



SILENT SPRING INSTITUTE



RESEARCHING THE ENVIRONMENT AND WOMEN'S HEALTH

Identifying breast carcinogens: a new approach





Janet Ackerman

Staff Scientist

Silent Spring Institute

What kinds of studies reveal cancer causes?

- High, well-defined exposures among large groups

	No disease	Disease
Not exposed		
Exposed		

What kinds of studies reveal cancer causes?

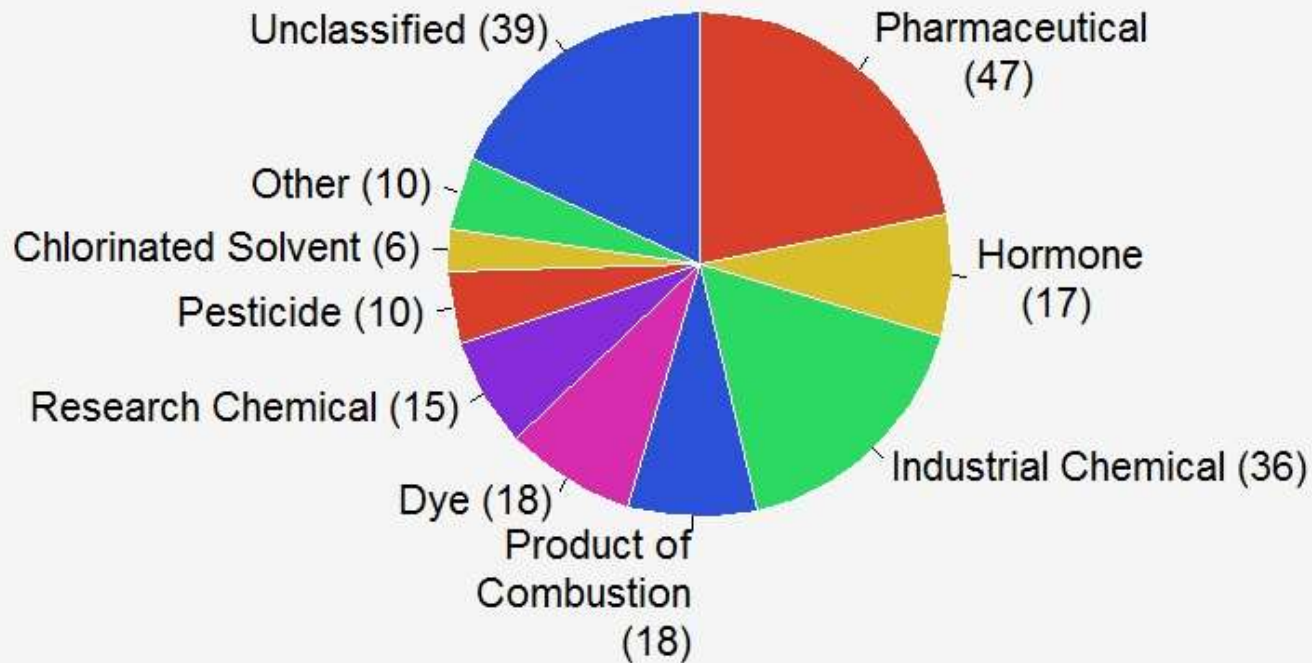
- Occupational studies
 - Men, chemicals, cancers (not breast)



- Accidents/disasters (e.g. ionizing radiation)
- Pharmaceuticals (e.g. HRT, DES)

Animal studies

- 216 chemicals found to cause mammary tumors in rodents



Animal and human studies

- Rodent and human results are generally consistent

Exposure	Human Breast Cancer	Rodent Mammary Tumors
HRT (E + P)	+	+
HRT (E)	(+)	+
Oral Contraceptives (E + P)	+	+
DES	+	+
Griseofulvin, Furosamide, Metronidazole	(+)	+
Indomethacin, Nitrofurantoin	(-)	+
Ionizing radiation	+	+
Alcohol	+	(+)
Heterocyclic amines (meat)	(+)	+
Sleep disruption	(+)	+
Ethylene oxide	(+)	+
PAH	(+)	+
Solvents	(+)	+
DDE (adult exposure)	-	-
DDT (early life exposure)	(+)	Not tested
PCBs (general population)	-	-
PCBs (polymorphism)	(+)	Not tested
Dioxin (early life exposure)	(+)	(+)

+	Stronger evidence of association
(+)	Limited evidence of association
(-)	Limited evidence for no association
-	Stronger evidence for no association

Rudel et. al 2014
Environmental Health Perspectives

- But...



