



**Breast Cancer and Environment – Peer Education Tool Kit**  
*Zero Breast Cancer – Adolescent Education Project*

## Teacher Supplement

### Basic Cancer Terms

**Benign tumor:** A non-cancerous growth that does not invade nearby tissue or spread to the body.

**Cancer:** Changes in the body's cells leading to abnormal cell division that result in a variety of diseases. Most cancers develop in many steps over a period of years or decades. Many types of cancers form a lump or mass called a *tumor*, which can invade and destroy healthy tissue. Cancer cells can break away from the tumor and spread through the body through the bloodstream or the lymphatic system. Not all tumors are cancerous. Cancers are named for the part of the body where they originated, even if they have spread. Cancers may develop over several years or decades and may have many causes or risk factors.

**Carcinogen:** Any agent -chemical, physical, or biological –that causes DNA mutations that lead to cancer.

**Carcinoma:** A type of malignant (cancerous) tumor that tends to arise from the body's surface (epithelial) cells such as skin cancer or breast or colon cancer. At least 80% of the all cancers are carcinomas.

**Diagnosis:** The identification of a disease.

**First-degree relative:** A parent, sibling, or child. Family history for cancer is concerned with this relation.

**Immune system:** The body's complex defenses to fight infections and diseases, including cancer.

**Incidence:** The number of people who develop a disease, divided by the number of people at risk of developing the disease in a specific time period.

**In-situ cancer:** Very early stage cancer that *has not spread* to surrounding healthy tissues.

**Invasive cancer:** A cancer that has broken through the borders and spread to surrounding healthy tissues.

**Leukocytes:** Also called white blood cells, type of cells that fight infection.

**Local cancer:** An invasive cancer that is entirely enclosed in the organ where it originated.

**Lymph:** The clear, almost colorless part of blood that seeps into spaces between the body's cells. The **lymphatic system** produces and stores white blood cells (leukocytes) that fight infection.

**B-lymphocytes** are white blood cells that produce antibodies and protect from infection and disease.

**Lymph nodes:** Glands in the lymph system that carry lymph fluid, similar to veins in the body.

**Mortality ratio:** The number of people who die from a disease, divided by the number of people at risk of dying from the disease in a specific time period.

**Neoplasia:** Abnormal growth of cells (that may be benign or cancerous)



## **Breast Cancer and Environment – Peer Education Tool Kit** *Zero Breast Cancer – Adolescent Education Project*

**Oxidative stress:** Physiological stress on the body that is caused by repeated damage by “free radicals” in cells that are not “neutralized” by “antioxidants.” O.S. is associated with aging and cancer development.

**Pathology:** The scientific study of the nature of disease, its causes and progression and consequences.

**Pre-cancerous growth:** Abnormal cells that don’t have all the features of a cancer cell.

**Prognosis:** The predicted outcome of a disease or disorder

**Risk factor:** Genetic alteration, a habit, or an environmental compound that increases chances for developing cancer.

**Relapse or Recurrence:** The return of cancer after initial treatment and a period of improvement.

**Remission:** Disappearance of cancer signs following treatment.

**Tumor:** An abnormal mass of tissue that results from too much cell division, and interfering with surrounding body tissues. Tumors have no useful purpose. They can be benign or malignant. A **benign tumor** is not cancerous, and does not invade surrounding tissue or spread to other parts of the body  
A **malignant tumor** is cancerous; it can metastasize, or spread to other parts of the body.

## **Biological and Cellular; and Hereditary and Genetic Factors and Cancer**

**Cell:** The basic unit of all living things. Organs are made up of millions of cells. Each cell contains DNA (the genetic blueprint) and other essential components enclosed in a membrane.

**Cell division:** A process in which a full-grown cell divides into two new ones.

**Chromosomes:** The threadlike structures inside the cell nucleus that contain about 1,000 genes, which carry hereditary information. There are 46 chromosomes in each cell in your body, except reproductive cells (egg and sperm) that contain only 23 chromosomes.

