

# Agent Orange Terminology compiled by Gary D. Moore

The following collection of terms are a combination of medical and scientific words used when reading about **Agent Orange**, herbicide, dioxin, and/or the diseases related to the effects of **herbicide** exposure. I have tried to present these terms at a level that a **normal person** can understand. Sometimes it is an impossible task. I have referenced texts that may help clarify a term. I encourage anyone who is interested in pursuing research, or trying to understand the ill effects of **dioxin** to purchase these references. The "references" have been very helpful in my research efforts. It is my sincere hope that this list of TERMS will clarify, educate, and, hopefully, assist your understanding about dioxin.

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### A

**Adipose** of or relating to (animal/human) fat tissue.

**ADP or Adenosine diphosphate** An intermediary molecule that is converted to ATP when bonded to a third phosphate group. [Adenosine is a combination of adenine and ribose - part of RNA & DNA structures.]

**Agent Orange** A herbicide containing trace amounts of the toxic contaminant dioxin that was used in the Vietnam War to defoliate areas of jungle growth. The name was derived from the orange identifying strip on drums in which it was stored. Agent Orange was a 1:1 mixture of the n-butyl esters of 2,4-dichlorophenoxyacetic acid (**2,4-D**) and 2,4,5-trichlorophenoxyacetic acid (**2,4,5-T**). A byproduct contaminant of the manufacturing process for 2,4,5-T is 2,3,7,8-tetrachlorodibenzo-para-dioxin (**TCDD**), commonly referred to as **dioxin**. Demand for military Agent Orange resulted in higher levels of dioxin contamination than in the **2,4,5-T** produced for civilian applications.

Description	TCDD (Dioxin)	Foliage Use
Agent Orange	1.77 to 40 ppm	Broad Leaf
Agent Blue (Purple)	32.8 to 45 ppm	Narrow Leaf
Agent Red (Pink)	65.6 ppm	Anything

Agent White (Green)	65.6 ppm	Broad Leaf
Silvex	1 to 70 ppm	Fungicide
2,4,5-T (Current)	0.1 ppm or less	Broad Leaf

**Allergy** A sensitivity to certain substances including pollens, foods, plants, animals or microorganisms. Indications of allergy include, but not limited to sneezing, itching, skin rashes, and queasiness.

**Amino Acid** An (organic) acid containing the amino group (NH<sub>2</sub>). Any of the alpha-amino acids that are the chief components of proteins (manufactured by living cells). Amino acids are an essential part of the diet. If any of the essential amino acids are absent, a deficiency results (especially during critical development times, i.e., pregnancy and childhood). Amino acids directly relate to DNA and RNA (the elemental building blocks of life).

**Antibody** A protein substance produced in the blood or tissues in response to a specific antigen, such as a bacterium or a toxin. Antibodies destroy or weaken bacteria and neutralize organic poisons. (This is the basis of immunity. **AIDS** is characterized by inability to produce required antibodies.)

**Androgenic** Having the quality of a steroid hormone, such as testosterone or androsterone. These control the development and maintenance of masculine characteristics.

**Antigen (also antigene)** Is a substance that upon introduction into the body stimulates the production of an antibody. These include toxins, bacteria, foreign blood cells, and the cells of transplanted organs.

**Aromatic Compounds** Chemical compounds containing one or more six-carbon rings characteristic of the benzene series and related organic groups. (Amazing... but camphor, a healing and useful drug, is in this group.)

**Atoxic** Something that is not poisonous or toxic to living organisms.

**Atrophy** The emaciation. or wasting away of tissues, organs, or the entire body.

**ADD or Attention Deficit Disorder.** A (childhood) disorder characterized by impulsiveness, hyperactivity, and short attention span. ADD is believed to lead to learning disabilities and various behavioral problems when the children mature.

**ATP** Adenosine triphosphate (**C<sub>10</sub>H<sub>16</sub>N<sub>5</sub>O<sub>13</sub>P<sub>3</sub>**). This is a storehouse of chemical energy in a cell when one of its two high-energy phosphate bonds is broken in hydrolysis. ATP releases energy and becomes ADP.

**Autoimmune** Relating to an immune response by the body against one of its own tissues or types of cells often thought to be triggered by an external chemical exposure, such as, lead or mercury.

