

## **Breast Cancer Prevention**

### *Reducing risk through nutrition, lifestyle & environmental action*

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#### *The Breast Cancer epidemic*

One woman in eight will develop breast cancer in her lifetime, making it - in developed countries (except for Japan) - the most common cause of cancer death. Breast cancer accounts for 500,000 deaths annually.<sup>i[i]</sup> Ominously, its incidence has risen about 50% since 1950, however rates have leveled during the last decade.<sup>ii[ii]</sup> Breast cancer survival rates have not improved either, despite chemotherapy.

It is fascinating and important that breast cancer rates vary by where you live. American women have about 6 times the risk of Japanese women!<sup>iii[iii]</sup> Japanese-Americans, however, have the same rate of breast cancer as other Americans. When women migrate to another country their breast cancer rates assume the pattern of their new country within 2 to 3 generations.<sup>iv[iv]</sup> **This points to life style as a crucial factor in breast cancer causation and prevention strategies.** Wide variation of breast cancer rates within the U.S. point also to environmental factors.<sup>v[v]</sup> <sup>vi[vi]</sup>

#### *Prevention Perspectives*

Some people feel that most disease, including breast cancer, is genetically determined. While it is true that having a family history of breast cancer is a risk factor, “breast cancer genes” cause less than 10% of cases. Nutrition and lifestyle are also transmitted through families, but of course these things can be changed, while genes - for the foreseeable future - cannot.

Breast cancer risk is increased by: hormones, diet, alcohol, and smoking, and is prevented by: vitamin A, carotenoids (the pigment in carrots and other vegetables) and exercise.<sup>vii[vii]</sup> Breast cancer risk is also increased by exposure to industrial hydrocarbons. All of these factors, and others, will be discussed in this essay.

I strongly reject the pessimism about primary prevention expressed by the American Cancer Society (ACS) when they state (wrongly) that there are “no practical ways to prevent breast cancer ... Since Women may not be able to alter their personal risk factors, the best opportunity for reducing mortality is through early detection” (by mammography).<sup>viii[viii]</sup> While mammography is of some value, I believe the ACS underrates the ability of women to change their personal risk factors.

## *Mammography*

Again, while mammography is of value, it is a serious mistake to over-estimate its effectiveness. Surveys have demonstrated that women both greatly overestimate their risk of dying of breast cancer and the effectiveness of screening<sup>xix</sup> It is likely that nutrition, lifestyle and environmental action are more effective at reducing breast cancer risk than complying with ACS guidelines for mammographic screening. Nonetheless, studies have shown a 24% reduction in breast cancer mortality among those receiving mammographic screening compared to those who did not. Breaking this down by age groups - 29% reduction among women between 50 and 69 years of age, a 13% reduction among women 40 to 49 years of age (not statistically significant), and only marginal effects for women between 70 and 74 years of age.<sup>xx</sup> Despite the fears of some women about mammograms, there was no evidence that getting a mammogram causes breast cancer.

Another way of viewing the numbers is to look at the number needed to routinely screen to save one life.<sup>xxi</sup> For woman between ages 40-49, 2500 must be screened to save one. For woman between ages 50-69, 270 would have to be screened to save one life. Obviously mammograms work much better for woman between 50 and 70. On the other hand, these numbers are not nearly good enough! Fortunately, primary prevention through nutrition, lifestyle and environmental action offer much more hope. For starters, we should be able to reduce our risk to as low as Japan, where the rate is 1/6 of ours!

## *Environmental Perspective*

According to Samuel Epstein<sup>xxii</sup> - the primary proponent of environmental causation of breast cancer – In fact we know a great deal about its avoidable causes, which include:

- ❖ Prolonged use of oral contraceptives and Estrogen Replacement Therapy
- ❖ High-fat animal and dairy product diets that are heavily contaminated with chlorinated pesticides that are estrogenic and carcinogenic to the breast, and meat contaminated with potent sex hormones following their use to fatten cattle in feed lots prior to slaughter
- ❖ Exposure to petrochemical carcinogens in the workplace that put about 1 million U.S. Women at increased risk.
- ❖ Exposure to carcinogenic chemicals from hazardous waste sites and petrochemical plants that pollute soil, air and water.
- ❖ Exposure to indoor air pollutants, including carcinogenic pesticides and solvents
- ❖ Prolonged use of black and dark brown hair dyes
- ❖ Heavy smoking and drinking commencing in adolescence
- ❖ Inactivity and Obesity

It should be noted, that some of these factors confer relatively small risk, such as – medical estrogens (see below), and that some of these environmental factors can be avoided, such as - high-fat, non-organically produced animal products or hair dyes. Also, it should be noted that while Japanese women are exposed to as much industrial toxins as Americans their breast cancer risk is apparently moderated by their lifestyle, primarily their diet. This fact should not diminish our commitment to environmental clean up, but clearly empowers individuals to protect themselves.

