



SILENT SPRING REVIEW

RESEARCHING THE ENVIRONMENT AND WOMEN'S HEALTH

PREMIER ISSUE

"We tolerate cancer-causing agents in our environment at our peril. . . . For those in whom cancer is already a hidden or a visible presence, efforts to find cures must of course continue. But for those not yet touched by the disease and certainly for the generations as yet unborn, prevention is the imperative need."

—Rachel Carson, *Silent Spring*

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This newsletter is published by Silent Spring Institute, named in recognition of Rachel Carson, whose pioneering book tied the use of pesticides to adverse effects on wildlife and humans. Carson herself died of breast cancer in 1964, just two years after Silent Spring was published. In her memory, and for women—and men—everywhere, Silent Spring Institute is dedicated to identifying the links between the environment and women's health, especially breast cancer.

From the Executive Director

In 1962, the year Rachel Carson published *Silent Spring*, women in the United States had about a one-in-fourteen chance of developing breast cancer. Today, that risk has risen to one in eight—the kind of increase that Carson foreshadowed in her landmark book. Despite our decades-old war on cancer, women are much more likely to be diagnosed with breast cancer today than in any previous generation.

If we are to understand this increase, a key research priority must be evaluating our assault on the environment over the past 50 years. Breast cancer incidence in the United States has been rising steadily since World War II, when our society began pumping out pesticides, radiation, plastics, solvents, and other chemicals, leaving residues in our air, water, and soil. Throughout this country, women living downstream and downwind have been absorbing environmental toxins into their breasts and may be paying for it with their lives.

This year alone 175,000 women in the United States will learn they have breast cancer; known genetic factors will account for just 5 to 10 percent of these diagnoses. The established risk factors for breast cancer—such as earlier menarche, later menopause, childlessness, and delayed childbearing—explain less than half of all diagnoses, and many of these factors are ones women cannot change. Countless studies of diet have failed to identify clear dietary risk factors. Laboratory studies suggest that many of the chemicals now found in our environment may cause breast tumors or hasten their growth, yet few studies have looked for the effects of these chemicals on women. If we are to have genuine hope of defeating the breast cancer epidemic, we must find ways to prevent breast cancer from occurring.

The grim statistics and unexplained patterns of risk do contain a glimmer of hope. If breast cancer rates can rise—increasing over time, varying across regions, and changing as women move to new places—then we may be able to learn how to make those rates fall. This hope underlies the mission of Silent Spring Institute: to identify the links between the environment and women's health, especially breast cancer.

Silent Spring Institute builds on a unique collaboration among scientists, physicians, public health advocates, and community activists who are dedicated to identifying—and changing—the links between the environment and breast cancer. This partnership began in 1993, when activists from the Massachusetts Breast Cancer Coalition questioned the elevated breast cancer rates throughout Cape Cod and demanded a scientifically sound investigation.

This research is extremely complex, and the challenges before us are great. We must, for example, estimate a woman's exposure to chemicals years—even decades—before her tumor first appeared. It is unlikely that any one study will bring dramatic breakthroughs. Rather, knowledge will build incrementally from many studies using multiple methods. We will be uncovering layers and layers of clues, just as if we were peeling layers of onion.

With this premier issue of the *Silent Spring Review*, we hope to extend our outreach nationally, for the need is great for a national agenda, a national voice, on environmental links to breast cancer. The only way we can turn back the tide of breast cancer is to learn how to prevent it.

Julia G. Brody, PhD



Silent Spring Institute is dedicated to identifying the links between the environment and women's health, especially breast cancer.

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Did the Environment Cause My Breast Cancer?

By Susan S. Bailis

Headlines trumpet “Rate of new cancer cases declines” and “Lifestyle is the answer.” Certainly it’s good news that the incidence of cancer dipped this year. If people can reduce their risk of certain cancers by eating vegetables and staying away from cigarettes, that’s good, too; but the implication that these statistics let environmental risks off the hook is dead wrong. Pollution is, after all, the “lifestyle” we share in a society that depends on the trappings of modern urban life.

I care passionately about the search for cancer risks because I have metastatic breast cancer. New discoveries about what caused my cancer and how it could have been prevented won’t help me personally, and they won’t help the 45,000 other women in Massachusetts with breast cancer; but I feel we have a moral obligation to our daughters to insist that scientists look hard for preventable causes of breast cancer. We cannot ignore the environment in that search.

Like every woman diagnosed with breast cancer, I have wondered whether my cells expanded crazily because of the DDT we used in our garden when I was a child or because of some unknown pollutant that leached into the water or dispersed in the air, or even something my mother was exposed to when she was pregnant. Or was it none of the above? We have an ethical responsibility to answer these questions.

