

**Backgrounder****Glyphosate: Response to Hairy Cell Leukemia Allegations**

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A 1998 epidemiologic study from Sweden investigated the potential or suspect occupational causes of hairy cell leukemia (HCL) (Nordstrom et al., 1998). HCL is a blood cancer that is manifest as the proliferation of a particular type of white blood cell. It has been classified by some as a variant non-Hodgkin's lymphoma (NHL), while others treat it as a related disorder with a likely different origin and disease process.

This HCL study preceded the widely publicized NHL and pesticides study from the same Swedish research group. In addition to agricultural chemicals, this HCL study also considered exposure to farm animals and numerous other factors (e.g. wood impregnating agents, petroleum derivatives, "exhausts", ultraviolet light, "mold dust", asbestos, etc.). The authors reported modest but statistically significant associations for all herbicides, all insecticides, all fungicides, impregnating agents, all animals, all solvents, and paint. Leading experts do not consider the results of this study to be credible evidence that any of the agricultural factors studied are causes of HCL. In fact, the study authors themselves recommended that caution be used when interpreting the results. According to Dr. Mark Cullen of Yale University's School of Medicine: *"the fact that virtually every tested factor proved positive -- inconceivable biologically - - speaks to simpler interpretation, namely differential reporting by cases and controls"* (Cullen, 1999).

In 2001, the HCL study was reviewed by several experts (Acquavella et al., 2001). These authors proposed that recall bias was the most likely explanation for the reported findings. Recall bias refers to the fact that ill people are more likely than well people to recall exposure to suspected substances. Acquavella et al. conclude: *"In view of the intrinsically weak measure of exposure, the multiple hypotheses being tested, the evidence for possible recall bias, the small numbers of cases and controls with exposure to any herbicide (16 and 22 respectively), and the inability to control for confounding factors, the validity of reported associations between HCL and specific agents is questionable."*

The results of the Nordstrom et al. study do not meet well-established criteria from the epidemiology literature for determining cause and effect. The associations were weak and there was no dose-response relationship. Finally, there is no experimental evidence from several long-term studies with animals that support the findings.

There is widespread agreement among regulatory and health organizations that there is no evidence that glyphosate might cause cancer in people (U.S. Environmental Protection Agency 1993, World Health Organization 1994). These assessments were based on thorough reviews of numerous toxicology studies conducted according to internationally accepted guidelines. The most recent review was conducted by the European Commission's Health and Consumer Protection Directorate-General, after which glyphosate was re-registered for use in Europe (European Commission 2002). The EC review, like others around the world, concluded that glyphosate is not carcinogenic.

Related Documents: [Backgrounder: Glyphosate and Biomonitoring Studies](#)

## References

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<http://www.inchem.org/documents/ehc/ehc/ehc159.htm>

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<sup>1</sup> Unpublished references can be requested from Monsanto's Public Affairs Director for Agricultural Chemicals at 314-694-3546.