

GLOSSARY

Scientific & Medical Terms

Developed by the
**Cincinnati Breast Cancer
and the Environment
Research Center**



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ADVOCATES

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GLOSSARY

Absorb / Absorption: to take in; taking up of liquids by solids; passage of a substance through some surface of the body into body fluids and tissues.

ACTH: adrenocorticotrophic hormone (or corticotrophin); a polypeptide hormone secreted by the pituitary gland; part of the hypothalamic-pituitary-adrenal axis.

Adipogenesis: the formation of fat or fatty tissue.

Adipose tissue: a connective tissue consisting chiefly of fat cells that come from dietary fats or produced by the body; functions as an endocrine organ, producing hormones such as leptin, etc.

Adiposity: obesity.

Adrenarche: underarm/pubic hair growth during puberty induced by a normal increase in activity of the adrenal cortex which releases adrenal androgens.

Advocate: one who promotes an issue or supports a particular cause; to plead on behalf of someone or something.

Aliquot: a measured portion of a sample collected for analysis; the sample could be biologic (blood, urine, etc.) or environmental.

Alkylphenols: chemicals used in the production of detergents, plastics and some pesticides; tend to persist in the environment and can have estrogen-like properties.

Analyte: the substance measured by a laboratory test.

Aneuploidy: the state of having an abnormal number of chromosomes.

Angiogenesis: the formation of new blood vessels; important in tumor growth.

Anthropometry: measurements of the human body: height, weight, skin fold thickness, etc.

Antibodies: special proteins that are made by the immune system to attack and neutralize foreign substances called antigens.

Anti-estrogen: a substance that blocks the activity of estrogen.

Antigens: foreign substances (viruses, bacteria or abnormal cell changes) that are attacked by the immune system.

Antineoplastic: preventing the development, maturation or spread of cancer (neoplastic) cells.

Apoptosis: programmed cell death; a process that limits cell growth.

Aromatase: an enzyme or group of enzymes that converts androgens (testosterone) into estrogens.

Asbestos: a strong, non-combustible mineral fiber used in the past for fireproofing and insulation; it can pollute air and water and cause cancer or asbestosis when inhaled.

Atrazine: a widely used agricultural herbicide; mainly used on corn and soybean crops.

B cells (also called B lymphocytes): white blood cells that produce antibodies and protect against infection and disease.

Bacteria: any of a large group of single-cell, microscopic organisms that live in soil, water, plants, organic matter, animals and/or people; some can cause disease.

BCA (Breast Cancer Alliance of Greater Cincinnati): a breast cancer advocacy and educational organization founded in 1994.

BCERC (Breast Cancer & the Environment Research Centers): funded by the National Institute of Environmental Health Sciences and the National Cancer Institute; centers are based at the University of California-San Francisco, University of Cincinnati, Michigan State University and Fox Chase Cancer Center.

Benign proliferative breast disease: a group of non-cancerous conditions that may increase the risk of developing breast cancer; examples include ductal hyperplasia, lobular hyperplasia and papillomas.

Benign tumor: a non-cancerous growth that does not invade nearby tissue or spread to other parts of the body.

Benzene: a carcinogenic compound widely used in the chemical industry; also found in tobacco smoke, vehicle emissions and gasoline fumes.

Benzo(a)pyrene: a polycyclic aromatic hydrocarbon found in coal tar, automobile exhaust (especially diesel engines), wood smoke and charbroiled foods; causes changes in the chromosomes of a gene(s) (mutagenic) and is highly carcinogenic.

BFR (Brominated Flame Retardants): over 70 variants are produced to treat electronics, furniture and clothing; some are considered persistent organic pollutants which are known to accumulate in the body.

Bile: a secretion of the liver; bile is stored in the gallbladder, discharged into the duodenum (small intestine) during eating, aiding the digestion of lipids.

Bioaccumulation: the increase in concentration of a substance(s) in an organism or a part, e.g., fat tissues, of the organism; the organism has a higher concentration of

the substance than the concentration in the organism's surrounding environment.

Bioconcentration: bioaccumulation of substances taken in by the organism from water only; the rate of uptake from water is greater than the rate of excretion.

Bioinformatics: the science of managing and analyzing biological data using advanced computing techniques; especially important in analyzing genome research data.

Biological monitoring: the periodic measurement of toxic substances or their metabolites in samples of blood, tissues, secretions, excretions (urine, stool, breast milk, seminal fluid) or exhaled air.

Biologically effective dose: the amount of a deposited or absorbed chemical that reaches the cells or target site where an adverse effect occurs or where the chemical interacts with a membrane surface.

Biomagnification (or Bioamplification): the increase in concentration of a substance in a food chain (not an organism); POPs are compounds that biomagnify. (See Persistent Organic Pollutants.)

