**Immunity** is defined as resistance to infectious disease and the collection of cells and tissues that protects the body from infection is known as the **immune system**. The coordinated reaction of the cells of the immune system to a pathogen is known as the **immune response**.

* **Antigen** is a general term that applies to molecules that bind to antibodies or T cell receptors with high affinity. Antigens come in many forms: for example, small molecules in the environment and a huge array of bactierial and viral surface proteins might all act as antigens. Many times, you will see the terms antigen and microbe used interchangeably, since most antigens are derived from larger pieces of a microbe.
* **Lymphocytes** are cells found in the blood, lymphoid tissues and most organs of the body that express receptors for specific antigens and mediate immune responses. The lymphocytes that we will talk the most about are **B cells** and **T cells**. (B cell = B lymphocyte; T cell = T lymphocyte)
* When B and T cells become activated, they divide and mature into **effector cells** that actually do the job of fighting the microbe. Mature B cells are called **plasma cells**; plasma cells secrete **antibodies**, which are glycoprotein molecules that bind antigens with high affinity and help to eliminate those antigens. Mature T cells are called **effector T cells**. Effector T cells either assist (“help”) leukocytes to kill ingested microbes or directly kill infected cells.
* **Humoral immunity** is the type of adaptive immunity that is mediated by antibodies produced by plasma cells. Humoral immunity is the main mechanism for defending against extracellular microbes and their toxins.
* **Cell-mediated immunity** is the type of adaptive immunity mediated by T lymphocytes; cell-mediated immunity is the main defense mechanism against microbes that survive within phagocytes (i.e. the bacteria that causes Tuberculosis) or that infect the cytosol of non-phagocytic cells (i.e. many viruses).
* **Cytokines** are secreted proteins that work as mediators of immune and inflammatory reactions. Cytokines provide a mechanism for cells of the immune system to “talk” to one another to coordinate a response. **Interleukin** is another term for a cytokine that acts on other leukocytes.

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**Accessory cell:** Cell required for, but not actually mediating, a specific immune response. Often used to describe antigen-presenting cells (APC; see below).

**Affinity:** A measure of the binding constant of a single antigen combining site with a monovalent antigenic determinant.

**Agglutination:** The aggregation of particulate antigen by antibodies. Agglutination applies to red blood cells as well as to bacteria and inert particles covered with antigen.

**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.

**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.

**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.

**Alternate (Alternative) pathway:** The mechanism of complement activation that does not involve activation of the C1, C4, C2 pathway by antigen-antibody complexes, and begins with the activation of C3.

**Anaphylatoxin:** Substance capable of releasing histamine from mast cells.

**Anaphylaxis:** Immediate hypersensitivity response to antigenic challenge, mediated by IgE and mast cells. It is a life-threatening allergic reaction, caused by the release of pharmacologically active agents.

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

**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.

**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.

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

**Antigenic determinant:** A single antigenic site or epitope on a complex antigenic molecule or particle.

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

**Atopy:** A term used by allergists to describe IgE-mediated anaphylactic responses in humans, usually genetically determined.

**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.

**Avidity:** The summation of multiple affinities, for example when a polyvalent antibody binds to a polyvalent antigen.

**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.

**Basophil:** A polymorphonuclear leukocyte., whose basophils granules contain heparin, histamine and other vasoactive amines. Within tissues, these cells are known as mast cells q.v.

**Bence-Jones protein:** Dimers of immunoglobulin light chains in the urine of patients with multiple myeloma.

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

**Bursa of Fabricius:** An outpouching of the cloaca in birds; site of development of B cells in birds.

**Carcinoembryonic antigen (CEA):** Antigen present during embryonic development which normally disappears but reappears in malignant tissue.

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

**Cell-mediated cytotoxicity (CMC):** Killing (lysis) of a target cell by an effector lymphocyte.

**Cell-mediated immunity (CMI):** Immune reaction mediated by T cells; in contrast to humoral immunity, which is antibody mediated. Also referred to as delayed-type hypersensitivity.

**Chemotaxis:** Migration of cells along a concentration gradient of an attractant.

**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.

**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:** 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.

**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.

**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.

**Coombs' test:** A test named for its originator, R.R.A. Coombs, used to detect non-agglutinating antibodies on red blood cells by addition of an anti-immunoglobulin antibody.

