



Could Our **Wardrobe** Contribute to **Cancer?**

By Beth Fiteni, M.S.E.L.

Organic food is a commonplace, but the conversation is just getting started with regards to the **health effects of our clothing**. While there is still research to be done on the potential dangers of the **carcinogenic chemicals** in our clothes, prevention begins with education.

Clothing is considered one of the basic necessities of life. It protects us from the elements, and is an expression of personal style and status. Each person in the U.S. consumes an average 83.9 lbs of textiles per year (1). However, while many people are starting to eat organic food, there isn't a widespread conversation about the connection between our clothing and the planet, so that most people are likely not aware of the process by which clothes are made.

What's Really In Our Clothing

Common fabrics are made from many different raw materials.

Let's start with polyester. Developed in the 1950s, about 11 million tons of polyester are produced each year. Polyester is a petrochemical-based synthetic plastic polymer made up of many esters, xylene and ethylene. It can contain terephthalic acid (PET- plastic #1), so is technically recyclable. "Most polyester is manufactured using antimony as a catalyst. Along with being a carcinogen, antimony is toxic to the heart, lungs, liver and skin (2)." There is a concern that it may leach phthalates, which are hormone disrupting chemicals, especially if it's a hot summer perspiration-invoking day.

Nylon is another petroleum-based material originally developed by DuPont around World War II. It is made of diamine, dicarboxylic acid and acetic acid (3).

Acrylic is made from acrylic acid, (ibid, 3) which the Environmental Protection Agency says is a “strong irritant to the skin, eyes, and mucous membranes (4).” It is not known whether acrylic acid causes cancer, but it is a possible mutagen and reproductive toxin, and is toxic to bladder, brain, the upper respiratory tract, eyes, and central nervous system (CNS) (5).

Even cotton, a natural product, can be associated with environmental hazards. Cotton crops are sprayed with about 25% of all insecticides used on the world’s crops combined, according to the Organic Trade Association (6). About 1/3 lb of pesticide is used to make the average t-shirt (7).

Aside from the fabrics themselves, chemicals are used to break down cellulose, add color, or to make fabric stain-proof. “Some chemicals used for “finishing” of fabric contain heavy metals like copper, chromium, and cobalt, which are known carcinogens, or dioxin - also carcinogenic, and suspected hormone disruptors (8).” For example, making clothing less prone to wrinkling usually involves formaldehyde, a suspected carcinogen. Several years ago, formaldehyde was found in Victoria’s Secret bras after a consumer experienced negative health effects (9).

Did You Know?

Polyvinyl chloride (PVC) is used to make plastisol ink, used in some t-shirt and other garment panel printing. It contains phthalates, which are hormone disruptors.

The chemical Microban, which is combined into polyester, nylon, and cotton blends, is an anti-microbial that may contain triclosan. Triclosan is currently suspected to be a hormone disruptor.

Synthetic chemical dyes are petro-chemical based, and contain chemicals such as coal tar, which contains many substances believed to be carcinogenic. Heavy metals like

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chromium and cadmium are used to make bright color dyes (10). Dioxins are also used in the dyeing process and are often discharged into the environment. Azo dyes are commonly used, and are made from genotoxic aromatic amines that damage our cells' DNA, and may lead to cancer. The danger is not only to those who wear the clothes in question, but those who make them: "In the United States, deaths amongst factory workers from several cancers, cerebrovascular disease, lung disease are significantly higher – 40 times higher, for some diseases – than in the general population (11)."

Dry Cleaning

If you use a dry cleaner, you are very likely paying for a chemical called Perchloroethylene (also Tetra-chloroethylene, or "Perc" for short) to clean your garments. The majority (80%+) of dry cleaning businesses use Perc, made by Dow Chemical, a chemical solvent that removes dirt and oil-based stains without water (12).

According to the Agency for Toxic Substances and Disease Registry (ATSDR) (13), *"The Department of Health and Human Services (DHHS) has determined that tetrachloro-ethylene may reasonably be anticipated to be a carcinogen. Tetrachloroethylene has been shown to cause liver tumors in mice and kidney tumors in male rats."*

A University of Albany and New York Attorney General study found a correlation between human exposure to Perc and elevated levels of kidney cancer (14). Perc volatilizes into the air, and exposure through inhalation can cause neurological effects such as dizziness or headache (id, 13). So, it is wise to air out clothing before you bring it into your home.