Biomarker: a substance detected in the blood, urine, other body fluids and/or tissues used to measure or indicate exposure to or alterations caused by a chemical compound; also used to detect the presence/progress of a disease (tumor marker).

Biomarker of effect: a substance detected in body fluids and/or tissues used to measure or indicate a biological response to an environmental chemical which gives a measure of toxic effect; biological responses may be at the molecular, cellular or whole organism level.

Biomarker of exposure: a substance detected in body fluids and/or tissues used to measure or indicate exposure to a chemical compound.

Bioremediation: any process that uses microorganisms, fungi, green plants or their enzymes to clean a contaminated environment to its original condition.

BMI (Body Mass Index): used to gauge whether or not a person is overweight; it is calculated by dividing a person's weight (kilograms) by her/his height (meters²).

BPA (Bisphenol A): used in the production of epoxy resins that line food cans, bottle tops and water supply pipes; also used in production of polycarbonate plastics found in many food and drink packaging; known to have estrogenic effects.

BRCA1 and BRCA2: two of the primary genes involved in breast cancer; classified as tumor suppressor genes.

Caloric restriction: regulation of the consumption of calories.

Cancer: a term for diseases in which abnormal cells divide without control; cancer cells can invade nearby tissues and can spread through the bloodstream and lymphatic system to other parts of the body (metastasize).

Carcinogen: a substance that causes cancer.

Carcinogenesis: a process by which normal/healthy cells turn into cancer cells.

Carcinoma: a cancerous growth made up of epithelial cells: cells from tissues that form the covering around organs, such as lung, liver, or breast, or the lining of blood vessels.

Carcinoma *in situ*: a cancer that involves only the cells in which it began and has not spread to nearby tissues.

Case control: a type of epidemiology study design in which persons with and without a disease (or exposure of interest) are studied to identify factors associated with the disease.

CDC (Centers for Disease Control and Prevention): a major component of the US Dept. of Health and Human Services; provides facilities and services for the investigation, identification, prevention and control of disease.

Cell: the basic unit of all living things; each cell contains essential components enclosed by a membrane.

Cell differentiation: a process by which immature/unspecialized cells become mature/specialized, i.e. have a specific function.

Cell proliferation: an increase in the number of cells as a result of cell division.

Chemoprevention: the use of dietary substances and/or drugs to delay the development of cancer or stop it from coming back.

Chemotherapy: treatment of infections and other diseases with chemical agents/drugs.

Chromatin: mass of genetic material (DNA and proteins) compacted in the cell nucleus; it forms chromosomes.

Chromosome: a long strand of DNA that contains about 1,000 genes which carry hereditary information; there are 46 chromosomes in each cell of the body, except reproductive cells (egg and sperm) that contain only 23 chromosomes.

Clinical trial: a type of research study that uses volunteers to test new methods of screening, prevention, diagnosis or treatment of a disease; also called a clinical study.

Cohort: a collection or sampling of individuals who share a common characteristic (e.g., the same age group) or experience (e.g., employment in a particular industry during or for a specified period).

Complementary and alternative medicine: forms of treatment that are used in addition (complementary) or instead of (alternative) standard medical treatments; examples include dietary supplements, mega-dose vitamins, herbal preparations, special teas, acupuncture, massage therapy, spiritual healing, meditation, etc.

Confidence interval (CI): a measure of the reliability of a statistical parameter (for example a population mean); reported as \pm some number or as a numerical range. The CI is reported for a specified confidence level, most commonly 90%, 95% or 99%.

Confidence level: reflects the certainty that the statistic being presented is accurate; reported as a percentage, e.g., 90%, 95% or 99%.

Confounding: a variable that is associated with the independent and dependent variables in a statistical analysis; confounders must be controlled for in statistical analyses to avoid making a false conclusion about a probable causal relation between the two variables.

Congeners: two or more things that are similar or closely related in structure, function or origin; chemical compounds similar in composition and effect.

COTC (Community Outreach & Translation Core): a component of the Breast Cancer & the Environment Research Centers; responsible for integrating breast cancer advocates into the BCERCs and communicating research findings to the non-scientific public and policy analysts.

Corticosteroids / Corticosterone: a hormone of the adrenal cortex; it influences carbohydrate, potassium and sodium metabolism; it is essential for normal absorption of glucose, the formation of glycogen in the liver and tissues, and the normal utilization of carbohydrates by the tissues.

Cotinine: a major metabolite of nicotine found in blood and urine; currently regarded as the best biomarker for exposure of nonsmokers to environmental tobacco smoke.

Critical period: a time in the early stages of an organism's life during which it displays a heightened sensitivity to certain environmental stimuli; the organism develops in particular ways due to experiences at this time.