Questions about breast cancer and the environment seem so compelling. There are 70,000 chemicals in commerce today. Only 450 have been tested by the National Toxicology Program for effects on breast cancer. Among those tested, 36 do cause mammary tumors in animals, and even these chemicals have not been

studied to learn how women are exposed to them or how they affect human breast cancer risk.

National and international trends in disease raise questions about environment, too. While there has been a decline in cancer overall, there have been no gains in breast cancer incidence since 1990. When women move from a low-incidence region such as Asia to a high-incidence place such as the United States, their breast cancer rates and the rates for their daughters and granddaughters go up. Clearly something preventable is happening to increase breast cancer risk. Diet, childbearing, and other lifestyle factors all change over time and differ from one culture to another, but study after study of these factors fails to explain most breast cancer risk, while massive changes in the environment since World War II have barely been addressed in breast cancer research.

Here in Massachusetts, we can take pride in our state’s leadership. Our state was one of the first to declare breast cancer an epidemic, and the Legislature earmarked \$1.5 million a year for research on breast cancer and the environment. These funds support such studies as the Cape Cod Breast Cancer and Environment Study, conducted to study why breast cancer rates have been 20 percent higher on Cape Cod than statewide at least since the Cancer Registry began tracking incidence in 1982.

The scientific ideas that underlie the Cape Cod Study illustrate why studying the environment is important for women everywhere. Dr. Julia Brody, principal investigator for the study, explains that one central hypothesis comes from what we *do* know about breast cancer. “Many of the established risk factors for breast cancer, such as earlier menarche, later menopause, and later childbearing, are associated with a woman’s lifetime exposure to natural estrogens, so it makes sense to ask whether synthetic chemicals that mimic estrogen also increase breast cancer risk.” *continued on page 8*



Susan Bailis (right) and daughter Kathryn at a breast cancer forum

“I have wondered whether my cells expanded crazily because of the DDT we used in our garden when I was a child or because of some unknown pollutant that leached into the water or dispersed in the air.”

Mapping Breast Cancer Risk on Cape Cod

Cranberry bogs on Cape Cod are flooded in early autumn, dotting the landscape with pools of magenta berries. Water-reel harvesting machines circle the water, loosening the berries from their vines. The berries then pop to the surface and glisten on the water. In Harwich, a small town on the elbow of Cape Cod, a cranberry festival is held every year to mark the harvest.

Yet this autumnal beauty may have come with a deadly price. Over the decades, pesticides have been used on the Cape to protect cranberry bogs, to cultivate golf courses, and to develop residential communities. The entire Cape has been sprayed with DDT in repeated attempts to eradicate gypsy moths; like its neighboring towns, Harwich has also been sprayed with other pesticides that linger in the air, water, and soil, sometimes for decades. Harwich is now one of eleven Cape communities whose breast cancer rates are at least 15 percent higher than those of the rest of Massachusetts.

While researchers across the country have been mapping women's genetic susceptibility to breast cancer, Silent Spring Institute researchers have been mapping women's geographic susceptibility. With only 5 to 10 percent of breast cancer linked to heredity, established risk factors accounting for less than half of all breast cancer

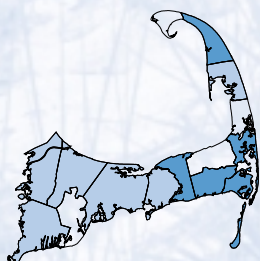
cases, and breast cancer rates higher than they have been in decades, these scientists are scouring the environment for clues.

In the first three years of the Cape Cod Breast Cancer and Environment Study, Silent Spring researchers amassed critical data through painstaking fieldwork. They created maps of water supply pipes, pored over records of wide-area pesticide applications, and traced septic systems. By superimposing such data on historical land use maps in a computerized Geographic Information System (GIS), they have created a powerful diagnostic tool for assessing environmental risks on the Cape.

Those risks may be elevated, in part, because the vast sandy beaches that give the Cape its special beauty also make it a fragile ecosystem. The porous soil that covers the groundwater aquifer makes drinking water especially vulnerable to environmental impact—the effects, for example, of septic systems, wastewater, and the pesticides used on cranberry bogs, golf courses, and lawns. With the GIS, the researchers can align the locations of drinking-water supply wells with data about previous land uses to identify potential sources of contamination.

Silent Spring's GIS incorporates land use information dating back to the 1950s, allowing the researchers to map the Cape's transition from forest and farm to residential communities and to study how changes in land use may have heightened chemical exposure. This GIS is the first to integrate current and historical information on the Cape environment for use in health studies.

