

## CENTRAL GLOSSARY

**Acute-phase proteins:** *Proteins* found in the blood shortly after the onset of an infection that participate in the early phases of the host defense against the infection.

**Adaptive immunity:** Response of *antigen*-specific immune cells when they encounter the *antigen*, including the development of immunological memory; also known as acquired immunity; adaptive immune responses are distinct from innate immune responses.

**Affect:** Emotion or subjectively experienced feeling.

**Acetaldehyde:** A toxic product that results from the breakdown of alcohol by the enzyme *alcohol dehydrogenase (ADH)*.

**Adenosine triphosphate (ATP):** A molecule, generated largely in the *mitochondria*, that provides the energy needed for many key metabolic functions.

**Alcohol dehydrogenase (ADH):** An *enzyme* that breaks down alcohol by *oxidation*, converting it to *acetaldehyde*.

**Allele:** One of two or more variants of a gene or other *deoxyribonucleic acid (DNA)* sequence. Different alleles of a gene generally serve the same function (e.g., code for a *protein* that affects eye color) but may produce different *phenotypes* (e.g., blue eyes or brown eyes). Some alleles may produce a product that has no function or an abnormal function.

**Anisotropy:** Having a different value when measured in different directions. Anisotropy is the property of being directionally dependent, as opposed to isotropy, which implies homogeneity in all directions.

**Anterior:** Towards the front of an organism; opposite of *posterior*.

**Antibodies:** Immune molecules naturally produced by the body that recognize foreign or harmful molecules which have entered the body, bind to these molecules, and mark them for destruction by the body's immune system.

**Apoptosis:** Cell death in which the affected cell participates by activating a cascade of biochemical reactions that leads to death.

**Atrophy:** The complete or partial wasting away of parts of the body; a physiological process of tissue breakdown involving cell death.

**Antigen:** Any molecule that can bind specifically to an *antibody* and generate an immune response.

**Antioxidant:** A substance (e.g., *glutathione* and vitamins A and E) that inhibits *oxidation*, serving as a defense against harmful *reactive oxygen species (ROS)*.

**Arrhythmia:** Any condition in which there is abnormal electrical activity in the heart (i.e., the heart beat is too fast, too slow, or irregular).

**Atherosclerosis:** Condition in which the walls of the arteries thicken because of the buildup of fatty materials, such as *cholesterol*; may lead to complete blockage of the artery.

**Atherosclerotic plaque:** The buildup of cells, lipids (e.g., *cholesterol*), calcium, and connective tissue that forms in the artery walls during *atherosclerosis*.

**Cardiomyopathy:** Condition characterized by the deterioration of the function of the heart muscle (i.e., myocardium).

**CD4:** *Protein* present on the surface of certain T-cells (helper T-cells) that helps the T-cell recognize and bind to their

specific *antigens*; also serves as co-receptor for the human immunodeficiency virus.

**CD8:** *Protein* present on the surface of certain T-cells (cytotoxic T-cells); also involved in the recognition of specific *antigens* by the T-cells.

**Cell-mediated response:** Any immune response mediated by the actions of immune cells rather than molecules secreted by these cells; sometimes more specifically used to refer to any *adaptive immune response* in which *antigen*-specific T-cells have the main role.

**Cerebellum:** A region at the lower back of the brain that controls sensory perception and coordination of movement and contributes to certain higher-order cognitive and affective functions.

**Cerebrospinal fluid (CSF):** Fluid that surrounds the brain and spinal cord and fills the *ventricles* and cortical *sulci*.

**Chemokines:** Small signaling *proteins* that stimulate the migration and activation of cells (e.g., *macrophages*); have a central role in inflammatory responses.

**Cholesterol:** A fat-soluble substance widely distributed in the body (e.g., in blood, brain tissue, liver, and nerve fibers) that is continuously produced in the body and taken up with foods of animal origin; can be classified into "good" cholesterol (i.e., *high-density lipoprotein [HDL]*) and "bad" cholesterol (i.e., *low-density lipoprotein [LDL]*), which is associated with an increased risk of heart disease.

**Chromatin:** The combination of *deoxyribonucleic acid (DNA)* and *proteins* that makes up chromosomes.

**Ciliated (cells):** Cells with hair-like protrusions (e.g., in the airways) that serve to propel foreign particles (e.g., dust, bacterial fragments) out of the body.

**Collagen:** The major *protein* of fibrous connective tissue involved in the production of scar tissue; produced in the liver by *stellate* cells.

