Xenoestrogens and Breast Cancer: Nowhere to Run

By Luita D. Spangler

This article was originally published in Winter 1996 in WomenWise magazine. WomenWise is the quarterly health-oriented publication of the Concord Feminist Health Center in Concord, New Hampshire. This article is copyrighted and is re-printed here with permission from the publisher. For more information, contact Concord Feminist Health Center at 603-436-7588.

Luita D. Spangler impatiently awaits the revolution while teaching literature and working as a healthworker.

Thanks to the efforts of persistent, outraged and energetic women's health advocates, many people are now aware of the fact that the incidence of breast cancer has reached epidemic proportions in the U.S. and is rising steadily throughout the globe. The possibility that a woman in North America will contract the disease has risen from one chance in twenty in 1950 to the current rate of one in eight. In the U.S., the rate of breast cancer among white women from 1950 to 1989 increased by 53% or by over 1% annually. Today, breast cancer is the most prevalent type of cancer in women, and is the leading cause of death among women between the ages of 40-55. Every year 182,000 American women will be diagnosed with breast cancer; 46,000 women die of the disease annually. And despite occasional optimistic noises from organizations like the American Cancer Society and the National Cancer Institute, 5-year survival rates for the three main national cancer killers - lung, breast and colo-rectal - have remained unchanged for decades.

Three major classes of risk factors for breast cancer have been recognized by such conventional cancer organizations as the American Cancer Society. The first factor is a familial history of breast cancer, particularly breast cancers that occur among pre-menopausal women; this factor has fueled the recently publicized search for a "breast cancer gene." Not to diminish the importance of any research advance in the battle against breast cancer, but researchers estimate that this factor may account for only 5% of the total incidence of breast cancer, in spite of all the recent media ballyhoo about this gene. Dietary fat has been counted as a risk factor, although this link is controversial, the research evidence for this connection has been tenuous and inconsistent.

The third accepted factor involves a woman's lifetime exposure to estrogen, since estrogen has been proved to promote breast tumors. Important risk elements in a woman's life involve her overall exposure to estrogen include early menarche (onset of menstruation), late menopause, and childlessness or late childbearing. A woman's exposure to "exogenous hormones" (hormones produced outside of the body) may also be an important component; this would include prolonged use of oral contraceptives, the use of the injectable contraceptive Depo-Provera and Norplant contraceptive silicone rods, and long-term postmenopausal estrogen replacement therapy.

These three factors combined, however, can only account for about 25% of breast cancers,
and can't explain breast cancer's dramatic increase in frequency within the last fifty years. There is actually a strong rationale for the current breast cancer epidemic, but efforts to research and publicize the evidence for this probable determinant have encountered heavy political resistance.

**Organochlorines Are Toxic**

In 1990, Elihu Richter and Jerry Westin, two environmental specialists from Hebrew University's Hadassah School of Medicine, discovered a surprising glitch in otherwise universally depressing breast cancer statistics. They found that in the decade between 1976 and 1986, Israel was unique among 28 counties surveyed in that it actually registered a significant drop in breast cancer mortality. This was in spite of increasing risk factors in the Israeli population, such as per capita fat intake and increasing patterns of delayed pregnancy, and previous Israeli breast cancer rates that paralleled the international epidemic. As Westin noted, "All and all, we expected a rise in breast cancer mortality of approximately 20% overall, and what we found was that there was an 8% drop, and in the youngest age group, the drop was 34%, as opposed to an expected 20% rise. So if we put those two together, we are talking about a difference of about 50%, which is enormous."

Westin and Richter eventually connected this drop in breast cancer mortality to a 1978 Israeli ban on the use of three organochlorine pesticides (a ban, by the way, that was opposed by the Israeli cancer establishment). Prior to 1978, alpha-benzene hexachloride (BHC), gamma benzene hexachloride (lindane) and DDT were used heavily in Israeli cowsheds. As a result, the three pesticides heavily contaminated milk and milk products, at rates between 100 and 1,000 times greater than in the U.S., national public outcry resulted in legislation prohibiting these three pesticides.

