

PESTICIDES and HEALTH - STUDIES

Precautionary Principle

“When an activity raises the threats of harm to the environment or human health, precautionary measures should be taken, even if some cause and effect relationships are not yet fully established.”

1. Two most common childhood cancers rising: brain/nervous system cancer increased by 32.6 percent and acute leukemia by 27.4 percent between 1973 and 1990. According to data collected by the U.S. Surveillance, Epidemiology, and End Results (SEER) program of the National Cancer Institute.
2. A study of Denver children under age 15 found a strong association between home use of pesticides in the yard and soft-tissue sarcoma (4-fold increase) and between use of pest strips containing dichlorvos and leukemia (Leiss et al. *Am. J. Public Health* 1995;85:249-252)
3. **Use of 2,4-D for lawn weed control increases child exposures indoors. The pesticides residues had been tracked into the home by the person applying the herbicide or by active dog. This increased a 1 to 2 year old child’s exposure to 2,4-D significantly by ingestion of contaminated dust, penetration through the skin, and inhalation of 2,4-D re-suspended into indoor air. (Nishioka et al. Distribution of 2,4-D in Air and on Surfaces inside Residences after Lawn Applications: Comparing Exposure estimates from Various Media for Young Children. *Environ. Health Perspect.* 2001;109:1185-1191).**
4. Higher rates of fetal death observed when a mother’s exposure to pesticides occurred during weeks three to eight of pregnancy, the most sensitive time of pregnancy when fetal organs are developing. Fetal death rates were two to three times higher than unexposed groups when pesticides had been applied within one square mile of the mother’s residence. Rates were higher with exposure to 3 or more of the five pesticide classes examined 2001. (Bell et al. “Case-Control Study of Pesticides and fetal Death Due to Congenital Anomalies”. *Epidemiology* 2001;12:148-156).
5. Neuroblastoma, which accounts for up to 10% of all childhood tumors, was found to be associated between the use of household pesticides, garden pesticides, and professional extermination. Herbicides were more strongly associated with neuroblastoma than were insecticides (odds ratio 1.9 and 1.3 respectively). Stronger associations were also found for garden pesticides use and diagnosis of neuroblastoma in children after 1 year of age. (Daniels et al. *Epidemiology* 2001;12(1):20-27).

6. **Canine malignant lymphoma has been associated with dog owner's use of 2,4-D on their lawns. The risk of canine malignant lymphoma increase 2-fold with four or more yearly owner applications of 2,4-D. (Hayes et al. *J. of the Nat. Cancer Institute* 83:1226-1231).**
7. **In Minnesota's Red River Valley, farm children with birth defects were over three times more likely to have fathers who used glyphosate herbicides than children without this disorder. (Garry, V.F. et al, 2002. Birth defects, season of conception, and sex of children born to pesticide applicators living in the Red River Valley of Minnesota, USA. *Enviro. Health Persp.* 110 (Suppl. 3): 441-449.)**
8. Developmental toxicity in mice was studied using a combination of 2,4-D, mecoprop, dicamba, and inactive ingredients (a common mixture). Decreased litter sizes correlated with low dose exposures to this mixture. (Cavieres MF, Porter W et al. Developmental toxicity of a commercial herbicide mixture in mice: I. Effects on embryo implantation and litter size. *Environmental Health Perspectives* 110:1081-1085, 2002)
9. Golf course superintendents have been found to be at a significantly increased risk of four cancer types including - brain cancer, lymphoma (non-Hodgkin's lymphoma, NHL), prostate and large intestine cancer. A study was conducted of 686 deceased members of the Golf Course Superintendents Association of America (1972-1992). Brain cancer and non-Hodgkin's lymphoma rates were over twice the national average. Prostate cancer occurred almost 3 times the national average and intestinal cancer occurred at 1.75 times the national average. Similar patterns of disease rates had also been found previously in other studies of similar occupations. (Drs. Koss, BC, Burneister, IF, Ogilvie, LK, Fuortes, IJ, Department of Preventive Medicine Health, University of Iowa, *American Journal of Industrial Medicine*, 29(5):501-506, 1996)
10. A study sponsored by the National Cancer Institute indicates that household and garden pesticide use can increase the risk of childhood leukemia as much as seven-fold. (Lowengart, R. et al., Childhood Leukemia and Parent's Occupational and Home Exposures, *Journal of the National Cancer Institute* 79:39, 1987)
11. **The most used herbicide on lawns and turf in the nation is 2,4-D. Has been linked to non-Hodgkin's lymphoma. (Hoar, S., et al., Agricultural Herbicide Use and a Risk of Lymphoma and Soft-Tissue Sarcoma, *Journal of the American Medical Association* , 259(9): 1141-1147, 1986; Wigle, D., et al., Mortality Study of Canadian Farm Operators: Non-Hodgkin's Lymphoma Mortality and Agricultural Practices in Saskatchewan, *Journal of the National Cancer Institute* 82(7):575-582, 1990; Woods, J., Non-Hodgkin's Lymphoma Among Phenoxy**