**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.

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

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

**Delayed type hypersensitivity (DTH):** A T cell-mediated reaction to antigen, which takes 24-48 hours to develop fully, and which involves release of lymphokines and recruitment of monocytes and macrophages. Also called c cell-mediated immunity.

**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.

**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.

**DR antigens:** MHC class II molecules found on B cells and antigen-presenting cells of humans.

**Enchancing antibodies:** Antibodies which enhance the survival of a graft or of a tumour.

**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.

**Eosinophil:** A polymorphonuclear leukocyte with large eosinophilic (i.e. red) cytoplasmic granules.

**Eosinophil chemotactic factor of anaphylaxis (ECF-A):** A substrate released from mast cells during anaphylaxis which attracts eosinophils.

**Epitope:** An alternative term for antigenic determinant.

**Equivalence zone:** In a precipitin reaction, the region in which the concentration of antigen and antibody leads to maximal precipitation.

**Exon:** The region of DNA coding for a protein or a segment of a protein.

**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.

**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.

**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.

**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.

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

**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.

**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.

**Graft versus host reaction (GVH):** The pathologic consequences of a response initiated by transplanted immunocompetent T lymphocytes into an allogeneic, immunologically incompetent host. The host is unable to reject the grafted T cells and becomes their target.

**HLA complex:** See 'Major histocompatibility complex'.

**H-2 complex:** The major histocompatibility complex situated on chromosome 17 of the mouse; contains subregions K, I and D.

**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.

**Heterophile antigen:** A cross-reacting antigen that appears in widely ranging species such as humans and bacteria.

**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:** 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.

**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.

**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.

**Hypersensitivity:** State of reactivity to antigen that is greater than normal for the antigenic challenge; hypersensitivity is the same as allergy and denotes a deleterious outcome rather than a protective one.

**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.

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**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.

**Idiotype:** 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.

**Immediate-type hypersensitivity:** Hypersensitivity tissue reaction occurring within minutes after the interaction of antigen and antibody.

**Immune adherence:** The adherence of particulate antigen coated with C3b to tissue having cells with C3b receptors.

**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.

**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.

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

**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-idiotype 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.

**Isograft:** A tissue transplanted between two genetically identical individuals.

**Isohemagglutinins:** Antibodies to major red blood cell antigens present normally as a result of inapparent immunization by cross-reactive antigens in bacteria, food, etc.

**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.

**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).

**J chain (joining chain):** A polypeptide involved in the polymerization of immunoglobulin molecules IgM and IgA.

**J gene:** 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.

**K cell:** An effector lymphocyte with Fc receptors which allow it to bind to and kill antibody-coated target cells.

**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.

**Light chain (L chain):** The light chain of immunoglobulin is a structural feature that occurs in two forms: kappa and lambda.

**Linkage disequilibrium:** The frequency, in a population of linked genes, which is governed by factors other than change.

**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.

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

**Macrophage-activating factor (MAF):** Actually several lymphokines, including interferon, released by activated T cells, which together induce activation of macrophages, making them more efficient in phagocytosis and cytotoxicity.

**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 cell:** Tissue located cell probably derived from basophils. Possesses receptor for Fc of IgE. Participates in 'Immediate hypersensitivity' reactions.

**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.

**Migration inhibition factor (MIF):** A lymphokine that inhibits the motility of macrophages in culture.

**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.

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

**Mixed lymphocyte reaction (MLR):** When lymphocytes from two individuals are cultured together, a proliferative response is generally observed, as the result of reactions of T cells of one individual to MHC antigens on the other individual's cells.

**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.

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

**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.

**Null cells:** An early population of lymphocytes bearing neither T-cell nor B-cell differentiation antigens.

**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.

**Paratope:** An antibody combining site that is complementary to an epitope.

**Passive immunization:** Immunization by the administration of preformed antibody into a nonimmune individual.

**Phagocytosis:** The engulfment of a particle or a microorganism by leukocytes.

**Phenotype:** The physical expression of an individual's genotype.

**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.

**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.

**Polymorphonuclear leukocyte:** White cell, granular cytoplasm. Neutral staining (neutrophil) - most frequent, phagocytic. Basophilic staining - basophil q.v. Eosinophilic staining - eosinophil q.v.

