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Program on  
Breast Cancer and Environmental Risk Factors

SPRECHER  
INSTITUTE  
for Comparative  
Cancer Research

## Breast Cancer - The Estrogen Connection: In the Dump and Down the Drain

Scientists are concerned that even at low levels, environmental estrogens may work together with the body's own estrogen to increase the risk of breast cancer. How can we prevent these chemicals from getting into our environment? **Watch the video**, see [What you can do](#), and read on to [Learn More about What Goes in the Dump and Down the Drain](#).

Media

[Press Release Article](#)

New! [In the DUMP & Down the DRAIN Handout](#)

New! [Alternatives and Recycling Handout](#)



[Breast Cancer - The Estrogen Connection: \*\*Cosmetics and More\*\*](#)  
Learn about ingredients in cosmetics that are estrogen mimics.  
**Duration: 03:11**



[Breast Cancer - The Estrogen Connection: \*\*Plastics\*\*](#)  
Learn about estrogenic chemicals that can leach from plastics.  
**Duration: 03:08**



[Breast Cancer - The Estrogen Connection: \*\*In the Dump and Down the Drain\*\*](#)  
Learn about preventing estrogenic chemicals from getting into the environment.  
**Duration: 04:06**  
[Playing Now.](#)

### What you can do:

Learn the names of environmental estrogens.

- **Nonylphenol** and **octylphenol** are surfactants released from detergents.
- Heavy metals found in electronics are metalloestrogens.
- This includes **cadmium**, **nickel** and **lead**.

Read the label

- Use laundry detergents that are labeled "biodegradable."
- Use laundry detergents that use "plant-based surfactants."

**Recycle and Reuse** Do not throw cell phones, PDA, hard drives, or TV and computer monitors into the trash.

Bring all electronics to your local recycling facility.

OR go to [EPA's Plug-In to eCycling website](#) to find stores that accept electronics

More information is available on [breast cancer and the estrogen connection](#).

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## Learn More about What Goes in the [Dump](#) and [Down the Drain](#)

By Suzanne M. Snedeker, PhD

### Metals in Electronics – Keep them OUT of the Dump

Scientists are concerned that even at low levels, the environmental estrogens we are exposed to can add up, and may work together with the body's own estrogen to increase the risk of breast cancer. Certain heavy metals have been identified as environmental estrogens. Many of these heavy metals are found in electronics you may use. Read on to find out how you can take action to keep electronics and heavy metals out of our environment.

- [Learn their names](#)
- [Uses](#)
- [The E-Waste Crisis \(Electronic Waste\)](#)
- [What you can do](#)
- [Links to get you started](#)
- [More on heavy metals and breast cancer risk](#)

#### Learn their names

- Cadmium
- Nickel
- Lead

#### Uses

- Cadmium and nickel were used in older rechargeable cell phone and laptop batteries. You'll usually find "NiCd" on these types of batteries. Newer rechargeable batteries do not have cadmium but may have nickel.
- Lead is used in solder in circuit boards in many types of electronics, and to line older TV and computer screens. Older TVs have 4 to 7 lbs. of lead, and new models have 2 lbs. of lead.

#### The E-Waste Crisis (Electronic waste)

- In 2005, Americans discarded 2 million tons of E-waste including cell phones, TVs, computers, printers, scanners, fax machines, and peripherals. The U.S. Environmental Protection Agency (EPA) estimates about 80-95% ended up in landfills, while 15-20% was recycled.
- The EPA estimates that about 180 million electronic items bought from 1980 to 2004 are still tucked away in drawers, closets and basements (<http://epa.gov/ecycling/faq/htm>).

#### What you can do

- **Don't Dump:** Don't throw away rechargeable batteries or any electronic device in the trash. Instead, REUSE, RECOVER, RECYCLE.

- **Reuse:** Cell phones and other electronics in good condition can be donated to many charities, including schools and non-profit organizations.
- **Recover:** Nearly all parts of a cell phone (metals, plastic and batteries) can be recovered to make other electronics.
- **Recycle:** Businesses and government agencies are working together to make donating electronics easier.