**Complement:** Set of plasma *proteins* that act together to attack extracellular pathogens; the *proteins* cover the pathogen, which facilitates pathogen removal by *phagocytes*.

**Complementary DNA (cDNA):** A segment of *DNA* identical in sequence to at least part of the coding sequence of a gene, generated in the laboratory from a natural *messenger RNA (mRNA)* molecule. cDNA can be produced in large quantities for sequencing and other genetic studies.

**Complicated alcoholism:** Alcoholism exacerbated (or complicated) by the presence of other co-occurring conditions, such as *Korsakoff's syndrome (KS)*.

**Computed tomography (CT):** Imaging method using computer processing to generate a three-dimensional image from a large series of two-dimensional X-ray images taken around a single axis of rotation; allows identification of characteristics of the internal structure of an object.

**Concordance:** The presence of the same trait in both members of a pair of twins (or a set of individuals).

**Confidence interval (CI):** A statistical measure that can be used to determine how reliable the value of a measurement is. The 95 percent CI gives an estimated range for the measurement

that has a 95 percent likelihood it includes the actual value. The larger that range, the less reliable is the measurement.

**Coronary artery disease:** End result of the accumulation of *atherosclerotic plaques* in the walls of the arteries that supply the heart muscle with blood; often used synonymously with *coronary heart disease*, although coronary heart disease also can have causes other than coronary artery disease.

**Coronary heart disease:** Any abnormal condition that affects the blood vessels supplying the heart muscle, thereby resulting in reduced flow of oxygen and nutrients to the heart muscle and impairing the heart's ability to pump blood into the body.

**Corpus callosum:** The largest connective pathway in the human brain. It is made of nerve fibers that connect the left and right sides (hemispheres) of the brain.

**Cytochromes:** Specialized enzymes within *mitochondria* and other cell structures. Different cytochromes play important roles in metabolizing toxic substances, drugs, and other chemicals, as well as in producing *adenosine triphosphate (ATP)*.

**Cytokines:** A family of molecules, produced primarily by cells of the immune system, that regulate cellular interactions and other functions. Many cytokines play important roles in initiating and regulating inflammation.

**Cytosol:** Fluid contained within the cell, where several biochemical reactions (e.g., glycolysis) take place.

**Demyelination:** Loss of the *myelin* sheath of nerve cells.

**Diffusion tensor imaging (DTI):** *Magnetic resonance imaging (MRI)* method to produce *in vivo* images of biological tissues by measuring local characteristics of the passive movement (i.e., diffusion) of water molecules; used for imaging of tissues that have an internal fibrous structure, such as the *myelin* sheath covering nerve fibers; in these cases, water molecules can more easily diffuse along the direction of the fibrous structure than perpendicular to it, a property called *anisotropy*.

**Diffusivity:** The rate of passive movement (i.e., diffusion) of a water molecule in a fluid or tissue.

**Dorsal:** Toward the backside of an organism; opposite of *ventral*.

**Deoxyribonucleic acid (DNA):** A family of large molecules within the cells of an organism that carry genetic information by specifying the structure of *proteins*.

**Endophenotype:** A heritable trait or characteristic that is not the condition under investigation but has been shown to be associated with the condition; for example, certain neurobiological characteristics have been noted in people with alcoholism and may be used as endophenotypes to identify people at risk for alcoholism.

**Endothelium:** Layer of cells lining the body cavities and blood vessels.

**Endotoxin:** A highly toxic chemical component of the cell walls of bacteria that occur normally in the intestine. Endotoxin can be released into the bloodstream when the bacteria die.

**Enzyme:** A substance (usually a *protein*) that directs and accelerates chemical reactions in the body but does not itself undergo permanent change.

**Epigenetic:** Referring to heritable changes in *phenotype* or gene expression caused by mechanisms other than changes in the underlying *deoxyribonucleic acid (DNA)* sequence.

**Ester:** An organic chemical compound formed by the reaction of an organic acid (e.g., acetic acid) and an alcohol.

**Event-related potential:** A characteristic pattern of brain waves elicited when a person is exposed to a stimulus (e.g., a sudden sound or light).

**$\gamma$ -aminobutyric acid (GABA):** A *neurotransmitter* that in the brain acts to reduce the activity of the signal-receiving nerve cell (i.e., an inhibitory *neurotransmitter*); helps to restore stable conditions (i.e., homeostasis) in a stressful situation.

**Fatty acids:** Building blocks of fat molecules. Alcohol interferes with the normal metabolism of fatty acids and promotes the deposit of dietary fat in the liver.