## *Life Style*

Substantial evidence implicates affluent lifestyle as a potent cause of breast cancer.<sup>xxiii</sup> Data from 66 countries showed that breast cancer mortality was most strongly associated with dietary factors that were typically associated with affluence (or that poverty protects against breast cancer!):

1. Extremely low fat intake early on in life (particularly animal products) may reduce risk.
2. Olive oil-enriched diets may be protective.
3. Increasing vegetable intake and limiting alcohol consumption may have a modest effect on breast cancer risk.<sup>xvi[xvi]</sup>
4. Fish and cereal products exert protective effects.
5. While obviously not recommended as a cancer protection strategy having more babies is protective
6. Breast-feeding reduces breast cancer risk

## Specific Breast Cancer promoters & prevention strategies

### *Estrogens*

**Human Estrogen** is an important cause of breast cancer. **16- $\alpha$  hydroxyestrone** – a metabolite of estrogen - activates estrogen receptors that may trigger breast cancer by strongly increasing the interaction between estrogen receptors and growth-promoting genes, enhancing breast-cell proliferation and perhaps damaging DNA.

A variety of factors impact the levels of “bad” estrogen metabolites. Reducing fat in the diet below 20% of calories lowers estrogen levels, which in turn reduces 16- $\alpha$  hydroxyestrone.<sup>xvii[xvii]</sup>

**Phytoestrogens** found in foods such as **Soy**, Apples, Rhubarb, Carrots, Pomegranate seeds, Dates, Onions, Radishes, Cucumbers, Peas, Cabbage, Legumes & Hops yield 2-hydroxyestrone which blocks 16- $\alpha$  hydroxyestrone. Asian females who have a reduced incidence of breast cancer have higher levels of 2-hydroxyestrone and lower levels of 16- $\alpha$  hydroxyestrone than non-Asian women and they eat more soy products and green vegetables.<sup>xviii[xviii]</sup> A case control study in European women similarly demonstrates the protective effects of dietary phytoestrogens.<sup>xix[xix]</sup> **Cruciferous Vegetables** – (Broccoli, Brussels’ Sprouts, Cabbage, Cauliflower) have isothiocyanates such as indole-3-carbinol that also increase the 2:16- $\alpha$ - hydroxyestrone ratio, and therefore has anti-carcinogenic potential.<sup>xx[xx] xxi[xxi]</sup> Young **broccoli sprouts** contain 30 to 50 times the amount of **isothiocyanates** found in mature broccoli heads. To cut the risk of cancer in half, experts suggest consuming 2 pounds of broccoli and similar cruciferous vegetables a week. However, with the potency of broccoli sprouts, the individual would need to consume only 1 ounce of sprouts to get the same benefit.<sup>xxii[xxii]</sup> Fruit and vegetable fiber also possesses a strong significant inverse association with breast cancer risk.<sup>xxiii[xxiii] xxiv[xxiv]</sup> The rationale for the benefit of dietary fiber in breast cancer risk reduction includes<sup>xxv[xxv]</sup>:

1. A high fiber diet reduces circulating estrogens by reducing enterohepatic recirculation of estrogen.<sup>xxvi[xxvi]</sup>
2. Many plants and vegetables contain isoflavones and lignans which are capable of being converted into weak estrogens in the bowel that may compete with estrogen binding sites.
3. A high fiber diet is generally not associated with obesity.
4. A high fiber diet usually has a lower content of fat and a higher content of antioxidant vitamins, which may protect against breast cancer.
5. Diets rich in fiber and complex carbohydrates can improve insulin sensitivity with associated reduction in circulating estrogen levels.