### Links to get you started

- [Plug-In to eCycling](#) EPA's website with links to business that have eCycling programs
- [myGreenElectronics](#) Learn about corporate recycling programs and how to locate recycling options near you
- [eBay's Rethink Initiative](#) How to sell, trade in, donate, or recycle electronics

### More on heavy metals and breast cancer risk

- **Estrogenicity:** Estrogens signal breast cells to divide by interacting with a receptor (estrogen receptor-alpha). Researchers from the Lombardi Cancer Center and Georgetown University found that a variety of heavy metals could activate estrogen receptor pathways, and stimulate estrogen-dependent breast tumor cells to grow in tissue culture. The metals identified as having estrogenic properties included cadmium, nickel, and lead. They are called metalloestrogens (Martin et al., *Endocrinology*, 144:2425-2436, 2003; Darbe, J. of Applied Toxicology, 26:191-197, 2006).
- **Breast cancer risk:** Researchers from the University of Wisconsin Comprehensive Cancer Center reported that women with the highest levels of cadmium in their urine (a measure of recent exposure) had a two-fold higher risk of breast cancer compared to women with the lowest levels of urinary cadmium (McElroy et al., *J. of the National Cancer Institute* 98(12):869-873, 2006).
- **Risk of other cancers:** While scientist continue to evaluate the role heavy metals may play in breast cancer risk, several heavy metals have already been linked to other human cancers. The [International Agency for Research on Cancer \(IARC\)](#) has rated cadmium and nickel as human carcinogens. Inorganic lead has been rated as probably carcinogenic to humans.

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## Learn More about What Goes Down the Drain Environmental Estrogens in Detergents

By Suzanne M. Snedeker, PhD

Scientists are concerned that even at low levels, the environmental estrogens we are exposed to can add up, and may work together with the body's own estrogen to increase the risk of breast cancer. Some chemicals, used as surfactants in detergents to get the dirt out, go down the drain, and during wastewater treatment, they break down and form the environmental estrogens called nonylphenol and octylphenol. Read on learn more about these chemicals and how you can chose products with surfactants that are not estrogenic.

### Nonylphenol and Octylphenol

- [Uses](#)
- [Where does NPE go?](#)
- [Exposure](#)
- [Regulation](#)
- [What you can do](#)
- [Estrogenicity](#)
- [Other toxic effects](#)

### Uses

- In detergents: Nonylphenol is used in a "polyethoxylated" form (NPE) in industrial and household detergents, including laundry detergents and household cleaning products. In the detergents the NPE form acts as a surfactant to help get the dirt out.
- Other uses: NPE has many other uses. It is used as a wetting agent to help paint stick to surfaces rather than bead up. It also can help liquids disperse evenly (dispersant), and helps ingredients blend together (emulsifier). It is used in many industrial applications including making paper and plastics, metal fabrication, pesticide formulations and textile manufacturing.

### Where does NPE go?

NPE used in household cleaners and laundry detergents does go down the drain. The polyethoxylated NPE-form goes into septic systems or wastewater treatment plants. Bacteria break down the NPE into chemicals that are environmental estrogens called nonylphenol and octylphenol. (see [http://www.ec.gc.ca/ceqg-rcqe/English/Pdf/GAAG\\_NPE\\_SoQG\\_e.pdf](http://www.ec.gc.ca/ceqg-rcqe/English/Pdf/GAAG_NPE_SoQG_e.pdf)).