Critics quickly challenged this suggested connection between breast cancer mortality and pesticide exposure, claiming that since most environmentally-induced cancers take at least twenty years to develop, the drop in mortality happened too quickly to associate with the prohibition of the three pesticides. In reply, Westin and Richter explained that organochlorine pesticides are "complete" carcinogens, which both initiate and promote tumor growth, and whose presence (or absence) can change cancer statistics quite rapidly.

Actually, **animal experiments conducted back in the 1960's proved that organochlorine pesticides caused breast cancer in rats.** Like so many other animal studies, however, the results and their suggested human parallel were totally ignored when they proved inconvenient to the international chemical industrial machine. Other research conducted nearly thirty years ago demonstrated that organochlorine pesticides concentrate in animal and human fat tissue. As early as 1981, one research study concluded that organochlorine pesticides "might be considered possible contributors to the high incidence of breast cancer among women."

Such pesticides as DDT, dioxin and atrazine are called "organochlorines" because they are organic compounds containing chlorine bonded to carbon. Organochlorines are also produced in the manufacture of herbicides, detergents, including those present in the production of spermicidal foam or lubricants, petrochemicals such as polychlorinated biphenyls (PCBs), PVC
plastics and paper. Organochlorines have only recently been synthesized; their massive introduction into the international chemical industry began after World War II. DDT, for example, was introduced in 1943 by the U.S. as a pesticide for the military's anti-malarial campaigns, and widespread civilian use began two years later after the end of the war.

As environmental pollutants, however, organochlorines are now everywhere. According to Greenpeace thirteen tons of chlorine are produced in North America every year. One percent is used to chlorinate drinking water, while the rest is used in the production of plastics, to bleach paper products, and for many other industrial and agricultural uses. Dumped into landfills, chlorine based compounds leak into soil and water, and eventually collect in the tissues of living organisms. Incinerators burn chlorine-containing trash, releasing organochlorines into the atmosphere. In animals (yes, humans are animals) organochlorines are stored in fat tissue and, since these substances are inefficiently metabolized, they stay in the body forever and accumulate. Because of this, the amount of organochlorine in the bodies of animals becomes more and more concentrated as they move up the food chain. Of course, human beings sit right at the top of the food chain, ingesting and amassing organochlorines like crazy. The first report of DDT in animal milk was published in 1945; the first reports of DDT in human fat and human breast milk appeared three years later.

Recent scientific research has clearly demonstrated an association between organochlorines and breast cancer. An analysis of chemical plant workers in Hamburg, Germany discovered a two-fold increase in breast cancer among the women workers who had been exposed to dioxin contamination. Significantly higher levels of breast cancer have been found in separate studies of women living near organochlorine chemical plants in Minnesota and Long Island. Other studies have revealed elevated breast cancer mortality among professional chemists, among hairdressers and users of hair dye.

Analyses of the breast fat of women with breast cancer found that DDT, its derivative DDE, polychlorinated biphenyls (PCBs) and other organochlorine pollutants actually concentrate in the cancer tissue itself, in contrast with surrounding non-cancerous tissue. In one study, the biopsied breast fat of women with breast cancer contained forty percent more chlorinated pesticides than tissue from women whose biopsies proved negative. Mary Wolff, an associate professor of environmental and occupational medicine at the Mount Sinai School of Medicine in New York, examined archived blood specimens from women in New York City. Wolff, who claims to have been "a skeptic all along about the environmental connections to breast cancer, but I keep being proven wrong," discovered that the blood from women who later developed breast cancer registered much higher levels of DDE. The results from this study, published in the April 21, 1993 Journal of the National Cancer Institute, lead Wolff to suggest that women exposed to such pesticide derivatives may face up to four times greater risk for developing breast cancer.