**Fibrosis:** The formation of scar tissue.

**Free radicals:** Highly reactive molecular fragments that frequently contain oxygen. (See *reactive oxygen species [ROS]*)

**Genome-wide association study (GWAS):** An examination of genetic variation associated with observable traits across the genome, using *single nucleotide polymorphisms (SNPs)*.

**Gavage:** Introduction of nutrients directly into the stomach via a feeding tube.

**Genotype:** The genetic makeup of an individual organism that is determined by the specific *alleles* of each gene carried by the individual.

**Genu:** The *anterior* end of the *corpus callosum*.

**Glutathione (GSH):** An *antioxidant* molecule found naturally in the body, composed of three amino acids (i.e., glutamate, cysteine, and glycine).

**Hepatitis:** Generalized *inflammation* of the liver, often accompanied by tissue death and *fibrosis*. Alcoholic hepatitis can be fatal, but may be reversible with abstinence.

**Hepatocytes:** The principal cells of the liver, which carry out most of the liver's metabolic activities.

**Heterozygous:** Carrying two different *alleles* of a given gene. Contrasts with *homozygous*, where both *alleles* are the same.

**High-density lipoprotein (HDL):** A type of *lipoprotein* that transports *cholesterol* from the tissues to the liver for excretion or reuse; also known as "good" *cholesterol*.

**Hippocampus:** A seahorse-shaped gray-matter structure in the medial borders of the temporal lobes in each cerebral hemisphere; a principal function is in consolidation of new memories.

**Humoral response:** Immune response mediated by *proteins* in the blood; more specifically used to refer to the *antibody*-mediated arm of the *adaptive immune response*.

**Inbred strain:** Animal strain generated by repeatedly inbreeding brother-sister pairs so that ultimately all animals of the strain are genetically identical.

**In vitro:** Literally translated as "in glass;" refers to experiments conducted with isolated cells or tissues or with cells or tissues grown in culture dishes

**In vivo:** Refers to experiments conducted in an intact animal.

**Infarct:** An area of tissue death resulting from a local lack of oxygen that is caused by obstruction of blood supply.

**Inferior:** Located toward the feet of an organism; opposite of *superior*.

**Inflammation:** A defensive response to local tissue injury or infection, serving to prevent the spread of injury and acti-

vate the immune system; regulated by *cytokines*. Prolonged or excessive inflammation can damage healthy tissue, as in alcoholic liver disease.

**Inhibitor:** Molecule that binds to an *enzyme* or other *protein* and decreases its activity.

**Innate immunity:** Immune response whose components are present in the body from birth that is not specific to a particular *antigen* and does not increase in intensity with repeated exposure to a pathogen.

**Interferons:** A group of *proteins* that increase the resistance of cells to viral infection. Interferons also act as *cytokines* and can enhance some immune responses.

**Interleukins:** *Cytokines* of the immune system.

**Ischemia:** A condition in which blood flow is restricted to a part of the body.

**Ischemia/reperfusion injury:** Injury caused to tissue when blood supply to the tissue is first interrupted (see *ischemia*) and then re-established; is caused by *oxidative stress* caused by the absence of oxygen and nutrients during the *ischemia*.

**Korsakoff's syndrome (KS):** Brain disorder characterized primarily by the inability to form new memories; resulting from the thiamine (vitamin B1) deficiency of *Wernicke's encephalopathy (WE)*.

**Kupffer cells:** Specialized immune cells in the liver that filter bacteria and other foreign substances from the blood, and produce *antibodies* and *cytokines*.

**Limbic system:** A group of brain structures that together control such functions as emotional behavior and long-term memory.

**Linkage analysis:** The comparison of subjects within a family to evaluate the relationship/correlation between an *allele* and a *phenotype* (e.g., a disease).

**Lipids:** Fatty substances, including simple fats, their major components (i.e., *fatty acids*), and various fat-soluble substances (e.g., *cholesterol*).

**Lipoprotein:** A biochemical complex that contains both *lipids* (e.g., *cholesterol*) and *proteins*.

**Low-density lipoprotein (LDL):** A type of *lipoprotein* that transports *cholesterol* from the liver to the tissues; high levels of LDL are associated with cardiovascular disease; therefore, it also is known as "bad" *cholesterol*.

**Locus:** A specific location on a chromosome.

**Macrophage:** A *phagocyte* residing in tissues throughout the body. In addition to ingesting foreign particles and microorganisms, macrophages synthesize *proteins* and other substances important in inflammatory responses, including *cytokines*. Macrophages that reside in the liver are called *Kupffer cells*.