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## B

**B Cell** is a type of lymphocyte that plays a major role in the body's humoral immune response. When stimulated by a particular foreign antigen, B Cell lymphocytes differentiate into plasma cells that synthesize the antibodies (that circulate in the blood and react with the specific antigens). Also: **B-lymphocyte**

**Basal Cell Carcinoma** (Cancer) is a malignant tumor of the epithelium (skin area) that begins as a small bump and enlarges to the side. It develops a central crater that often crusts and bleeds. The tumor rarely spreads to other organs (**metastasis**), but surrounding tissue is destroyed. In 90% of cases, the tumor grows between the hairline and the upper lip. The main cause of the cancer is excessive exposure to the sun, x-rays, or chemical compounds (such as **dioxin**). Treatment is surgical removal or x-ray therapy. Also called basal cell epithelioma, basaloma, carcinoma basocellulare, hair matrix carcinoma.

**Basophil** A cell, especially a white blood cell, having granules.

**Benzene Hydrocarbons** are found typically in petroleum. Coal tar is one source of hydrocarbons; but most hydrocarbons from coal tar have the carbon arranged in rings rather than in chains. Rings usually have six carbon atoms. The simplest of these hydrocarbons is benzene (C<sub>6</sub>H<sub>6</sub>). **Chlorobenzene** (a benzene derivative) is used to make insecticides. Compounds with ring structure (verses chains) are called **aromatic compounds**.

**Beta-carotene** is a vitamin made from the kelp plant (a type of seaweed). Beta-carotene can be converted by the body to vitamin A. Beta-carotene is an anti-oxidant. Do not take more than 50,000 IUs a day, and pregnant women should avoid taking beta-carotene altogether.

**Birth Defect** is a structural or functional abnormality that develops before birth and is present at the time of birth, especially as a result of faulty development, infection, heredity, or exposure to environmental (**teratogenic**) agents. Also called **Congenital Anomaly**. An excellent site for birth defect information is [Association Birth Defects Children](#)

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## C

**Cancer** is any of variety of malignant growths characterized by the proliferation of foreign (growth) cells that corrupt surrounding tissue, and contaminate (new) body tissues. Cancer is a general term for a **tumor**, or about cells (tissue) that have an uncontrolled (or abnormal) growth pattern. Cancerous cells often invade and destroy normal tissue cells. A cancer tends to spread to other parts of the body by releasing cells into the lymphatic system or bloodstream. Thus, the abnormal (cancer) cells are spread far from the point of origin in the body that first produced the (rogue) cells. The first site of cancer is sometimes called a **primary cancer**. The tumor that grows as a result of the original cancer is called a **secondary cancer**. A secondary cancer often is noticed before the primary cancer is found. There are more than 150 different kinds of cancer and as many different causes, including viruses, too much exposure to sunlight or x-rays, cigarette smoking, and chemicals in the environment. The most common sites for the growth of cancerous tumors are the lung, breast, colon, uterus, mouth, and bone marrow. Many cancerous tumors or lesions are curable if found in the early stage. Early signs for cancer may be a change in bowel or bladder habits, a nonhealing sore, unusual bleeding or discharge, a thickening or lump in the breast or elsewhere, indigestion or difficulty in swallowing, an obvious change in a wart or mole, or a nagging cough or continuing hoarseness. There are numerous and sundry treatments, but include: surgery, radiation, and (drug) chemotherapy as well as non-conventional herb and vitamin ingestion.

**Carcinogen** is a cancer-causing substance or agent. Carcinogens can be inorganic, such as asbestos and arsenic, or organic, such as certain molds and viruses. Others include various types of radiation, such as ultraviolet and X-rays. Carcinogens can be inhaled (radon and tobacco smoke), ingested (nitrites), or absorbed through the skin (DDT and other pesticides). According to the Concise Columbia Electronic Encyclopedia **30% of Americans will die** of cancer caused in part by **environmental carcinogens** before they reach the age of 74.

**CFC (Chlorofluorocarbon)**. Any of various halocarbon compounds consisting of carbon, hydrogen, chlorine, and fluorine were once used extensively as (aerosol) propellants and refrigerants. Chlorofluorocarbons are believed to cause the depletion of the (atmospheric) ozone layer.

**CFIDS or Chronic Fatigue Immune Dysfunction Syndrome**. Induce these symptoms: viral reactivation, immunological abnormalities, extreme fatigue, headaches, neurological and cognitive dysfunction, chronic sore throats, and lymph node enlargement, muscle and joint pain, neuritis, depression and mood swings and chronic infections.

**Cholestyramine** is a cholesterol-reducing drug. It was recently used to detoxify persons exposed to **ketone**.

**Chloracne** is a skin condition marked by blackheads and pimples in people who are in contact with chlorinated chemical compounds, as cutting oils, paints, varnishes, and dioxin. The condition usually affects the face, arms, neck, and any other exposed areas.

