The Inconvenient Truth about Pesticides, What Industry Isn't Saying

UBC Okanagan Campus

Kelowna, BC

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What we don't know about pesticides can hurt you

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DDT

Two competing visions of reality

1. ”Experts” are in the best position to judge what is in your best interest

2. Any sensible person is capable of judging the situation correctly, and determining the correct course of action, given the right information

“I know no safe depository of the ultimate powers of the society but the people themselves; and if we think them not enlightened enough to exercise their control with a wholesome discretion, the remedy is not to take it from them, but to inform their discretion by education.”

Thomas Jefferson

Letter to William Charles Jarvis

Sept. 4, 1820

Some pitfalls along the way

1. Am I selling you something, or am I simply telling you what I know?
2. Am I beholden to someone else, or some other goal, or am I being “up front”?
3. Am I knowingly leaving out important information in order to make a point?
4. Am I over-emphasizing certain information in order to make a point?
5. Do I actually understand what I’m talking about?

Current and emerging models

1. In living systems [ecosystems], every part interacts with every other part.
2. Changing one part changes all other parts.
3. Big changes, by powerful man-made agents, produce many effects, only few of which are known, and many of which are unexpectedly harmful.
4. Systems that are diverse are stable.

What we know

1. All pesticides [herbicides, insecticides, fungicides, rodenticides etc.] are designed to ***kill*** [“-cides”].
2. All pesticides kill ***more*** than their target species.
3. Pesticides can ***never*** be directly tested in humans [the Nuremberg Rules].
4. Pesticide residues are present in the bodies of ***everyone*** in this room.
5. Our bodies also contain many ***other*** chemical residues; there are almost no studies whatsoever to examine the interaction among all these chemicals and our own metabolism.
6. The body of evidence designed to prove that these chemicals are safe is ***far larger*** than the body of evidence aimed at finding out if they are not.
7. When someone with a ***vested interest*** in a chemical being tested pays for research on that chemical, the chance that such research will “prove” the chemical to be safe and beneficial is *sharply increased* [Stelfox inter alia].
8. ***One out of every five new drugs for humans is either taken off the market, or given a “black box” warning, in its first five years of use.***

What do we don't know

1. How industrial chemicals actually affect the human body – especially in combination.
2. How much of the scientific literature has been contaminated by unrecognized bias

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THE LETHAL IMPACT OF ROUNDUP ON AQUATIC AND TERRESTRIAL AMPHIBIANS

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Abstract. The global decline in amphibian diversity has become an international environmental problem with a multitude of possible causes. There is evidence that pesticides may play a role, yet few pesticides have been tested on amphibians. For example, Roundup is a globally common herbicide that is conventionally thought to be nonlethal to amphibians. However, Roundup has been tested on few amphibian species, with existing tests conducted mostly under laboratory conditions and on larval amphibians. Recent laboratory studies have indicated that Roundup may be highly lethal to North American tadpoles, but we need to determine whether this effect occurs under more natural conditions and in post-metamorphic amphibians. I assembled communities of three species of North American tadpoles in outdoor pond mesocosms that contained different types of soil (which can absorb the pesticide) and applied Roundup as a direct overspray. After three weeks, Roundup killed 96–100% of larval amphibians (regardless of soil presence). I then exposed three species of juvenile (post-metamorphic) anurans to a direct overspray of Roundup in laboratory containers. After one day, Roundup killed 68–86% of juvenile amphibians. These results suggest that Roundup, a compound designed to kill plants, can cause extremely high rates of mortality to amphibians that could lead to population declines.

Key words: amphibian decline; frog; glyphosate; pesticide; pollutants; Roundup; toad; toxicology.

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"After three weeks, Roundup [a herbicide] killed 96 – 100% of larval amphibians... After one day, Roundup killed 68 -- 86% of the juvenile amphibians"

Scientific American, September 17, 2007

PESTICIDE EXPOSURE TIED TO ASTHMA IN FARMERS

[Rachel's introduction: Overall, 16 of the pesticides studied were associated with asthma: 12 with the allergic variety of asthma and 4 with the non-allergic type.]