**Differentiation:** Refers to how mature (developed) cancer cells are in a tumor. Differentiated tumor cells resemble normal cells and tend to grow slower, compared to poorly formed cancer cells that grow faster.

**DNA:** DNA stands for deoxyribonucleic acid. The DNA molecule inside each cell carries genetic information (cell growth, division, and function) that is passed on from one generation to the next.

**Enzyme:** A substance in cells that speeds up chemical reactions in the body.

**Familial cancers:** Cancers that occur frequently in “cancer-prone” families in which defective or mutated (flawed) genes are passed on from one generation to the next. If a woman inherits **BRCA-1 and BRCA-2** genes, she has a higher risk of developing breast and/or ovarian cancer than the average woman’s risk.



## **Breast Cancer and Environment – Peer Education Tool Kit** *Zero Breast Cancer – Adolescent Education Project*

**Gene:** a segment of DNA, or heredity unit, found inside all cells passed from parent to offspring. Genes determine hair and eye color and height, as well as susceptibility to certain diseases. Genes contain the information for making proteins in the cell. Genes instruct cells to grow or not grow.  
**Genetic:** Related to the genes or inherited characteristics, as opposed to another cause (e.g. environmental)

**Genome:** The complete genetic material of an organism.

**Genomics:** The comprehensive study of whole sets of genes and their interactions.

**Genetic counseling:** A communication process with a trained genetic counselor to review your genetic risk for a certain cancer. Your family history and personal medical history is discussed. Counseling may lead to genetic testing. Genetic counselors provide information and support to other family members.

**Genetic markers:** Alterations in DNA that may indicate an increased risk of developing specific cancers.

**Genetic susceptibility:** An inherited increase in the risk of developing a certain disease or disorder.

**Hereditary:** An inherited trait, capable of being transmitted genetically from both parents to a child.

**Hormone:** A chemical “messenger” produced in one part of the body by an endocrine gland (i.e. thyroid) or an organ (i.e. ovaries) that is transported to other parts through the bloodstream. Hormones are involved in the body’s normal growth, including sexual development and reproduction from puberty through adulthood. Hormones such as *estrogen* and *progesterone* influence or regulate breast cells.

**Inhibitor:** A drug that slows or blocks biological, chemical, or enzyme action (used in cancer treatment)

**Hyperplasia:** When cells in an organ are growing faster than normal, or grow in irregular patterns.

**Mutation:** A change in one or more genes that results in a new trait. It can be minor, harmful, or have no effect on how the cell functions. The BRCA-1 and BRCA-2 gene mutations increase breast cancer risk.

**Nucleus:** The most prominent component of a cell containing hereditary information (chromosomes)

**Oncogene:** An altered gene that normally directs cell growth. An oncogene promotes uncontrolled growth of cancer. This altered gene can be inherited, occur randomly (an error) or be prompted to act by an environmental exposure to a cancer causing agent.

**Receptor:** a protein inside or on the surface of the cell, capable of binding to a specific substance (such as hormones – e.g. estrogen) and bringing about biological changes (i.e. cell growth)

**Proteins:** Molecules in the cell that perform a wide variety of functions such as chemical reactions that support life (e.g. releasing enzymes for digesting food). Specific proteins are related to cancer progression.

**Tissue:** a group or layer of cells, such as the skin or breast, grouped together to perform certain functions.

**Tumor suppressor gene:** A gene or “cell guardian” whose normal function is to prevent abnormal cells from dividing. Certain mutations in tumor suppressor genes (such as BRCA genes) can progress to cancer.

**Virus:** smaller than a single cell or bacteria and cannot reproduce outside a living organism. Viruses can cause infectious diseases. Examples of viruses: Hepatitis B (HBV) and hepatitis C (HCV) and AIDS.