Wolff concludes her article with the suggestion "that environmental chemical contamination with organochlorine residues may be an important etiologic factor in breast cancer. Given the widespread dissemination of organochlorine insecticides in the environment and the food chain, the implications are far-reaching for public health intervention worldwide." Such a blunt statement prompted an immediate reaction from the ranks of the conventional cancer establishment. Stephen Sternberg, for example, a doctor working with the Memorial Sloan-Kettering Cancer
Center in New York, in direct response to Wolff's research, complained in a following issue of the same publication that "we appear to be in the middle of an uproar regarding breast cancer." Worrying about "misdirected funding," he went on to fuss that "the findings by Wolff et al require a more conservative conclusion before costly intervention studies are undertaken in an attempt to implicate organochlorine compounds in causation. …I suggest that more caution be taken in ascribing possible causation of breast cancer to DDT and other organochlorines. The media and the public have a tendency to misinterpret or indulge in hyperbole in evaluating such reports."

One may wonder why one of Mary Wolff's anti-cancer colleagues would react in such a grumpy fashion to an apparent advance in the fight against breast cancer. Actually if organochlorines are seriously implicated in the present epidemic of breast cancer, the existing cancer research establishment may be testy indeed. It is an unfortunate fact that much of the cancer research currently going on is actually funded by the very same chemical companies that are filling the environment with organochlorine pollution.

For example the United Kingdom-based Zeneca Group is a primary corporate sponsor and funding source for the U.S. National Breast Cancer Awareness Month. Zeneca also coincidentally markets Nolvadex, the trade name for tamoxifen citrate, a synthetic anti-estrogen used to treat breast cancer, to the tune of $470 million a year. Despite the fact that tamoxifen has been implicated as a possible cause of uterine cancer, liver damage, and other health problems, the drug is now being tested among a population of 16,000 perfectly healthy women as a breast cancer preventative (the consent form for this drug trial was changed after the National Cancer Institute was accused of withholding information about the risk of endometrial cancer and tamoxifen). Zeneca, recently spun off from its parent corporation, Imperial Chemical Industries, also manufactures and sells $300 million a year's worth of acetochlor, a carcinogenic herbicide, and was named in a government lawsuit for dumping DDT and PCBs into Los Angeles and Long Beach harbors. In 1988, a third of the leadership board of the Memorial Sloan-Kettering Cancer Center, Stephen Sternberg's patron institution, had direct ties to the oil, chemical, automobile and cigarette industries. One of their fund-raising appeals, proudly outlining their latest research directions, makes no mention of environmental causes of breast cancer, but brags that "MSK scientists are seeking to understand the role genes play in breast cancer, to identify genetic markers that correlate with increased risk, and to find ways of intervening, possibly through gene therapy, to prevent or cure the cancer."

If the current breast cancer epidemic could be traced simply to the international use of organochlorine pesticides, the task of promoting global pesticide elimination would be daunting enough. Unfortunately, the association between these pesticides and breast cancer merely reflects the tip of a rather grotesque iceberg.

**Organochlorines Mimic Estrogen**

Organochlorines are not only often overtly toxic, they also possess estrogenic activity; in other words, they mimic estrogen. Basically natural hormones function by attaching to cell receptors that are designed specifically for that hormone; once connected, they trigger various chemical changes in the body. Natural bodily estrogen, or estradiol, tends to be disassembled relatively
quickly by the body and is then eliminated from the bloodstream. Chemicals that function like estrogen (called "xenoestrogens," literally, "foreign estrogens") wreck havoc in a number of ways. By taking up a receptor site, they can prevent a natural hormone from binding and block in its normal function. They can move into the nucleus of a receptor cell and disrupt the cell's growth and division. Xenoestrogens are known to exaggerate the carcinogenic effects of radiation, and may increase the breast cancer risk among women who were subjected to prenatal exposure to these substances.

In addition, estradiol in the body seems to be metabolized in two distinct ways. One end of an estrogen molecule has two carbon atoms; the other end has sixteen. Estrogen, which is metabolized through the two-carbon end seems to be innocuous, but a sixteen-carbon metabolite stimulates uncontrolled cell proliferation and allows groups of cells to grow without anchoring to a surface - two important factors needed for the development of cancer. Sixteen-carbon metabolites are also toxic to cellular DNA. Synthetic xenoestrogens apparently block the 2-carbon pathway and promote 16-carbon metabolism. (In contrast, natural plant xenoestrogens, like those occurring in broccoli, cabbage, and cauliflower, favor the carbon metabolite.) Finally, they tend to stay in the body and remain active for a much longer time than natural estrogen, giving them the opportunity to do the body enormous harm.