Cross sectional: a type of epidemiology study design in which a randomly selected sample of persons from a community, industry or population are studied to assess the factors associated with the incidence or prevalence of a disease/condition.

Cultural diet: a diet given to offspring *in utero* and throughout their lifespan.

Cutaneous breast cancer: cancer that has spread from the breast to the skin.

Cytotoxic therapy: drug treatment that is designed to inhibit the proliferation of cells or to selectively destroy abnormal cells.

DCIS (ductal carcinoma *in situ* or intraductal carcinoma): a non-invasive, pre-cancerous condition in which abnormal cells are found in the lining of a breast duct; the abnormal cells have not spread outside the duct to other tissues in the breast. DCIS may become invasive cancer and spread to other tissues; at this time, it is not known how to predict which lesions will become invasive.

DDT (Dichloro-Diphenyl-Trichloroethane): the first modern pesticide; banned in the U.S. in the early 1970s because of its persistence and toxicity in the environment.

Dermal: relating to the skin (epidermis).

DES (diethylstilbestrol): an artificial estrogen used in the past to prevent miscarriage; daughters of women who took DES have a higher risk of vaginal cancers.

DHHS (US Department of Health & Human Services): a cabinet-level department of the US government responsible for the functions of various federal social welfare programs, health delivery agencies and research institutes.

Differentiation: the acquisition of functions and forms different from those of the original; in cancer, differentiated tumor cells resemble normal cells and tend to grow slower than undifferentiated or poorly differentiated tumor cells which lack the structure and function of normal cells and grow faster.

Dioxin (TCDD): a contaminant of the herbicide 2,4,5-T; widely used throughout the world as a defoliant and for weed control; highly toxic to humans and stable in the environment.

DMBA (dimethyl benz(a)anthracene): an experimental carcinogen, not found in nature, synthesized in the lab to be used as a test carcinogen. DMBA serves as a model carcinogen for the class of polycyclic aromatic hydrocarbons (PAHs), which include many carcinogens; DMBA-generated breast cancer in the lab closely mimics human tissue changes.

DNA (deoxyribonucleic acid): the molecule inside the cell that carries genetic information and is passed on from one generation to the next.

DNA adduct: the binding of an environmental chemical with DNA, causing DNA damage; sometimes used as biomarkers of effect in research.

Dose dependent: the effect of a chemotherapeutic agent or environmental toxin is proportionate to the treatment or exposure dose, respectively.

Dose limiting (side effects): drug reaction(s) that prevent administering the drug at a higher dosage.

Dose rate: the rate at which a drug or toxin is administered over a given period of time.

Double blinded: a type of clinical study in which neither the medical/research staff nor the study participants know whether individual participants are receiving the study treatment or placebo.

Ductal extension: measured as the distance from the midpoint of the lymph node to the leading edge of the ductal tree.

Ductal tree: refers to the branch-like formation of the mammary gland ducts.

Eligibility (or inclusion) criteria: requirements that must be met for an individual to be included in a research study; examples include age or type and stage of cancer.

Endocrine disruptors: a diverse group of environmental chemicals that are capable of interfering with hormones produced in the body; also called xenoestrogens.

Endocrine system: a network of ductless glands and other structures in the body that secrete hormones directly into the blood, affecting the function of specific organs and processes like metabolism and growth.

Endocrine therapy: treatment that adds, blocks or removes hormones in order to slow or stop the growth of certain cancers (such as breast or prostate); also called hormone therapy, hormonal therapy or hormone treatment.

Endocrinology: the study of the anatomic, physiologic and pathologic characteristics of the endocrine system and the treatment of endocrine problems.

Endogenous: originating or produced within the organism or one of its parts. (The opposite is exogenous.)

Endometrium: the layer of tissue that lines the uterus.

Endothelial: a type of cell found in the lining of blood vessels, lymph nodes and the heart.

Enterohepatic circulation: refers to the circulation of bile from the liver (where it is produced) to the small intestine (where it aids in the digestion of fats and other substances) and then back to the liver.

Environment: any and all conditions external to an organism that can affect its life, development and/or survival.

Enzyme: a substance that speeds up chemical reactions in organic matter, including the body; enzymes act on substrates to catalyze chemical reactions.

EPA (Environmental Protection Agency): develops and enforces national standards and regulations that implement environmental laws enacted by Congress.

Epidemiology: the study of the patterns of diseases in human populations and the factors that influence the incidence, severity, morbidity and mortality of diseases.

Epigenetic: modifications to the structure of the DNA, but not the DNA sequence, that result in changes in gene function (the organism's phenotype).

Epithelial cells: cells arranged in one or more layers that form part of a covering or lining of a body surface; these cells usually adhere to each other along their edges and surfaces.