### Exposure

- **Sludge:** Most of the nonylphenol and octylphenol from wastewater treatment ends up in sewage sludge. Some of the sewage sludge is applied to agricultural land. There is little data available on the nonylphenol levels of crops grown on sludge-treated soil, and limited data on grazing animals feeding on sludge-treated pasture land. More research is needed to determine if this is a significant route of exposure. (Sjostrom, et al., *Environmental Pollution*, doi:10.1016/j.envpol.2008.03.005, 2008; Rhind et al., *Environmental Health Perspectives*, 113:447-453, 2005).
- **Water:** Nonylphenol has been detected at low levels in rivers worldwide and in groundwater from septic systems (Shao et al., *Archives of Environmental Contamination and Toxicology*, 48(4):467-473, 2005; Clark et al., *International J. of Environmental Analysis and Chemistry*, 47:167-180, 1992; Loos et al., *Analytical and Bioanalytical Chemistry*, 387(4):1469-1478, 2007; Swatz et al., *Environmental Science and Technology*, 40(16):4894-4902, 2006).
- **Air and Dust:** Nonylphenol has been detected in the dust and air samples of households in a study conducted on Cape Cod, MA by the Silent Spring Institute (Rudel et al., *Environmental Science and Technology*, 37(20):4543-4553, 2003).
- **People:** A study conducted by the Centers for Disease Control and Prevention (CDC) reported low levels of octylphenol in over half of the urine samples they analyzed. This is evidence of exposure to this chemical in the U.S. population (Calafat et al., *Environmental Health Perspectives*, 116:39-44, 2008). The CDC is in the process of developing biomarkers for exposure to nonylphenol (Calafat et al., *Environmental Health Perspectives*, 113:391-395, 2005).
- **Infants:** Nonylphenol has been detected at low levels in human breast milk in studies conducted in the U.S. and Italy (Ye et al., *J. of Chromatography B*, 831:110-115, 2006; Ademollo et al., *Environment International*, doi:10.1016/j.envint.2008.03.001, 2008).

### Regulation

- **Europe:** In the United Kingdom, polyethoxylates were phased out of laundry detergents in the 1970s, but industrial uses persisted for many years. In 2005, the European Union banned the manufacture and use of NPEs and nonylphenol (EU Directive 76/769/EEC) because of evidence of toxicity to fish and other aquatic species, evidence of endocrine disruption, ubiquitous detection in rivers and lakes, and detection in the human food supply.
- **U.S.A.:** In the U.S., there are currently no regulations governing manufacture or use of polyethoxylates. However, the EPA has established the "Safer Surfactant Stewardship Program," which recognizes those who voluntarily commit to the use of safer surfactants in their products that are biodegradable and pose less of a toxic hazard to fresh and salt water fish (see <http://www.epa.gov>

/dfe/pubs/projects/formulat/sdsi.htm).

### What you can do

When you choose household detergents and laundry detergents:

- READ the LABEL
  - Look for products that list all of their ingredients.
  - Look for products that are **biodegradable**.
  - Look for products that state they use **plant or vegetable-based surfactants** (coconut surfactants are one example of a plant surfactant).
- Many major brands are starting to introduce cleaning products detergents that do not use NPE-based surfactants.

### Estrogenicity

Nonylphenol and octylphenol have tested positive as weak environmental estrogens in many types of screening tests. These environmental estrogens are much weaker (less potent) than the estrogen made by a woman's ovaries. Nonylphenol also can support the growth of estrogen-dependent human breast cancer cells grown in the laboratory. (Shelby et al., Environmental Health Perspectives, 104:1296-1300, 1996; Miller et al., Environmental Health Perspectives, 109:133-138, 2001; Bonefeld-Jorgensen et al., Environmental Health Perspectives, 115(suppl 1):69-76, 2007; Recchia et al., Food Additives and Contaminants, 21(2):134-144, 2004).

### Other toxic effects

Nonylphenol is very toxic to fish, and can cause feminization of male fish. Therefore, keeping these chemicals out of the environment is important for human health and wildlife health. (Goksoyr et al., J. Toxicological and Environmental Health A, 69(1-2):175-184, 2006; Popek et al., Reproductive Biology, 6:(Suppl. 1)175-188, 2006).

More information is available on [breast cancer and the estrogen connection](#).

**Acknowledgements:** Dr. Suzanne Snedeker would like to acknowledge her student research assistants, Kasia Fertala and Laschelle Dana-Marie Stewart, who helped retrieve and organize the references used to write this article, and Carmi Orenstein for her helpful comments on drafts of this article.

Last Update 10.19.09

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