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[J Natl Cancer Inst.](#) 2018 May 1;110(5):509-516. doi: 10.1093/jnci/djx233.

# Glyphosate Use and Cancer Incidence in the Agricultural Health Study

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## Abstract

**Background:** Glyphosate is the most commonly used herbicide worldwide, with both residential and agricultural uses. In 2015, the International Agency for Research on Cancer classified glyphosate as "probably carcinogenic to humans," noting strong mechanistic evidence and positive associations for non-Hodgkin lymphoma (NHL) in some epidemiologic studies. A previous evaluation in the Agricultural Health Study (AHS) with follow-up through 2001 found no statistically significant associations with glyphosate use and cancer at any site.

**Methods:** The AHS is a prospective cohort of licensed pesticide applicators from North Carolina and Iowa. Here, we updated the previous evaluation of glyphosate with cancer incidence from registry linkages through 2012 (North Carolina)/2013 (Iowa). Lifetime days and intensity-weighted lifetime days of glyphosate use were based on self-reported information from enrollment (1993-1997) and follow-up questionnaires (1999-2005). We estimated incidence rate ratios (RRs) and 95% confidence intervals (CIs) using Poisson regression, controlling for potential confounders, including use of other pesticides. All statistical tests were two-sided.

**Results:** Among 54 251 applicators, 44 932 (82.8%) used glyphosate, including 5779 incident cancer cases (79.3% of all cases). In unlagged analyses, glyphosate was not statistically significantly associated with cancer at any site. However, among applicators in the highest exposure quartile, there was an increased risk of acute myeloid leukemia (AML) compared with never users (RR = 2.44, 95% CI = 0.94 to 6.32, Ptrend = .11), though this association was not statistically significant. Results for AML were similar with a five-year (RRQuartile 4 = 2.32, 95% CI = 0.98 to 5.51, Ptrend = .07) and 20-year exposure lag (RRTertile 3 = 2.04, 95% CI = 1.05 to 3.97, Ptrend = .04).

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**Conclusions:** In this large, prospective cohort study, no association was apparent between glyphosate and any solid tumors or lymphoid malignancies overall, including NHL and its subtypes. There was some evidence of increased risk of AML among the highest exposed group that requires confirmation.

## Comment in

[Glyphosate Use and Cancer Incidence in the Agricultural Health Study: An Epidemiologic Perspective.](#)

Ward EM.

J Natl Cancer Inst. 2018 May 1;110(5):446-447. doi: 10.1093/jnci/djx247.

PMID: 29155945 No abstract available.

[Re: Glyphosate Use and Cancer Incidence in the Agricultural Health Study.](#)

Sheppard L, Shaffer RM.

J Natl Cancer Inst. 2019 Feb 1;111(2):214-215. doi: 10.1093/jnci/djy200.

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[Response to Sheppard and Shaffer.](#)

Andreotti G, Lubin JH, Koutros S, Hofmann JN, Sandler DP, Lerro CC, Parks CG, Silverman DT, Beane Freeman LE.

J Natl Cancer Inst. 2019 Feb 1;111(2):216-218. doi: 10.1093/jnci/djy201.

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