

## Letter to the Editor

**Correspondence re: K. P. Cantor *et al.*, Pesticides and Other Agricultural Risk Factors for Non-Hodgkin's Lymphoma among Men in Iowa and Minnesota, *Cancer Res.*, 52: 2447-2455, 1992.**

We recently published findings regarding the risk of exposure to pesticides and other agricultural factors from a case-control study of NHL<sup>1</sup> in Iowa and Minnesota (1). After we completed the initial interviews for this project (conducted in 1981-1984), another study reported associations of NHL risk with the annual number of days of pesticide use (2), information which we did not originally collect. In 1987, we conducted a supplemental interview of Iowa respondents only, to obtain these data. For each pesticide reported in the 1981-1984 interview, subjects were asked about the usual number of days per year each chemical had been handled. Eligibility for the supplemental interview was restricted to the 110 cases and 211 controls from Iowa (or their next of kin), who in the initial study reported agricultural use of at least one of the pesticides used by at least 50 or more respondents. Trained interviewers administered the 10-min supplemental questionnaire by telephone, asking about the number of days per year that each pesticide was personally handled by the study subject before and after 1960. Interviews were completed by 107 cases (48 living, 59 next-of-kin) and 203 controls (146 living, 57 next-of-kin), 97% of those eligible.

NHL risks among Iowa farmers by the number of days per year of handling, mixing, or applying selected pesticides are shown in Table 1. If the reported number of days of use before and after 1960 differed, the larger number was used in our calculation. Small numbers of exposed individuals occurred in most exposure categories. The brief telephone interview was held 3 to 5 years after the initial interview. In the interim, many cases had died, and for these patients (and those deceased in the original study), the questionnaire was administered to the spouse or other close relative (59 of 107 cases, 55%). The proportion of proxy respondents for cases was higher in the follow-up survey (55%) than in the original study or than among controls (28%). Unlike the initial in-person interview, these questions on frequency of pesticide use were not asked in the context of an extended question-

naire where respondents had an opportunity to recall many aspects of their farming experience. The time delay, different method of data collection, and participation of more proxies likely introduced substantial exposure misclassification that is likely to mask exposure-response gradients (3). We therefore consider these findings to be very weak evidence either for or against the possibility of a causal association with any single pesticide exposure.

These findings, originally included in our manuscript, were removed at the suggestion of journal peer reviewers. Government and industry groups have recently requested these results, and we submit our findings in the interest of making them publicly available.

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<sup>1</sup> The abbreviation used is: NHL, non-Hodgkin's lymphoma.

Table 1 Odds ratios (OR) and 95% confidence intervals (CI) for the handling of selected crop and animal insecticides and herbicides, by the number of days of use per year, from a resurvey of Iowa farmers<sup>a</sup>

Pesticide	Did not use pesticide		Days of use/year														
	Ca	Ctl	1-4				5-9				10+						
			Ca	Ctl	OR	CI	Ca	Ctl	OR	CI	Ca	Ctl	OR	CI			
<b>Crop insecticide</b>																	
Carbaryl	92	175	5	8	1.2	0.3-4.3	3	5	0.7	0.1-4.4	4	7	1.0	0.3-4.4			
Chlordane	95	180	6	8	1.6	0.5-5.3	1	2			3	7	0.5	0.1-2.7			
DDT <sup>b</sup>	70	145	12	24	1.2	0.5-2.8	6	9	1.6	0.4-5.6	12	12	1.7	0.6-4.8			
Diazinon	84	169	9	11	2.0	0.7-5.5	5	10	1.2	0.3-4.1	5	7	1.6	0.4-6.1			
Lindane	98	184	6	4	3.3	0.8-13.2	2	4	0.4	0.04-4.6	2	6	0.5	0.1-3.5			
Malathion	95	177	5	9	1.4	0.4-4.7	2	6	1.1	0.2-5.7	3	6	0.6	0.1-3.4			
<b>Animal insecticide</b>																	
Chlordane	88	173	8	16	1.2	0.4-3.3	3	5	1.7	0.3-8.3	2	5	0.9	0.1-6.2			
DDT	73	120	5	30	0.3	0.1-0.8	4	16	0.5	0.1-1.8	15	26	0.9	0.4-2.0			
Lindane	64	133	17	37	1.3	0.6-2.6	5	8	1.5	0.4-5.4	14	16	2.3	0.9-5.7			
Malathion	82	163	10	25	1.0	0.4-2.3	2	6	0.3	0.03-3.2	6	6	2.9	0.8-10.3			
Nicotine	91	179	7	9	1.8	0.6-5.8	1	4	0.4	0.04-4.5	2	4	0.9	0.1-5.7			
<b>Herbicide</b>																	
Chloramben	82	151	9	19	1.1	0.4-2.5	6	9	1.3	0.4-4.6	1	12	0.1	0.01-1.3			
2,4-D	37	48	19	50	0.6	0.3-1.3	13	47	0.4	0.2-0.9	26	37	1.1	0.5-2.4			
Dicamba	83	150	7	12	1.3	0.4-3.8	6	16	1.0	0.3-3.0	3	8	0.9	0.2-3.8			
2,4,5-T	90	165	9	15	1.2	0.4-3.1	1	11	0.3	0.03-2.2	5	6	1.6	0.4-5.9			

<sup>a</sup> OR relative to Iowa farmers who did not report use of the specific pesticide. All OR adjusted for type of respondent, age, cigarette smoking status, family history of lymphoproliferative cancer, high-risk occupations, and high-risk exposures in a logistic regression analysis.

<sup>b</sup> DDT, *p,p'*-dichlorodiphenyl-trichloroethane; 2,4-D, dichlorophenoxyacetic acid; 2,4,5-T, 2,4,5-trichlorophenoxyacetic acid.