

0-A

(+)sense RNA (plus-sense RNA)

A virus with a single-stranded RNA genome of the same polarity ('sense') as mRNA.

(-)sense RNA (minus-sense RNA)

A virus with a single-stranded RNA genome of the opposite polarity ('sense') as mRNA.

Abortive Infection

When a virus infects a cell (or host), but cannot complete the full replication cycle, i.e. a non-productive infection.

Acquired immune deficiency syndrome (AIDS)

clinically defined state of disease manifestation characterized by the failure of the immune system caused by HIV.

Activator

a DNA-binding protein that regulates one or more genes by increasing the rate of transcription.

Active site

The region of an enzyme to which a substrate binds and at which a chemical reaction occurs.

Acute Infection

Relatively brief infections, i.e. a few days to a few weeks, following which the virus is usually eliminated completely from the body by the immune system.

Affinity

A measure of the strength with which one molecule binds to another via a single binding site. For the reaction $A + B \rightleftharpoons AB$, the affinity can be expressed as KD (equilibrium dissociation constant) = $[A][B]/[AB]$. KD is also equal to the concentration at which half-maximal binding occurs, so the lower the KD , the higher the affinity.

Allele

one of a series of alternate forms of a gene.

Allelic exclusion

The ability of heterozygous lymphoid cells to produce only one allelic form of antigen-specific receptor when they have the genetic endowment to produce both. Genes other than those for the specific receptors are usually expressed codominantly.

Allelic

Relating to one of a series of two or more alternate forms of a gene that occupy the same position or locus on a specific chromosome.

Allergen

An antigen responsible for producing allergic reactions by inducing IgE formation.

Allergy

A term covering immune reactions to non-pathogenic antigens, which lead to inflammation and deleterious effects in the host.

Allogeneic

Having a genetic dissimilarity within the same species.

Allograft

A tissue transplant (graft) between two genetically nonidentical members of a species.

Allotypes

Antigenic determinants that are present in allelic (alternate) forms. When used in association with immunoglobulin, allotypes describe allelic variants of immunoglobulins detected by antibodies raised between members of the same species.

Angstrom

A unit of length used for measuring atomic dimensions. One angstrom equals 10⁻¹⁰ meters.

Antibiotic

A class of natural and synthetic compounds that inhibit the growth of or kill other microorganisms.

Antibody-dependent, cell-mediated cytotoxicity (ADCC)

A phenomenon in which target cells, coated with antibody, are destroyed by specialized killer cells (NK cells and macrophages), which bear receptors for the Fc portion of the coating antibody (Fc receptors). These receptors allow the killer cells to bind to the anti-body-coated target.

Antibody

Serum protein formed in response to immunization; antibodies are generally defined in terms of their specific binding to the immunizing antigen.

Antigen processing

Large molecules are broken down (processed) within macrophages into peptides and presented within the groove of MHC molecules.

Antigen receptor

The specific antigen-binding receptor on T or B lymphocytes; these receptors are transcribed and translated from rearrangements of V genes.

Antigen-binding site

The part of an immunoglobulin molecule that binds antigen specifically.

Antigen-presenting cell (APC)

A specialized type of cell, bearing cell surface class II MHC (major histocompatibility complex) molecules, involved in processing and presentation of antigen to inducer, or helper, T cells. Examples: macrophage, dendritic cells.

Antigen

A substance, often a protein or large polysaccharide, which is perceived as foreign by the body and stimulates an immune response. Components of microbes such as cell walls, flagella, toxins, and the coats of viruses can serve as antigens.

Antigen

Any foreign material that is specifically bound by specific antibody or specific lymphocytes; also used loosely to

describe materials used for immunization. Antigens may also be immunogens if they are able to trigger an immune response, or haptens if not.

Antigenic determinant

A single antigenic site or epitope on a complex antigenic molecule or particle.

Arbovirus

A family of viruses transmitted by arthropods (insects).

Assembly

The stage of replication during which all the structural components come together at one site in the cell and the basic structure of the virus particle is formed.

ATP

Nucleoside triphosphate composed of adenine, ribose, and three phosphate groups that is the principal carrier of chemical energy in cells. The terminal phosphate groups are highly reactive in the sense that their hydrolysis, or transfer to another molecule, takes place with release of a large amount of free energy.

Attachment

The binding of a virus particle to a specific receptor on the surface of a host cell.

Attenuated

Used to describe a microbe that has been changed or weakened so that it does not cause disease.

Autograft

A tissue transplant from one area to another on a single individual.

Autoimmunity (autoallergy)

An immune response to "self" tissues or components. Such an immune response may have pathological consequences leading to autoimmune diseases.

Autosome

any chromosome that is not a sex chromosome.

Avidity

The combination of multiple affinities, for example when a polyvalent antibody binds to a polyvalent antigen.

AZT (azido-deoxythymidine)

A drug used to treat HIV. It targets the reverse transcriptase enzyme.

B

B lymphocyte (B cell)

The precursors of antibody-forming plasma cells; these cells carry immunoglobulin and class II MHC (major histocompatibility complex) antigens on their surfaces.

Bacteriophage

a virus that infects bacteria. Can also be used in a shortened form, phage.

