

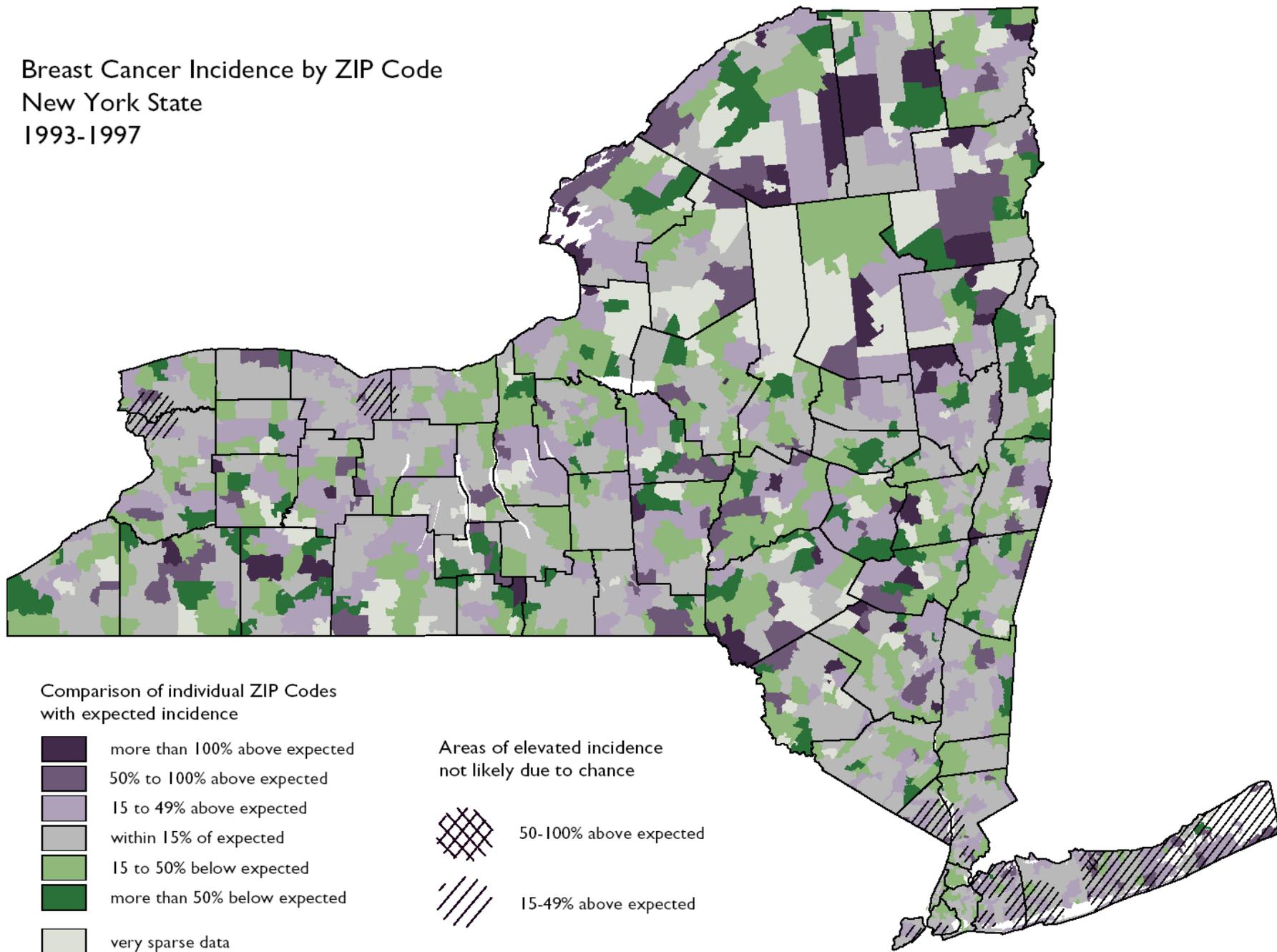
Long Island Breast Cancer Study

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Outline

- ① Long Island Breast Cancer Case Control Study (Marilie Gammon, PI)
- ① Broader picture of understanding the effects of environmental factors on breast cancer risk

Breast Cancer Incidence by ZIP Code
New York State
1993-1997



Public Law 103-43, June 10, 1993

- © The Director of the National Cancer Institute in collaboration with the Director of the National Institute of Environmental Health Sciences, shall conduct a **case-control study to assess biological markers of environmental** and other potential **risk factors** contributing to the incidence of breast cancer in:
 - A. the Counties of Nassau and Suffolk, in the State of New York, and
 - B. 2 other counties with high rates (one in NY and one Connecticut)

Public Law 103-43, GIS Requirement

- © Certain elements of the study ... shall include the use of a geographic system to evaluate the current and past exposure of individuals, including direct monitoring and cumulative estimates of exposure, to:
1. contaminated drinking water
 2. sources of indoor and ambient air pollution, including emissions from aircraft
 3. electromagnetic fields
 4. pesticides, and other toxic chemicals
 5. hazardous and municipal waste
 6. other factors as appropriate.