**Chlorine** is a highly irritating, greenish-yellow gaseous **halogen**, capable of combining with nearly all other elements. Its element symbol is **Cl**, atomic number 17; atomic weight 35.45; freezing point  $-100.98^{\circ}\text{C}$ ; boiling point  $-34.6^{\circ}\text{C}$ ; specific gravity 1.56 ( $-33.6^{\circ}\text{C}$ ); valence 1, 3, 5, 7. Chlorine does not occur freely in its element form in nature, but its compounds are common minerals. It is the 20th most abundant element on earth. Chlorine is produced (principally) by electrolysis of sodium chloride (salt water). Chlorine is used for bleaching paper pulp and other organic materials, destroying germ life in water, and preparing bromine, tetraethyl lead, and other important products.

**Chlorophenoxy** is a class of herbicides in which 2,4-D, 2,4,5-T, MCPA, et al, belong.

**Cognitive Dysfunction** is a psychological condition of conflict or anxiety resulting from inconsistency between one's beliefs and one's actions, such as opposing the slaughter of animals and eating meat.

**Complementarity** is a matching of components for a desired result; for example, in the paired series: 2\_3\_1\_4\_0 2\_1\_3\_0\_4 the numerics in the first group complement those in the second group to yield the arbitrary number 4 in each pair. Complementarity underlies membrane construction, protein synthesis, and cell reproduction.

**Compound** is anything that consists of two or more substances, ingredients, elements, or parts.

**Congenital Anomaly.** See Birth Defect.

**Cytoplasm** The protoplasm outside the nucleus of a cell.

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## D

**Defoliant** is a chemical that is sprayed or dusted on plants that cause the leaves to fall off (See: **Agent Orange**).

**Dioxin (TCDD).** Any of several carcinogenic or teratogenic heterocyclic hydrocarbons that occur as impurities in petroleum-derived herbicides (considered by some to be the most toxic chemical known to man). Dioxin is an ingredient in a certain herbicide used widely throughout the world to help control plant growth. Because of its high level of toxicity, it is no longer made in the United States. Exposure to dioxin is linked to **chloracne** and **porphyria cutanea tarda**. Dioxin is the toxic contaminant of Agent Orange, sprayed by the U.S. military aircraft on areas of southeast Asia from 1965 to 1970 to kill concealing trees and shrubs (approximately 4200 square miles). No safe exposure levels have been found. It has been strongly linked to many cancers and is very harmful to all living things. Chemically known as: **2,3,7,8-tetrachlorodibenzopara-dioxin or 2,3,7,8-T.**

**Diuretic** is a liquid, substance, or drug that can increase the discharge of urine.

**DNA or Deoxyribonucleic acid** is what holds the genetic information needed for heredity.

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## E

**Electromechanochemical Energy** is the interconversion of electrical, mechanical, and chemical energy by the cell's energy-gathering systems to unleash, gather, and store the power locked in **ATP**.

**Environmental Agents** include drugs, chemicals, pesticides, dioxin, mercury, lead, radiation, etc., or combination of these.

**Environmental Hormone** are environmental agents that alter growth patterns in living organisms (plants, animals, humans) unnaturally.

**Enzyme** is protein that catalyzes, or speeds up, biochemical reactions without itself undergoing a lasting change.

**Esters** are a class of organic compounds corresponding to the inorganic salts and formed from an organic acid and an alcohol with the elimination of water. Esters are organic compounds in which two hydrocarbon groups are linked by an oxygen atom.

**Estrogenic** relates to any of several steroid hormones produced chiefly by the ovaries and responsible for promoting estrus and the development and maintenance of female secondary sex characteristics.

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## F

**FAS or Fetal Alcohol Syndrome** is a pattern of congenital malformation that has been identified in the children of chronically alcoholic women. It may include growth and mental deficiency, microcephaly, short palpebral fissures (relating to the eyelid), and other anomalies of the skeleton and heart.

**Fluorocarbon** is an inert liquid or gaseous halocarbon compound in which fluorine replaces some or all hydrogen molecules, used as aerosol propellants, refrigerants, solvents, and lubricants and in making plastics and resins. See: CFC.

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## G

**Granule.** *Relating to biology* is a cellular or cytoplasmic particle.

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## H

**Half-Life** is the time required for **half the quantity of a drug or other substance** within in a living organism to be metabolized or eliminated by normal biological processes. Also called **biological half-life**. Note: Dioxins' half-life is several years (8.6 years per the Ranch Hand Study.)