Blocking antibody

A functional term for an antibody molecule capable of blocking the interaction of antigen with other antibodies or with cells.

Bone Marrow

The soft tissue found in the hollow center of long bones in which blood cells are produced.

C

Capsid

A protein shell comprising the main structural unit of a virus particle.

Carbohydrate

molecules that are chemically defined by their neutral compounds, carbon, hydrogen and oxygen. Carbohydrates come in simple forms such as sugars and in complex forms such as starches and fiber.

Carrier

A large immunogenic molecule or particle to which an antigenic determinant is attached, allowing the determinant to become immunogenic.

CD4

A protein on the surface of certain leukocytes. Helper T cells are among the cell types that possess CD4. CD4 is involved in the binding of HIV to its host cells.

CDC

Centers for Disease Control (don't confuse with CD4)

cDNA

DNA synthesized from mRNA (using reverse transcriptase).

Cellular immunity

The arm of the immune system directed toward antigens associated with cells, such as those expressed by virally infected cells or cancers. The T cells of cellular immunity respond specifically to such antigens.

Central Dogma [of molecular biology]

The principle that genetic information flows from DNA to RNA to protein.

Chaperones

Proteins that help other proteins fold or escort other proteins throughout the cell.

Chemokine

A chemical signal that attracts white blood cells to infected parts of the body. Chemokine receptor. A protein associated with the membranes of white blood cells that chemokines can attach to.

Chemotaxis

Migration of cells along a concentration gradient of an attractant.

Chromosome

A structure containing genetic material (DNA) within the nucleus of a cell.

Chronic Infection

The converse of acute infections, i.e. prolonged and stubborn. Caused by viruses which are able to persist in the body.

Cladistics

a branch of biology that determines the evolutionary relationships between organisms based on derived similarities.

Cladogram

an evolutionary tree that depicts inferred historical branching relationships among entities. Unless otherwise stated, the depicted branch lengths in a cladogram

are arbitrary; only the branching order is significant.

Class I, II and III MHC molecules

Proteins encoded by genes in the major histocompatibility complex (q.v.). Class I molecules are designated HLA-A, B, or C. Class II molecules are designated DP, DQ or DR.

Class switch

See isotype switch.

Classical pathway

The mechanism of complement activation initiated by antigen-antibody aggregates and proceeding by way of C1, C4 and C2.

Clonal deletion

The loss of lymphocytes of a particular specificity due to contact with either "self" or artificially introduced antigen.

Clonal selection theory

The prevalent concept that specificity and diversity of an immune response are the result of selection by antigen of specifically reactive clones from a large repertoire of preformed lymphocytes, each with individual specificities.

Cluster determinant (CD)

Cluster of antigens with which antibodies react that characterize a cell surface marker.

Codominance

a situation in which multiple alleles are dominant and can be expressed simultaneously.

Codon

Sequence of three nucleotides in a DNA or messenger RNA molecule that represents the instruction for incorporation of a specific amino acid into a growing polypeptide chain.

Combinatorial joining

The joining of segments of DNA to generate essentially new genetic information, as occurs with Ig genes during the development of B cells. Combinatorial joining allows multiple opportunities for 2 sets of genes to combine in different ways.

Complement components

An enzymatic system of serum proteins triggered by the classical and alternative pathways, and resulting in target cell lysis, phagocytosis, opsonization and chemotaxis.

Complement receptor

A structure found on erythrocytes, lymphocytes, neutrophils, monocytes and macrophages that binds C3 fragments.

Complement

A series of serum proteins involved in the mediation of immune reactions. The complement cascade is triggered classically by the interaction of antibody with specific antigen.

Constant region (C region)

The invariant carboxyl-terminal portion of an antibody molecule, as distinct from the variable region which is at the amino-terminal of the chain.

Cross-reactivity

The ability of an antibody, specific for one antigen, to react with a second antigen; a measure of relatedness between two different antigenic substances.

Cytokine

A molecular signal that modulates immune response.

Cytokines

Soluble substances secreted by cells, which have a variety of effects on other cells, e.g. Interleukin 1 (IL-1).

Cytomegalovirus (CMV)

A wide spread herpes virus capable of producing severe in persons with suppressed immune function

Cytoplasm

contents of a cell that are contained within its plasma membrane (in the case of eukaryotic cells, outside the nucleus).

Cytotoxic (Cytolytic) T cell

Cell that kills target cells bearing appropriate antigen within the groove of an MHC class I molecule that is identical to that of the T cell.

D

D gene segment

A small segment of immunoglobulin heavy-chain and T-cell receptor DNA, coding for the third hypervariable region of most receptors.

Determinant

Part of the antigen molecule which binds to an antibody-combining site or to a receptor on T cells (see hapten and epitope).

Differentiation antigen

A cell surface antigenic determinant found only on cells of a certain lineage and at a particular developmental stage; used as an immunologic marker.

DNA

deoxyribonucleic acid; a chain of deoxynucleotides with bases A (adenine), C (cytosine), T (thymine), and G (guanine).

Domain

A compact segment of an immunoglobulin molecule, made up of about 110 amino acids around an S-S bond, and encoded by a unique segment of DNA, surrounded by nontranslated sequences.