Epithelium: membranous tissue composed of one or more layers of cells (**epithelial cells**), forming the covering of most internal and external surfaces of the body as well as the lining of vessels, body cavities, glands and organs.

Estradiol: the most potent naturally occurring human form of the hormone estrogen.

Estrogens: the family of hormones that promote the development of female secondary sex characteristics.

Estrogen receptor (ER): protein normally found in mammary cells to which estrogens attach and thereby exert their biological function.

Estrus cycle: the recurring physiologic changes that are induced by reproductive hormones in most mammalian placental females; estrus (or heat) is signaled to the males of the species when ovulation is imminent. (Humans undergo a menstrual cycle in which the ovulation process is concealed.)

ER negative cancer: breast cancer cells that do not have the estrogen receptor; these ER-negative tumors do not need estrogen to grow and usually do not respond to hormone (anti-estrogen) therapy.

ER positive cancer: breast cancer cells that have the estrogen receptor; these ER-positive tumors need estrogen to grow and usually do respond to hormone (anti-estrogen) therapy that blocks ER function and subsequent tumor growth.

Etiology: origin or cause(s) as in the cause(s) of a disease or abnormal condition; factors which produce or predispose toward a certain disease or disorder.

ETS (environmental tobacco smoke): ambient smoke produced by persons smoking cigarettes; also known as second-hand smoke.

Exclusion criteria: eligibility criteria used to exclude individuals from participating in a study, often because a pre-existing condition puts the individual at-risk in the study protocol or the condition potentially interferes with the study outcome.

Excretion: the process of eliminating waste products of metabolism and other non-useful materials from an organism.

Exogenous: originating from or produced outside of the organism.

Experimental design: a type of research study design that alters a risk factor or

Exposure: contact of the outer or inner parts of an organism to a biologic, chemical or physical agent.

Exposure assessment: prescribed documentation of an environmental agent's contact with and entry into an organism (especially the human body); focuses on sources and concentrations of the agent(s) in the environment, exposure pathways and probable internal dose.

Exposure pathway: probable routes by which an organism comes in contact with a biologic, chemical or physical agent; refers to the behaviors of the organism that expose it to the agent as well as the agent's characteristics that enable it to come into contact with the organism.

Extracellular: outside the cell(s).

Familial cancers: cancers that occur in families in which a mutated gene, associated with an elevated risk of developing a particular cancer(s), is passed on from one generation to the next. (BRCA1 and BRCA2 genes are examples: If a woman inherits one of these genes, she has a higher risk of developing breast and/or ovarian cancer.)

Family history: a record of an individual's current and past illnesses and those of her/his grandparents, parents, aunts/uncles, siblings, children and other family members; can be used by geneticists and genetic counselors to assess risk for certain diseases.

Fatty acids: building blocks of fat, essential for cell energy and growth.

Saturated Fatty Acids: found in animal fats and tropical oils (palm and coconut); can raise the levels of LDL (bad) cholesterol.

Polyunsaturated Fatty Acids: found mainly in fish, corn, soybean and safflower oil; may help reduce cholesterol levels. (See also Omega-3 fatty acids.)

Fetal programming: an early stimulus or insult operating at a critical or sensitive period of prenatal development that results in a long term change in the structure or function of the organism.

Fibrocystic breast disease: non-cancerous breast tissue build-up; although, some types of fibrocystic breast tissue changes can lead to an increased risk for breast cancer.

Fine needle aspiration (FNA): the removal of fluid or tissue with a needle for examination under a microscope; also called needle biopsy.

FISH (fluorescent *in situ* hybridization): a laboratory technique used to determine the presence/amount of a certain gene in a cell.

Focus group: a qualitative research technique in which an experienced moderator leads about 8-10 participants through a semi-structured discussion on a select topic.

Gavage: administration of a liquid or semi-liquid through a tube, inserted in the nose and passed down the throat and into the stomach

Genes: pieces of DNA, or heredity units, which are passed from parents to their children; genes contain the information for making specialized proteins that are responsible for specific traits, such as eye color, height, etc.

Gene knockout: a laboratory term used to describe a type of mouse or cells whose DNA sequence has been intentionally deleted or inactivated for research purposes.

Genetic counseling: a general process in which a trained genetic counselor documents generations of an individual's family history (pedigree) to assess their or their off-springs' risk of a select disease(s)/disorder(s); based on the family history, the pros/cons of genetic testing may be discussed and/or the results interpreted.

Genetic markers: alterations in DNA that may indicate an increased risk of developing a specific disease or disorder.

Genetic susceptibility: an inherited increased risk of developing a certain disease or disorder.

Genetic testing: analysis of DNA to look for genetic alteration(s) that may indicate an increased risk for developing a disease(s) or disorder.

Genome: the complete genetic material of an organism.

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

Genotype: the genetic makeup/constitution of an organism; distinguished from its physical appearance (phenotype).