Principal Investigator and Team Members

- ◎ **Marilie Gammon**
University of North Carolina
- ◎ **Regina Santella**
Columbia University, New York, NY
- ◎ **Mary Wolff**
Mount Sinai School of Medicine, New York, NY
- ◎ **And many, many other collaborators and team members**

Study Population

- © 1508 women newly diagnosed with breast cancer from New York cancer registry
- © 1556 “population-based” control women without breast cancer from Random-Digit-Dialing and Medicare rosters

Data Collection Protocol

- © Women interviewed in homes about socio-demographics, reproductive history, diet, use of pesticides, medical history, use of hormones, family history of cancer, body size changes over lifetime, physical activity
- © Women provided blood and urine samples
- © Dust, tap water, and soil sampling

Community Participation in the LI Study

- ③ Town meetings held with community
- ③ Served as Advisors on the case-control study and the Project as a whole
- ③ Cancer Information Service outreach office on LI
- ③ Advocates participated in peer-review of grants
- ③ Continued participation of PI and NCI in LI network

Findings: Most Established Risk Factors Confirmed (Magnitude of Increased Risk)

◎ Excess risk associated with

- Increasing age
- Family history of breast cancer
- First birth at late age (>28 years)
- Never having given birth
- Higher income

◎ No excess risk for

- Early age at menarche
- Higher education attainment

Hypotheses: To Determine If . . .

- © **Organochlorines and polycyclic aromatic hydrocarbons are associated with an increased risk of breast cancer among women in Long Island**

Organochlorines

- © Included pesticides – DDT, DDE (a metabolite of DDT), chlordane, dieldrin and
- © Polychlorinated biphenyls: chemicals found in coolants and lubricants in transformers, capacitors and other electrical equipment

Polycyclic Aromatic Hydrocarbons (PAHs)

- ◎ **Caused by incomplete combustion of chemicals including:**
 - Diesel fuel
 - Cigarette smoke
 - Vehicle exhaust
 - Smoked/grilled foods

Why Study These Chemicals?

- ◎ Still ubiquitous in environment even though many of these compounds are no longer used
- ◎ Measurable levels in biological fluids in many Americans
- ◎ Persist in body for long time periods