By Anthony J. Brown, MD

NEW YORK (Reuters Health) -- Exposure to several commonly used pesticides appears to increase the risk of asthma, US researchers report.

This finding stems from a study of nearly 20,000 farmers, which was presented Sunday at the European Respiratory Society Annual Congress in Stockholm.

Pesticide exposure is a "potential risk factor for asthma and respiratory symptoms among farmers," lead author Dr. Jane A. Hoppin, from the National Institute of Environmental Health Sciences in Research Triangle Park, North Carolina, told Reuters Health.

"Because grains and animals are more common exposures in agricultural settings, pesticides may be overlooked," Hoppin warned, adding: "Better education and training of farmers and pesticide handlers may help to reduce asthma risk."

Of the 19,704 farmers included in the study, 127 had self-reported (doctor diagnosed) allergic asthma and 314 had non-allergic asthma.

The main finding was that a history of high pesticide exposure was associated with a doubling of asthma risk, Hoppin noted. The link remained statistically significant after adjusting for a variety of potentially confounding factors including age, smoking, body weight, and state of residence.

Overall, 16 of the pesticides studied were associated with asthma: 12 with the allergic variety of asthma and 4 with the non-allergic type. Coumaphos, EPTC, lindane, parathion, heptachlor, and 2,4,5-TP were most strongly linked to allergic asthma. For non-allergic asthma, DDT, *malathion*, and phorate had the strongest effect.

"This is the first study with sufficient power to evaluate individual pesticides and adult asthma among individuals who routinely apply pesticides," Hoppin noted. Moreover, this is the only study to date to do this for allergic and non-allergic asthma separately, the researcher said.

"The main finding was that a history of high pesticide exposure was associated with a doubling of asthma risk"

Organic Diets Significantly Lower Children's Dietary Exposure to Organophosphorus Pesticides

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We used a novel study design to measure dietary organophosphorus pesticide exposure in a group of 23 elementary school-age children through urinary biomonitoring. We substituted most of children's conventional diets with organic food items for 5 consecutive days and collected two spot daily urine samples, first-morning and before-bedtime voids, throughout the 15-day study period. We found that the median urinary concentrations of the specific metabolites for malathion and chlorpyrifos decreased to the nondetect levels immediately after the introduction of organic diets and remained nondetectable until the conventional diets were reintroduced. The median concentrations for other organophosphorus pesticide metabolites were also lower in the organic diet consumption days; however, the detection of those metabolites was not frequent enough to show any statistical significance. In conclusion, we were able to demonstrate that an organic diet provides a dramatic and immediate protective effect against exposures to organophosphorus pesticides that are commonly used in agricultural production. We also concluded that these children were most likely exposed to these organophosphorus pesticides exclusively through their diet. To our knowledge, this is the first study to employ a longitudinal design with a dietary intervention to assess children's exposure to pesticides. It provides new and persuasive evidence of the effectiveness of this intervention. *Key words:* children's pesticide exposure, chlorpyrifos, dietary pesticide exposure, malathion, organic diet, organophosphorus pesticides, urinary biomonitoring. *Environ Health Perspect* 114:260–263 (2006). doi:10.1289/ehp.8418 available via *http://dx.doi.org/* [Online 1 September 2005]

The National Research Council (NRC) report *Pesticides in the Diets of Infants and Children* (NRC 1993) concluded that dietary intake represents the major source of pesticide exposure for infants and children, and this exposure may account for the increased pesticide-related health risks in children compared with adults. However, direct quantitative assessment of dietary pesticide exposure in children to support this conclusion is no simple task: Several studies (Adgate et al. 2000; Fenske et al. 2002; Gordon et al. 1999; MacIntosh et al. 2001) have analyzed pesticides in representative samples of children's food, and only two have used biologic monitoring to specifically examine dietary exposures (Curl et al. 2003; MacIntosh et al. 2001). The paucity of exposure data renders the debate over pesticide-related health risks in children controversial (Flower et al. known to cause neurologic effects in animals and humans, for the summer 2003 sampling period. Results of pyrethroid pesticides for the same summer sampling period, as well as results from other sampling periods, will be reported as soon as they become available.