Germline mutation: a gene mutation, present in the egg or sperm, that can be passed from parent to a child.

Glucocorticoids: a general classification of adrenal cortical hormones; primarily active in protecting against stress and in affecting protein and carbohydrate metabolism.

Glucose: sugar, a source of energy; formed during digestion and the metabolism of carbohydrates in the body.

Gonadotropins: hormones secreted by the pituitary gland; capable of promoting gonadal (ovaries and testes) growth and function.

Habitus: the physical characteristics of a person.

H and E: a specific immunohistochemical stain in which hematoxylin and eosin are used to stain normal and pathologic structures in a cross-section of the mammary gland.

Herbicide: a chemical that destroys plants and weeds.

Histology: the science concerned with fine cell structures, tissues and organs in relation to their function.

Homeostasis: the property of a living organism to regulate its internal environment so as to maintain a stable, constant condition, i.e., equilibrium.

Hormonal profile: analysis of a substance (generally serum) to determine the levels of progesterone, testosterone, β -estradiol, cortisol, DHEA-S and melatonin.

Hormone: a chemical substance produced and secreted by an endocrine (ductless) gland; transmitted by the blood to another tissue on which it has a specific effect.

Hydrolysis: any chemical reaction in which water is one of the reactants; the combination of water with salt to produce an acid and a base; the reverse of neutralization.

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

Hyperplastic: relating to hyperplasia; the state of having an increase in number of normal cells in a tissue or organ.

Hypothalamic-pituitary-adrenal axis: a complex, multi-directional pathway between the hypothalamus of the brain, the pituitary gland and the adrenal gland; controls

reactions to stress and regulates various body processes including digestion, the immune system, mood, sexuality and energy usage.

Hypothesis: a best estimation, based on scientific knowledge and assumptions, of the results of an experiment; it usually describes the anticipated relationship among variables in an experiment. A scientific hypothesis must be 1) testable and 2) falsifiable.

Immunohistochemistry: analytical methods based on dyes and antibodies, used to locate and identify markers in cancer tissues.

Imprinting: events during gestation and/or early post-natal stages that may have long term consequences for health.

Incidence rate: 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.

Indolent: non-invasive or slow growing.

Infiltrating ductal carcinoma (IDC): the most common type of breast cancer; the cancer begins in the milk ducts and invades other tissues.

Inguinal: relating to the groin.

Inhibitor: a drug or compound that slows or blocks biological, chemical or enzymatic action.

Initiated cell: a cell which has undergone genetic changes leading to cancer after an environmental or chemical insult.

In situ cancer: early stage cancer that has not spread.

Insulin: a hormone secreted by the beta cells of the islets of Langerhans of the pancreas; essential for metabolism

and regulation of blood sugar; causes liver and muscle cells to take in glucose and store it in the form of glycogen; causes fat cells to take in blood lipids and turn them into triglycerides.

Insulin-like growth factor (IGF): a hormone, with other growth-promoting factors, that plays a role in the development of the mammary gland; also known as somatomedin.

Internal (absorbed) dose: the amount of an environmental agent or chemotherapeutic agent absorbed by the organism and available to undergo metabolism, transport, storage and/or elimination.

Intraductal Proliferation (IDP): a precursor lesion in the DMBA rat model in which only epithelial cells within the ducts are affected.

In utero: in the uterus; typically refers to events that occur in the womb before birth.

Invasive lobular carcinoma (ILC): breast cancer that originates in the milk glands and spreads into surrounding tissues; accounts for 10-15% of all breast cancers.

In vitro: in an artificial environment; refers to a process that is studied in a test tube or culture medium.

In vivo: studies conducted within a living organism.

Ionizing radiation: high energy waves; kills and/or retards cell development and causes gene mutations and chromosome breaks; a known cause of breast cancer.

Irradiation: the use of high energy radiation to kill cancer cells.

Isoflavones: substances found in soy products that can act as weak estrogens; currently being studied for their prophylactic properties.

Isoform: a protein that has the same function as another protein but which is encoded by a different gene and may have small differences in its sequence.

Laser capture microdissection (LCM): a method for isolating pure cells from specific microscopic regions of tissue sections; useful for collecting selected cells for DNA, RNA and/or protein analyses; does not alter or damage the morphology or chemistry of the collected sample or surrounding cells.

Latency: time between exposure to a pathogenic organism, chemical agent or radiation, and the onset of disease.

Leptin: a hormone produced by adipose (fat) tissue which has a role in body weight regulation, blood cell development, blood vessel formation and immune function; plays a central role in fat metabolism and helps to control appetite *via* the brain's hypothalamus.

Leukocytes: also called white blood cells; type of cells that fight infection.