**Halocarbon** is a compound, such as a fluorocarbon, that consists of carbon and one or more halogens.

**Halogen** is any of a group of five chemically related nonmetallic elements including **fluorine, chlorine, bromine, iodine, and astatine**. The name halogen, (salt former) refers to the property of each of the halogens to form with sodium a salt similar to common salt (sodium chloride). Each member of the group has a valence of 1 and combines with metals to form halides, as well as with metals and nonmetals to form complex ions.

**Halogenated** is a substance that has been treated or combine with a halogen.

**Herb** is an aromatic plant used especially in medicine or as seasoning. Herbs have been cultivated for centuries for their natural healing properties.

**Herbicide** is a chemical substance used to destroy, or inhibit the growth of plants, especially weeds. Many herbicides kill by over stimulating growth (hormones). Herbicides can be selective (killing specific plants), or non-selective (killing everything in the area in which they are used).

**Heterocyclic** means containing more than one kind of atom joined in a ring.

**Histamine** is a white crystalline compound,  $C_5H_9N_3$ , found in plant and animal tissue, used as a agent to dilate blood vessels.

**Hodgkin's Disease** is a malignant, progressive, sometimes fatal disease of unknown etiology, marked by enlargement of the lymph nodes, spleen, and liver. Symptoms include loss of appetite, weight loss, generalized itching, low-grade fever, night sweats, a decrease of red blood cells, and increase of white blood cells. Approximately 7,100 Americans are diagnosed with the disease annually, and causes approximately 1,700 deaths a year, affects twice as many males as females, and usually develops between 15 and 35 years of age. Radiation of lymph nodes, using a covering mantle to protect other organs, is the usual treatment for early stages of the disease. Combination chemotherapy

is the treatment for advanced disease. In more than one-half of the patients treated, the symptoms go away for long periods of time, and 60% to 90% of those with limited spreading of the disease may be cured. It is widely held that Hodgkin's disease may start as a swelling or infection and then develop into a tumor. According to another theory it may be a disorder of the immune system. Clusters of cases have been reported, but there is no definite evidence of an infectious agent, and the cause of the disease remains a mystery. Named for Thomas Hodgkin (1798-1866), British physician.

**Hormone** is a substance, usually a peptide (natural or synthetic amino acid compound) or steroid (natural or synthetic compound), produced by one tissue and conveyed by the bloodstream to another that effects physiological activity, such as growth or metabolism. Note: Dioxins alter the growth pattern of plants; energizing rapid growth so as to burn-out the plant. Therefore, dioxin is considered an environmental hormone.

**Hydrogen Chloride (HCl)** is a colorless pungent poisonous gas that fumes in moist air and produces hydrochloric acid when dissolved in water. **HCl** is used in the manufacture of plastics.

**Hydrolysis** is a breakdown of a chemical compound by reaction with water as in the separation of a dissolved salt, or the (catalytic) conversion of starch to glucose.

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### I

**Immunoassay** is a laboratory or clinical technique that makes use of the specific binding between an antigen and its homologous antibody in order to identify and quantify a substance in a sample.

**Immunosuppression** is the suppression of the immune response, as by drugs or radiation, in order to prevent the rejection of grafts or transplants or control autoimmune diseases. Also called **immunodepression**.

**Isomer** is a compound having the same percentage composition and molecular weight as another compound but differing in chemical or physical properties.

**Ipecac (also ipecacuanha)** 1. A tropical American shrub having roots and root stocks that produce a bitter-tasting crystalline alkaloid (emetine). 2. A medicinal preparation that is used to induce vomiting, particularly in cases of poisoning and drug overdose. Note: Ipecac syrup is used to detoxify persons exposed to dioxins, etc.

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### K

**Ketone** is a class of organic compounds having a carbonyl group linked to a carbon atom in each of two hydrocarbon radicals. The simplest ketone, **acetone (CH<sub>3</sub>-CO-CH<sub>3</sub>)**, matches the general ketone formula, (three hydrogen atoms attached to each of the end carbon atoms). Other ketones are camphor, many steroids, some fragrances, and some sugars. Ketones are relatively reactive organic compounds and are invaluable in synthesizing other compounds. They are also important intermediates in cell metabolism.