Dominant allele

An allele that is expressed if it is on at least one chromosome.

DR antigens

MHC class II molecules found on B cells and antigen-presenting cells of humans.

dsDNA

Double-stranded DNA. A DNA molecule in which two chains (backbones of alternating sugars and phosphates) are linked together by hydrogen bonding between complementary bases.

E

Emerging/Re-emerging Infectious Disease

infections that have newly appeared in a population or have existed but are rapidly increasing in incidence or geographic range.

Endemic

A disease that exists permanently in a particular region or population. For example, malaria is endemic in parts of Africa.

Endocytosis

uptake of material into a cell by an invagination of the plasma membrane and its internalization in a membrane bound vesicle.

Endosome

membrane-bound organelle in animal cells that carries materials newly ingested by endocytosis and passes many of them on to lysosomes for degradation.

Enhancer elements

cis-regulatory sequences that can elevate levels of transcription from an adjacent promoter.

Envelope

A lipid membrane enveloping a virus particle.

Enzyme-linked immunosorbent assay (ELISA)

An assay in which an enzyme is linked to an antibody and a coloured substrate is used to measure the activity of bound enzyme and, hence, the amount of bound antibody.

Enzyme

A substance, usually a protein, that speeds up, or catalyzes, a specific chemical reaction without being permanently altered or consumed. Some RNA molecules can also act as enzymes.

Epidemic

An outbreak of disease that attacks many peoples at about the same time and may spread through one or several communities.

Epitope

An alternative term for antigenic determinant.

Erythrocytes

red blood cells.

Eukaryote

an organism composed of one or more cells containing a nucleus.

Exon

The region of DNA coding for a protein or a segment of a protein.

F

F(ab')₂

A fragment of an antibody containing two antigen-binding sites generated by cleavage of the antibody molecule with the enzyme pepsin which cuts at the hinge region C-terminally to the inter-H-chain disulphide bond.

Fab

Fragment of antibody containing the antigen-binding site, generated by

cleavage of the antibody with the enzyme papain, which cuts at the hinge region N-terminally to the inter-H-chain disulphide bond and generates two Fab fragments from one antibody molecule.

Fc receptor (FcR)

A receptor on a cell surface with specific binding affinity for the Fc portion of an antibody molecule. Fc receptors are found on many types of cells.

Fc

Fragment of antibody without antigen-binding sites, generated by cleavage with papain; the Fc fragment contains the C-terminal domains of the heavy immunoglobulin chains.

Fluorescence

An optical phenomenon in which absorption of a photon triggers emission of a photon with a longer (less energetic) wavelength. All fluorescent dyes emit light of one wave length (e.g., green) after they have absorbed light of another wave length (e.g., blue).

Fluorescence recovery after photobleaching (FRAP)

An optical technique that can be used to monitor two dimensional lateral diffusion of a fluorescently-labeled molecule in a membrane. A small area of a cell membrane is bleached by laser light. A diffusion coefficient can be calculated from the amount of time required for unbleached labeled molecules to diffuse back into the bleached area.

Fluorescent antibody

An antibody coupled with a fluorescent dye, used with a fluorescence microscope to detect antigen on cells, tissues, or microorganisms.

Folding

see protein folding.

Freund's complete adjuvant

A water-in-oil emulsion that contains an immunogen, an emulsifying agent, and killed mycobacteria which enhance the immune response to the immunogen; termed "incomplete" Freund's adjuvant if mycobacteria are not included.

Fusion Protein

The protein(s) on the surface of a virus particle responsible for fusion of the virus envelope with cellular membranes.

G

Gamma globulin

an old name for IgG antibodies that circulate in the blood.

Gene expression

An important stage of viral replication at which virus genetic information is expressed. One of the major control points in replication.

Genetic marker

A known DNA sequence that is an indicator or predictor of a particular phenotype.

Genome replication

The stage of viral replication at which the virus genome is copied to form new progeny genomes.

Genotype

All of the genes possessed by an individual; in practice it refers to the particular alleles present at the loci in question.

Germ line

Refers to genes in germ cells as opposed to somatic cells, that is, genes in their unrearranged state rather than those rearranged for production of a protein.

Globulins

simple proteins found in the blood serum that contain various molecules central to immune system function.

Glycoprotein

a protein containing covalently-attached carbohydrate.

Guide strand

also known as the antisense strand - This is the siRNA strand that get loaded onto RISC. It usually refers to the strand that is complementary to the targeted mRNA. The guide strand serves to direct the RISC to the mRNA that needs to be degraded

gp120

Glycoproteins with a molecular weight of 120,000 daltons, which are part of the peg-like structures protruding from the surface of HIV.

H

H-2 complex

The major histocompatibility complex situated on chromosome 17 of the mouse; contains subregions K, I and D.

HAART (highly active antiretroviral therapy)

A combination of three or more anti-HIV drugs used in the treatment of HIV.

Haplotype

A particular combination of closely linked genes on a chromosome inherited from one patient.

Hapten

A compound, usually of low molecular weight, that is not itself immunogenic but that, after conjugation to a carrier protein or cells, becomes immunogenic and induces antibody, which can bind the hapten alone in the absence of carrier.

