

Definitions for Reading Cancer Biology Papers

Cancer-disease characterized by the uncontrolled, abnormal growth of cells

Tumor-an abnormal mass of tissue that results from excessive cell division; may be benign or malignant

Benign-not cancerous. Unlike malignant tumors, do not invade adjacent tissues and do not spread throughout the body. However, cells in benign tumors could acquire additional changes so that they become malignant or cancerous.

Malignant-cancerous

Lesion-part of a tissue that has been structurally changed due to disease; tumor or precursor to a tumor

Hyperplasia-hyper-proliferation of a tissue; an increase in the number of cells

Dysplasia-atypical proliferation of cells, may be thought of as intermediate category between hyperplasia and neoplasia

Neoplasia-neoplasm means new growth and refers to any tumor; includes abnormal differentiation of cells, increase in cell number, and complete loss of growth control

Metaplasia-change in tissue in which one type of mature differentiated cell appears to be replaced by cells of another type; example is replacement of columnar epithelium by squamous epithelium; often a response to irritation, may be present before neoplasia

Adenoma-an ordinarily benign neoplasm of glandular or ductal epithelial tissue

Adenocarcinoma-an adenoma that becomes malignant

Carcinoma-malignant tumor derived from epithelium, can be used by itself or as a suffix

Epithelia-tissue constructed of one or more layers of cells that cover the internal and external surfaces of the body and its organs. Includes: skin, intestine, lung, etc.

-oma-can be a benign tumor from mesenchymal tissue when used with appropriate prefix (osteoma=benign tumor of bone; angioma=benign tumor of blood vessels)

-sarcoma-suffix for malignant tumors of mesenchymal tissue (osteosarcoma=malignant tumor of bone; angiosarcoma, etc.)

Tumor suppressor-gene that normally functions to inhibit cell growth and division cycles

Oncogene-gene that when mutated or expressed at abnormally high levels contributes to converting a normal cell into a cancerous cell

Transformation-cells are transformed if they are demonstrated to: form colonies, or foci, in soft agar, grow without contact inhibition, change in cell morphology and/or form tumors when injected under the skin of nude mice; often refers to events in cell culture

Locus (plural=loci)-the chromosomal location that is occupied by a particular gene or one of its alleles

“9p21”- human and mouse chromosomes have two arms, the p arm (short, although not as short in mice) and the q arm (long) which are separated from each other by the centromere

Allele-one of a pair, or series, of alternative forms of a gene that occur at a given locus in a chromosome; may also refer to the genotype of a chromosomal region including more than one gene

Loss of heterozygosity-heterozygosity refers to having different alleles at one or more loci in homologous chromosomes; LOH is when the wild-type copy, or allele, is lost, often via chromosomal deletion or recombination. Can be detected by comparing the ratio of wild-type and mutant DNA in tumor tissue versus somatic tissue; also, by using chromosomal markers to identify the loss of a missing gene

Germline-usually refers to an inherited mutation; would be present in all cells of an organism and passed on to progeny

Somatic-mutation that arises in a specific cell/tissue; not inherited

Genotype-description of the gene makeup; wild-type = genotype in which both alleles are normal; heterozygous = one wild-type allele, one mutant; homozygous = two mutant alleles (compound heterozygote = two mutant alleles, but each allele has distinct mutation)

Phenotype-the observable physiological, cellular, molecular characteristics of an organism or a population of cells

More specific to the methods used here:

Transgenic mice-carry expression plasmid DNA that is randomly inserted into the genome in concatamers; often, a tissue-specific promoter is used to drive expression of the cDNA for YFG (your favorite gene); used for over-expression studies or to express a mutant protein

Knockout mouse-a mouse strain genetically engineered to carry an allele that will not produce the RNA/protein product of the gene of interest; produced by homologous recombination; used to study the effects of loss of the gene product

Targeting vector-plasmid DNA that bears a mutation or exon replacement and a positive selection marker flanked by 2 arms of DNA homologous to the locus of interest; will be inserted into the genome via recombination of the homologous arms

Null-an allele or a mouse that has two knockout alleles (homozygote)

Immunohistochemistry (IHC)-method used to detect proteins in cells; involves using an antibody to detect the protein of interest and a secondary antibody coupled with a chemical reaction. Often, cells that contain the protein of interest (positive cells) appear brown (with DAB and peroxidase, depends on the substrates used).

H&E (hematoxylin & eosin)-common dye combination used to stain tissues and determine their basic architecture; hematoxylin is purple/blue and stains nuclei, eosin is orange/pink and stains cytoplasm; hematoxylin is usually used as a counterstain to see nuclei in tissues subjected to IHC

Northern blot-RNA, Western blot (or immunoblot)-protein, Southern blot-DNA

For help with terms, try:

-National Cancer Institute website: www.cancer.gov/dictionary/

Some definitions from: *Principles of Genetics* by Snustad, Simmons, and Jenkins