Unfortunately, organochlorines are merely one type of a current flood of xenoestrogens recently introduced into our environment. The synthetic hormone Diethylstilbestrol (DES), given to women in the 50's and 60's to (ineffectively) prevent miscarriage, with cancerous results for both the women and their children, is still widely used in the meat industry as a feed supplement to put weight on animals scheduled for slaughter; the hormone is, of course, passed on to people in the meat. The dairy industry is currently awash in rBGH, an artificial hormone developed to stimulate dairy cows into producing more milk for an already glutted market, with dire results for the cows and as yet unknown effects on human consumers. Xenoestrogenic material leaches out of polycarbonate plastics, often used in food and cosmetic packaging - even tin cans thinly lined with polycarbonate plastic leak estrogen into their contents.

Light pollution, the global trend toward filling the environment with artificial illumination, also seems to be compounding the problem; melatonin, a natural hormone secreted at night by the pineal gland, has anti-estrogenic properties and may inhibit the development of cancer, but is suppressed by the presence of artificial light. The production of melatonin is also reduced by the presence of even very weak electromagnetic fields, such as those associated with radio waves and household microwave ovens.

**Not Just Women Affected, Males too**

Of course, this deluge of xenoestrogens doesn't just affect women, although the epidemic of breast cancer may be its most dramatic manifestation at present. Global wildlife has been bearing the primary brunt of environmental pollution for decades, and there is mounting documentation of hormonal disruption among certain species. Indeed, the well-known link between DDT and fatally thin eggshells among such birds of prey as the bald eagle is a perfect example of such xenoestrogen-related destruction.
Finally, there is increasing evidence that the ubiquitous presence of synthetic estrogen in the environment is beginning to take its toll on the health of men, as well. International incidences of testicular cancer, undescended testes and hypospadias (in which the urethral openings on the penis is on the underside rather than the tip) are sharply on the rise, while the average male sperm count is dropping equally as rapidly; researchers have discovered that semen from the average man today has half the amount of sperm in it, and of poorer quality, than that of fifty years ago.

Seen in the light (literally) of global industrial pollution, the epidemic of breast cancer ceases to be a mystery and becomes a measure of the times. Equally measuring the times has been the industrial reaction to this accumulating chemical indictment. Instead of working to eliminate and prevent xenoestrogenic pollution, the chemical industry and its medical cohorts have responded by pouring more drugs into the environment to counter act the effects of previously introduced synthetic substances; by concentrating their research on high profile but less significant factors, like the elusive breast cancer gene; or by concentrating on expensive and technologically seductive cancer therapies, like gene therapy. Declining male fertility has been counteracted with invasive and dangerous drugs and surgical procedures aimed entirely at women's reproductive systems.

With all this in mind, it is natural to ask, what can a woman do to minimize her chances of coming down with breast cancer? At the moment, individual strategies are limited, at best. Breast feeding before the age of thirty has been demonstrated to be a protective act; unfortunately, the theory behind this is that a woman decontaminates her breasts of organochlorines and other environmental carcinogens by passing the toxins out through her breast milk - into her infant. Since organochlorines accumulate in animal fat, eating a low-fat diet seems a logical preventative step, although the most recent studies seem to indicate that greatly reducing fat from one's diet after reaching adulthood has no protective value. Trying to avoid industrial pollution is also a good idea, albeit a bit difficult for those of us who choose to participate actively in life on the planet.

Individual solutions are obviously no answer to the international epidemic of breast cancer, but collective organizing and action may be. And this is just what is beginning to take place. In 1991, women from a collection of grass-roots organizations converged on Washington DC to form the National Breast Cancer Coalition. At present, this coalition has grown to comprise nearly 300 member organizations and thousands of individuals across the country. In October 1993, Greenpeace released its report *Chlorine, Human Health and the Environment: The Breast Cancer Warning*, a compilation of studies clearly linking chlorine-based chemicals to the epidemic of breast cancer. At the same time, the American Public Health Association (APHA) unanimously passed a resolution urging U.S. industry to stop using chlorine.