Heavy chain (H chain)

The larger of the two types of chains that comprise a normal immunoglobulin or antibody molecule.

Helper T cells

A class of T cells which help trigger B cells to make antibody against thymus-dependent antigens. Helper T cells also help generate cytotoxic T cells.

Heme

cyclic organic molecule containing an iron atom that carries oxygen in hemoglobin and carries an electron in cytochromes.

Hemoglobin

protein in red blood cells that associates with O₂ in the lungs by means of a bound heme group.

Heterozygous

containing two different alleles of the same gene.

Hinge region

A flexible, open segment of an antibody molecule that allows bending of the molecule. The hinge region is located between Fab and Fc and is susceptible to enzymatic cleavage.

Histocompatibility Antigens (HLA)

a group of molecules found on the membranes of cells that are specific to the individual. They are used to determine compatibility of tissues in organ transplants and participate in the immune response to viruses.

Histocompatibility

Literally, the ability of tissues to get along; in immunology, it means identity in all transplantation antigens. These antigens, in turn, are collectively referred to as histocompatibility antigens.

HIV (Human Immunodeficiency Virus)

a lentiviral (genus) retrovirus (family) that is the cause of the disease known as AIDS.

HLA complex

See 'Major histocompatibility complex'.

Homology

common ancestry of two or more genes or gene products

Homozygous

containing two identical alleles of the same gene.

Host Defense

the sum of bodily defense against disease.

Humoral immunity

Any immune reaction that can be transferred with immune serum is termed humoral immunity (as opposed to cell-mediated immunity). In general, this term refers to resistance that results from the presence of specific antibody.

Humoral immunity

The arm of the immune system directed toward circulating antigens such as bacteria, toxins, and viruses that have not entered cells. Antibodies secreted by plasma cells mediate humoral immunity.

Hybridoma

A hybrid cell that results from the fusion of an antibody-secreting cell with a malignant cell; the progeny secrete antibody without stimulation and proliferate continuously both in vivo and in vitro.

Hypervariable regions

Portions of the light and heavy immunoglobulin chains that are highly variable in amino acid sequence from one immunoglobulin molecule to another, and that, together, constitute the antigen-binding site of an antibody molecule. Also, portions of the T-cell

receptor which constitute the antigen-binding site.

I

Ia

"Immune response-associated" proteins, found on B cells and antigen-presenting cells of mice; an old term now replaced with MHC (major histocompatibility complex) class II molecules.

Idiotypic

The combined antigenic determinants (idiotopes) found on antibodies of an individual that are directed at a particular antigen; such antigenic determinants are found only in the variable region.

Immune complex

Antigen bound to antibody.

Immune modulators

Substances that control the expression of the immune response.

Immune response (Ir) gene

A gene controlling an immune response to a particular antigen; most genes of this type are in the MHC (major histocompatibility complex), and the term is rarely used to describe other types of Ir genes outside the MHC.

Immunization

protection against disease by vaccination, usually with a weakened (attenuated) form of the pathogen that is unable to cause illness.

Immunogen

A substance capable of inducing an immune response (as well as reacting with the products of an immune response). Compare with antigen.

Immunoglobulin (Ig)

A general term for all antibody molecules. Each Ig unit is made up of two heavy chains and two light chains and has two antigen-binding sites.

In vitro

performing a given experiment in a controlled environment outside a living organism (e.g. in a test tube).

In vivo

which takes place inside an organism. In science, in vivo refers to experimentation done in or on the living tissue of a whole, living organism as opposed to a partial or dead one.

Incubation time

the period of exposure to an infectious agent and the first sign of infection.

Inhibitor

A molecule that "inhibits," or blocks, the biological action of another molecule.

Innate immune system

Integrase

An HIV enzyme that facilitates the integration of viral DNA into the host cell's chromosome.

Interferon

A group of proteins having antiviral activity and capable of enhancing and modifying the immune response.

Interleukin-1 (IL-1)

a protein that is active early in an immune response.

Interleukin-2 (IL-2)

one of a family of proteins that control the growth and function of many types of lymphocytes.

Interleukins

Glycoproteins secreted by a variety of leukocytes which have effects on other leukocytes.

Internal image

A spatial configuration of the combining site of an anti-idiotypic antibody which resembles the epitope to which the idiotype is directed.

Intron

A segment of DNA that does not code for protein; the intervening sequence of nucleotides between coding sequences or exons.

Isotype switch

The shift of a B cell or its progeny from the secretion of antibody of one isotype or class of antibody with the same V regions but a different heavy-chain constant region and, hence, a different isotype (class switch).

Isotypes

Classes of antibody that differ in the constant region of their heavy chain (Fc portion); distinguishable also on the basis of reaction with antisera raised in another species. These differences also result in different biological activities of the antibodies.

J-K

J chain (joining chain)

A polypeptide involved in the polymerization of immunoglobulin molecules IgM and IgA.

J gene segment

A gene segment coding for the J or joining segment in immunoglobulin DNA; V genes translocate to J segments in L chains, and to D and J segments in H chains. Also, codes for a portion of the T-cell receptor.

