

Rachel's Environment & Health News

#334 - New Study Links DDT To Breast Cancer

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Do trace residues of industrial chemicals harm humans?

A new study published yesterday in the JOURNAL OF THE NATIONAL CANCER INSTITUTE reports that breast cancer in American women is strongly associated with DDE (a form of DDT) in their blood.[1] Breast cancer strikes 176,000 women in the U.S. each year, and each year 46,000 die of it. DDE is a residue derived from the well-known pesticide, DDT. DDT was banned in the U.S. in the early 1970s but trace residues are still measurable nearly everywhere in the environment. Furthermore, DDT is still heavily used today in many locations outside the U.S.

The principal author of the new study, Dr. Mary Wolff at the Mt. Sinai School of Medicine in New York, says, "[Our] findings suggest that environmental chemical contamination with organochlorine residues may be an important etiologic [causal] factor in breast cancer. Given the world-wide dissemination of organochlorine insecticides in the environment and the food chain, the implications are far-reaching for public health intervention worldwide."

The study shows that women with high levels of DDE in their blood have a four-times-greater risk of breast cancer than women with low levels of DDE in the blood. (In this case, "high" means 20 billionths of a gram of DDE in each milliliter of blood and "low" means 2 billionths of a gram in each milliliter of blood. There are 28.3 grams in an ounce, and 4.7 milliliters in a teaspoon.)

The study group was selected from 14,290 New York City women who had attended a mammography (breast x-ray) clinic and had each donated 30 milliliters of blood. Within the group of 14,290, 58 women who later developed breast cancer were selected for a case-control study. The 58 "cases" were matched with 164 "controls," women from the large group who did not have breast cancer but who were matched to the "case" women in several key respects (such as age, menopausal status, and so forth). All their blood samples were analyzed for DDE and PCBs. DDE is created when DDT is metabolized (processed by a living organism that has eaten it). PCBs are industrial chemicals originally used as insulators in electrical equipment. PCBs were banned in the U.S. in 1976 but are still measurable in all parts of the environment. (In the study, PCBs were also associated with breast cancer but the association was not statistically significant. There was one chance in 6 that the association was due to random chance and statistical significance was defined as one chance in 20, or less.)

For fifty years, the incidence of breast cancer in American women has risen at a steady 1 percent per year.[2] In 1940, an American woman's lifetime risk of getting breast cancer was one in 16. Today it is one in 8. (See Table 1, which shows the risk of breast cancer in the U.S. today for women at various ages.) However, death from breast cancer has remained steady throughout the past 20 years because of life-saving, though brutal, treatment methods (chemotherapy, radiation therapy, and surgery).

No one doubts that something in the environment is responsible for the rising incidence of breast cancer in the U.S. Japanese women have only one-fifth as much breast cancer as American women; but when Japanese women move to the U.S., they are stricken with breast cancer at U.S. rates.

Since the 1960s, medical specialists have been trying to track down the causes of breast cancer. Throughout the 1980s, most scientists believed that a high-fat diet caused breast cancer. A study of diet and breast cancer in 120,000 women has now discredited this theory and it has been abandoned.[2]

Researchers are now focused on the female hormones estrogen and progesterone which, they suspect, may play a large role in breast cancer.

It has been known since the early 1970s that breast cancer is

somehow related to estrogen. Beginning at menarche (the onset of menstruation) and continuing until menopause, a woman experiences a sharply rising and falling exposure, first to estrogen and then to progesterone, in a repeating 4-week ovulation cycle.

Late menarche and early menopause (both of which reduce a woman's lifetime exposure to estrogen) are both associated with reduced breast cancer risk. In addition, women who have their ovaries removed early in life and are therefore exposed to much less estrogen than other women, rarely have breast cancer.

Furthermore, women who have "estrogen replacement therapy" (i.e., take estrogen pills) have a 40 percent increased risk of breast cancer, and women who use birth control pills have a 50 percent increased risk of breast cancer. These clues all relate estrogen to breast cancer.

But the EXACT relationship is not understood.

In recent years, menarche in American women has been occurring at earlier and earlier ages. (Chinese women reach menarche at age 17; today U.S. women reach menarche at 12.8 years, on average, but 200 years ago North American women reached menarche at age 17.) The declining age of menarche in U.S. women increases their lifetime exposure to estrogen, which possibly increases their risk of breast cancer.

