

Notes for presentation to Unitarian Universalist Church of Olinda by James Brophy and Margaret Keith, March 24, 2013

1. We want to explore with you today an issue that we believe is relevant to the Unitarian principle, which promotes “*Respect for the interdependent web of all existence of which we are a part.*” It seems that the aim of this beautiful principle would be in direct conflict with many of society’s priorities and practices.
2. Let’s consider for a moment the issue of climate change. Recent research has found that it has already altered the seasons in the Arctic to make them more like southern regions. The full impact on the food web and other biological systems is largely unknown. One of the study’s authors has cautioned that we “*are doing a strange experiment.*” And I think we would add, that it is a very *dangerous* and *unethical* experiment with enormous potential repercussions.
3. All of us here can probably weigh in on the subject of climate change. But there are many, many other “strange experiments” going on everyday that few of us have even considered. The one we want to talk to you about today is the impact of workplace chemical exposures on women’s risk for breast cancer. Everyday, tens of thousands of Canadian women are unknowingly being subjected to workplace chemicals that have been shown in animal and human studies to promote the development of breast cancer.
4. Margaret and I have spent the past fifteen years studying these risks in hopes of contributing to prevention efforts. This morning, we are going to briefly describe our recent research study for you. We published the results in November in the journal, *Environmental Health*.
5. But first we will give you a little background information. Too often we hear that breast cancer is caused by genetics or poor lifestyle choices – or bad luck. But the Breast Cancer Fund’s *State of the Evidence* on the connection between the environment and breast cancer tells us it is likely caused by a combination of influences, including chemical exposures.
6. We know that scientists have identified **216** chemicals...
7. ...that can induce breast tumours in animals. About four times that number – over **870** chemicals -- have been shown to disrupt the hormonal system. Breast cancer, like male prostate or testicular cancer, is typically hormone mediated. Should we be concerned about small day-to-day exposures?
8. Here is an example of the potent effects of even small amounts of exposure. This little green frog, whose name is Darnell, was raised by Dr. Tyrone Hayes in a lab at the University of California-Berkeley. He has produced both children and grandchildren. Genetically, Darnell is male. But after living in water that was contaminated with the herbicide Atrazine at a level of 2.5 parts per billion—slightly less than what's allowed in our drinking water—he developed a female body, inside and out.
9. Darnell then became a mother, having successfully mated with other males. In case you haven’t guessed, Atrazine is an endocrine disrupter. It has been banned in Europe but, as many of you know, it is still being used on farm crops in North America.
10. Here’s another disturbing story. In 1991, researchers in a lab at Tufts University discovered that breast cancer cells were unexpectedly growing in a culture they were working on. At first they couldn’t figure out what was going on. They hadn’t added anything to the cells to make them grow.
11. It turned out that the manufacturer had changed the formulation of the plastic tubes to make them sturdier and more impact-resistant. They had added nonylphenol and it was leaching into the culture and acting on the

cancer cells as if it were a natural estrogen. And estrogen is a known breast cancer promoter

12. There are many gaps in breast cancer research. Perhaps because of gender and social class bias within the dominant scientific institutions, there has been little attention paid to the disproportionate exposures experienced by many blue-collar populations. In Canada, for instance, bisphenol A (BPA) is banned in baby bottles, which it should be, but not a thought has been given to the health risks faced by the women and men who produce these products -- or to their offspring. Not nearly enough has been done to better understand:

- the links between breast cancer and **occupational exposures**,
- the role of **hormone disrupters** in workplace settings,
- the effects of **complex mixtures** of chemicals, which are typical in many workplaces,
- the **cumulative** effects of these exposures over **time**,
- and the effects of exposure during periods of **biological vulnerability (typically in the younger years)**.

13. These are the gaps we attempted to address, in part, in our various research studies, all of which were carried out in the local area. Our most recent study builds from two previous studies.

14. In the first, which was a fairly small study, we found an elevated risk for breast cancer in women 55 years or younger who had ever farmed. In the second, a somewhat more developed study, we again found an elevated risk for women who had farmed and we also observed that the risk increased for women who had farmed and then went on to work in the auto industry. We believe that this finding pointed to the possible effect of early occupational exposures and later heightened susceptibility.

15. Our most recent study was much larger and more comprehensive than the previous two. It included **1,006** women with breast cancer and **1,146** randomly selected women from the community who did not have breast cancer. Beginning in early 2003 we began conducting interviews using a very extensive questionnaire.

16. We asked the women to provide us with information about such non-occupational factors as their reproductive history, income, education, smoking, alcohol use, and family history of cancer.

17. We also gathered information about each woman's job history, including the types of industry and specific occupations she had worked in. We also noted her age at the beginning and end of each job, which provided us with information about possible exposures during periods when breast tissue was particularly vulnerable.