Limit of detection: the smallest amount (concentration) that can be detected with reasonable certainty using a specific analytical procedure.

Linear dose response: a type of response in which the risk of disease changes at the same rate as the exposure; as the exposure increases, the risk disease increases proportionately.

Lipophilic: ability of a chemical compound to dissolve in fats, oils, lipids and non-polar solvents.

Lobular carcinoma *in situ* (LCIS): a non-cancerous overgrowth of cells in breast lobules; may increase chances for developing breast cancer in the future.

Local cancer: a non-invasive cancer that is entirely confined to the original organ.

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

Lymphatic system: tissues and organs that produce, store and carry leukocytes that fight infection; system includes the bone marrow, spleen, thymus, lymph nodes and a network of thin tubules that carry lymph to all the tissues in the body.

Lymphomas: cancers that begin in cells of the lymphatic (immune) system; Hodgkins and non-Hodgkins are the two major categories of lymphoma.

Macrophage: a type of white blood cell that helps remove bacteria, viruses and abnormal cells.

Malignant tumor: a cancerous growth that can invade and destroy nearby tissue and spread to other parts of the body.

Mammary whole mount preparation: a procedure in which one or more rat mammary gland is removed, defatted, specially stained and mounted for examination; allows for examination of the whole mammary.

Mass-spectrometry: a laboratory technique for separating ions (atoms or groups of atoms with a positive or negative charge) based on their mass-to-charge ratios; a state of the art analytical technique used to measure biomarkers.

Maximum contaminant level: the highest level of a contaminant that USEPA allows; a legally enforceable standard.

Maximum contaminant level goal: the level of a contaminant at which there would be no risk to human health; not a legally enforceable standard.

Melanoma: a form of skin cancer that begins in melanocytes (cells that make the pigment melanin); usually begins in a mole.

Menarche: the first menstrual period.

Metabolic syndrome: a group of metabolic risk factors, including central obesity, blood fat disorders, insulin resistance and high blood pressure.

Metabolism /digestion: a chain of energy-producing chemical reactions in the body; all energy and material transformations that occur within living cells. These processes are the basis of life, allowing cells to grow and reproduce, maintain their structures, and respond to their environments.

Metabolite: intermediate or end products of metabolism.

Metabolome: the collection of all metabolites in a biological organism; considered the compilation of an organism's gene expression.

Metabolomics: the systematic study of the total metabolite pool (the metabolome) using nuclear magnetic resonance profiling.

Metalloproteinases (or metalloproteases): enzymes which use a metal in the catalytic mechanism; some are involved in cancer progression.

Metaplasia: abnormal change in cell appearance.

Metastases: the spread of cancer from one part of the body to another.

Mitogen: a chemical that stimulates cell division/growth.

Molecule: is made up of two or more atoms. Biological molecules (such as proteins and DNA) are made up of thousands of atoms.

Morphogenesis: differentiation and growth of tissues and organs during development.

Morphology: pertaining to the shape and form (structure) of an organ, tissue, etc.

Mortality rate: the number of deaths in a given population over a specified period of time.

Multifactorial: referring to multiple factors. Multifactorial disorders result from mutations in multiple genes and frequently involve exposures to environmental chemicals.

Multivariate analysis: analysis of more than one statistical variable at a time; distinguished from univariate analyses.

Mutation: an alteration in a gene that can result in a damaged, lost or displaced gene; it can be minor, deleterious or have no effect on cell function.

NBCC (National Breast Cancer Coalition): a coalition of grassroots breast cancer organizations that lobby at the national, state and local levels for public policies that impact breast cancer research, diagnosis and treatment; conduct educational programs like Project LEAD, etc.

NCI (National Cancer Institute): one of the National Institutes of Health established in 1937; supports and conducts basic and clinical biomedical research and training addressing cancer-related diagnosis, treatment, prevention and public education.

Neoplasia: abnormal (can be benign or cancerous) growth of cells.

NIEHS (National Institute of Environmental Health Sciences): one of the National Institutes of Health established in 1969; supports and conducts basic and human research and training addressing how environmental exposures, genetic susceptibility and age interact to affect health and disease.

NIH (National Institutes of Health): a part of the U.S. Department of Health and Human Services; the primary Federal agency responsible for conducting and supporting medical research; consists of 27 institutes and centers.

Nucleus: the most prominent component of a cell containing hereditary information (chromosomes).

Nulliparity: condition of having borne no children.

Odds ratio (OR): the ratio of the odds of a condition/event occurring in one group to the odds of it occurring in another group; $OR > 1$ indicates that the event/condition is more likely in the first group; $OR < 1$ indicates that the condition/event is less likely in the first group.

Olestra: a fat substitute that adds no fat, calories or cholesterol to products. It was created by Procter & Gamble in 1968; also known by its brand name, Olean.