What is causing the declining age of menarche? Some scientists say simply, improved nutrition. Others say it may be caused by industrial chemicals in our food that mimic hormones and interfere with the internal mechanisms that regulate our bodies. DDT, DDE, PCBs and dioxin are examples of chemicals now known to mimic hormones and disrupt the endocrine system of fish, birds and mammals, including humans.[3]

Dr. Patricia Whitten at Emory University in Atlanta, Ga., has examined historical records extending back 200 years in several countries. Dr. Whitten's concludes that improved nutrition cannot account for all the changes in human reproduction that are observable in the historical record. She believes that hormone-mimicking industrial chemicals in the environment provide a more satisfactory explanation.[4]

The debate over menarche has real consequences in the kinds of research that scientists are doing. Scientists who believe hormone-mimicking industrial chemicals may play an important role are doing the kinds of studies reported today in the JOURNAL OF THE NATIONAL CANCER INSTITUTE, examining hormone-mimicking chemicals like DDT in relation to breast cancer.

On the other hand, those who believe improved nutrition provide sufficient explanation for the change in menarche tend to ignore external influences, such as environmental chemicals. Malcolm Pike at University of Southern California (USC) School of Medicine has emerged as a leader of this school of thought. Pike argues as follows: nutrition is the cause of reduced age of menarche; nutrition is unlikely to worsen, so we're stuck with reduced age of menarche and therefore with increased exposure to estrogen. Pike is experimenting with a technical fix, giving women additional chemicals (pharmaceuticals) to block their natural production of estrogen, then giving them controlled doses of estrogen, to maintain their chemical balance artificially. SCIENCE magazine reported January 29, 1993 that, "To the extent it's possible to see a trend emerging in the 1990s, this anti-estrogen strategy appears to be a leading contender." Dr. Walter Willett at Harvard University's School of Public Health is in Pike's camp. He says, "In the end, I think we're going to have to go with a pharmacological fix." SCIENCE comments "There may be some reluctance to support such experiments because people feel they are 'unnatural.'" But, says Willett, "our whole lifestyle is unnatural."

Dr. Wolff's new study does not definitively prove that chemical residues cause breast cancer. The number of "cases" is small. Additional research will be needed. Nevertheless, an editorial in the JOURNAL OF THE NATIONAL CANCER INSTITUTE yesterday said, "Because the findings of Wolff [and associates] may have extraordinary global implications for the prevention of breast cancer, their study should serve as a wake-up call for further urgent research." [5]

--Peter Montague, Ph.D.

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[1] Mary S. Wolff and others, "Blood Levels of Organochlorine Residues and Risk of Breast Cancer," JOURNAL OF THE NATIONAL CANCER INSTITUTE Vol. 85 (April 21, 1993), pgs. 648-652.

[2] Eliot Marshall, "Search for a Killer: Focus Shifts From Fats to Hormones," SCIENCE Vol. 259 (January 29, 1993), pgs. 618-621. See also, Eliot Marshall, "The Politics of Breast Cancer," SCIENCE Vol. 259 (January 29, 1993), pgs. 616-617.

[3] Everyone interested in chemicals that mimic hormones must read Theo Colborn and Coralie Clement, editors, CHEMICALLY-INDUCED ALTERATIONS IN SEXUAL AND FUNCTIONAL DEVELOPMENT: THE WILDLIFE/HUMAN CONNECTION [Advances in Modern Environmental Toxicology Vol. XXI] (Princeton, N.J.: Princeton Scientific Publishing Co., 1992).

[4] Patricia L. Whitten, "Chemical Revolution to Sexual Revolution: Historical Changes in Human Reproductive Development," in Theo Colborn and Coralie Clement, cited above, pgs. 311-334.

[5] David J. Hunter and Karl T. Kelsey, "Pesticide Residues and Breast Cancer: The Harvest of a Silent Spring?" JOURNAL OF THE NATIONAL CANCER INSTITUTE Vol. 85 (April 21, 1993), pgs. 598-599.

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Table 1

A Woman's Risk of Developing Breast Cancer Today in the U.S.

By age 25: one in 19,608 By age 30: one in 2525 By age 35: one in 622 By age 40: one in 217 By age 45: one in 93 By age 50: one in 50 By age 55: one in 33 By age 60: one in 24 By age 65: one in 17 By age 70: one in 14 By age 75: one in 11 By age 80: one in 10 By age 85: one in 9 Ever: one in 8

Source: See footnote 2.

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Descriptor terms: pesticides; ddt; dde; breast cancer; morbidity; mortality; mary wolff; mt sinai school of medicine; new york, ny; females; hormones; estrogen; endocrine disrupters; menarche; menopause; estrogen replacement therapy; birth control pill; patricia whitten;