Previous Link to Cancer

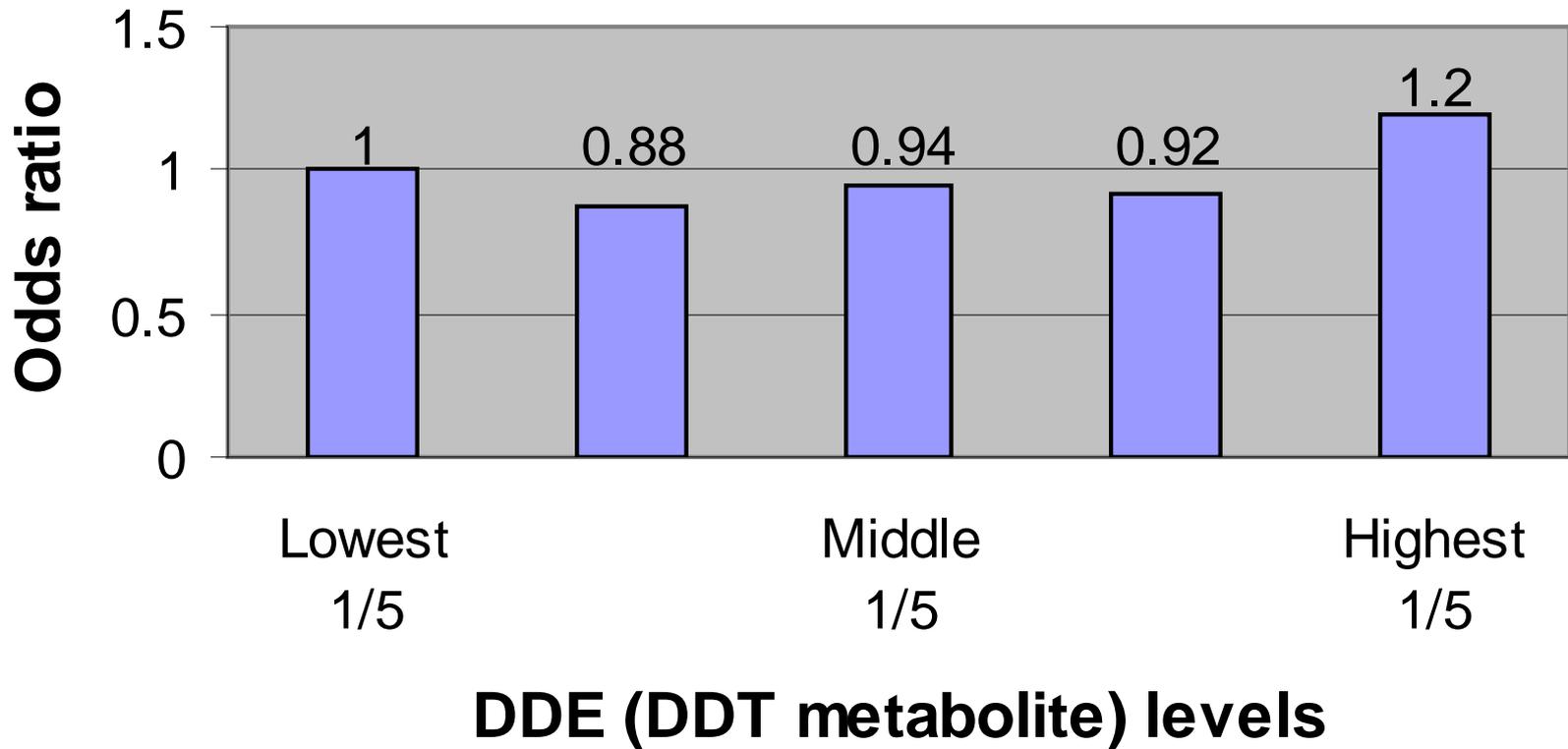
- ◎ DDT and related metabolites cause liver cancer in rats
- ◎ DDT and PCBs have estrogenic activity in human tissues
- ◎ Estrogen is thought to be one of most important determinants of breast cancer
- ◎ PAHs cause breast cancer in rodents

Organochlorines

- ③ Were measured in blood
- ③ Blood levels correspond well to levels in tissues where organochlorines are stored (fat tissues)
- ③ Current levels now reflect cumulative levels throughout life

Odds Ratio for Breast Cancer

Controlled for age, race, history of infertility problems, history of benign breast disease



More Findings

- ◎ **No dose response relationship**
- ◎ **No increased risk associated with organochlorines among women who**
 - **Had not breastfed**
 - **Were overweight**
 - **Were post-menopausal**
 - **Long term residents of LI**
 - **Had invasive vs. *in situ* cancers**
 - **Had estrogen-receptor positive vs. negative tumor**