Since then, a number of women's health organizations, feminist groups, environmental groups and general health organizations have joined forces to demand fundamental change in the battle against breast cancer and other environmentally-induced diseases. As Joan D'Argo, a worker with Greenpeace, explains, "Breast cancer is a harbinger of other environmental diseases. We need to meet face-to-face with the chemical industry in diverse gatherings; if we don't, the
corporate world will just threaten to take their business elsewhere." As an example of this sort of organizing, here in New Hampshire the New Hampshire Breast Cancer Coalition has joined forces with the Seacoast Anti-Pollution League, the Women's Cancer Awareness Project (Seacoast Region) and Greenpeace to form the Toxic Links Collaborative.

One main obstacle this burgeoning movement faces is the nation's archaic method of testing possible environmental toxins; at the moment, organochlorines are tested individually for their carcinogenic potential. This method entirely overlooks the fact that their effects on the body are interactive and cumulative. Therefore it is impossible to isolate out the villainous effects of one xenoestrogenic substance from the thousands of other mixing with it in our environment. Another obstacle is the global distribution of these environmental toxins: when one substance is banned in one nation, it may be heavily marketed and used in other, less restrictive countries. This is especially true in developing nations; for example, in Costa Rica, annual pesticide use can reach levels equivalent to eight pounds per person, double the average level of use in industrialized countries.

Nevertheless, the international cry of alarm over organochlorine pollution and its cost in human and environmental health is growing louder. And the chlorine industry is not ignoring this growing sound. The Chemical Manufacturers Association (a lobby representing more than 170 chemical companies), the Chlorine Institute, and many pulp, paper and incineration organizations have combined their financial resources to launch a massive public relations counter-attack. You will be seeing their advertisements more and more frequently now, in magazines, newspapers, even on television, promoting chlorine as a hygenic substance as natural as mother's milk.

It's not. But it's in it.

**SOURCES (for article above)**

Following is a partial list, for a complete list call the author at 603-436-7588.


**WHAT YOU CAN DO**
• Reduce or eliminate use of plastic containers for food storage.
• Ask for office paper products whitened without chlorine.
• Purchase non-bleached coffee filters, paper, napkins, toilet tissue, tampons, etc. The EPA has determined that using bleached coffee filters alone can result in a lifetime exposure to dioxin that exceeds acceptable risks.
• Use tampons and sanitary napkins made of organic cotton without chlorine. (The FDA detected dioxins and dozens of other substances in conventional tampons. Look for ones that contain no chlorine, fragrance, wax, surfactants, rayon, etc.)
• Do not use chlorine bleach for household cleaning or laundry. Hydrogen peroxide is a safe alternative; it breaks down to water and oxygen.
• Drink filtered or bottled water, not "city water" that contains chlorine.
• Do not use pesticides or herbicides.
• Regard long-time use of synthetic or animal derived hormone treatments (oral contraceptives and hormone replacement therapy) with healthy skepticism, investigate natural and plant-derived alternatives for HRT.
• Don't purchase plastic products (their production releases chlorinated toxins into the environment).
• Use only natural underarm deodorants; avoid anti-perspirants.
• Eat a low-fat diet, but be cautious of synthetic fat substitutes (avoid animal foods that contain hormones such as milk, chicken, beef, pork). Avoid fried, char-broiled, or barbecued as forms of cooking.
• To counter free radicals, eat foods high in anti-oxidants (vitamins A, C, E, selenium, beta carotene) - green leafy vegetables, kale, carrots, yams, sweet potatoes, citrus, nuts, broccoli, cauliflower). Avoid alcohol and caffeine/coffee.
• Eat organically grown food.

FOR MORE INFO, CONTACT

Health Care Without Harm - read about efforts to eliminate harmful plastics from the health care industry.

My House is Your House - read about the second most used plastic, polyvinyl chloride (PVC), and how you can join the movement to phase out the use of this serious environmental and health hazard.

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"Reach for Unbleached"
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Dr. Andrew Weil on "Eating to Prevent Breast Cancer"

Dr. Andrew Weil on Anti-Oxidants

The Breast Cancer Fund - links between breast cancer and environmental toxins