Kaposi's Sarcoma

a cancer-like growth of small blood vessels typically associated with advanced stage AIDS

Killer T cell

A T cell with a particular immune specificity and an endogenously produced receptor for antigen, capable of specifically killing its target cell after attachment to the target cell by this receptor. Also called cytotoxic T cell.

Kilodalton

A unit of mass equal to 1,000 daltons. A dalton is a unit used to measure the mass of atoms and molecules. One dalton equals the atomic weight of a hydrogen atom (1 gram/mol or 1.66 x 10⁻²⁴ grams/molecule).

L

Lagging strand

one of the two newly synthesized strands of DNA found at a replication fork. The

lagging strand is made in discontinuous lengths synthesized 3' to 5' that are later joined covalently.

Latency

The period between contracting a disease and showing symptoms; similar to incubation period

Latent Infection

Viruses which are able to down-regulate their gene expression can establish a truly latent state, i.e. with strictly limited gene expression and without ongoing virus replication. Latent virus infections typically persist for the entire life of the host.

Leading strand

one of the two newly synthesized strands of DNA found at a replication fork. The leading strand is made in continuously synthesized 5' to 3'.

Lentivirus

a class of retroviruses characterized by a long incubation period. HIV (human immunodeficiency virus) and SIV (simian immunodeficiency virus) are lentiviruses.

Leukocytes

white blood cells

Light chain (L chain)

The light chain of immunoglobulin is a structural feature that occurs in two forms; kappa and lambda.

Lipids

a class of biological molecules that are mostly hydrophobic, typically having a small hydrophilic region that allows them to assemble into structures such as membranes and micelles.

Lymph Nodes

small organs of the immune system widely distributed throughout the body.

Lymphocyte

Small cell with virtually no cytoplasm, found in blood, in all tissue, and in lymphoid organs, such as lymph nodes, spleen, and Peyer's patches, and bears antigen-specific receptors.

Lymphokines

Soluble substances secreted by lymphocytes, which have a variety of effects on lymphocytes and other cell types.

Lysosome

acidic organelles which contains digestive enzymes.

M

Macrophage

A large phagocytic cell of the mononuclear series found within tissues. Properties include phagocytosis, and antigen presentation to T cells.

Major histocompatibility complex (MHC)

A cluster of genes on chromosome 6 in humans, encoding cell surface molecules that are polymorphic and that code for antigens which lead to rapid graft rejection between members of a single species which differ at these loci. Several classes of protein such as MHC

class I and II proteins are encoded in this region. These in humans, are known as 'Human leukocyte antigens' (HLA).

Mast Cells

immune cells best known for their role in allergy and anaphylaxis, but that also play an important role in wound healing and defense against pathogens.

Matrix Protein

A structural protein of a virus particle which underlies the envelope and links it to the core.

Maturation

The stage of viral replication at which a virus particle becomes infectious.

Maximum Likelihood/Maximum

Parsimony

technique used in cladistics to explain the observed distribution of character states across taxa with the fewest inferred changes between character states. This assumption that "the simplest possible explanation is the best" is considered by some to be a generalization of Occam's Razor.

Membrane protein

a protein that is anchored to a lipid bilayer.

Memory T-cells

T-cells that have been exposed to specific antigens and are able thereafter to proliferate upon repeat exposure to the same antigen.

Memory

In the immune system, memory denotes an active state of immunity to a specific antigen, such that a second encounter with that antigen leads to a larger and more rapid response.

MHC class I molecule

A molecule encoded to genes of the MHC which participates in antigen presentation to cytotoxic T (CD8+) cells.

MHC class II molecule

A molecule encoded by genes of the MHC which participates in antigen presentation to helper T (CD4+) cells.

MHC restriction

The ability of T lymphocytes to respond only when they 'see' the appropriate antigen in association with "self" MHC class I or class II proteins on the antigen presenting cells.

Minor histocompatibility antigens

These antigens, encoded outside the MHC, are numerous, but do not generate rapid graft rejection or primary responses of T cells in vitro. They do not serve as restricting elements in cell interactions.

miRNA

micro RNAi; 20-23 nucleotide long RNAs that are encoded by specific genes. They are processed from long, single stranded non-coding RNA sequences that fold into hairpins. miRNAs function in repressing mRNA translation or in mRNA degradation.

Mitochondria

Membrane-bounded organelle, about the size of a bacterium, that carries out oxidative phosphorylation and produces most of the ATP in eukaryotic cells

Mitogen

A substance that stimulates the proliferation of many different clones of lymphocytes.

Molecular clock hypothesis

the hypothesis that molecules evolve in direct proportion to time, so that differences between homologous DNA sequences or proteins can be used to estimate the time elapsed since the two molecules (or the taxa that contain them) last shared a common ancestor.

Molecular epidemiology

The use of nucleotide sequence information to study the diversity and distribution of virus populations.

Molecular systematics

the detection, description, and explanation of molecular biological diversity, both within and among species. The study of the diversity of organism molecular characteristics, especially how they relate evolutionarily.

Monoclonal Antibody

laboratory produced antibodies that are specific for a specific antigen.