18. In preparation for the data analysis, we assessed each job as having low, moderate, or high exposure to cancer-causing agents or endocrine disrupting chemicals. We then analyzed the results.

19. We found several non-work-related associations. We observed an elevated risk for women who:

- had a higher body mass index after menopause,
- had lower education and income
- had fewer pregnancies
- had more years between the start of menstruation and menopause
- and who smoked

20. These are the key **occupational** associations we found. These findings are based on 10 years duration in a job where women were likely to have been *highly exposed*.

- There was an overall increased breast cancer risk of 42 percent among the highly exposed women across all occupations and industries.
- Women who worked in farming had a 36 percent increase in breast cancer risk.
- The risk of developing breast cancer more than **doubled** for women working in bars and gambling facilities, such as casinos and racetracks.
- A 73 per cent increase in risk was found in the metalworking sector, which includes tooling, foundries and metal parts manufacturing.
- The risk more than **doubled** for women working in the food canning sector.
- ... as well as for women working in the auto industry's plastics manufacturing sector.

I want to take a moment to put these findings into perspective. Research tells us that moderate alcohol consumption confers an increased breast cancer risk of about 27%. Now think about this in relation to our finding for work in agriculture, for example, in which we found a 36% increased risk, or the food canning industry, in which we found a 235% increased risk or for the automotive plastics industry, which conferred a 268% risk. Add to the equation the fact that almost 100,000 women in Canada at any given time are working in agriculture and almost a quarter of a million women work in manufacturing of some type.

21. There were also some important findings about premenopausal breast cancer.

- The risk for developing breast cancer before menopause increased **more than 4 times** for women who worked in automotive plastics.
- And the risk was **more than five times** higher for those who had worked in food canning.

22. How do we explain the increased risks for breast cancer in the various occupational categories? We know, in the example of farming, several pesticides act as mammary carcinogens or can mimic hormones. Employment in farming and exposure to pesticides often begins earlier in women's lives than other occupations and the early exposures may be playing a role in the risk.

23. The elevated risk of developing breast cancer in bars and gambling facilities may be linked to second-hand smoke exposure and night work, which has been found to disrupt the endocrine system.

24. Women working in tooling, foundries and metal parts manufacturing can be exposed to a variety of potentially hazardous metals and chemicals.

25. Exposures to chemicals in the food canning industry may include vapours from the polymer linings of cans, such as BPA, and to pesticide residues, or perhaps sterilants? This is one area for which we have very little exposure information.

26. Many plastics and additives, such as flame-retardants and hardeners, have been found to release estrogenic and carcinogenic chemicals. Cumulative exposures to **mixtures** of these chemicals are a significant concern.

27. What are some of the possible implications of these research findings?

- We believe that the study has demonstrated the value of including **occupational histories** in exploring breast cancer risk. In fact, it shows the need for collecting occupational histories for **all cancer** patients.
- It also clearly shows that we need to rethink the way we establish **regulations** regarding allowable exposures. The setting of exposure limits needs to take into account the potential of particular chemicals to mimic hormones and to increase breast cancer risk. And the regulations must take into account the effects of **mixtures of chemicals** in work environments.

- Women who develop breast cancer following work in environments with carcinogens and endocrine disrupters should receive **workplace compensation**. To our knowledge no woman in Ontario has ever been compensated for breast cancer.
- We clearly need more research in the neglected area of occupational risks for breast cancer.
- And, of course, we need to take **preventive action**. This should involve a wide range of strategies that include education, substitution, engineering controls, regulation and enforcement.

28. We need to apply the Precautionary Principle to our regulatory systems. It states that, *“When an activity raises threats of harm to human health or the environment, precautionary measures should be taken, even if some cause and effect relationships are not fully established scientifically.”*

29. We believe that refusing to make changes because of such so-called uncertainty is more a political than a scientific decision. And it is one that could potentially jeopardize the health many thousands of people. Unfortunately, our economic system and its inherent drive for greater profits define most aspects of our lives. The degree to which our society is willing to provide regulatory protection as we await the elusive goal of absolute “scientific certainty” is really a measure of how little our system seems to value human health.

30. As researchers and occupational health advocates, we are in agreement with Robert Procter, author of the Cancer Wars, who argues that incomplete knowledge is not an excuse for failing to reduce hazards. As he said, ** “to do otherwise, to wait and see, to delay in the face of good but partial evidence, is tantamount to experimenting on humans.”*

31. We need to take a long hard look the largely unregulated “strange experiments” we are conducting on humans and the planet. Increased breast cancer risk is but one manifestation of our disregard for the hazards posed by uncontrolled industrialization and chemical use. We’ll end by borrowing another quote related to climate change that we think fits, just as well, the issue of chemical harm. As author, Bill MacKibbin, says, *“We are running Genesis backwards, decreating.”*

In essence, we are playing God, without a license -- and without the professional qualifications.