Materials and Methods

Subject recruitment. Twenty-three children 3–11 years of age were recruited from local public elementary and Montessori schools in the suburban Seattle, Washington, area. A letter and a fact sheet describing the study were sent home with children. Families that were interested in participating contacted the research group directly by telephone or e-mail. Schools did not provide any assistance in recruiting subjects. A screening question-

Subject Division approved the use of human subjects in this study.

Sampling period. Each child committed to a 15-consecutive-day sampling period, which consisted of three phases. Children consumed their conventional diets during phase 1 (days 1–3) and phase 3 (days 9–15). During phase 2 (days 4–8), organic food items were substituted for most of children's conventional diet, including fresh fruits and vegetables, juices, processed fruit or vegetables (e.g., salsa), and wheat- or corn-based items (e.g., pasta, cereal, popcorn, or chips) for 5 days. These food items are routinely reported to contain OP pesticides [U.S. Department of Agriculture (USDA) 2005]; we used data from the years 2000–2003. OP pesticides are not regularly detected in meats and dairy products, so these food items were not substituted.

All organic food items were purchased by the research staff from a single grocery store. Parents were asked to request organic foods for their children in phase 2 with the goal of exactly replacing the items the children would have normally eaten as part of their conventional diet. This method ensured that any detectable change in dietary pesticide exposure would be attributable to the organic food rather than a change in the diet. Each child's daily dietary consumption was recorded by a parent in a food diary throughout the study period. Organic food items, mostly juices and fresh vegetables and fruits, were purchased before and during the study period and analyzed by one of the laboratories contracted by

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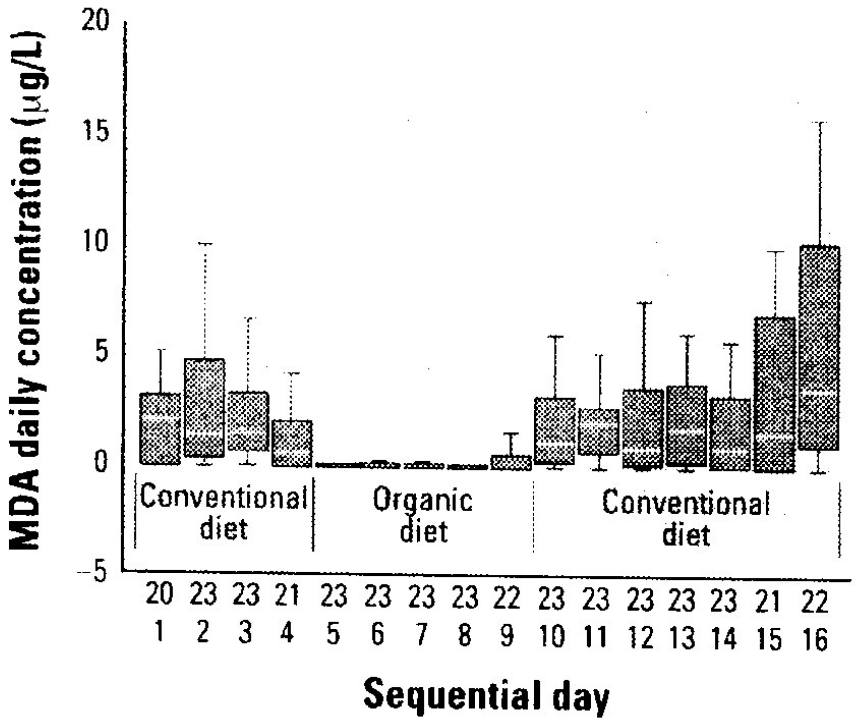


Figure 1. Box plots of DVWA of MDA concentrations in 23 children 3–11 years of age for 15 consecutive days in which conventional and organic diets were consumed. The top row of numbers on the *x*-axis represents numbers of children.