## **Breast Cancer and Environment – Peer Education Tool Kit** *Zero Breast Cancer – Adolescent Education Project*

### **Introduction to Cancer Research Terms**

**Animal studies:** Mice or rats are most commonly used to test for cancer-causing substances because they are small and easy to handle, and are generally similar to humans in their response to carcinogens. Mice studies provide information on hormonal and chemical effects on the breast.

**Bioinformatics:** The science of managing and analyzing biological data using advanced computing techniques. Especially important in analyzing genome research data.

**Biomonitoring:** By collecting *samples* of body fluids and tissue from large groups or populations, scientists can analyze the presence of certain chemicals in the human body that may affect public health and diseases. Volunteers provide samples of saliva, urine, fat, or blood for laboratory study.

**Clinical Trial:** A type of research study that uses volunteers to test new methods of screening, prevention, diagnosis or treatment of a disease. It may be conducted in a clinic or medical center.

**Epidemiology:** The study of the patterns of diseases in human populations, and the factors that influence these patterns. . Epidemiologists study groups of people over time to observe whether a specific lifestyle habit (lack of exercise) or exposure (alcohol, tobacco) is associated with cancer. Epidemiology is the study of the incidence, distribution, and control of disease in a population.

**Laboratory Experiments:** Researchers use human cells grown in the laboratory to study how exposures to potential carcinogens may cause changes at the molecular and genetic level in cells.

**Proteomics:** The study of the full set of proteins (the proteome) encoded by a genome

**Prospective:** A study that follows a specific group of people in their everyday lives. Many long-term cancer studies use this method to observe how similar groups develop specific diseases.

### **Environmental Exposures Including Those Known or Suspected for Breast Cancer**

**Asbestos:** A group of naturally occurring fibrous minerals used for insulating buildings and to make commercial textiles. Asbestos fibers and all commercial forms of asbestos are human carcinogens.

**Benzene:** A colorless, flammable liquid with a sweet odor that is formed from both natural and man-made sources, including cigarette smoke. It is considered a human carcinogen.

**Atrazine:** A commonly used pesticide that may pose a risk for breast and other cancers.

**Biomarker:** A substance sometimes found in the blood, other body fluids or tissues. A high level of a biomarker may mean that a certain type of cancer is in the body. Some biomarkers are associated with tumors. Other biomarkers indicate exposure to environmental chemicals.



**Breast Cancer and Environment – Peer Education Tool Kit**  
*Zero Breast Cancer – Adolescent Education Project*

**Bisphenol-A:** A chemical compound used in hard plastics and food can linings that may pose a risk for breast cancer.

**Carcinogen:** A substance that causes cancer.

**DNA Adduct:** An example of a biomarker, an environmental chemical that enters the body and binds to DNA, causing DNA damage. These chemicals may possibly cause or lead to cancer.

**DDT** –a pesticide widely used in the U.S. until it was banned in the 1970’s. DDT is still used in some countries to control agricultural pests. DDT is a known human carcinogen.

**Environment:** The combination of circumstances, physical conditions and outside influences surrounding and individual. Exposure to a wide variety of natural and man made substances are responsible for cancer. Cancer risks linked with environmental chemicals *may* be present in the air, water, food and the workplace

**Environmental factors:** such as viruses, sunlight and chemicals interact with cells throughout out lives.

**Environmental risk factors:** influences in our surroundings, such as radiation, toxins, and infections.

**Environmental tobacco smoke (ETS). Also known as Second-hand Smoke:** the combination of smoke emitted from the burning end of a cigarette, cigar, or pipe, and smoke exhaled by the smoker. ETS contains at least 60 known carcinogens. Early exposure to ETS is associated with breast cancer in younger women.