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## L

**Leukemia** is any of various acute or chronic neoplastic diseases of the bone marrow in which unrestrained proliferation of white blood cells (leukocytes) occurs, usually accompanied by anemia, impaired blood clotting, and enlargement of the lymph nodes, liver, and spleen. Males are affected twice as frequently as females. The cause of leukemia is not clear, but it may result from exposure to radiation, benzene, or other chemicals that are toxic to bone marrow. Diagnoses of acute and chronic forms are made by blood tests and bone marrow studies. The most effective treatment includes intensive chemotherapy, using antibiotics to prevent infections, and blood transfusions.

**Lipids** are a diverse group of organic compounds, including fats, oils, waxes, sterols, and triglycerides, that are insoluble in water but soluble in common organic solvents (alcohol, ether, etc.). Lipids are oily to the touch. The most important lipids are the phospholipids, which are major components of the cell membrane. Lipids together with carbohydrates and proteins are the principal structural material of living cells. Other important lipids are the waxes that form protective coatings on the leaves of plants and the skins of animals, and the steroids that include vitamin D, and several key hormones.

**Lupus** is any of several diseases, especially systemic lupus erythematosus, that principally affect the skin and joints but often also involve other systems of the body.

**Lymphocyte** is a white blood cell formed in lymphoid tissue.

**Lymphoma** is any of various usually malignant tumors that arise in the lymph nodes or in other lymphoid tissue.

**Lymphosarcoma** See: Non-Hodgkin's-Lymphoma.

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## M

**Metastasis** is the spread of pathogenic microorganisms or cancerous cells from an original site to one or more sites elsewhere in the body, usually by way of the blood vessels, or lymphatics. It also means a secondary cancerous growth formed by transmission of cancerous cells from a primary growth located elsewhere in the body.

**Microcephaly** is the abnormal smallness of the head.

**Morbidity** is the rate of incidence of a disease often in reference to epidemiology studies.

**Mortality** in reference to health issues, a death rate.

**Mitochondria** is any of various round or long cellular organelle in the cytoplasm of nearly all eukaryotic cells, containing genetic material and many enzymes important for cell metabolism, including those responsible for the conversion of food to usable energy (through cellular respiration).

**Myeloma** is a bone-destroying tumor. This cancer can (and often does) develop at the same time in many location of the body (thus, multiple). Myeloma causes large areas of destruction of the bone. The tumor occurs most often in the ribs, vertebrae, pelvic bones, and flat bones of the skull. Intense pain and fractures are common. Various types of myeloma include: endothelial myeloma, extramedullary myeloma, giant cell myeloma, multiple myeloma, osteogenic myeloma.

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## N

**Neoplasia** is the formation of new tissue. It also relates to the formation of a neoplasm(s).

**Neurotoxin** is a toxin that damages or destroys nerve tissue.

**Non-Hodgkin's-Lymphoma or NHL** is a cancer (disease) of the body cells that create abnormal formations (swells). Any kind of cancer of the lymph tissues other than Hodgkin's disease. Also called **lymphosarcoma**.

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## O

**Organelle** is a differentiated structure within a cell, such as a mitochondrion, vacuole, or chloroplast, that performs a specific function.

**Oxidation** is loss of electrons by an atom. Burning is rapid oxidation.

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## P

**PCB** is any of a family of industrial compounds produced by chlorination of **biphenyl**. Noted primarily as an environmental pollutant that accumulates in animal tissue with resultant pathogenic and teratogenic effects. Known as **polychlorinated biphenyl**.

**Peripheral Neuropathy** is any disorder of the motor and sense nerves that are outside of the brain and spinal cord (therefore, a peripheral nervous system disorder). One example is a numbness or tingling feeling in the fingers (paresthesia).

**Phenoxy herbicide** is any of a class of aromatic organic compounds having at least one hydroxyl group attached directly to the benzene ring.

**Phospholipid** is a (bimodal) molecule composed of two contradictory elements like a phosphate group that attracts water and a lipid which repels water.

**Pi** is the symbol for an **inorganic phosphate**.

**Prostate cancer** is the 3rd leading cause of cancer deaths in the US (males over the age of 50). It is a slow spreading cancer of the prostate gland. More than 120,000 new cases are reported in the United States each year. A direct cause of Prostate Cancer is not known, but it is believed to be hormone-related. Be cautioned that a male may not have direct symptoms, but the cancer may be detected due to bladder blockage, infection, or the presence of blood in the urine. The cancer can spread, and cause bone pain in the pelvis, ribs, or spine. It is commonly found by rectal examination followed by tissue removal and examination (biopsy). Treatment is by surgery, radiation therapy, and hormones. Treatment depends on the age of the patient, the extent of the disease, and other factors.