"As activists, we are tremendously proud of the innovative research Silent Spring has been doing on Cape Cod," says Bev Baccelli, president of the Massachusetts Breast Cancer Coalition.



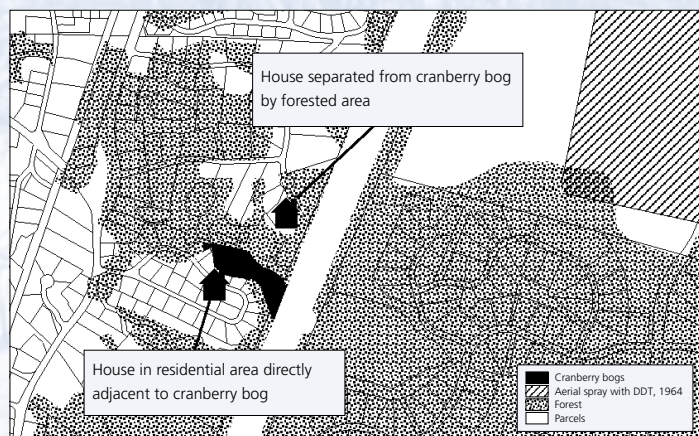
Left: Breast cancer incidence in the towns of Cape Cod, 1982–1994

Towns with breast cancer incidence higher than the rest of the state

15–24% higher

25–55% higher

Right: GIS map showing how exposure is reduced when residential areas are separated from pesticide sources by forest.





"We believe that Silent Spring's research on environmental links to breast cancer will lead to the identification of preventable causes of this disease as well as many other kinds of cancer."

In 1998, the Institute entered into the second three-year phase of the study. In this phase, the researchers are interviewing 2,500 Cape women, both those with and those without breast cancer. Through the interviews, the researchers will collect information on recognized risk factors, such as family and childbearing history; exposure to chemicals, such as pesticides, household detergents, and personal care products; occupations; and leisure activities, such as golf.

In addition, the researchers will analyze a broader spectrum of environmental samples for compounds that may be related to breast cancer. They will test household dust and air, for example, to learn how and to what extent women are exposed to potentially carcinogenic chemicals at home.

Using the GIS, the researchers will apply new analytical methods developed in the first phase of the study to identify small pockets of elevated breast cancer incidence. They will then be able to analyze the data to determine whether there are links between the women's individual environmental exposures and breast cancer.

To share the information compiled thus far with a range of audiences—including Cape residents, women concerned about breast cancer, environmental scientists, public officials, educators, and students—Institute researchers have produced both a printed atlas and an electronic atlas of the maps they created. These atlases are intended as a source of information about the Cape environment and as a resource for those who want to explore possible effects of the environment on health.

For many women on the Cape, these atlases will have a very personal application as they glean information about the sites of their own homes. This information may empower them in a way that Cheryl Osimo, the Cape coordinator for Silent Spring Institute, was not. When Osimo developed breast cancer in 1991, she was not aware that the Cape, where she had lived since 1978 and summered for many years before that, had one of the highest rates of breast cancer in Massachusetts.

"I had no family history and kept asking myself, 'Why is this happening to me?'" Osimo says. "I started wondering about the water I drank and the air I breathed."

And, although Osimo is encouraged by Silent Spring's progress, she refuses to become complacent. "I know I appear to be in a constant panic," she says. "This is a very scary disease. Women are dying and leaving their loved ones. Children are being left to live their lives without their mothers, and so I'm panicking. I'm frightened, and my hope for the future is that our children will not have to deal with this anymore."

The printed version of the atlas may be obtained by contacting Silent Spring Institute directly; the electronic version of the atlas may be viewed at www.silent.spring.org/atlas/atlas.htm. The atlases were funded by The Dolphin Trust. In addition, a written report on the first three years of the Cape Cod Breast Cancer and Environment Study is available in libraries on Cape Cod and directly from the Institute's offices.



Detective Work in the Suburbs

In the early 1970s, Amy Present shared a house with friends in Newton, Massachusetts. Of the seven women who lived there, four were later diagnosed with cancer—including Present, who was treated for breast cancer in 1984. The other three women died. For the past 20 years, Present has since learned, she has been living in a neighborhood whose breast cancer incidence is 37 percent higher than the state average.



Amy Present

Present's experience with breast cancer inspired her to become involved in promoting breast cancer awareness and in advocating for research. She joined forces with other women with breast cancer and their families and friends to demand answers on behalf of their own communities and women everywhere. Why are breast cancer rates higher in such communities as Newton? And why are breast cancer rates five times higher in some countries, including the United States, than in the developing world?