Herbicide-Exposed Farm Workers in Western Washington State, *Chemosphere* 18(1-6):401-406, 1989; Zahm, S., et al., A Case Control Study of Non-Hodgkin's Lymphoma on the Herbicide 2,4-dichlorophenoxyacetic acid (2,4-D) in Eastern Nebraska *Epidemiology* 1(5):349-356, 1990)

12. PON1 status of farmworker mothers and children as a predictor of organophosphate sensitivity. (Furlong CE, Holland N, Richter RJ, Bradman A, Ho A, Eskenazi B. Department of Genome Sciences, Division of Medical Genetics, University of Washington, Seattle, Washington)
13. Organophosphate Pesticide Exposure and Neurodevelopment in Young Mexican-American Children (Brenda Eskenazi,¹ Amy R. Marks,¹ Asa Bradman,¹ Kim Harley,¹ Dana B. Barr,² Caroline Johnson,¹ Norma Morga,³ and Nicholas P. Jewell¹ *Environ Health Perspect* 115: 792-798 2007)
14. Pesticides in household dust and soil: exposure pathways for children of agricultural families. (N J Simcox, R A Fenske, S A Wolz, I C Lee, and D A Kalman *Environ Health Perspect*. 1995 December; 103(12): 1126–1134.
15. Chemical predictors of wheeze among farmer pesticide applicators in the **Agricultural Health Study**. (Hoppin JA, Umbach DM, London SJ, Alavanja MC, Sandler DP. *Am J Respir Crit Care Med* 2002;165:683-9.)
16. Cancer health effects of pesticides: systematic review. (Bassil KL, Vakil C, Sanborn M, Cole DC, Kaur JS, Kerr KJ. Family Medicine Centre, Queen's University, 220 Bagot St, Kingston, ON *Can Fam Physician*. 2007 Oct;53(10):1704-11)
17. Exposure to pesticides and childhood cancer risk: has there been any progress in epidemiological studies? (Jurewicz J, Hanke W. Department of Environmental Epidemiology, Nofer Institute of Occupational Medicine, Łódź, Poland. *Int J Occup Med Environ Health*. 2006;19(3):152-69)
18. Family pesticide use and childhood brain cancer. (Davis JR, Brownson RC, Garcia R, Bentz BJ, Turner A. *Arch Environ Contam Toxicol*. 1994 Jan;26(1):130-3.)
19. Non-cancer health effects of pesticides: systematic review and implications for family doctors. (Sanborn M, Kerr KJ, Sanin LH, Cole DC, Bassil KL, Vakil C. *Can Fam Physician*. 2007 Oct;53(10):1712-20)

20. Acute Illnesses Associated With Pesticide Exposure at Schools (*JAMA -The Journal of the American Medical Association* Vol. 294 No. 4, July 27, 2005)
21. “DREAMS for public awareness model”, Porter W et al 1999. Endocrine, immune, and behavioral effects of aldicarb (carbamate), atrazine (triazine) and nitrate (fertilizer) mixtures at groundwater concentrations *Toxicology and Industrial Health* 15(1-2)
22. Semivolatile Endocrine-Disrupting Compounds in Paired Indoor and Outdoor Air in Two Northern California Communities (Rudel R et al *Environmental Science & Technology*. 2010 Sept)
23. Triclosan is a potent inhibitor of estradiol and estrone sulfonation in sheep placenta (James, MO et al *Environment International*. 2010 Nov)
24. Impact of Prenatal Exposure to Piperonyl Butoxide and Permethrin on 36-Month Neurodevelopment (Horton M et al, *Pediatrics*. 2011 Feb 7)
25. Attention-Deficit/Hyperactivity Disorder and Urinary Metabolites of Organophosphate Pesticides (Bouchard M *Pediatrics*. May 2010)
26. A nine-home pilot study was conducted to evaluate monitoring methods in the field that may be used to assess the potential exposures of children aged 6 months to 5 years to pesticides found in the home environment. The greatest number of pesticides and highest concentrations were found in carpet dust.

Evaluation of Methods for Monitoring the Potential Exposure of Small Children to Pesticides in the Residential Environment. (Lewis RG, Fortman RC, Camann DE. *Arch. Environ. Contam. Toxicol.* 1994;26: 37-46)

Other Resources

Ontario College of Family Physician’s Pesticide Literature Review

www.ocfp.on.ca/English/OCFP/Communications/CurrentIssues/Pesticides/

Agricultural Health Study - sponsored by the [National Institutes of Health](#) (specifically the [National Cancer Institute](#) and the [National Institute of Environmental Health Sciences](#)) and the [Environmental Protection Agency](#) aghealth.nci.nih.gov/

National Environmental Education Foundation - neefusa.org/

EPA Endocrine Disruptor Screening Program (EDSP) www.epa.gov/endo/

Patient Resources

Beyond Pesticides *beyondpesticides.org*

Children's Environmental Health Coalition *healthychild.org*

Healthy Lawn Team *healthylawnteam.org*

Northwest Coalition for Alternatives to Pesticides *pesticide.org/factsheets.html*

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