**Herbicide:** An agent that destroys plants and weeds.

**Ionizing radiation:** An invisible, high frequency radiation that can damage the DNA or genes in the body.

**Latent period:** The time between exposure to an environmental carcinogen and the development of cancer.

**Linear dose response:** A type of response in the body where the cancer risk changes at the same rate as the exposure – if the exposure increases, cancer risk increases at the same rate (e.g. alcohol and breast cancer)

**Pesticide:** An agent used to destroy any type of pest, like bugs that eat plants (e.g. insecticides, herbicides)

**Protective factors** may be present in specific protective genes, or in the diet, that help prevent cancer.

**Phthalates:** A class of industrial compounds used widely as plastic softeners, additives to perfumes and hairsprays, lubricants, and wood finishers, among other things. Phthalates are suspected carcinogens.

**Perfluorooctanoic acid (PFOA):** Used to manufacture various non-stick consumer products, including Teflon cookware and Gore-Tex clothing. PFOA’s are suspected carcinogens.

**Polychlorinated Biphenyls (PCB’s):** A group of over 200 industrial chemicals that were widely used before they were banned in 1974. PCB’s continue to be released in the environment and are found in other mammals, human body tissues and breast milk.

**Synthetic:** An artificial substance not found in nature, for example: synthetic chemicals.

**Susceptible:** A term used to describe someone who is more likely to develop a disease.



## **Breast Cancer and Environment – Peer Education Tool Kit** *Zero Breast Cancer – Adolescent Education Project*

**Threshold dose response:** a type of response in which, at very low exposures, there appears to be no detectable increased risk for disease; this establishes a threshold (level) below which no risk is detected

**Tobacco:** Exposure to the carcinogens in tobacco products account for about *one-third of all cancer deaths* in the U.S. each year. Cigarette smoke contains more than 100 cancer-causing substances. Smoking tobacco and exposure to second hand smoke (ETS) during the teen years is associated with breast cancer.

**Toxicology:** The science of poisons, including their source, chemical composition, action, tests and antidotes (treatment to reverse their effects).

**Xenobiotic:** An environmental chemical compound, or natural substance that is foreign to the body.

### **Healthy Nutrition and Body Weight Maintenance Terms**

**Antioxidants:** Chemicals (many found in foods and beverages) that protect against cancer. Antioxidants fight against the toxic agents that can damage DNA. (Green tea is a one source of antioxidants, along with grapes, apples and green leafy vegetables). Consult with your health department for food safety guidelines.

**Body Mass Index (BMI):** An index of *obesity* that uses weight and height to determine levels of body fatness for adults, aged 20 and older. The formula to calculate BMI is mass in kilograms (kg) divided by the square of height in meters (m<sup>2</sup>). (*The National Institutes of Health web site offers a BMI calculator*).

**Carotenoids:** Brightly colored particles found in the cells of vegetables, which may protect the body from cancer. **Beta-carotenes** (carotenoids) are found in carrots, peaches, cantaloupes, and sweet potatoes

**Cruciferous vegetables:** The cabbage family - cauliflower, radishes, collards, kale and bok choy may be protective for breast cancer. Broccoli contains a chemical that removes cancer-causing agents from cells.

**Dietary fat:** Fat consumed as part of a person's diet. Foods from animal sources are the major contributors of dietary fat. There are several types of dietary fats, of which the "trans-fats" (*Omega-6 fatty acids*) appear to *increase the risk* of certain diseases. Fat is an essential nutrient that protects and maintains the body.

**Energy expenditure** Exercise or physical activity

**Fiber:** The remains of plant stem walls found in beans and whole grains and fruits and vegetables. Fiber moves food through the digestive track, eliminating toxins and carcinogens from the body.

**Isoflavones:** Substances found in soy products that can act as "weak estrogens;" which are being studied as possible breast cancer preventive agents. (Doctors may advise *against* soy for women with breast cancers)

**Omega-3 - fatty acids to include:** Type of "polyunsaturated fatty acids" that the body absorbs from food. Found in cold-water fish (tuna, salmon) and in dark green leafy vegetables, flaxseeds and some vegetable oils. The Omega-3 fatty acids are considered "healthy fats" that strengthen the immune system.