Monoclonal

Literally, coming from a single clone. A clone is the progeny of a single cell. In immunology, monoclonal generally describes a preparation of antibody that is monogenous, or cells of a single specificity.

Monocyte

Large circulating white cell, 2-10% of total white cells, phagocytic, indented nucleus. Migrates to tissues, where it is known as a macrophage.

Monokines

Soluble substances secreted by monocytes, which have a variety of effects on other cells.

Monophyletic

a group of taxa that contains an ancestor and all of its descendants.

mRNA

Messenger RNA, translated on ribosomes to produce proteins.

Mutation

a change in genetic information occurring as a result of spontaneous or external influences

Myeloma

A tumour of plasma cells, generally secreting a single species of immunoglobulin.

N

Natural killer cells

a major cellular component of the innate immune system, that attack cells that have been infected by microbes, but not microbes themselves.

Neutralization

Blocking of virus infection by antibodies; also, an assay which measures this.

NK cell

Naturally occurring, large, granular, lymphocyte-like killer cells that kill various tumour cells; they may play a role in resistance to tumours. Also, they participate in ADCC. They do not exhibit antigenic specificity, and their number does not increase by immunization.

Non-nucleoside reverse transcriptase inhibitor (NNRTI)

a small molecule that binds to the reverse transcriptase enzyme and inhibits the movement of its protein domains needed to carry out the process of viral DNA synthesis (a class of medication used to treat HIV)

Nuclear magnetic resonance (NMR) spectroscopy

A technique used to determine the detailed, three-dimensional structure of molecules and, more broadly, to study the physical, chemical, and biological properties of matter. It uses a strong magnet that interacts with the natural magnetic properties in atomic nuclei.

Nucleic acid

RNA or DNA, a macromolecule consisting of a chain of nucleotides joined together by phosphodiester bonds.

Nucleocapsid

The core of a virus particle consisting of the genome plus a complex of proteins.

Nucleoside analogue reverse transcriptase inhibitors (NARTs)

analogues of naturally occurring deoxynucleotides that lack a 3'-hydroxyl group on the deoxyribose moiety (a class of medication used to treat HIV)

Nucleus

The major organelle of a eukaryotic cell, which contains DNA organized into chromosomes.

O

Opportunistic Disease/Infection

infections caused by organisms that usually do not cause disease in a person with a healthy immune system, but can affect people with a poorly functioning or suppressed immune system.

Opsonin

A substance that, when bound to antigen, amplifies the normal phagocytic process.

Opsonin

A substance, usually antibody or complement component, which coats a particle such as a bacterium and enhances phagocytosis by phagocytic cells.

Opsonization

Literally means "preparation for eating". The coating of a bacterium with antibody and/or complement that leads to enhanced phagocytosis of the bacterium by phagocytic cells.

Osmotic pressure

Pressure generated by the osmotic flow of water through a semi-permeable membrane into an aqueous compartment containing solute at a higher concentration.

Outgroup

In cladistics, whenever three monophyletic groups of organisms are compared, and two of them are more closely related to each other than either is to the third, the third group is known as the outgroup. The evolutionary conclusion from this is that the outgroup branched from the parent group before the other two groups branched from each other. An outgroup is needed to root a phylogenetic tree.

P

Pandemic

an epidemic that spreads worldwide.

Paratope

An antibody combining site that is complementary to an epitope.

Parvovirus

a family of small viruses known to cause disease in animals and humans.

Passenger strand

also known as the sense strand - the siRNA strand that gets discarded; usually refers to the strand that has the same sequence as the targeted mRNA.

Passive immunization

Immunization by the administration of preformed antibody into a nonimmune individual.

Pathogen

a biological agent that causes disease or illness to its host.

Penetration

The stage of viral replication at which the virus genome enters the cell.

Peptide

a short chain of amino acids, produced either synthetically or by translation from messenger RNA (mRNA). A rough rule-of-thumb is that proteins are 50 residues or more, and peptides are less than 50 residues.

Persistent Infection

Infections in which ongoing virus replication occurs, but the virus adjusts its replication and pathogenicity so as to avoid killing host. They differ from chronic infections in that whereas in chronic infections, the virus is usually eventually cleared by the host (unless the infection proves fatal), in persistent infections, the virus may continue to be present and to replicate in the host for its entire lifetime.

Phagocytosis

The engulfment of a particle or a microorganism by leukocytes.

Phenotype

The physical expression of an individual's genotype.

Phylogenetic tree

a tree showing the evolutionary interrelationships among various species

or other entities that are believed to have a common ancestor. A phylogenetic tree is a form of a cladogram. In a phylogenetic tree, each node with descendants represents the most recent common ancestor of the descendants, and edge lengths correspond to time estimates.

Phylogram

a tree that depicts inferred historical relationships among entities. Differs from cladogram in that the branches are drawn proportional to the amount of inferred character change.

Pinocytosis

Ingestion of liquid or very small particles by vesicle formation in a cell.

Plasma cell

End-stage differentiation of a B cell to an antibody-producing cell.

Plasmid

a DNA molecule separate from the chromosomal DNA and capable of autonomous replication, typically circular and double-stranded.

Pneumocystis carinii pneumonia

a type of opportunistic fungal pneumonia seen frequently in AIDS patients.