In 1994, Present helped to establish Silent Spring Institute, which has extended its focus beyond Cape Cod to address the elevated breast cancer rates in Newton. With funding from the Massachusetts Department of Public Health, the study is examining factors that may contribute to elevated breast cancer rates in Newton.

Between 1982 and 1992, Newton had a breast cancer rate that was 11 percent higher than that of Massachusetts as a whole. The breast cancer rates are uneven within the city, ranging from 22 percent below to 55 percent above the state average.

In late 1997, as part of the Newton Breast Cancer Study, Silent Spring researchers distributed mail surveys to approximately 2,000 women, asking questions about individual risk factors for breast cancer, possible risk factors in homes and workplaces, and residential histories. To identify differences in risk factors in the city's high- and low-incidence areas, the researchers analyzed these data, along with information about Newton's environmental features, which they drew from their geographic information system. The researchers expect to release their findings during the summer of 1999.

"The study is innovative because it considers both individual women's histories and environmental features of their neighborhoods," says Julia Brody, executive director of the Institute. "By looking at both of these simultaneously, we hope to better understand the many factors that may increase a woman's risk of breast cancer."

As for Amy Present, she continues to advocate for more research into environmental links to breast cancer. "People have called me and asked, 'Should I move out of Newton?'" she says. "I say, 'Stay where you are and get involved.'"

Participants in the annual Susan G. Komen Breast Cancer Foundation / Boston Race for the Cure wore paper numbers that not only helped organizers tally completion times, but also served as a graphic reminder of the 175,000 women in the United States—our mothers, our sisters, our wives, our friends, ourselves—who are diagnosed with breast cancer each year.



Research Briefs

Researchers from the Copenhagen Center for Prospective Population Studies in Denmark have found that exposure to dieldrin, an estrogen-mimicking pesticide, may increase women's risk of developing breast cancer. The investigators tested blood for 46 different chemical exposures, including dieldrin, DDT, and polychlorinated biphenyl (PCB). Only dieldrin seemed to confer an increased risk for breast cancer. Widely used in the 1950s, dieldrin remains in the environment for decades and can contaminate rainwater, soil, and food. The pesticide was banned from agricultural use in both Denmark and the United States in 1975. (*Lancet*, 1998;352:1816–20)

Boston University School of Public Health investigators have discovered an association between tetrachloroethylene (PCE)-contaminated public drinking water and lung cancer and, possibly, colorectal cancer. Subjects in the population-based case-control study were exposed to PCE when it leached from the vinyl lining of drinking-water distribution pipes. The scientists are currently extending their research to investigate the effects of PCE on breast cancer. (*Environmental Health Perspectives*, 1999;107:265–271)

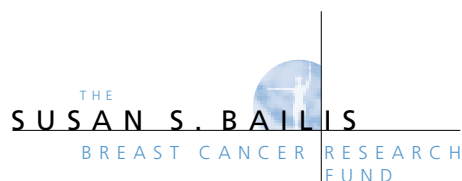
Phthalates, common constituents of plastics, have received much attention recently because of their effects on hormones. Environmental Protection Agency scientists have found, for example, that rats whose mothers had phthalate exposure exhibited a range of abnormalities and produced far less testosterone than those whose mothers had no such exposure. (*Toxicology and Industrial Health*, 1999;15:94–118)

Did You Know?

- In the United States, a woman is diagnosed with breast cancer every three minutes.
- Most breast cancer research has focused on detection and treatment rather than cause and prevention. Yet mammography fails to identify 40 percent of the breast cancer in women under the age of 50, and each year 44,000 U.S. women die from the disease. Breast cancer is the second leading cause of cancer deaths among women.
- Chemicals that cause human breast cancer cells to grow in the laboratory are found in such common consumer goods as detergents, hair spray, plastic toys, pesticides, and plastic food wraps.
- The U.S. government spends only one penny of every 25 tax dollars on cancer research.
- Of the 3,000 high-production chemicals used in the United States, 43 percent have never undergone basic toxicity tests. Only 7 percent have been tested using the full battery of standard toxicity tests.
- Tamoxifen, which is used for breast cancer treatment, is classified by the International Agency for Research on Cancer as a known human carcinogen because of its effects on the uterus. In the tamoxifen prevention study, researchers gave this drug to healthy women who were considered at high risk for breast cancer. This study of just one compound cost the federal government \$50 million.