**Omega-6 - fatty acids to limit:** Sources include corn oil and safflower oil used in cooking fried foods.



## **Breast Cancer and Environment – Peer Education Tool Kit** *Zero Breast Cancer – Adolescent Education Project*

**Phytoestrogens:** Naturally occurring compounds found in plants and legumes (such as beans, peas, soybeans and lentils) or plant products (such as whole grain cereals,) that can act like “weak estrogens

**Simple sugars:** Found in white bread, white rice, cookies, cakes, candy and sweetened beverages (limit)

**Trans-Fatty Acids:** Contained in hydrogenated fats (margarine), fried foods, processed foods (avoid).

### **Basic Breast Development, and Girl’s and Women’s Reproductive Health Life Cycle Events**

**Areola:** A circular area surrounding the nipple that appears darker than the rest of the breast.

**Endometrium:** Tissue lining a woman’s uterus; the organ where a baby grows during pregnancy.

**Estrogen:** A family of hormones that promote the development of female (reproductive) characteristics.

**Lobules:** The milk-producing lobe parts of the breast; lobules are like sacs that connect to the milk ducts.

**Mammary glands:** Special organs in the breast that produce and secrete milk (for breastfeeding a baby)

**Menarche:** The first menstrual period; which begins for girls at varying ages. Early menarche (before age 12) is considered a risk factor for breast cancer, possibly because it increases lifetime exposure to estrogen.

**Menstruation:** The discharge of blood-filled lining of the uterus, frequently called the monthly “period.”

**Menopause:** The time in a woman’s life when her menstrual periods end, usually between ages 48-54.

**Milk ducts:** Tubes in the mammary (breast) gland that lead from the milk-producing lobules to the nipple.

**Nulliparity:** Condition of not bearing children. Nulliparity is one risk factor associated with breast cancer.

**Pregnancy:** A pregnancy carried to term (live birth) before age 30 completes the natural biological cycle of the breast and is associated with reduced breast cancer risk. Breastfeeding is also considered protective.

**Puberty:** The stage of adolescence in which an individual becomes physiologically capable of sexual reproduction. The onset of puberty, when the breast is developing, may be a critical stage for exposures.

**Progesterone:** Female hormone involved in the menstrual cycle and development of mammary glands

**Thelarche:** The beginning of development of the breasts in the female, sometimes called “breast buds.”

### **Terms Related to Breast Health, Breast Cancer Detection and Treatment of Breast Cancer:**

**Benign (proliferative) breast disease:** a group of non-cancerous conditions (of the breast) that may increase the risk of developing breast cancer. Examples include “hyperplasia” of the ducts or lobules.

**Biopsy:** A procedure in which breast tissue is surgically removed to test for abnormal cells or cancer.



## **Breast Cancer and Environment – Peer Education Tool Kit** *Zero Breast Cancer – Adolescent Education Project*

**Breast Cancer:** Breast cancer is thought to be many different types of cancer.

**Breast Cancer Cells:** Cells that line the milk ducts and cover the lobular organs that make milk are common sites where breast cancer develops.

**Breast reconstruction:** A surgeon uses the body's own tissue or manmade materials to create a new breast.

**Breast implants:** Saline or silicone filled sacs inside rubber-like shells that are surgically inserted behind the breast tissue to enlarge the breast (one method of breast reconstruction).

**Breast self-exam (BSE):** Checking your breasts (looking and feeling) monthly, for changes or lumps

**Chemoprevention:** The use of medicines, drugs and/or dietary substances to delay the progression of cancer or to stop it from coming back (recurring). Chemoprevention is targeted to the *type* of breast cancer.

**Chemotherapy:** Treatment with prescribed drugs that kill cancer cells. Chemotherapy is often used with surgery and radiation to treat cancer when it has spread, when it comes back, or to prevent further spread. Chemotherapy side effects (most are temporary) may include nausea, vomiting, loss of appetite and fatigue.