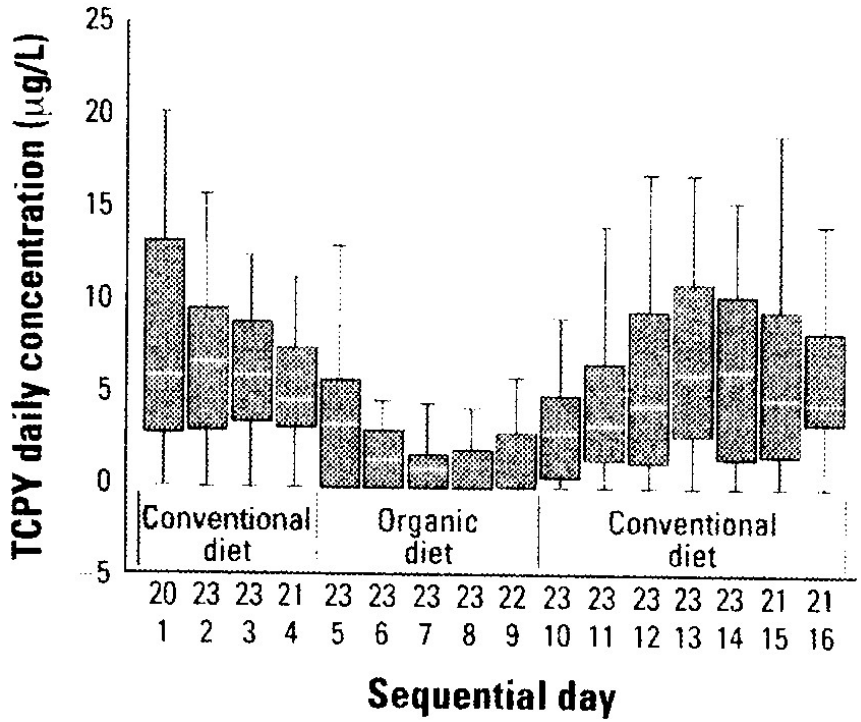
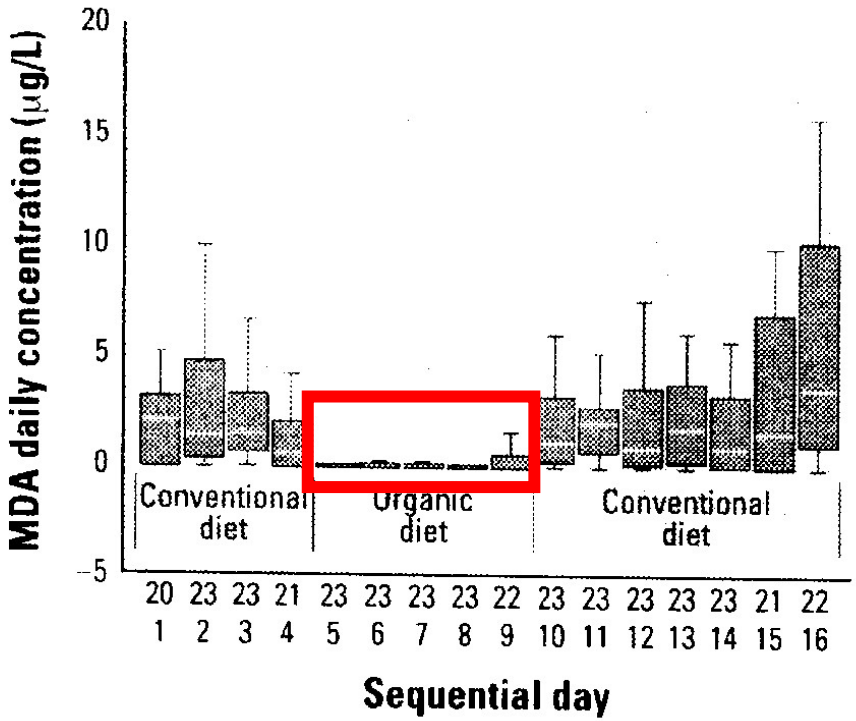