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So What Can We Do?

There are not many studies showing a direct correlation between chemical exposure in clothing and disease. However, prevention is the cure. To be on the cautious side, we can choose fashions made with “greener” materials. For example, we can look for clothing made with organic cotton. This means the cotton is grown without pesticides. Organic cotton clothing can be found online and in boutiques around the country, as well as in chain stores such as Walmart and H&M. Hemp is another clothing option that does not involve the use of many chemicals in its production.

Natural fibers can be dyed with natural dyes, often made from plants or minerals. For example, indigo can be made from indigo flowers and madder plant can make red dye. Though sometimes toxic mordants (which make the color stick to the fabric) are still even used with natural dyes, there are natural mordants including mineral salts from iron, copper, tin, and alum (id, 7). Also, when dry cleaning clothing, we can choose a greener alternative such as cleaners that use carbon dioxide or Green Earth.

We as consumers have a choice, and we can use the power of our knowledge to create change for the better.

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She has a Masters of Studies in Environmental Law (MSEL). In 2010, she was awarded the EPA’s Environmental Quality Award for her work in creating educational materials on children’s environmental health (www.Ribbet.org) through the Huntington Breast Cancer Action Coalition, and has been featured in local news and print media. She is on the board of Prevention is the Cure, and is currently writing a book on eco-fashion and sustainable clothing entitled *How to Green Your Wardrobe*.

References

1. Hawley, J. (2008). Economic Impact of Textile and Clothing Recycling. In J. Hethorn & C. Ulasewicz (Eds.), *Sustainable Fashion: Why Now? A conversation about issues, practices, and possibilities*.
2. McDonough, W. & Braungart, M. (2002). Transforming the Textile Industry. *Green@Work Magazine*. [May/June 2002 issue].
3. Clement, A. M., & Clement, B. (2011). *Killer Clothes*. Summertown, TN. Hippocrates Publications.
4. Environmental Protection Agency. (2000). Acrylic Acid. Retrieved October 27, 2013 from <http://www.epa.gov/ttnatw01/hlthef/acrylica.html>
5. ScienceLab.com, Inc. (2013, May 21). Acrylic Acid [Material Safety Data Sheet]. Retrieved October 27, 2013 from <http://www.sciencelab.com/msds.php?msdsId=9922794>
6. Organic Trade Association. (2011) Cotton and the Environment. Retrieved October 27, 2013 http://www.ota.com/organic/environment/cotton_environment.html
7. Ecomall. A Green Clothing Manifesto. Retrieved October 27, 2013 from <http://www.ecomall.com/greeshopping/clothingmanifesto.htm>
8. Fletcher, K. (2008). *Sustainable Fashion & Textiles*, page 49. London, UK. Earthscan.
9. Fresh Unlimited Organic Luxury. (2008, December 4). I'll Take My Lingerie Without Formaldehyde Thanks... Entry post. Retrieved October 27, 2013 from <http://freshunlimited.wordpress.com/2008/12/04>
10. Hoffman, L. (Ed.). (2007). *Future Fashion White Papers*. New York, NY. Earth Pledge.
11. Green Cotton. (2008, June 12). Synthetic Dyes: A Look at Environmental & Human Risks. Entry post. Retrieved October 27, 2013 from <http://greencotton.wordpress.com/2008/06/18>
12. Environmental Protection Agency. (1994) Chemicals in the Environment: Perchloroethylene. Retrieved October 27, 2013 from http://www.epa.gov/chemfact/f_perchl.txt
13. Agency for Toxic Substances and Disease Registry. (1997) Tetrachloroethylene (PERC). Retrieved October 27, 2013 from <http://www.atsdr.cdc.gov/toxprofiles/tp18-c2.pdf>
14. Short, A. (2010, February 17). Activists 'PERC' up to new findings. NY Post [online]. Retrieved October 27, 2013 from <http://nypost.com/2010/02/17/activists-perc-up-to-new-findings>