### Xenoestrogens – “Endocrine Disruptors”

DDT, polychlorinated biphenyls and other chlorinated organic are xenobiotics that alter the body's own production and metabolism of estrogen. The list of ubiquitous xenoestrogens includes

insecticides such as DDT and methoxychlor, synthetic estrogens, aromatic hydrocarbons and breakdown components of plastics and a common weed killer Atrazine. Potentially harmful xenoestrogens also include gasoline, car emissions, synthetic estrogens and antidepressive drugs.

### *Medical Estrogens*

Estrogen Replacement Therapy (ERT) for menopausal women increases risk for women aged 60 to 64. Oral contraceptives slightly increase the risk of having breast cancer diagnosed. The data shows that the relationship between oral contraceptives and breast cancer in younger women appears to have a biological basis rather than an artifact or result of bias. There is a new class of medical estrogens called selective estrogen receptor modulators (SERM) that act like phytoestrogens and may reduce breast cancer by up to 50%, but, unlike soy products and other vegetable phytoestrogens, SERMs may induce cancer of the ovary. Raloxifene (Evista) is the first drug in this class to reach the market.

### *Dietary Fat & Eicosanoids*

Data regarding the relationship to fat in the diet to breast cancer has been inconsistent. Studies have suggested high intakes of dietary fat result in higher levels of estrogens. It is also possible that industrial chemicals (antibiotics, hormones or pesticides) contaminating meat are the culprits. It also appears that some types of fat – particularly fish oil and olive oil are protective against breast cancer, while animal fats and polyunsaturated vegetable oils promote breast cancer. Again, **Omega-3 fatty acids – mainly fish oil** - suppress breast cancer. There is an inverse relationship between the incidence of breast cancer and the level of **fish consumption**, which suggests a role for omega-3 fatty acids in the prevention of breast cancer.

Fats produce chemicals called Eicosanoids in the body. Some Eicosanoids promote breast cancer, while others prevent it. This is why some fats, like red meat fats (so called –saturated fats), promote breast cancer, while Omega-3 fats protect. Interestingly, **Aspirin** and other anti-inflammatory drugs influence the metabolism of fats into Eicosanoids and can prevent breast cancer. In evaluating 511 breast cancer patients compared to 1,534 control subjects, women using nonsteroidal anti-inflammatory medications at least 3 times a week for more than 1 year had an odds ratio of .66 (that is – a 34% reduction). There were similar odds ratios for the use of ibuprofen and aspirin. Aspirin also reduces the risk of heart attack, and some kinds of stroke through the same chemistry; however, it increases the risk of bleeding.

### *Insulin & Syndrome-X*

Americans are becoming progressively obese because of diet and sedentary lifestyle. This is a risk factor for a wide variety of diseases including breast cancer. Increased body mass results in increased insulin levels. This is called “syndrome-x.” Insulin appears to trigger breast cancer. The fattest third have a 1.9-fold higher risk of dying from breast cancer than the thinnest third. The epidemic of obesity is a complex social phenomenon, related to sedentary lifestyle, decreased fiber consumption, decreased fruit and vegetable consumption and increased “junk food” consumption. Breast cancer risk is just the tip of the iceberg!

## *Antioxidants*

Because human beings breathe oxygen, using it to “burn” fuel for energy, we are vulnerable to oxidative damage from the “sparks” (free radicals), that are an inevitable consequence of this chemistry. Free radicals are a major cause of aging, and through damaging DNA are major causes of breast cancer.

Life on earth depends on antioxidants, which “scavenge” free radicals and dispose of them safely. Our bodies have several built-in anti-oxidant systems, which require nutritional factors to function properly. Some of these factors are vitamins, some are minerals, and some are other chemicals found chiefly in fruits and vegetables. There have been important observations regarding the protective effects against breast cancer for Carotenoids (from carrots and other vegetables), Retinol (Vitamin A) and Vitamin E.<sup>lii</sup> Vitamin C intake has a strong significant inverse association with breast cancer risk.<sup>liv</sup> **Selenium** in the range of 1.00-1.21 umol/L showed a significant preventive effect.<sup>lv</sup>

While taking vitamins may confer some protection from breast cancer, it should be emphasized that a wide variety of plant-based foods may be more important. **Green Tea** – current studies show an inverse association between green tea consumption and the number of axillary lymph node mets, as well as decreased recurrence of stage I and II breast cancer.<sup>lvii</sup> Limonene (from lime and other citrus fruits) – in a rat model - caused complete regression of both mammary cancers.<sup>lviii</sup>