**Clinical breast examination** A doctor or nurse physically inspects and the breasts (by feeling) for changes

**Complementary and alternative medicine (CAM):** Forms of treatment that are used in addition to (complementary), or in the place of (alternative), standard medical treatments. CAM's may include dietary supplements, mega dose vitamins and herbal preparations, special teas, acupuncture, massage therapy, spiritual healing and meditation.

**Cyst:** A fluid filled sac that can feel like a breast lump and is usually not cancerous.

**DCIS:** Also called intraductal carcinoma, a non-invasive, pre-cancerous condition in which abnormal cells are found in the lining of the breast duct but have not spread outside the milk duct.

Doctors carefully "monitor" DCIS patients and provide treatment to prevent cancer progression.

**Estrogen Receptor:** A protein normally found in mammary cells. Estrogen attaches to these receptors and exerts their biological function. Some breast cancers need "positive" estrogen receptors to grow, therefore they are treated medically with "anti-estrogen" hormone therapy that "blocks" the tumor's growth.

**Fibroadenoma:** Benign (non-cancerous) tumor of the breast, common in young women.

**Fibrocystic changes:** Breast tissue that is normally lumpy, not considered cancerous.

**Hyperplasia:** When cells in an organ are growing faster than normal.

**Gynecologist:** Physician who specializes in the reproductive health of women, including breast exams

**Informed consent:** The process of explaining a course of treatment, along with the risks, benefits, and possible alternatives. It is a legal document showing that a patient understands and agrees to treatment.

**Inhibitor:** A drug that slows or blocks biological, chemical, or enzymatic action, used in cancer treatments.

**Irradiation:** The use of high-energy radiation to kill cancer cells (directed by a Radiation Oncologist).

**Locally advanced cancer:** A cancer that has spread to other parts of the breast and nearby lymph nodes.



## **Breast Cancer and Environment – Peer Education Tool Kit** *Zero Breast Cancer – Adolescent Education Project*

**Lumpectomy:** The removal of a cancerous breast lump along with some of the surrounding normal tissue.

**Mammogram:** A low-dose X ray that gives a detailed picture of breast tissue and some cancers.

**Digitized mammogram**-A mammogram that is recorded in computer code instead of on X-ray film.

**Micro-calcifications** are deposits of calcium in the breast that show up as white specks on a mammogram that *may be* an early sign of breast cancer. A **radiologist** interprets these results.

**Mastectomy:** The surgical removal of the breast, which may be followed by “reconstructive” surgery.

**Oncologist:** A medical doctor who specializes in cancer diagnosis and treatment.

**Radiation oncologist:** A medical doctor - radiologist who diagnoses and treats cancer patients.

**Pathology:** The scientific study of the nature of disease and its causes, progression and effects.

### **Vocabulary References - Zero Breast Cancer Adolescent Education Project**

*Adapted or Reproduced for Educational Purposes from the following scientific information sources:*

*Breast Cancer Questions & Answers for Young Women (Vogel, C.; Twenty-First Century Books, 2001*

*Breast Health and Cancer Detection (Aronson, V., Need to Know Library, Rosen Publishing Group, Inc.,2000)*

*Cancer and the Environment, What You Need to Know, What You Can Do (U.S. Dept Health & Human Services)*

*National Institutes of Health, National Cancer Institute, National Institute of Environmental Health Sciences, 2003)*

*“Cancer Facts,” National Cancer Institute, (2005)*

*Good for You: Reducing Your Risk of Developing Cancer (American Cancer Society, Health Content Products, 2002)*

*“Medical & Scientific Glossary” Developed by the Cincinnati Breast Cancer and the Environment Research Center (BCERC) University of Cincinnati Children’s Hospital Medical Center (2005); NIH Grant #ES/CA 012770-02*