Figure 2. Box plots of DVWA of TCPY concentrations in 23 children 3–11 years of age for 15 consecutive days in which conventional and organic diets were consumed. The top row of numbers on the *x*-axis represents numbers of children.



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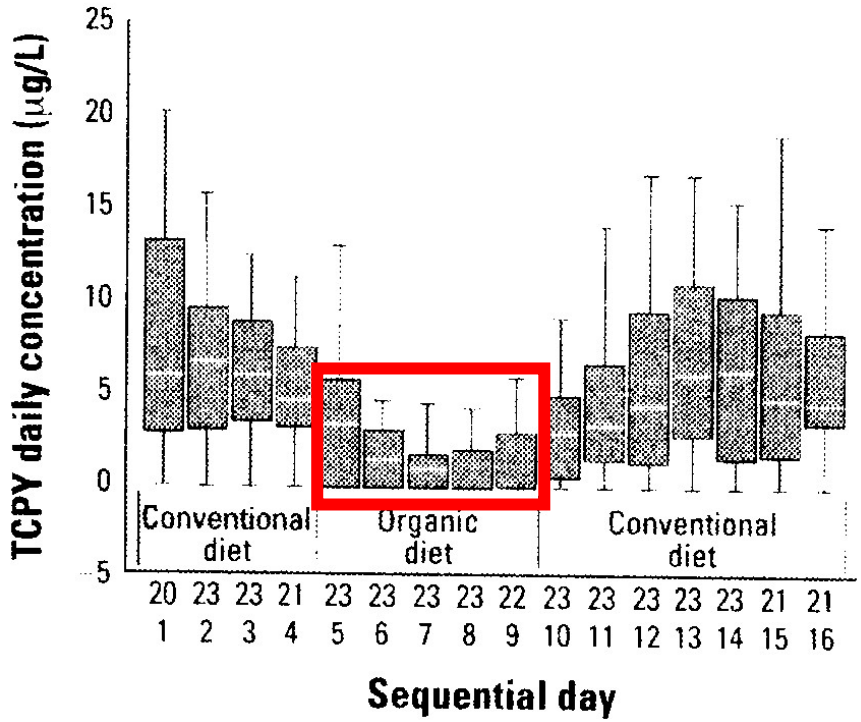

