



Module 7: Breast Health

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BACKGROUND

The American Cancer Society notes that breast cancer is the most common cancer among American women (except for skin cancers). In 2007 it was estimated to have affected more than 178,000 people or 1 in 8 women in the US.¹ Breast cancer is also the second leading cause of cancer deaths (lung cancer is the first). Population studies suggest that the low breast cancer rates found in countries throughout Asia and Africa increase as women emigrate to the US and adopt western diet and lifestyle patterns. Subsequent generations inherit western patterns of disease, including the risk of developing breast cancer.^{2,3}

Risk Factors:

Risk and protective breast cancer factors can be characterized as modifiable or non-modifiable. Female gender and increasing age reflect the role of hormones and are the most important non-modifiable risk factors. Heredity is thought to play a role in 5 to 10% of breast cancer cases. Genetic mutations include that of both BRCA1 and BRCA2, as well less common genes such as p53 and PTEN. High levels of endogenous hormones and other growth factors accelerate the course of the disease at many points, from initiation and early mutation to tumor development and spread.^{4,5,6}

Modifiable risk factors including exercise, diet, lifestyle and the environment are major contributors in the development of cancer. It is estimated that as many as 70% of all preventable cancers and 33% of cancer deaths may be attributed to diet.¹

This module will focus on the role of nutrition and other modifiable risk factors as they relate to breast cancer, as well as overall breast health.

Biological Mechanisms of Breast Cancer Prevention:

The Role of Exercise

Many studies that have found that *exercise* is of particular importance in both risk reduction and increased survival rates following breast cancer diagnosis. Although many physicians and patients are aware of this, it is important for health providers to emphasize the importance of exercise to their patients. Exercise directly effects the metabolic processes (insulin resistance, IGF) and has been shown to reduce risk factors for the development and progression of breast cancer.⁷ IGFs interfere with apoptosis and are known to be the most powerful signal in the body encouraging cells to continue proliferating.⁸

Regular exercise also stimulates immune activity, enhances detoxification and assists in reducing body fat--a source of endogenous estrogen.

The Role of Diet

Diet plays an essential role in breast cancer prevention. Many dietary constituents found in fruits, vegetables and whole grains contain phytochemicals, which effect cancer risk by altering the biochemical milieu of the body. The term "phytochemicals" refers to a wide variety of bioactive compounds found in plants. A phytochemical may influence one or more stages in carcinogenesis, from initiation to promotion and progression to a malignant tumor.

Hundreds of phytochemicals have been identified. Their modes of action include: 1) acting as antioxidants providing protection to cell membrane and DNA; 2) inhibiting tumor growth; 3) increasing the activity of (P450 enzyme pathways) that detoxify potential carcinogens, 4) inhibiting the formation of nitrosamines; 5) decreasing cell proliferation and enhancing apoptosis; 6) maintaining normal DNA repair; and 7) altering estrogen metabolism by binding with hormone receptor sites.

The table below is adapted from *Foods to Fight Cancer* by Richard Beliveau, PhD and Denis Gingras, PhD. It illustrates potential anticancer agents, in what foods these agents are found, as well as the pathway they influence.

Phytochemical Anti-Cancer Agent	Food Source	Pathway Influenced
Sulforaphane	broccoli/broccoli sprouts	Block carcinogens
Indole - 3 Carbinol	brussels sprouts	Interferes with action of precancerous estrogen
Diallyl sulfide	garlic, onions	Intercepts and detoxifies carcinogens
Ellagic acid	berries	Antioxidant/blocks carcinogens
Curcumin	turmeric, curry	Antioxidant/ Cox inhibitor
EGCG	green and white tea	Antioxidant/blocks promotion and progression
Genistein	whole soy foods	Antiangiogenic /Blocks promotion and progression
Resveratrol	red wine, grapes	Antioxidant/Blocks promotion and progression
Lycopene	tomatoes, watermelon, kiwi	Blocks promotion and progression
Anthocyanidins	blueberries, black berries, dark chocolate	Blocks promotion and progression
Limonene	orange and lemon peel	Inhibit cell growth/ Blocks promotion and progression
Omega-3 fatty acids	cold water fishes	Regulate cell growth/ Blocks promotion and progression
Procyanidins	blueberries, black berries, dark chocolate	Blocks promotion and progression