**Flavonoids** are polyphenolic antioxidants that occur naturally in fruits, vegetables and in beverages such as tea and wine. Many of them are scavengers of free radicals, antioxidants, chelating agents, and modifiers of enzymatic and other biological functions.<sup>lviii</sup> **Silymarin**, a flavonoid antioxidant, has anticarcinogenic effects in human breast cancer.<sup>lix</sup> **Carotenoids** (beta-cryptoxanthin, lycopene, and lutein/zeaxanthin) may protect against breast cancer.<sup>lx</sup>

## *Other micronutrients*

**Vitamin D** - An ecological study showed a strong inverse correlation between breast cancer mortality in the United States and ultraviolet sunlight, suggesting low vitamin D levels may play a part in breast cancer.<sup>lxi</sup> **Garlic** has considerable evidence supporting its anticancer effect. The chemo preventive potential of garlic in inhibiting tumor genesis lies in the presence of organosulfur compounds such as diallylsulfide, diallydisulfide and diallylpolsulfides, thiosulfinates, sulfoxides, S-allylcysteine.<sup>lxiii</sup>

Alcohol consumption is clearly associated with breast cancer, while Folate (a B vitamin) reduces this risk. The Nurses' Health Study of 88,000 women for 16 years, revealed 3,483 incident cases of invasive breast cancer. There was a direct association with breast cancer and the number of drinks consumed. One drink per night (such as wine) increased risk by 50%, two drinks doubled risk, however, folate consumption (such as in multi-vitamins and leafy green vegetables) mitigated this risk as well as the risk of colon cancer and coronary heart disease.<sup>lxiii</sup>

## *Lactation*

As mentioned previously, the longer a woman breast feeds, the lower her risk of breast cancer.<sup>lxiv</sup>

## *Tobacco*

The odds ratio of breast cancer for ever active smokers compared to women who were unexposed to either passive or active smoke was 2.2 for an average lifetime consumption of 1 to 9 cigarettes per day, 2.7 for 10 to 19 cigarettes per day and 4.6 for 20 or more cigarettes per day. The odds ratio was 3.2 among passive smokers who were exposed for an equivalent of 2 hours per day for 25 years. **Active and passive exposure to tobacco smoke may increase the risk to breast cancer.**<sup>lxv[lxv]</sup>

## *Stress*

In evaluating 119 consecutive women between 27 years of age who were referred for biopsy of suspicious lesions, 41 were diagnosed as having malignant disease. After adjusting for variables, severe life events increased the risk to breast cancer with an odds ratio of 11.6. **There appears to be an etiologic association between life stress and breast cancer.**<sup>lxvi[lxvi]</sup> Moreover, support groups are more beneficial to breast cancer patients than chemotherapy.<sup>lxvii[lxvii]</sup> There may be some specific psychodynamic issues related to breast cancer.<sup>lxviii[lxviii]</sup>

## *To Prevent Breast Cancer*

- Don't smoke (and don't tolerate second hand smoke)
- Minimize exposure to toxic chemicals and unnecessary drugs
- Breast feed
- Work for the environment
- Deal with Stress (*such as meditation*)
- Get mammograms (*particularly if you're between 50-70 years of age*)
- Moderate alcohol consumption, and if you do drink- take folic acid supplements (*400-800 micrograms per day or enough to keep homocysteine level low*)
- Exercise regularly
- Eat your Veggies (and Fruits) (*5-10 servings per day*)
- Eat Fiber (*soluble fiber like bran, and insoluble fiber like fruits and veggies*)
- Reduce Animal Fats, minimize Trans-fats (*hydrogenated*) & increase  $\Omega$ -3 fats (*fish and flax*) &  $\Omega$ -9 fats (*olive oil*)
- Multi-vitamin/ Multi-mineral supplement
- Eat Phytoestrogens every day - Soy, Apples, Rhubarb, Carrots, Pomegranate seeds, Dates, Onions, Radishes, Cucumbers, Peas, Cabbage, Legumes & Hops
- Eat Cruciferous vegetables every day (and other detoxifying foods) - Broccoli, Cabbage, Cauliflower, Brussels Sprouts, Onions, Garlic

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