Bottom Line

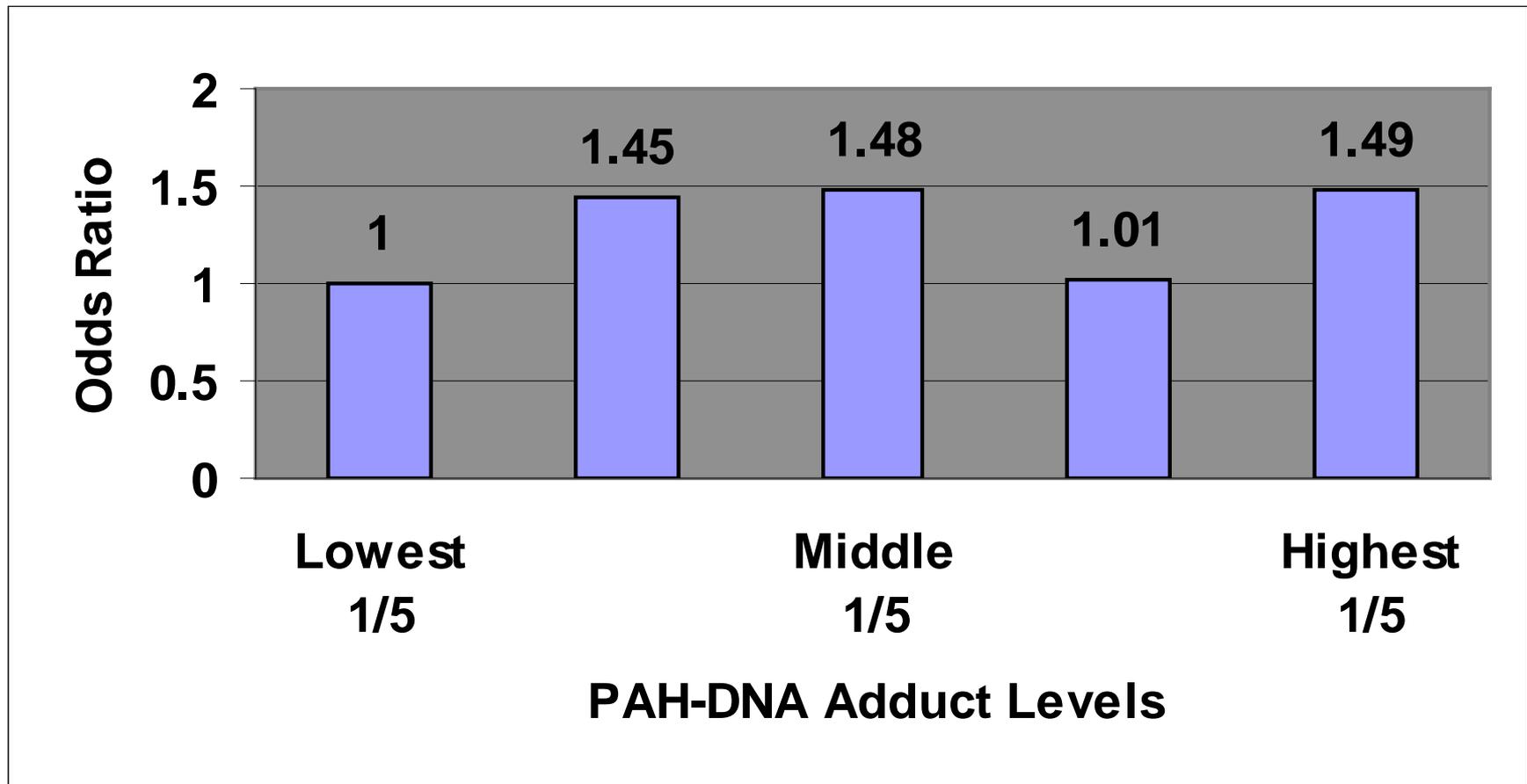
- © Findings do not support the hypothesis that organochlorines increase breast cancer risk among Long Island women

Polycyclic Aromatic Hydrocarbons

- ⊙ PAH DNA-adducts measured in blood
- ⊙ PAH adducts are metabolites of PAH that have bound to DNA
- ⊙ Considered to reflect combination of exposure and capacity to repair DNA
- ⊙ PAH adducts now reflect exposures perhaps within the past 3 year, but not entirely known

Odds Ratios for Breast Cancer

Controlled for age, race, history of infertility problems, season of blood donation, religion, parity, total # months of lactation, body mass, 1st degree family history of breast cancer, and age at first birth



Conclusions About PAHs

- ◎ **No dose-response relationship**
- ◎ **No consistent association with two main sources of PAH: active or passive cigarette smoking or eating grilled and smoked foods**
- ◎ **These findings need to be replicated in other studies**

50% increased risk considered modest

- ◎ Smoking increases risk of lung cancer by 900-1000%
- ◎ A family history of breast cancer increases risk by 100-200%

Case-Control Study Next Steps

- © Do organochlorine compounds and lifestyle factors influence breast cancer survival?
- © Are some common variations in certain genes associated with risk of breast cancer?
- © Interaction of variants in genes and environmental contaminants and risk of breast cancer
- © Electromagnetic fields and breast cancer

Genes involved in

- ◎ Responses to oxidative stress
- ◎ Folate metabolism
- ◎ Estrogen biosynthesis and metabolism

Relatively few well-established environmental causes of cancer in the general population

- ◎ Arsenic
- ◎ Radiation
- ◎ Environmental tobacco smoke

Cancer case more likely to represent a cancer cluster if it involves

- ◎ One type of cancer (e.g., site, histology)
- ◎ A rare type of cancer
- ◎ A type of cancer in a group not usually affected by the cancer