The *Nurses Health Study*, an important study relating diet and breast cancer, tracks 83,234 premenopausal women who consumed five or more servings of fruits and vegetables per day. The study found that these women had a 23% *reduced risk* of breast cancer compared to those women consuming less than two servings per day. Women with a strong family history of breast cancer had a 71% reduced risk when they are five or more servings per day.⁹

Orange, red, yellow and dark green fruits and vegetables contain carotenoids, a family of over 600 phytochemicals that include **alpha-carotene**, **beta-carotene**, **beta-cryptoxanthin**, **lutein** and **zeaxanthin**. Women should consume more food containing these important carotenoids. Serum levels of these specific carotenoids may have an inverse relationship to breast cancer risk, so the higher the level, the lower the risk of breast cancer. In one case-controlled study (270 cases, 270 controls), it individuals in the lowest quartile of total carotenoid intake had a 231% increased risk for breast cancer.¹⁰

Cruciferous vegetables such as cabbage, cauliflower, broccoli, brussels sprouts, turnips and radishes, contain **indole-3-carbinol**, a substance that stimulates liver detoxification enzymes and has been shown in laboratory tests to inhibit breast cancer cell growth.¹¹ Indole-3-carbinol is destroyed by cooking, so it is important to consume them in their raw state. Broccoli contains **sulforaphane**, a substance that also has exhibited cancer-suppressing properties in lab tests. The crucifers are also rich sources of nutrients such as folic acid, vitamin C and fiber, which are associated with an overall reduced risk of cancer.

> Alcohol

A pooled analysis of six prospective studies conducted in Canada, the Netherlands, Sweden, and the United States with 322,647 women for up to 11 years, including 4,335 participants with a diagnosis of incident invasive breast cancer, found a linear relationship between alcohol intake and breast cancer risk. For women consuming $\frac{3}{4}$ to 1 drink per day, breast cancer risk was increased by 9% compared to nondrinkers. For those consuming 2 to 5 drinks per day, the adjusted relative risk was increased 41% versus nondrinkers.¹²

> Folate

Folate is involved in DNA synthesis and methylation and may reduce breast cancer risk, particularly among women with greater alcohol consumption. Among 88,818 women in the *Nurses Health Study* who drank at least one drink daily, those consuming 300 micrograms or more of folate daily reduced their risk of developing breast cancer from 32% to 5%.¹³ Rich sources of folate include beans, dark leafy greens (especially spinach and collards), fortified cereals, orange juice and multivitamins.

> Vitamin D

Once considered important only for its role in bone health, vitamin D has taken center stage as being integral to the regulation of genes that influence cell processes crucial to cancer development, including proliferation, angiogenesis and apoptosis. Dr. David Feldman, Professor of Medicine at Stanford University School of Medicine, recently demonstrated that calcitriol (a manmade form of vitamin D) targets genes that inhibit the synthesis and activity of prostaglandins which stimulate cancer growth and progression in cell cultures.

A study of 190 women with incident breast cancer (from a cohort of 5,009) found evidence that sunlight and dietary vitamin D can reduce the risk of breast cancer. A case-control study of breast cancer over an 11-year period in 24 states also found an inverse relationship between sunlight exposure and breast cancer risk.¹⁴

>Fats

There have been over 20 studies on the relationship between fat intake and long term survival—many of which were conducted with breast cancer survivors.^{15,16,17} Studies that

examined type of fat versus quantity of fat in the diet consistently found that high intakes of saturated fats were associated with a decreased survival rate.

Trans fats are chemically-altered fats used to increase the texture and shelf life of many processed foods. A case control study using body fat stores of trans fatty acids was conducted on 698 postmenopausal women with breast cancer. Women with trans fat stores in the highest 25% had an increased risk of postmenopausal breast cancer -- 40% greater than women with trans fat stores in the lowest 25%.¹⁸ Trans fats have been shown to increase inflammatory markers in the blood, creating an environment favorable to tumor cell growth and proliferation.