Omega-3 fatty acids: type of polyunsaturated fatty acids that are derived from food; found in cold-water fish (tuna, salmon and mackerel) and in dark green leafy vegetables, flaxseed oil and some vegetable oils. Capable of reducing serum cholesterol levels. Examples:

Docosahexaenoic and Eicosapentaenoic acids – in fish.
Alpha-linolenic acid – the only omega-3 fatty acid found in vegetable products; most abundant in canola oil.

Oncogene: a gene that normally directs cell growth, but becomes altered, thereby promoting cancer growth. Gene

alterations can be inherited, occur randomly, or can be caused by an environmental exposure to carcinogens.

Organic pollutants: See **Persistent organics**.

Outcome measure: the endpoint being studied; maybe be directly quantifiable or surrogate measures may be used as an estimate or index.

Over expression: excess of a particular protein; can be caused by an increase in the number of copies of the gene being expressed or increasing the binding strength of the promoter region; may be related to cancer progression.

Oxidative stress: physiological stress on the body that is caused by the cumulative damage done by free radicals inadequately neutralized by antioxidants. It is associated with aging and cancer development.

Paradigm: broadly, a philosophical or theoretical framework of any kind; the theories, laws, evidence and generalizations that are used to formulate research questions and perform experiments.

Pathogen: a disease-causing organism.

Pathology: the study and diagnosis of disease through examination of organs, tissues, cells and body fluids; the study of disease processes.

PBBs (polybrominated biphenyls): industrial chemicals found in plastics used in a variety of consumer products to make them difficult to burn, i.e. used as flame retardants.

PCBs (polychlorinated biphenyls): a group of over 200 industrial chemicals that were widely used. In 1974 all PCB production was banned in the US, but PCBs continue to be released in the environment and are found in human tissues and breast milk.

Perfluorooctanoic acid (PFOA): used to manufacture various non-stick consumer products, including Teflon cookware and Gore-Tex clothing.

Persistent Organics -same as POPs

Pesticide: a chemical used to destroy pests of any sort; the term includes fungicides, herbicides and insecticides.

PFC (Perfluorocarbons): a group of human-made chemicals composed of carbon and fluorine only; emitted as by-products of industrial processes and also used in manufacturing.

Phenotype: any observed quality of an organism, such as its morphology, development or behavior; distinguished from genotype.

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

Physiological: pertaining to the normal vital processes of organisms.

Phytoestrogens: naturally occurring compounds found in plants, such as soybeans, or plant products, such as whole grain cereals, that act like weak estrogens in the body.

Pipet: a procedure for exact measurement of fluid.

Polycyclic aromatic hydrocarbons:

Polymorphism: the quality or character of occurring in several different forms; genes can be polymorphic.

POP (Persistent Organic Pollutants or Pesticides): chemical substances that persist in the environment (do not biodegrade), bioaccumulate in human and animal tissue, biomagnify in food chains and pose risks of causing adverse effects to human health and the environment. POPs released in one part of the world can travel far beyond their source of origin *via* the atmosphere, oceans and other

pathways. Health effects include cancer, damage to the nervous system, reproductive disorders and disruption of the immune system.

Postnatal: occurring after birth.

Precocious puberty: the onset of puberty before the age of seven in Caucasian girls and before the age of six in African American girls.

Prevalence: the total number of cases of a disease/condition in a given population at a point in time.

PRG (Pink Ribbon Girls): a support network for young breast cancer survivors in Greater Cincinnati.

Progesterone: a steroid hormone secreted by the adrenal glands, brain, ovary and placenta; involved in the female menstrual cycle, embryogenesis, pregnancy and gestation; the major naturally occurring human progestogen.

Progestin: a synthetic progestogen that has some biological activity similar to progesterone.

Prospective study: a research study design that follows a cohort forward in time.

Protease: any enzyme that digests proteins by hydrolysis (reaction with water); any enzyme that reacts with water to break the peptide bonds that link amino acids together in the polypeptide chain.

Proteins: molecules in the cell that perform a wide variety of functions, such as protection support/movement, transportation, and activation of the chemical reactions that sustain life (e.g., enzymes for digesting food).

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

Psychosocial: refers to an individual's psychological development in the context of their social environment. The term can be used to describe the unique internal mental

processes that occur within the individual in response to her/his interactions with others such as parents, peers and teachers.

Puberty: a series of biologic events that leads to the attainment of adult stature, maturation of the interaction of the master glands of the endocrine system with the ovaries and testes, and the ability to reproduce.

Putative: generally regarded as such, but not definite; for example, putative carcinogen.

Receptor: a protein inside or on the surface of the cell, capable of binding to a specific substance (such as hormones) and exert biological actions (cell growth and differentiation); example: estrogen receptor (ER).

