

Part 3: Breast Cancer and Chemical Substances

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Estrogen: Estrogen is a steroid hormone that stimulates growth of a variety of female genital and non-genital tissues. Cumulative life-time estrogen exposure correlates directly with breast cancer risk. No one argues with this. It is one of the major reasons women endure hot flashes after menopause, rather than taking estrogen to prevent them.

It doesn't matter if the estrogen comes from pills, "bio-equivalent" hormone mixes, a patch, vaginal cream or your own ovaries. Having few or no children, getting pregnant later in life, breast-feeding for fewer months, starting periods at a younger age, entering menopause later in life and taking hormone replacement estrogen all expose women to more estrogen over the course of their lives.

Alcohol has the chemical structure C_2H_6O . As mind-altering chemicals go, it is one of the most popular. Women continue to drink in spite of clear scientific documentation, if not general knowledge, of the fact that alcohol contributes to both pre- and post-menopausal breast cancer risk.

First linked to cancer in 1977, the preponderance of evidence since then confirms that even a small amount of alcohol (one to two drinks per day) increases risk. The more you drink, the higher your risk of cancer. It doesn't make a difference whether you drank early or late in life.

The current theory of alcohol's contribution to cancer says that it acts by raising estrogen levels, but scientists don't have conclusive proof for the theory. If that theory is valid, breast cancers that grow in response to estrogen because they have estrogen receptors would be more common in drinkers. Some studies do see this association, lending credence to the theory.

It's not hard to consume enough to alcohol in increase your cancer risk. At only 5 grams per day (a third of a bottle of beer), the risk starts to rise. For the sake of reference, the U.S. definition of a standard drink is one

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which contains 14 grams of alcohol. Beer's alcohol content ranges from 2.5 – 12%, so the alcohol content

varies, but a standard 12 ounce bottle of beer containing 5% alcohol delivers 13.9 grams alcohol. Wine's usual alcohol content is 12%, but can range from 4% (wine coolers) to 19% (dessert wines). Just five ounces of 12% wine contains 15.6 grams alcohol. A single shot (1.5 ounces) of 80 proof liquor delivers 14 grams alcohol.

Women who consume 2-3 drinks per day incur the highest risk (50% more risk than non-drinkers), but there is a 9% increased risk for each 10 gram daily increase of alcohol consumed. At 30-60 grams per day (2-4 glasses of wine or shots of liquor), the risk is 140% that of a non-drinker.

Once you have breast cancer, drinking at least 3 drinks per week worsens your prognosis. The 2010 study from Kaiser Permanente, published in the Journal of Clinical Oncology, showed that drinking only 6 grams of alcohol per day increased the risk of cancer recurrence and dying from it.

Eating vegetables seems to partly counteract alcohol's effect. I wonder how many salads you would have to eat to counter the effect of ½ bottle of wine...

Radiation:

It's not a chemical, but radiation definitely increases breast cancer risk. Radiation exposure, from sources like CT scans, damages our genetic material, which can lead to cancer. Radiation therapy (to treat other cancers) and CT scans deliver whopping doses that make them the biggest culprits for subsequent breast cancer, but all x-rays, including chest x-rays and dental x-rays, emit radiation, but only low doses. Your risk increases as your cumulative, life-time radiation exposure from all sources increases.

Tobacco smoke: Smoking hasn't been high on the list of breast cancer risk factors, but it should be. One large study of nearly 80,000 postmenopausal women found that, compared to never-smokers, current smokers had a

16% higher breast cancer risk. For former smokers, risk remained 9% higher. A [second study](#) found that current and former smokers had a 39% higher rate of dying from breast cancer than women who had never smoked.

The results of the large National Surgical Adjuvant Breast and Bowel Project's Breast Cancer Prevention Trial strengthen the association. Women in this trial were, by selection, at high risk for breast cancer. The trial found a higher risk of invasive breast cancer in smokers compared to nonsmokers, a risk that increased with number of years of cigarette smoking.

Women who had smoked for less than 15 years had no increased risk for breast cancer, but smoking for between 15 and 35 years bumped the risk up by 34%. Smoking for more than 35 years raised that risk to 59% over never-smokers.

Acrylamide: Only very high levels of acrylamide in food contribute to breast cancer risk. Acrylamide forms as foods are cooked for a long time at high temperatures, whether in the manufacturing company or at home. How common are high acrylamide levels? According to a Swedish study, less than 1.5% of Swedish women exceeded a dangerous level of 1 mcg/Kg of body weight per day. In case you want to limit your exposure, coffee, fried potatoes and crisp bread were the greatest contributors of acrylamide in the Swedish study. Fresh vegetables and fruits have essentially none, another good reason to eat them.

Polychlorinated biphenyls (PCBs), DDT and DDE: Fear that weakly estrogenic organochlorine pollutants have caused the Western world's breast cancer problem is not justified by the data. PCBs inhibit, as well as imitate estrogen, but there is little evidence that PCBs cause many cases of breast cancer. DDT exposure in pre-pubescent girls increases the chance of breast cancer later in life, but probably contributes only a small amount to the overall breast cancer rate.

PCBs, DDT and DDE appear throughout the global ecosystem, including in fish, wildlife and human tissue. Some of the highest blood levels appear in women in those third world countries without DDT bans. Women there do not have high breast cancer rates and those with breast cancer do not have higher levels than women without. One 1993 study in New York did find higher PCB and DDE levels in breast cancer patients, but

multiple studies since, in the US and Europe, have not verified the results. Women exposed to high PCB levels at work have no increased risk of breast cancer.

DDT was banned in the U.S. in 1972 and PCBs were banned in 1977. The divergence of breast cancer rates and organochlorine levels in Westernized countries, as environmental levels have declined, argues against them causing the breast cancer epidemic.

This doesn't eliminate the possibility that exposure to some *other* chemical exposure is propagating the epidemic. Until we can identify them, women should exercise, imbibe less alcohol, and eat a healthy diet, all proven ways to minimize breast cancer risk.

Deodorant: Widely circulated, lay press reports of deodorants causing breast cancer have caused a great deal of fear in women. The reports suggest that chemicals in the deodorants enter the body by absorption through skin or nicks from shaving. They incriminate either aluminum, the active ingredient of most deodorants, or paraben preservatives as the culprit chemicals that might cause cancer. Most deodorants no longer contain parabens, which can mimic estrogen's effects in the body.

Conflicting data make it impossible to say if deodorants really do increase cancer risk. The National Cancer Institute concludes that, because the data is mixed and not terribly convincing even when it is positive, they can't confirm a causative relationship. They suggest more research.

Hints of Chemical Prevention, but don't bet your life on them:

Fish oil: Some data support the notion that fish oil supplements might protect against breast cancer. However, so many variables have confounded the study results that we can't establish a clear association.

Osteoporosis drugs: Post-menopausal women who take osteoporosis drugs of the bisphosphonate class (Fosamax, Actonel and others), seem to get less breast cancer, but there could be significant mitigating factors. No one is yet suggesting that we use these drugs for cancer prevention.