> Soy

As a non-animal plant source of protein, whole soy foods confer many health benefits. It does, however, remain controversial in some scientific circles, particularly with regard to its consumption among women with estrogen receptor positive breast cancers. The controversy surrounds the weakly estrogenic characteristics of the isoflavones, genistein and daidzein. The problems are seen not so much in whole soy foods eaten in moderation (one serving 3-5 times per week), rather, in isolated isoflavone supplements which have been shown in test tube studies to accelerate cell growth rate. These supplements often contain enriched isoflavones in amounts that far exceed the average consumption even among Asian populations. Soy supplements are never indicated in women with known breast cancer or a history of breast cancer. Soy supplements may act differently in the body when compared to those found in whole soy foods consumed in moderation.

Please refer to the Appendix for a list of reliable sources of information on complementary therapies.

Mammogram Recommendations:

There are varying recommendations regarding when a woman should undergo mammography. Given that this is an important topic for breast health, we encourage Ob/Gyn physicians to become familiar with the recommendations. One useful summary of these is found at the following website: <http://www.advocatehealth.com/system/services/women/guidelines.html>.

Women 40-49 Years of Age—

- Recommend counseling about potential risks and benefits of mammography and clinical breast exam for women ages 40 to 49.
American Academy of Family Physicians (AAFP)
- Recommend an annual mammogram beginning at age 40.
American Cancer Society (ACS)
American College of Radiology (ACR)
American College of Surgeons
- Recommend a mammogram every 1-2 years for women 40-49 years of age.
American College of Obstetricians and Gynecologists (ACOG)
American Medical Association (AMA)
American Medical Women's Association (AMWA)
National Cancer Institute (NCI)
- Recommend that women under the age of 50 should NOT be screened.
American College of Physicians (ACP)
Canadian Task Force on the Periodic Health Examination (CTFPHE)

- State there is insufficient evidence to recommend for or against routine screening for women under 50 years of age.
American College of Preventive Medicine (ACPM)
U.S. Preventive Services Task Force (USPSTF)

Women 50 Years of Age and Older—

- Recommend an annual mammogram.
American Cancer Society (ACS)
American College of Obstetricians and Gynecologists (ACOG)
American College of Radiology (ACR)
American College of Surgeons (ACS)
American Medical Association (AMA)
American Medical Women's Association (AMWA)
Canadian Task Force on the Periodic Health Examination (CTFPHE)
- Recommend a mammogram every 1 to 2 years.
American Academy of Family Physicians (AAFP)
American College of Physicians (ACP)
American College of Preventive Medicine (ACPM)
National Cancer Institute (NCI)
U.S. Preventive Services Task Force (USPSTF)

WHAT PATIENTS NEED TO KNOW

The American Institute for Cancer Research offers specific recommendations for cancer prevention.²¹ They are as follows:

1. Be as lean as possible within the normal range of body weight.
2. Be physically active as part of everyday life.
3. Limit consumption of energy-dense foods. Avoid sugary drinks.
4. Eat mostly foods of plant origin.
5. Limit intake of red meat and avoid processed meat.
6. Limit alcoholic drinks.
7. Limit consumption of salt. Avoid moldy cereals (grains) or pulses (legumes).
8. Aim to meet nutritional needs through diet alone.

To ask a question related to program module, please email our experts at info@obgynalliance.com.

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Appendix:

Reliable sources of information on complementary therapies:

- Medline Plus
 - o <http://www.nlm.nih.gov/medlineplus/druginformation.html>
- British Medical Journal
 - o <http://www.biomedcentral.com/bmccomplementaltermmed/>
- Memorial Sloan-Kettering Cancer Center
 - o <http://www.mskcc.org/aboutherbs>
- National Center for Complementary and Alternative Medicine
 - o <http://nccam.nih.gov>
- American Cancer Society
 - o http://www.cancer.org/docroot/ETO/ETO_5.asp?
- NIH Office of Dietary Supplements
 - o <http://dietary-supplements.info.nih.gov>
- United States Pharmacopeia
 - o <http://www.usp.org/dietarySupplements2007>

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Andrea Lukes, MD, MHSc, FACOG is the Founder and Chair of the Ob/Gyn Alliance. She has partnered with Beth Reardon to help create an educational channel for both providers and patients (TV segment in 2008 on Oxygen and ABC, formation of a Healthy Lifestyle Changes program through her private practice and research center - the Carolina Women's Research and Wellness Center).