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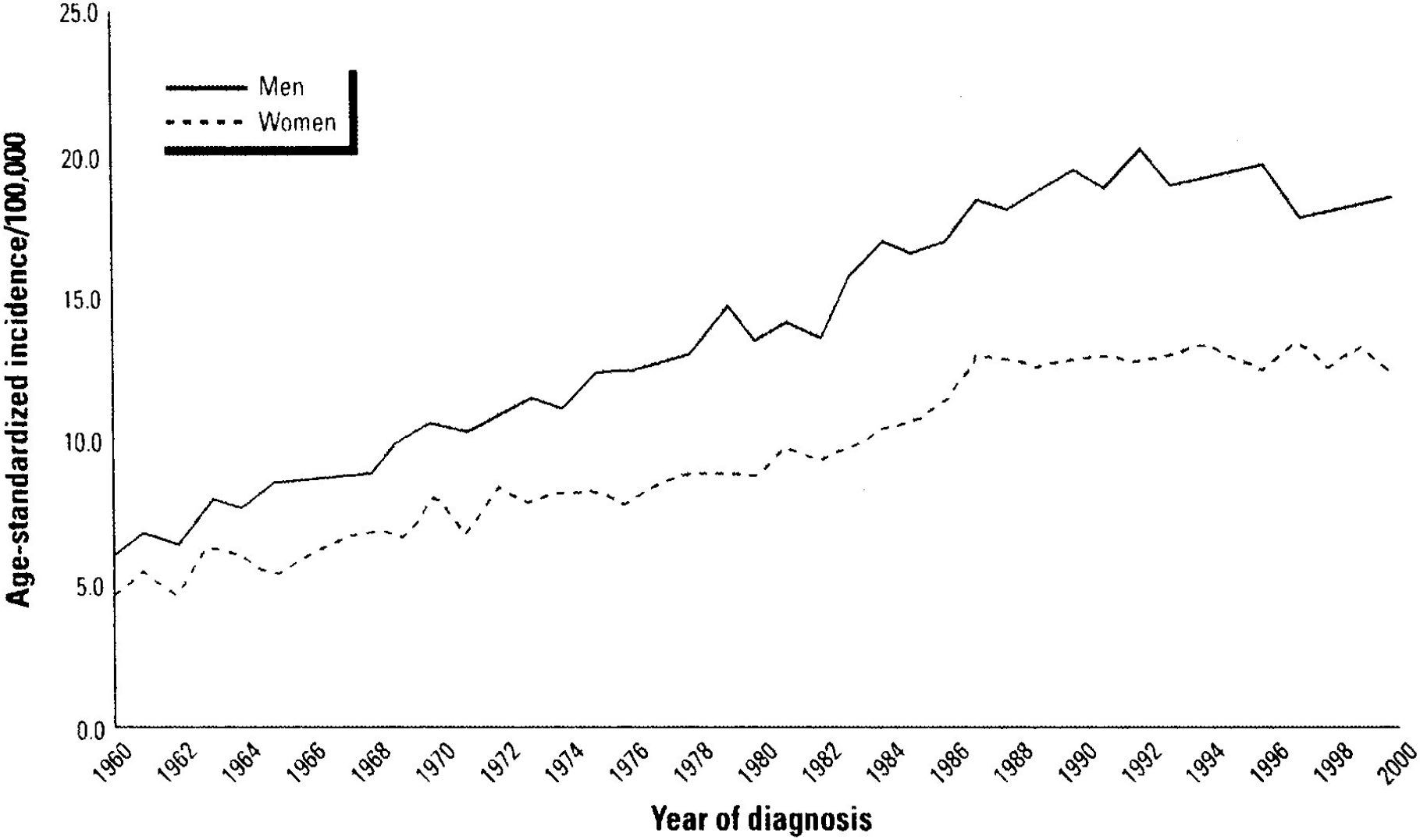
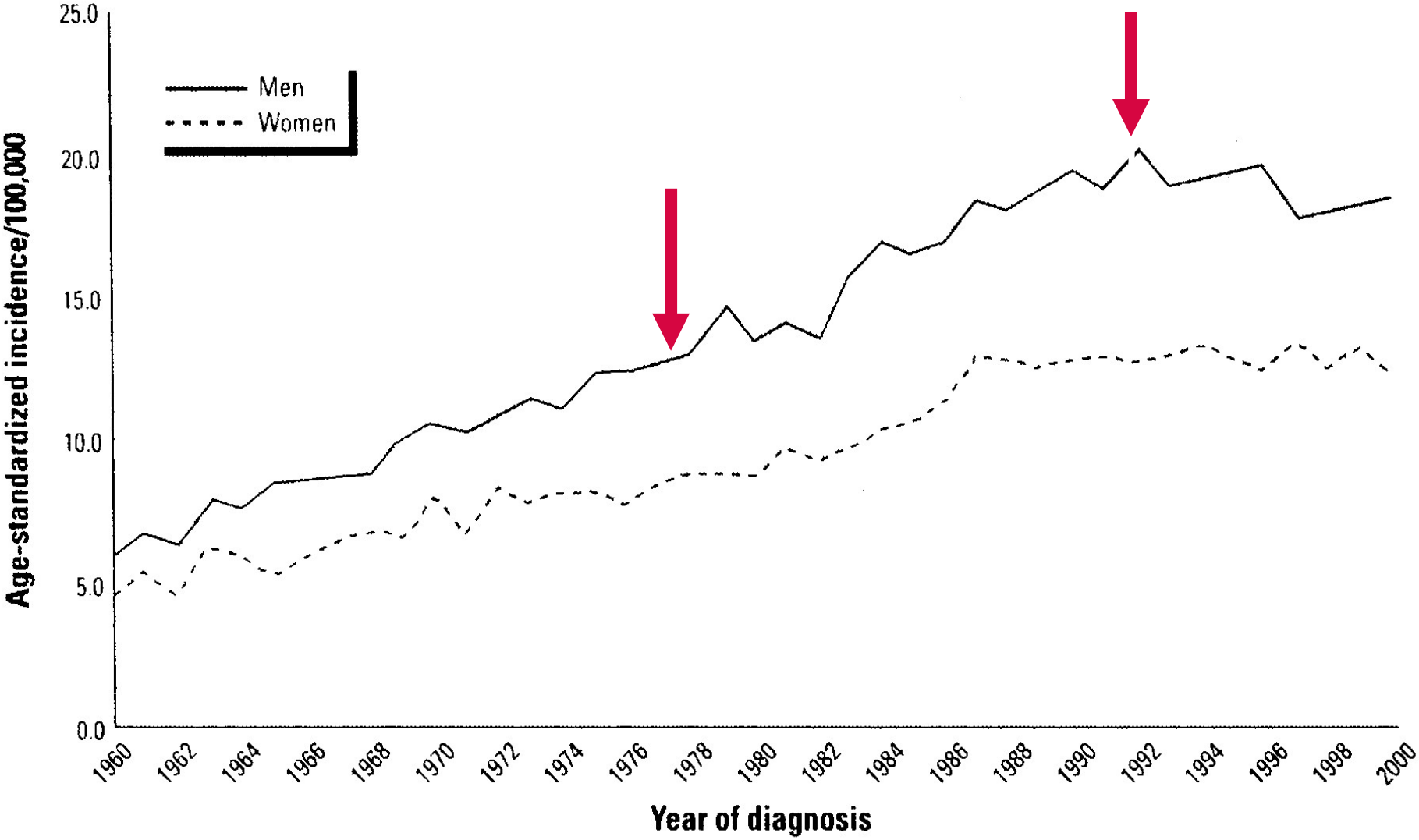