**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.

**Prophylaxis:** Protection.

**Radioallergosorbent test (RAST):** A solid-phase radioimmunoassay for detecting IgE antibody specific for a particular allergen.

**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.

**Reagin:** Allergist's term for IgE antibodies.

**Respiratory burst:** Oxygen dependent increase in metabolic activity within phagocytic cells stimulated by bacteria or parasites, to be microbicidal.

**Reticuloendothelial system:** A network of phagocytic cells.

**Rheumatoid factor:** An autoantibody (usually IgM) which reacts with the individual's own IgG. Present in rheumatoid arthritis.

**Second set rejection:** Accelerated rejection of an allograft in an already immune recipient.

**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.

**Slow-reacting substance of anaphylaxis (SRS-A):** A group of leukotrienes released by mast cells during anaphylaxis which induces a prolonged constriction of smooth muscle. This prolonged constriction is not reversible by treatment with antihistamines.

**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.

**Syngeneic:** Literally, genetically identical.

**Syngraft:** Same as isograft.

**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.

**Titre:** 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 titre 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.

**Toxoid:** A nontoxic derivative of a toxin used as an immunogen for the induction of antibodies capable of cross-reacting with the toxin.

**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.

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

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This is pulled from the list of terms in the notes packet. Tried to combine/condense terms that had multiple definitions. Some said skip - didn't know what that meant, so left them in. Some didn't have definitions - left as ????.

Original Alphabetical

**2 integrin**

CD18; one chain of the heterodimeric molecules LFA-1, and Mac-1

**2 microglobuli**

The invariant chain of the class I MHC cell surface protein

**a/i Treg**

????

**ABO system**

Blood group polysaccharide antigens

**Adaptive Immunity**

That part of the immune system that is specific and has memory (T-cells, B-cells)

**Adhesive molecules**

Surface molecules that bind counter molecules on other cells causing close contact between the cells; results in close cell-to-cell contact

**Afferent lymphatics**

Lymphatic vessels that enter the lymph nodes

**Affinity**

The force between molecules that impels them to bind to one another (non covalent)

**Affinity maturation**

The consequence of genetic mutations in the hypervariable region following B cell activation and isotype switching

**Allele**

one of two genes present at a specific locus

**Allotype**

Antigenic differences within a given class of Ig between members of the same species

**Allotypic**

Pertaining to an allotype

**Alpha-beta TCR**

Refers to the T cell antigen heterodimeric receptor on more than 90% of the T cells

**Alternative pathway of complement**

Pathway that is initiated by C3b, associated with innate immunity

**Alternative splicing**

The process by which mRNA is spliced to create either a mu or a delta heavy chain constant region

**Am**

The IgA allotypes

**Anaphylatoxin**

C3a, C4a, C5a. Binding to their receptors on mast cells and basophils induces cell degranulation (Histamine release).

**Anaphylatoxin inhibitor**

A protein that inactivates the anaphylatoxins (C3a, C4a, C5a)

**Anergic**

Non responsiveness

**Anergy**

The process by which a stimulus causes cells to become non responsive

**Antibodies**

Molecules that are secreted by plasma cells. They bind to antigen in a specific manner.

**Antibody dependent cell mediated cytotoxicity (ADCC)**

Destruction of cells by natural killer cells following interaction with the Fc region of IgG bound to the cell or microbe.

**Antigen**

Classic definition: molecules that have specific sequences to which adaptive immune respones can be generated.

**Antigenic determinant**

A particular component of an antigen that is recognized by unique lymphocyte receptors; the component of an antigen that is recognized by B-cells or T-cells (T-cells only recognize antigens displayed with MHC)

**Antigenicity**

A property of molecules to which an adaptive immune response can be generated.