Reference interval: a range of laboratory values for a specific analyte determined to be *normal* for specific age and gender categories; provides relevant comparison information for interpreting results; the 95% reference interval is most often reported.

Refractory cancer: cancer that does not respond to treatment.

Relapse: the return of cancer after initial improvement.

Relative risk (RR): the ratio of the probability of a condition/event occurring in an exposed group versus the condition/event occurring in the control (non-exposed) group. RR=1 indicates there is no difference; RR>1 indicates the risk is greater among the exposed; and RR<1 indicates the risk is greater among the control.

Risk factor: a characteristic that increases the risk of disease; may be genetic, life style behaviors, diet, environmental exposures, etc.

RNA (riboneucleic acid): “reads” information encoded in DNA and transfers it to a part of the cell that makes functional proteins.

Secretion: production of a substance that differs in its chemical and physical properties from the cell or gland that produces the product; intended for use within the organism, not to be excreted; the product can be a solid, liquid or gaseous.

Selenium: a dietary mineral essential for chemical reactions in the brain and other parts of the body.

Sensitive subpopulation: people who may be more vulnerable to exposure to an environmental exposure, whether a biological, physical or chemical agent; commonly refers to infants and children, elderly, and people with compromised immune systems.

Sentinel lymph node: the first lymph node where cancer spreads.

Signaling: a complex system of communication that governs basic cellular activities and coordinates cell actions; errors in cellular information processing are responsible for diseases such as cancer, autoimmunity and diabetes. The ability of cells to perceive and correctly respond to their microenvironment is critical to development, tissue repair, immunity and homeostasis.

Somatic mutations: alterations in the DNA that are not transmitted to the offspring; distinguished from germ line mutations which can be transmitted to descendents.

Somatomedin: see insulinlike growth factor (IGF).

Statistical significance: based on probabilities, the observed outcome is unlikely to have occurred by chance alone; statistical evidence of a difference.

Stress: disturbance of physiologic equilibrium.

Stress hormones: such as cortisol and norepinephrine are released during periods of high stress; the hormone regulating system is known as the endocrine system.

Stromal: pertaining to the connective tissue of an organ, gland or other structure.

Susceptible / susceptibility: a term used to describe a person(s) who is more likely to develop a disease; at risk of disease.

Target population: particular group of people selected for study, intervention, education, etc.

T cell: a type of white blood cell that attacks damaged cells, including cancer cells.

Telomerase: an enzyme which mediates the repair or preservation of terminal sequences of chromosomes.

Terminal ductal lobular unit (TDLU): alveolar-lobular structure which forms the functional unit of the human breast; changes with hormonal events such as puberty, pregnancy and lactation.

Terminal end buds (TEBs): structures at the tips of invading primary ducts in the developing mammary gland.

Thelarche: the beginning of breast development in the female.

Threshold dose response: a type of response in which, at very low exposures, there appears to be no detectable increased risk of disease; there is a threshold below which no risk is detected.

Tissue: a group or layer of cells, such as the skin, that together performs specific functions.

Titration: a procedure to determine the lowest antibody concentration needed to produce effective staining of given structures with minimal background.

Toxicology: the study of the effects of physical and chemical agents on living organisms.

Transcriptional: relating to the transfer of genetic information from one kind of nucleic acid to another; for example, from DNA to RNA.

Transgenic: referring to an organism in which new DNA has been introduced into the germ (reproductive) cells by injecting it into the nucleus of the ovum.

Tumor: an abnormal mass of tissue that results from uncontrolled cell division; can be benign (non-cancerous) or malignant (cancerous).

Tumor suppressor genes: or "cell guardians" – genes whose normal function is to prevent abnormal cells from dividing; certain mutations in tumor suppressor genes lead to cancer.

UV: ultraviolet light.

Vascular: relating to or including blood vessels; the vascular system includes the arteries, veins and capillaries that carry blood to and from the heart.

VEGF (vascular endothelial growth factor): responsible for the growth of blood vessels.

Virus: parasitic microorganisms capable of causing disease; smaller than a single cell or bacterium, they cannot reproduce outside a living organism.

Water contaminant: anything found in water (including microorganisms, radionuclides, chemicals, minerals, etc.) which may be harmful to human health.

Inorganic contaminants: mineral-based compounds such as metals, nitrates, and asbestos, which are naturally-occurring in some water, but can also enter water through human activities.

Organic contaminants are carbon-based chemicals, such as solvents and pesticides, which enter water through cropland runoff, discharge from factories, and other means.

Whole mounts: a preparation in which a sample of tissue (e.g., the entire breast) is examined for structure, type and frequency of lesions and other measurable parameters.

Xenobiotic: an environmental compound; outside the body.

Xenografts: a type of tissue graft in which the donor and recipient are of different species.

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