**Protein** is a large molecule comprised of amino acids in a distinct arrangement.

**PTSD or Post Traumatic Stress Disorder (Dysfunction)** is a psychological condition that occurs after a stressful situation (e.g., war, accident, rape, child abuse, etc.). PTSD is characterized by anxiety, depression, guilt, sorrow (or grief), a sense of shame, death anxiety, panic, low self-esteem, rage, and/or any combination of these. Treatment varies with the severity, and willingness of the person to seek help.

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## R

**Radical** *In chemistry*, is a small ionized group of atoms that are bound together and that tend to function as a single unit in chemical reactions. Some examples of radicals are the hydroxide (OH), sulfate (SO<sub>4</sub><sup>2-</sup>), and ammonium (NH<sub>4</sub><sup>+</sup>). The (so-called) free radicals are neutral groups of atoms with an unpaired electron. This makes most of them reactive and unstable. Free radicals are common as transient intermediaries in chemical reactions. Processes involving free radicals are used in the production of rubber and plastics. They are also common in chain reactions such as fire. Free radicals occur in body chemistry,

i.e., when white blood cells kill invading organisms. Free radicals are implicated in various maladies, such as arthritis, heart disease, and Alzheimer's disease. When natural enzyme controls fail, the free radicals attack lipids, proteins, and nucleic acids. This, in part, explains the harm done by carcinogens and blood fats.

**Reduction** is the gain of electrons by an atom.

**Ribosome** is a minute, round particle composed of RNA and protein found in the cytoplasm of living cells and active in the synthesis of proteins.

**RNA or Ribonucleic acid** is a universal polymeric constituent of all living cells, consisting of a single-stranded chain of alternating phosphate and ribose units with the bases adenine, guanine, cytosine, and uracil bonded to the ribose, the structure and base sequence of which are determinants of protein synthesis. Ribonucleic acid is the complement to DNA; it transcribes DNA's genetic instructions for the manufacture of proteins.

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## S

**Sarcoma** is a malignant tumor arising from connective tissues. Sarcoma is often a cancerous growth of the soft tissues usually appearing at first as a painless swelling. About 40% of sarcomas occur in the legs and feet, 20% in the hands and arms, 20% in the trunk, and the rest in the head or neck. The growth tends to spread very quickly. It is usually not caused by an injury, but it can grow in burn scars. Sarcoma must be cut out, and then the body is usually given x-ray and chemical treatment. [Plural: sarcomas, sarcomata]

**Soft Tissue Sarcomas** are tumors in muscles, fat, fibrous tissue, and vessels serving these tissues as well as the peripheral nervous system.

**Spina Bifida** is a congenital defect in which the spinal column is imperfectly closed so that part of the spinal cord (meninges) protrudes, often resulting in hydrocephalus and other neurological disorders. Also called **schistorrhachis**.

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## T

**T cell** is a principal type of white blood cell that completes maturation in the thymus and that has various roles in the immune system, including the identification of specific foreign antigens in the body and the activation and deactivation of other immune cells. Also: **T lymphocyte**

**TCDD or Tetrachlorodibenzo-p-dioxin (also 2,3,7,8-Tetrachlorodibenzo-p-dioxin)** is a family of dioxins that contain four (4) chlorine atoms each.

**Teratogen** is an agent, such as a virus, a drug, or radiation, that causes malformation of an embryo or a fetus (i.e., birth defects).

**Thalidomide** is a sedative and hypnotic drug, C<sub>13</sub>H<sub>10</sub>N<sub>2</sub>O<sub>4</sub>, withdrawn from sale in the U.S. after it was found to cause severe birth defects, especially of the limbs, when taken during pregnancy. It is available in many third world countries without warning and education.

**Toxin** a poisonous substance, especially for a protein. Toxins are produced by living cells or organisms, and capable of causing disease when introduced into the body tissues. Toxins are also capable of inducing neutralizing antibodies or antitoxins.

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## V

**Virulent** is something that is extremely poisonous or harmful, e.g., a disease or microorganism.

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## X

**Xenobiotic** foreign to the body or to living organisms. Normally referring to a synthetic chemical, e.g., a pesticide.

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## References

Include, but not limited to:

- Funk & Wagnells New Encyclopedia
  - Merriam-Webster's Collegiate Dictionary
  - The American Heritage Dictionary
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Additions, comments, suggestions, and corrections can be addressed to:

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