**Anti-idiotype antibodies**

Antibodies that are directed to the hypervariable regions of the light and heavy chains

**Anti-idiotypic antibodies**

Antibodies that are specific for a set of idiotopes

**Apoptosis**

The process by which cells undergo self induced suicide

**Aspergillus**

Opportunistic mold (fungal) infection

**Autoreactive**

Refers to immunological responses against self antigens

**Avidity**

The sum of the affinities when two molecules are interacting

**B7**

Counter molecule for CD28 (and CTLA-4)

**Ba**

Proteolytic fragment of Factor B following cleavage by Factor D.

**Bactericidal**

Kills bacteria

**Bacteriostatic**

Slows bacterial growth

**Basophils**

Circuling cells that degranulate; counterpart of mast cells.

**Bb**

Proteolytic fragment of Factor B following cleavage by Factor D. Forms part of the C3 convertase AP

**BCR**

The B cell receptor- refers to the antigen specific receptor on B cells

**Borrelia burgdorferi**

The causative agent of Lyme disease (extracellular bacterium)

**Bradykinin**

Peptide released from kininogen, causes an increase in vascular permeability-

**Btk kinase**

A tyrosine kinase required for B cell development- its genetic deficiency leads to X-linked a-gamma-globulinemia

**Bursa of Fabricuius**

Tissue where B cells mature from progenitor cells (in chickens).

**C1 inhibitor protein (C1 INH)**

A protein that binds to C1 to prevent its activation. When unbound C1 cleaves C4 and C2.

**C1 through to C9**

Proteins of the classical pathway

**C2b**

A weak kinin --and so can increase vascular permeability- it is a proteolytic fragment of C2.

**C3**

A complement protein that is central to both the alternative and classical pathways of complement.

**C3 convertase (AP)**

C3bBb

**C3 convertase (CP)**

C4b2a

**C3 tickover**

Term which refers to the spontaneous production of C3b which will activate AP of complement.

**C3a**

A proteolytic fragment of complement - functions as an anaphylatoxin.

**C3a, C4a, C5a**

Anaphylatoxins - released from proteolytic cleavage of C3, C4, and C5.

**C3b**

Proteolytic fragment of C3, an opsonin, activates alternative pathway, is a component of both pathways.

**C4bp**

Regulatory protein - binds to C4b preventing its attachment to cells; promotes dissociation of C3 convertase (CP)

**C5 convertase (AP)**

C3bBbC3b

**C5 convertase (CP)**

C4b2a3b

**C5a**

A proteolytic fragment of complement - functions as an anaphylatoxin.

**Candida albicans**

Opportunistic yeast (fungal) infection, causative agent of candidiasis

**Caspase (Skip)**

Protease (originally referred to as ICE protease and ice like protease) (cleave following aspartate residue)

**CD18**

2 integrin chain

**CD19**

A molecule on the surface of B cells—can be used as a panmarker for enumeration or identification of B cells

**CD2**

A molecule present on T cells and natural killer cells - used as a panmarker for T cells (with contaminating NK cells)

**CD25**

High affinity receptor for IL-2

**CD28**

Costimulatory molecule for T cell activation (ligand is B7)

**CD3**

A molecule that is present on all T cells- therefore a panmarker

**CD4**

Lineage defining molecule (T helper cells)

**CD4+ T cells**

T cells whose role is cytokine secretion

**CD40-CD40L**

CD40 is present on B cells and other antigen presenting cells; CD40L is present on T cells

**CD40L**

Ligand for CD40; required for B cell (CD40-CD40L) isotype switching and memory cell formation

**CD45**

A tyrosine phosphatase

**CD59**

Membrane attack complex inhibitor; regulatory protein

**CD79a**

Expressed in association with CD79b - the complex is expressed on the cell surface with BCR

**CD79a/CD79b**

Molecules that are expressed in association with mIg on the surface of B cells

**CD79b**

Expressed in association with CD79a - the complex is expressed on the cell surface with BCR

**CD8**

Lineage defining molecule (cytotoxic T cells)

**CD8+ T cells**

T cells whose role is cytotoxicity

**CD95-CD95 ligand**

Proteins whose interaction leads to apoptosis of the cell

**Chemokines**

Molecules that serve to attract cells expressing cognate receptors on the cell surface.

**Chemotatic molecule**

Molecules that serve to attract cells expressing their cognate receptors on the cell surface (e.g. chemokines)

**Chloride ion**

An ion that plasy a role in host defense in the presence of hydrogen peroxide.