**Magnetic resonance imaging (MRI):** A medical imaging technique that uses a powerful magnetic field to align hydrogen atoms found in water in the body; when exposed to a radio frequency pulse, the hydrogen atoms create a magnetic field detectable by a scanner. This signal can be manipulated to visualize detailed internal structures of tissue.

**Mammillary bodies:** A pair of small round bodies on the undersurface of the brain connecting several neural pathways to and from various parts of the brain, possibly involved in memory functions.

**Marker:** A *deoxyribonucleic acid (DNA)* sequence whose chromosomal location has been determined and is known to have at least two forms (*alleles*), making it useful for identifying the *locus* of an associated gene.

**Mental set:** A cognitive strategy used while solving a problem.

**Meta-analysis:** An analysis that combines the results of several studies addressing a set of related research hypotheses.

**messenger RNA (mRNA):** Key intermediary molecules that are generated when a gene is expressed (i.e., when the information encoded in the gene is converted into a *protein* product by the cell).

**Methylation:** The addition of a methyl group to another molecule; methylation of certain *deoxyribonucleic acid (DNA)* regions can alter the expression of the genes located in those regions; this is an example of an *epigenetic* mechanism of gene regulation.

**Microarray technology:** An automated, high-throughput technique for simultaneously analyzing thousands of different *deoxyribonucleic acid (DNA)* or RNA sequences.

**microRNA (miRNA):** A tiny piece of RNA that binds to a matching piece of *messenger RNA (mRNA)* to make it double-stranded and decrease the production of the corresponding *protein*.

**Microsatellite:** Highly *polymorphic loci* found every few thousand *nucleotides* in the *deoxyribonucleic acid (DNA)* that can be used as *markers* to determine from which parent or ancestor a specific *DNA* sequence has been inherited. Microsatellites typically consist of short sequences of one to six *nucleotides* that can be repeated 10 to 100 times. Each person or animal has a specific pattern of microsatellites that can be used to determine inheritance patterns.

**Microsomal ethanol-oxidizing system (MEOS):** An *enzyme* system that breaks down alcohol and generates toxic products such as *acetaldehyde* and oxygen radicals.

**Microtubules:** Minute tubules composed of the *protein* tubulin that are found in the fluid filling the cells and which form important structural components.

**Mitochondria:** Structures within cells that generate most of the cells' energy through the production of *adenosine triphosphate (ATP)*, which provides the energy needed for many key metabolic reactions.

**Myelin:** A white fatty material composed chiefly of alternating layers of *lipids* and *lipoproteins* that encloses the long nerve cell extension (i.e., axons) like a sheath to provide insulation

**Myelinolysis:** Dissolution or unfurling of the *myelin* sheaths of nerve fibers

**Neurogenesis:** The process by which new nerve cells (i.e., neurons) are generated.

**Neurotransmitter:** Signaling molecules produced in nerve cells (i.e., neurons) that serve to transmit signals from one neuron to another neuron or from a neuron to another type of cell (e.g., muscle cell); neurotransmitters are released from the signal-emitting neuron and bind to *receptors* on the surface of the signal-receiving cell.

**Nucleotide:** A building block of RNA or *deoxyribonucleic acid (DNA)* that consists of a base, a sugar, and a phosphate group.

