lymphoma
- Prolymphocytic leukemia, B-cell
- Mantle cell lymphoma
- Lymphoplasmacytic lymphoma
- Waldenstrom macroglobulinemia
- Diffuse large B-cell lymphoma, NOS
- Primary DLBCL of the CNS
- Primary cutaneous DLBCL, leg type
- T-cell/histiocyte-rich large B-cell lymphoma
- Intravascular large B-cell lymphoma
- ALK positive large B-cell lymphoma
- Plasmablastic lymphoma
- Large B-cell (plasmablastic) lymphoma arising from HHV-8 associated multicentric Castleman disease
- Primary effusion lymphoma
- Primary mediastinal (thymic) large B-cell lymphoma
- Burkitt lymphoma/leukemia
- Splenic marginal zone lymphoma
- Extranodal marginal zone lymphoma
- Nodal marginal zone lymphoma
- Primary cutaneous follicle center lymphoma
- Follicular lymphoma NOS
- Hairy cell leukemia
- Hairy cell leukemia variant
- Solitary plasmacytoma of bone
- Extrasosseous plasmacytoma
- Plasma cell myeloma/leukemia
- Heavy chain diseases
- B-cell lymphoid neoplasms, NOS

**T and NK neoplasms**

- Precursor T/NK-cell lymphoblastic leukemia/lymphoma, NOS
- Sezary syndrome
- Peripheral T/NK-cell lymphoma, NOS
- Angioimmunoblastic T/NK-cell lymphoma
- Subcutaneous panniculitis-like T-cell lymphoma
- Anaplastic large cell lymphoma ALK-positive
- Hepatosplenic T-cell lymphoma
- Enteropathy-associated T-cell lymphoma
- Primary cutaneous gamma-delta T-cell lymphoma
- Primary cutaneous T-cell lymphoma, NOS
- Mycosis fungoides
- Lymphoproliferative disease

- Mycosis fungoides
- Primary cutaneous CD30+ lymphoproliferative disorders
- T/NK-cell, lymphoid neoplasms, NOS
Cancer Has a Latency Period

Latency Period
The time between being exposed to something that can cause cancer and having symptoms.
Mr. Johnson’s Timeline

- January 20, 1972
  Mr. Johnson was born

- June 2012
  Promoted to Integrated Pest Manager at BUSD

- Start of Mr. Johnson’s cancer (according to Plaintiff’s experts)
Mr. Johnson’s Treating Doctors

Dr. Richard Hoppe
Oncologist
Stanford University

Dr. Youn Kim
Oncologist
Stanford University

Dr. Laura Pincus
Dermatopathologist
UCSF

Dr. Thach-Giao Truong
Oncologist
Kaiser Permanente