**Chronic granulomatous disease (Clinical)**

A genetic disorder that results in an inability to destroy antigen in the phagosome.

**Chronic mucocutaneous candidiasis**

Infections resulting from hole in the repertoire of CD4+ T cells

**Class I MHC**

Molecules that display peptides - complex is recognized by CD8+ T cells

**Class I MHC (major histocompatibility complex)**

Proteins present on all nucleated cells- antigenic fragments are displayed on the target cell surface within the protein groove.

**Class I MHC restriction**

Refers to the fact that the antigen receptors on CD8+ T cells can only recognize antigenic fragments displayed in the groove of class I MHC proteins

**Class II MHC**

Molecules that display peptides - complex is recognized by CD4+ T cells

**Class II MHC (major histocompatibility complex)**

Proteins present on all APC; antigenic fragments are displayed within their groove, complex on cell surface

**Class II MHC restriction**

Refers to the fact that CD8+ T cells only recognize antigenic peptides displayed in the groove of class II MHC proteins

**Class of antibody**

Antibody isotypes

**Classical pathway of complement**

Pathway that is initiated by IgM or IgG immune complexes

**Clonal expansion**

The sequential binary division of a cell following appropriate stimulation

**Codominant expression**

Both alleles are expressed

**Combinatorial diversity**

A term that refers to the multitude of gene segments that comprise variable regions of BCR and TCR

**Complement**

A host defense system consisting of soluble and membrane bound proteins.

**Complementary determining region (CDR)**

That part of the variable region which is hypervariable between antibodies

**Conjugate formation**

Interaction of two cells

**Constant region**

That part of the Ab molecule that is the same for all Ab of one class within an isotype

**Costimulatory molecules**

Proteins whose interaction with counter molecules is either required for, or enhances cell activation

**CR1**

Complement receptor 1; receptor for C3b

**CR2**

Complement receptor 2; receptor for C3bi

**CR3a/4a**

Complement receptor 3a/4a; receptor for the anaphylatoxins C3a and C4a.

**CR5a**

Complement receptor C5a; receptor for the anaphylatoxin C5a

**C-reactive protein (CRP)**

An inflammatory protein that acts as an opsonin. It is secreted by hepatocytes following stimulation with IL-6.

**Crossreactive**

Refers to the fact that some antibodies will bind to antigens that are closely related

**Cryptococcus neoformans**

Encapsulated fungal infection

**Cytokines**

Molecules that are secreted primarily (bot not exclusively) by cells of the immune system. These molecules play an important role in the activation and down regulation of immune responses.

**Death by neglect**

Refers to the phenomenon by which developing thymocytes die because they do not receive appropriate signals

**Decay accelerating factor (DAF)**

Regulatory protein; prevents formation of, or causes dissociation of C3 convertases; (binds C4b and C3b).

**Delayed hypersensitivity reaction (DTH)**

Reaction in which memory CD4+ T cells are activated

**Dendritic cell**

A professional antigen presenting cell

**Determinant**

See antigenic determinant or epitope.

**Diapedesis**

The movement or passage of blood cells, especially white blood cells, through intact capillary walls into surrounding body tissue (inflammation).

**Diversity (D)**

A gene segment that encodes a segment of the heavy chain Ig or the chain of the TCR but not light chain or TCR

**Down regulation**

The process by which expression of cell surface molecules is decreased

**Edema**

An excessive accumulation of fluid in tissue spaces.

**Efferent lymphatics**

Lymphatic vessels that leave tissues

**Endosome**

A vacuole that is formed within the cytosol

**Eosinophil cationic protein (ECP)**

Protein secreted by eosinophils - protein is toxic to helminths.

**Eosinophils**

Cells that play an improtant role in host immunity to helminths.

**Epitope**

See antigenic determinant.

**E-selectin**

Adhesive molecule expressed on the endothelium in response to IL-1 and TNF

**Extravasation**

The movement of cells from a vessel into surrounding tissue

**Factor B**

Component of the alternative pathway of complement, binds to deposited C3b

**Factor D**

Enzyme that cleaves bound Factor B

**Factor H**

Regulatory protein that binds C3b and so can prevent binding of Factor B to C3b, or cause the dissociation of C3bBb.