- Opportunistic infections:** Infections by pathogens that cause disease only in people with a compromised immune system but not in people with a healthy immune system.
- Opsonization:** Alteration of the surface of a pathogen or other particle (e.g., by covering it with *complement* or *antibodies*) so that it can be ingested by *phagocytes*.
- Oxidation:** A chemical reaction that usually involves removing a hydrogen atom from a molecule or adding oxygen to it (or both).
- Oxidative stress:** An imbalance between oxidants (e.g., *reactive oxygen species [ROS]*) and *antioxidants* that can lead to excessive *oxidation* and cell damage.
- Palpitation:** A conscious (abnormal) awareness of the heart-beat.
- Polyphenolic compound:** A compound containing more than one phenol unit per molecule; a phenol is any compound that contains a six-carbon aromatic ring, linked directly to a hydroxyl group (OH).
- Phenotype:** An observable property, trait, or physical appearance of an organism resulting from the interaction of the *genotype* with environmental factors.
- Phagocyte:** A white blood cell capable of ingesting foreign particles and microorganisms.
- Phagocytosis:** Process by which *phagocytes* engulf pathogens or other particles, internalize them, and destroy them with *enzymes* stored in the *phagocytes*.
- Plasma cells:** B-cells in the final stage of differentiation that produce *antibodies* and secrete them into the blood.
- Point mutation:** A change in a single nucleotide of the genome. Also see *single nucleotide polymorphism (SNP)*.
- Polymorphism:** The presence of two or more *alleles* of a gene or other *deoxyribonucleic acid (DNA)* sequence in a population.
- Pons:** A structure located on the brain stem that relays sensory information.
- Posterior:** Toward the back or rear (e.g., the posterior region of the brain is located toward the back of the head); opposite of *anterior*.
- Proteins:** Large molecules composed of long chains of amino acids linked together. Proteins help maintain the cell's structure and participate in many biological functions, including the regulation of metabolic reactions. The shape and function of a protein is determined by the sequence of its amino acids.
- Quantitative trait locus (QTL):** A *deoxyribonucleic acid (DNA)* region that is associated with a quantitative trait and which may contain one or more of the genes contributing to that trait.
- Reactive oxygen species (ROS):** Highly reactive, oxygen-containing *free radicals* that are generated during oxidative metabolism. ROS can react with and damage *lipids*, *proteins*, and *deoxyribonucleic acid (DNA)* in cells, causing *oxidative stress*.
- Receptor:** *Protein* that binds to specific molecules (e.g., *neurotransmitters*) to initiate intracellular activity.
- Reperfusion:** Restoration of blood flow through a tissue after a period of *ischemia*.
- Selectively bred line:** Lines of animals generated by breeding together those animals in a population that both have either very high, or very low levels of a *phenotype* of interest (e.g., voluntary alcohol consumption); after several generations of selective breeding, the resulting lines will exhibit stable differences in the *phenotype* of interest; the animals within a selectively bred line are not genetically identical.
- Sepsis:** Frequently fatal infection of the blood stream.
- Single-nucleotide polymorphism (SNP):** A *deoxyribonucleic acid (DNA)* sequence variation that results from the exchange of only a single *DNA* building block (i.e., *nucleotide*), useful as *markers*.
- Splenium:** The *posterior* region of the *corpus callosum*.
- Stellate cells:** Star-shaped liver cells that serve as the primary storage site for vitamin A compounds and fat molecules; their activation plays a central role in the development of *fibrosis*.
- Sulcus (pl. sulci):** Spaces between the foldings of brain tissue.
- Superior:** Toward the head (or top of the head) of an organism; opposite of *inferior*.
- Superoxide:** A destructive *reactive oxygen species (ROS)* produced as a byproduct of some *oxidation* reactions.
- Synaptic transmission:** Transmission of nerve signals from one nerve cell to another or from a nerve cell to another type of cell that occurs at a synapse—the junction between the nerve ending of the signal-emitting cells and a receptor-carrying region of the signal-receiving cell; involves the release of chemical messengers (*neurotransmitters*) from the signal-emitting cell that interact with *receptors* on the signal-receiving cell.
- Thalamus:** A large, dual-lobed mass of gray-matter cells located at the top of the brainstem. It receives auditory, somatosensory, and visual sensory signals and relays sensory signals to the cerebral cortex.
- Tumor necrosis factor alpha (TNF- $\alpha$ ):** A type of *cytokine* that promotes inflammatory responses, stimulates neutrophils and *macrophages*, induces fever, and induces *macrophages* to produce *cytokines*.
- Uncomplicated alcoholism:** Alcoholism without the presence of co-occurring medical conditions.
- Ventral:** Toward the belly-side of an organism.
- Ventricle:** Fluid-filled space in the brain.
- Vermis:** A complex brain structure (vermis means “wormlike”) composed of 10 lobules residing between the cerebellar hemispheres.
- Voltage-dependent ion channel:** A pore or channel spanning the cell membrane whose opening and closing is controlled by electrical impulses; once opened, the channel allows passage of charged molecules (i.e., ions) into or out of the cell.
- Voxel:** A volume element, representing a value on a regular grid in three-dimensional space.
- Wernicke's encephalopathy (WE):** A severe syndrome resulting in damage to multiple brain areas and characterized by poor balance and gait (i.e., ataxia), disturbance of eye movements (i.e., ophthalmoplegia), mental confusion, and impairment of short-term memory. WE results from inadequate intake or absorption of thiamine (vitamin B1) coupled with continued carbohydrate ingestion and can lead to the development of *Korsakoff's syndrome (KS)*.
- White matter:** A generic term for a collection of nerve cell fibers (i.e., axons) in the central nervous system.