Polyclonal activator

A substance that induces activation of many individual clones of either T or B cells. See Mitogen.

Polymorphism

Literally, "having many shapes"; in genetics polymorphism means occurring in more than one form within a species; the existence of multiple alleles at a particular genetic locus.

Polyprotein

A long polypeptide encoding several mature proteins which are subsequently released by protease cleavage.

Primary lymphoid organs

Organs in which the maturation of T and B lymphocytes take place and antigen-specific receptors are first acquired.

Primary responses

The immune response to a first encounter with antigen. The primary response is generally small, has a long induction phase or lag period, consists primarily of IgM antibodies, and generates immunologic memory.

Prokaryote

single celled microorganisms whose cells lack a well defined membrane enclosed nucleus (such as bacteria).

Promoter

nucleotide sequence in DNA to which RNA Polymerase binds to begin transcription.

Prophylaxis

Protection.

Protease Inhibitor

a class of medications used to treat HIV or other viral infections and act by inhibiting that activity of the viral protease enzyme to cleave nascent

proteins for final assembly of new virions.

Protease

An enzyme that facilitates the cleavage of proteins. In HIV, an enzyme that allows for the processing of newly translated polypeptides into the proteins that will be assembled into viral particles.

Protein folding

the process by which a protein attains its three-dimensional structure.

Protein

a chain of amino acids encoded by a gene and produced by a translation of messenger RNA (mRNA).

Proteome

the entire set of proteins expressed in a given organism at a give time.

Provirus

Viral DNA that is incorporated into a host cell's chromosome.

R

Radioimmunoassay (RIA)

A widely used technique for measurement of primary antigen-antibody interactions, and for the determination of the level of important biological substances in mixed samples. It takes advantage of the specificity of the antigen-antibody interaction and the sensitivity that derives from measurement of radioactively labelled materials.

Receptor

A specific molecule on the surface of a cell which is used by a virus for attachment.

Recessive

An allele that is only expressed if it is present on both chromosomes.

Release

The stage of viral replication at which virus particles escape the infected cell.

Replication

the process of copying a double-stranded DNA molecule.

Repressor

a DNA-binding protein that binds to a specific region of DNA to prevent transcription of an adjacent gene.

Resolution Limit

The minimal separation between two objects at which they appear distinct.

Retrotransposons

a transposable element that utilizes reverse transcriptase to transpose through an RNA intermediate.

Retrovirus

a virus with RNA as its genetic material that required the reverse transcriptase enzyme to reproduce itself.

Reverse transcriptase

An enzyme derived from a retrovirus, which uses single-stranded RNA as a template for the production of double-stranded DNA.

Rhinovirus

A genus of the Picornaviridae family of viruses. Rhinoviruses have single-

stranded positive sense RNA genomes. One of the most common viral infective agents in humans, and a causative agent of the common cold.

Ribosome

Particle composed of ribosomal RNAs and ribosomal proteins that associates with messenger RNA and catalyzes the synthesis of protein.

RISC

RNA induced silencing complex - a multi protein complex that together with the siRNA guide strand finds complementary mRNA and cleaves it.

RNA

ribonucleic acid; a chain of nucleotides with bases A (adenine), C (cytosine), U (uracil), and G (guanine).

RNAi

RNA interference; the silencing of gene expression triggered by the presence of double-stranded RNA homologous to portions of the gene. The gene silencing generally results from the cleavage and degradation of a target's gene mRNA, but it can also result from blocking translation of intact mRNA. See also: siRNA, miRNA, shRNA

Rooted phylogenetic tree

a directed tree with a unique node corresponding to the (usually imputed) most recent common ancestor of all the entities at the leaves of the tree.

rRNA

Any one of a number of specific RNA molecules that form part of the structure of a ribosome and participate in the synthesis of proteins. Often distinguished by their sedimentation coefficient, such as 28S rRNA or 5S rRNA.

S

Scavenger Cells

any of a diverse group of cells with the capacity to engulf and destroy foreign material and dead tissues and cells.

Secondary lymphoid organs

Organs in which antigen-driven proliferation and differentiation of B and T lymphocytes takes place.

Secretory component

A surface receptor on epithelial cells lining mucosal surfaces which binds dimeric IgA and transports it through the cell into mucosal secretions.

Serum sickness

A hypersensitivity reaction consisting of fever, rashes, joint pain and glomerulonephritis, resulting from localization of circulating, soluble, antigen-antibody complexes, which induce inflammatory reactions. Serum sickness was originally induced following therapy with large doses of antibody from a foreign source - e.g. horse serum.

shRNA

short hairpin RNA; shRNAs are processed by the enzyme Dicer in the

cell to produce siRNAs (the stem is the part cleaved by dicer to form the siRNA).

siRNA

small interfering RNA; 20-25 nucleotide long RNA molecules (formed through cleavage of long dsRNA) that serve to direct to RNAi machinery (in a sequence specific manner) to mRNA that needs to be degraded/silenced. siRNAs are particularly important inhibiting transposons and viral infection, but they can also regulate protein-coding genes. Synthetic siRNAs can also be artificially expressed for experimental purposes. see also: guide strand and passenger strand

Somatic Cells

Somatic cells, by definition, are not germline cells. In mammals, germline cells are the sperm and ova (also known as "gametes") which fuse during fertilisation to produce a cell called a zygote, from which the entire mammalian embryo develops. Every other cell type in the mammalian body - apart from the sperm and ova, the cells from which they are made (gametocytes) and undifferentiated stem cells - is a somatic cell; internal organs skin, bones, blood and connective tissue are all made up of somatic cells.