**Factor I**

Regulatory protein that requires one of several cofactors. Cleaves soluble forms of C3b and of C4b.

**FADD (Skip)**

Fas associated death domain

**Fas (Skip)**

A protein (CD95) that binds to the fas receptor (CD95L) - induces apoptosis of the cell

**Fas receptor (Skip)**

CD95 ligand ( CD95-CD95-L interaction leads to apoptosis)

**Fc R**

Receptor for the Fc portion of IgE

**Fc RIII**

A low affinity receptor for the Fc region of IgG antibodies

**FcγR**

Recptors for IgG Fc region.

**FcεR**

Receptor for IgE Fc region.

**Follicle associated epithelium**

That region of the lumenal epithelium that is not covered by mucus.

**Follicles**

Region of immune tissues in which B cells predominate

**FOXP3**

????

**Gamma-delta TCR**

Refers to the T cell antigen heterodimeric receptor on about 10 % of the T cells

**GAP**

GAP - GTPase activating protein which results in the inactivation of GTP by converting it to GDP

**Germinal center**

The region of the follicle in which B cells undergo proliferation and other differentiation events following activation

**Germline DNA**

Refers to genomic DNA, -- DNA that has not been altered by recombination events

**Glycocalyx**

A prominent filamentous layer on the surface of specialized endothelial cells

**Glycosylphosphatidylinositol (GPI) (Clincal)**

Molecule that serve to attach some proteins to the cell in lieu of a transmembrane domain

**Gm**

The IgG allotypes

**Guanine exchange factor**

GEF - exchanges GDP with GTP

**Half life**

The period during which the number of antibody molecules is decreased by 50%

**HAMA (human anti-mouse antibodies)**

Human responses to mouse antibodies injected for therapeutic value

**Hapten and carrier**

A small molecule (less than 6kD) that is not immunogenic unless it binds to a protien (carrier); Carrier - a protein to wahich a small moleucle (less than 6kD, hapten) has bound permitting an anit-hapten immune repsonse.

**Hematopoiesis**

A term used to refer to the differentiation of various cell types from a pluripotent stem cell. Cytokines play an improtant role in this process.

**Hepatocytes**

Liver cells

**Hereditary angioedema (HAE)- clinical**

Complement disorder caused by a genetic deficiency of C1 INH.

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Basic Immunology - Terms

**Basic Immunology**

**TERMS AND DEFINITIONS**

**ANTIGEN:** A substance that is recognized by the body as being foreign, thus it can

elicit an immune response. In blood banking, antigens are usually, but not

exclusively, found on the red blood cell membrane.

**ANTIBODY:** A protein secreted by plasma cells that is produced in response to, and

interacts with one specific antigen.

**AGGLUTININ:** An antibody that causes cells to clump (agglutinate).

**HEMOLYSIN:** An antibody that activates complement, leading to cell lysis.

**COMPLEMENT:** A system of over 25 plasma glycoproteins that, when activated, may

cause cell lysis, enhance opsonization or stimulate other parts of the

immune system (anaphylatoxin, chemotaxin, etc).

**HUMORAL RESPONSE:** Adaptive immune response that generates antibodies

specific for the antigen that triggered the response. Primary cell involved

in the B lymphocyte.

**CELLULAR RESPONSE:** Adaptive immune response controlled by T lymphocytes.

The release of cytokines by T lymphocytes influences other parts of the

immune system. Cytotoxic T lymphocytes release chemicals that cause

cell death.

**IMMUNE RESPONSE:** The body’s response to substances it perceives as foreign.

Response can be categorized as innate or adaptive. Adaptive may be

further divided into humoral or cellular responses.

**ZETA POTENTIAL:** The difference in electrical charge between the surface of a cell

and the outer layer of the ionic cloud that surrounds the cell in an

electrolyte solution.

**HOMOZYGOUS:** Possessing the same allele at a given gene locus.

**HETEROZYGOUS:** Possessing two different alleles at a given gene locus.

**DOSAGE:** An antibody that has a stronger reaction with a cell having homozygous

antigen expression than with a cell having heterozygous antigen

expression.