REVIEW

ADVANCE PUBLICATION



Environ Health Perspect; DOI:10.1289/ehp.1408337

Screening for Chemical Contributions to Breast Cancer Risk: A Case Study for Chemical Safety Evaluation

Megan R. Schwarzman,¹ Janet M. Ackerman,² Shanaz H. Dairkee,³ Suzanne E. Fenton,⁴ Dale Johnson,⁵ Kathleen M. Navarro,⁶ Gwendolyn Osborne,¹ Ruthann A. Rudel,² Gina M. Solomon,⁷ Lauren Zeise,⁸ and Sarah Janssen^{9,10}

[Author Affiliations](#) open



PDF Version (1 MB)

[Abstract](#)

[About This Article](#)

[Supplemental Material](#)

[Article-Level Metrics](#)

Background: Current approaches to chemical screening, prioritization and assessment are being re-envisioned, driven by innovations in chemical safety testing, new chemical regulations, and demand for information on human and environmental impacts of chemicals. To conceptualize these changes through the lens of a prevalent disease, the Breast Cancer and Chemicals Policy project convened an interdisciplinary expert panel to investigate methods for identifying chemicals that may increase breast cancer risk.

What causes breast cancer?

Events in biological processes potentially associated with breast cancer

Cellular & Molecular Events

Alterations in hormone levels,
metabolism or receptors
Changes in gene transcription
& translation
Cell cycle changes
Peptide hormones (growth hormones)

Genotoxicity
Oxidative stress
Immune modulation
Limitless replication potential
Evasion of apoptosis
Self-sufficiency in growth

Tissue Changes

Breast density
Tissue invasion
Sustained angiogenesis

TEB proliferation
Altered mammary gland
development
Ductal hyperplasia
Atypical hyperplasia

Susceptibility Factors

Obesity
Early onset of breast development
Alterations in cyclicity

Genetic polymorphisms in
metabolizing enzymes
Duration of lifetime
estrogen exposure

Promoting tumor growth

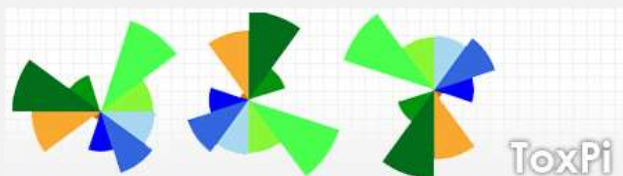


Breast cancer cells



Breast cancer cells
on estrogen

Robot biology



Still need better tests for

- Effects on mammary development
- Progesterone
- Thyroid
- Metabolism

AUTHOR FLORENCE WILLIAMS AT OUR 20TH ANNIVERSARY

"I SEE BREASTS AS A SENTINEL OF THE WORLD WE LIVE IN. I HAVE MUCH TO SAY."

WATCH THE VIDEO

FEATURED RESEARCH



NEW
Study measures carcinogenic flame retardants in people



NEW
A New Approach to Identifying Chemicals that Raise Breast Cancer

Contaminants pervasive in Cape Cod's drinking water supply, Silent Spring Institute finds

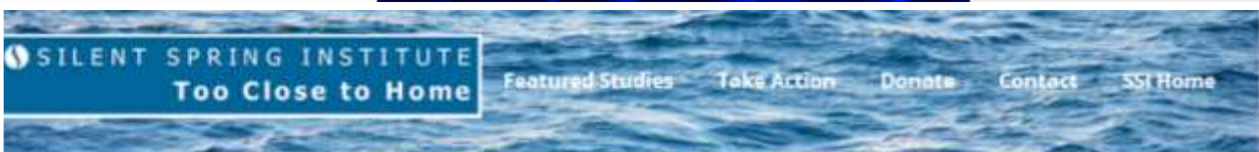
Our letter in Science outlines the major advances over the past 20 years on breast cancer and the environment

Pollution Gets Personal: When Study Participants Learn their Own Chemical Levels

MEDIA COVERAGE

On Earth - From the Outside In The

NEW AT SILENT SPRING INSTITUTE



Too Close to Home
Silent Spring Institute studies reveal that our exposure to harmful chemicals often hits too close to home. But these findings also offer guidance for reducing those exposures.

- Show All
- Consumer Products
- Flame Retardants
- Food Packaging
- Household Exposures
- Water

DONATE

HEALTHY GREEN CAMPUS

TOO CLOSE TO HOME