CDC Center for Environmental Health Sciences

Long Island Geographic Information System

- © Will provide researchers a new tool to investigate relationships between breast cancer and the environment in Suffolk and Nassau counties and to estimate exposures to environmental contaminants

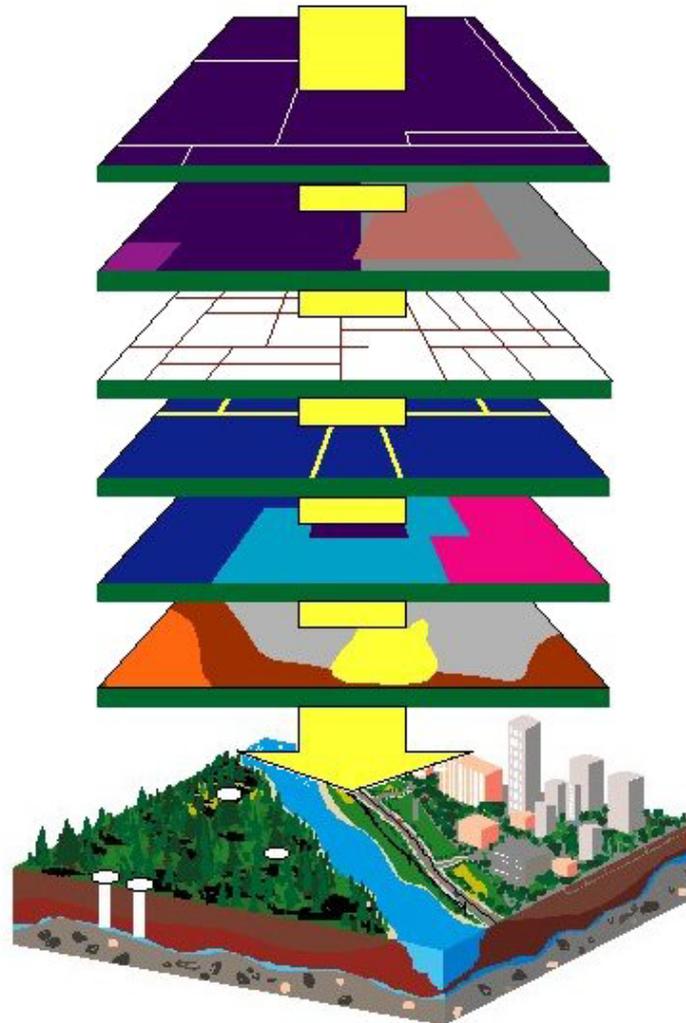
Long Island Geographic Information System

- © Public will be able to use the website to examine patterns of environmental exposures and breast cancer

LI GIS-H integrates

- © Environmental and breast cancer databases
- © Mapping capability
- © Statistical tools

Long Island Geographic Information System



Databases in Long Island GIS

- ◎ Breast cancer incidence (available from NY state registry)
- ◎ Breast cancer mortality
- ◎ Demographic
- ◎ Medical Facility
- ◎ Behavioral Surveys
- ◎ Air Quality
- ◎ Water Quality and Water Use
- ◎ Industrial Sites and Hazardous Materials
- ◎ Radioactive Sites or Materials

Long Island GIS

- © Available now to researchers with approved projects
- © Public mapping features available soon

Marin county, near San Francisco

- ⊙ High breast cancer rates
- ⊙ High level of community concern
- ⊙ California county and state health departments, CA universities, NCI, NIEHS working to address these issues
- ⊙ Major geographic information system under development (Peggy Reynolds, PI, California state health department)

Some NCI methodological studies

- ◎ **Statistical studies on cluster analysis**
- ◎ **Modeling of U.S. county breast cancer rates – efforts to determine how much of cancer incidence can be attributed to known risk factors that are available at the level of a county or other small geographic unit**

Interagency Task Force on Breast Cancer and the Environment



DIVISION OF
CANCER CONTROL
& POPULATION SCIENCES

- ◎ NCI, NIEHS, CDC, and EPA partnership
- ◎ To develop guiding principles for responding to reports of high cancer incidences
- ◎ To develop approaches to assess the contribution of environmental exposures to breast cancer risks

NIEHS/NCI RFA on Breast Cancer and the Environment



DIVISION OF
CANCER CONTROL
& POPULATION SCIENCES

- ◎ Basic biological research - changes that occur in normal mammary gland throughout lifespan vs. exposure-induced changes
- ◎ Epidemiologic cohort studies to identify determinants of puberty in girls
- ◎ Community participation