Stem Cells

primal undifferentiated cells that retain the ability to produce an identical copy of themselves when they divide (clone) and differentiate into other cell types.

Structural biology

A field of study dedicated to determining the detailed, three-dimensional structures of biological molecules to better understand the function of these molecules.

Structural genomics

A field of study that seeks to determine a large inventory of protein structures based on gene sequences. The eventual goal is to be able to produce approximate structural models of any protein based on its gene sequence. From these structures and models, scientists hope to learn more about the biological function of proteins.

Structure-based drug design

An approach to developing medicines that takes advantage of the detailed, three-dimensional structure of target molecules.

Substrate

A molecule that binds to an enzyme and undergoes a chemical change during the ensuing enzymatic reaction.

Supernatant

the liquid overlying material deposited by settling, precipitation, or centrifugation

Suppression

A mechanism for producing a specific state of immunologic unresponsiveness by the induction of suppressor T cells. This type of unresponsiveness is

passively transferable by suppressor T cells or their soluble products.

Suppressor T-Cells

a subset of T-cells that down regulate the immune response.

Synchrotron

A large machine that accelerates electrically charged particles to nearly the speed of light and maintains them in circular orbits. Originally designed for use by high-energy physicists, synchrotrons are now heavily used by structural biologists as a source of very intense X-rays.

Syndrome

A set of signs and symptoms that tend to occur together and which reflect the presence of a particular disease or an increased chance of developing a particular disease.

Syngeneic

Literally, genetically identical.

Syngraft

Same as isograft.

T

T cell

A lymphocyte which undergoes a developmental stage in the thymus.

T-dependent antigen

An immunogen that is able to induce antibody synthesis only in the presence of lymphokines released by helper T cells.

T-independent antigen

An immunogen which induces antibody synthesis in the absence of lymphokines released by T cells; the antibodies are generally only of the IgM isotype.

Terminator

nucleotide sequence in DNA which marks the end of a gene or operon for transcription.

Thymus

a small organ critical to the development of T-cell development.

Titer

The reciprocal of the last dilution of a titration giving a measurable effect; e.g. if the last dilution giving significant agglutination is 1:128, the titer is 128.

Tolerance

Diminished or absent capacity to make a specific response to an antigen, usually produced as a result of contact with that antigen under nonimmunizing conditions.

Toxoplasmosis

an opportunistic infectious disease produced by a protozoan.

Transcription

Copying of one strand of DNA into a complementary RNA sequence, sometimes termed the primary transcript, by the enzyme RNA polymerase.

Transformation

The introduction of a foreign plasmid into a bacterium in order to use bacteria to amplify the plasmid, allowing production of large quantities of the plasmid. Bacteria must be made

"competent" (or, "transformable") to take up a plasmid, which involves creating small holes in the bacterial cells. This can be done by treatment with calcium-containing compounds or using electroporation.

Translation

Process by which the sequence of nucleotides in a messenger RNA molecule directs the incorporation of amino acids into protein; occurs on a ribosome.

Transposition

the relocation of a chromosomal segment to a different position in the genome.

Transposon

a mobile piece of DNA that is flanked by terminal repeat sequences and typically bears genes encoding transposition functions.

tRNA

Set of small RNA molecules used in protein synthesis as an interface (adaptor) between mRNA and amino acids. Each type of tRNA molecule is covalently linked to a particular amino acid.

Tropism

The ability of a virus to infect specific cell or tissue types.

U-Z

Uncoating

The stage of viral replication at which structural proteins are lost and the virus genome is exposed to the replication machinery.

Unresponsiveness

Inability to respond to antigenic stimulus. Unresponsiveness may be specific for a particular antigen (see tolerance), or broadly nonspecific as a result of damage to the entire immune system, for example after whole body irradiation.

Unrooted phylogenetic tree

a phylogenetic tree that is not directed with respect to time.

Vaccination

Originally referred to immunization against smallpox with the less virulent cowpox (vaccinia) virus; more loosely used for any immunization against a pathogen.

Vector

An organism responsible for transmitting a pathogen from one host to another, e.g. a mosquito. (In molecular biology, a molecule used to clone nucleic acid sequences).

Viremia

the presence of virus in the blood

Virions

Structurally mature, extracellular virus particles.

Virus attachment protein

The protein on the surface of a virus particle responsible for binding the receptor.

Virus

a subcellular organism composed of genetic material and protein; able to reproduce only within living cells.

X-ray crystallography

A technique used to determine the detailed, three-dimensional structure of molecules. It is based on the scattering of X-rays through a crystal of the molecule under study.

Zoonosis

any infectious disease that may be transmitted from other animals, both wild and domestic, to humans or from humans to animals.