Strengthening Our Commitment

The **Susan S. Bailis Breast Cancer Research Fund**, built from private contributions, has been created to enable Silent Spring Institute to explore new pathways of scientific discovery. The fund will enable the Institute to conduct pilot studies of new methods and hypotheses, expand the areas of expertise on its research team, and develop communication tools. The fund is named in honor of Susan Bailis, a woman with breast cancer and co-chair of Solomont-Bailis Ventures.



Silent Spring Institute will receive a portion of the funds raised at the Massachusetts Breast Cancer Coalition's **Against the Tide Swim**, which will be held June 26, 1999.

The **Susan G. Komen Breast Cancer Foundation / Boston Race for the Cure** recently awarded Silent Spring Institute \$49,000 to continue its unique partnership of scientists and activists. The next Boston Race for the Cure will be held September 12, 1999.

BodyScapes, a personal training facility for fitness and well-being, is hosting the second annual **Breast Cancer PowerWalk** to benefit Silent Spring Institute. The 3.5-mile walk will take place September 26, 1999.

For information about these initiatives and others, call Silent Spring Institute at 617 332 4288, or visit our web site at www.silentspring.org.



Rachel Carson

"On average, breast cancer robs the woman it kills of twenty years of life. This means that in the United States, nearly one million years of women's lives are lost each year. In 1964, Rachel Carson died at age fifty-six—twenty years short of the average life expectancy for U.S. women at that time. Despite all the ways she was extraordinary, as a victim of breast cancer Carson was utterly typical."

—Sandra Steingraber, *Living Downstream: An Ecologist Looks at Cancer and the Environment*

Researchers have found estrogen-mimics in common products, including detergents, plastics, and pesticides. Scientists at Tufts Medical School have identified dozens of synthetic and natural chemicals that make breast cancer cells grow, and in 1997 the Cape Cod Study for the first time found estrogenic activity in contaminated groundwater from the Cape Cod aquifer.

Even as a lay person, I can see that the task ahead is complex. For example, scientists need to develop ways to measure exposure and disentangle the effects of many different pollutants, going back to the beginning of tumor growth years before a woman is diagnosed. And researchers need to study effects of environment in combination with other breast cancer risks.

As I look back at photographs of myself nursing my two children, I cannot fathom how my breast, which brought the joy of nurturing my babies from my own body, could turn on me and threaten my life. I trust that medicine will find a way to buy me enough time to see my children through many more years, but even as I look to new discoveries to save my life, I do not believe we should have to choose whether our research dollars go for treatment, early detection, or prevention. All are equally important. Finding preventable causes is too late for those of us already diagnosed, but what about the future? We must find out whether society is polluting the environment in ways that will cause breast cancer in our daughters and their daughters.

Susan S. Bailis is co-chair and co-chief executive officer of Solomont-Bailis Ventures, specialists in long-term care and senior living. Reprinted courtesy of the Boston Globe.

NetWorking

Cornell Program on Breast Cancer and Environmental Risk Factors

www.cfe.cornell.edu/bcerf
Looks at the links between breast cancer and environmental risk factors.

Massachusetts Breast Cancer Coalition

www.1in8@mbcc.org
Seeks to end the breast cancer epidemic through activism, advocacy, and education.

National Action Plan on Breast Cancer

www.napbc.org
Works to speed progress toward eradicating breast cancer.

National Alliance of Breast Cancer Organizations

www.nabco.org
Acts as a voice for the interests and concerns of breast cancer survivors and women at risk.

National Breast Cancer Coalition

www.natlbcc.org
Seeks to eradicate breast cancer through action and advocacy.

Rachel's Environment and Health Weekly

www.monitor.net/rachel/rehw-home.html
Provides news and resources for environmental justice.

Silent Spring Institute

www.silentspring.org
Seeks to identify the links between the environment and women's health, especially breast cancer.

Susan G. Komen Breast Cancer Foundation

www.breastcancerinfo.com
Seeks to advance breast cancer research, education, screening, and treatment.

The Breast Cancer Fund

www.breastcancerfund.org
Works to accelerate the response to the breast cancer crisis.

USA Breast Cancer Legislation

members.aol.com/BCLEGIS/index.htm
Summarizes pending breast cancer legislation in the United States.

Women's Environment Development Organization

www.wedo.org
Runs the Action for Cancer Prevention Campaign.

World Resources Institute

www.wri.org
Works to protect the Earth's environment.

Y-Me National Breast Cancer Organization

www.y-me.org
Provides information and support to anyone who has been touched by breast cancer.



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"Research that only looks inside women for the causes of breast cancer defies logic, fairness, and truth. We must look at least as much and at least as carefully at our surroundings, the air we breathe, the water we drink, and the food we eat, and what goes into them."

—Judith Kurland, Director of Region I, Department of Health and Human Services