Figure 1. Age-standardized incidence per 100,000 of NHL (ICD-7 code 200) according to the Swedish Cancer Registry for all ages in 2000 (National Board of Health and Welfare 2002a).



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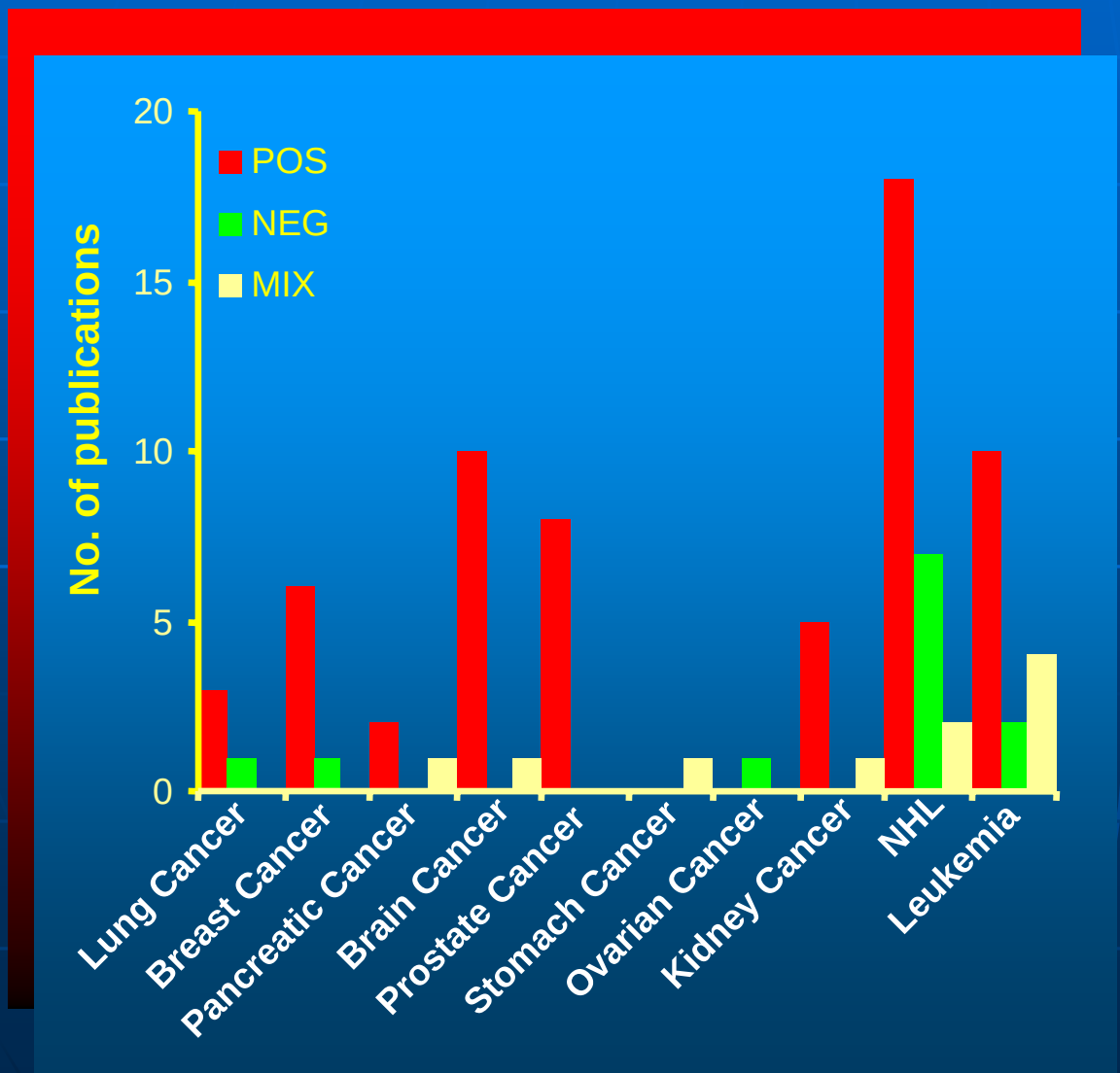

- 84 papers in total
- At least 84% of papers show a POSITIVE association between pesticide exposure and various cancers
- Only 8.3% are negative

The Precautionary Principle [or “look before you leap”]

Strength: encourages stringent efforts to prove the safety of an action before it is undertaken

Weakness: does not always address the risk of doing nothing, or of not taking the action proposed

Risk assessment
[or “my place or yours?”]

Strength: allows for the analysis of taking action versus not taking action, as well as a consideration of entirely different courses of action

Weakness: as more possibilities are introduced, it becomes increasingly difficult to assess the relative risk of each one

Our track record is not good…

" Planning and foresight are the keys to long-term survival of modern civilization, yet neither as individuals nor as societies do we plan for the truly worst case. We seem to hope for the best and plan accordingly... We appear incapable of learning a simple lesson that survival depends on the health of local ecosystems, and that we must nurture these systems..."

Moral & Walker: Environmental Disasters, Natural Recovery and Human Responses. Cambridge University Press, New York, 2007, pp 11-12.

We have no choice…

We must learn to do better, and quickly because the future generations, coming after this pivotal time in the Planet's history, will be enormously influenced by our choices.