

## **Glossary of Terms for my Lectures**

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### **7-dehydrocholesterol**

7-Dehydrocholesterol is a cholesterol precursor, and is converted to vitamin D3 in the skin, therefore functioning as provitamin-D3. It is converted to vitamin D3 in the presence of UV rays from the sun.

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### **Acidosis**

Acidosis is an increased acidity in the blood and other body tissue (i.e., an increased hydrogen ion concentration).

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### **Adiponectin**

Adiponectin is a hormone that modulates a number of metabolic processes, including glucose regulation and fatty acid breakdown. Adiponectin is secreted from fat cells and from the placenta in pregnancy. Its blood levels are inversely correlated with body fat percentage in adults.

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### **Adjuvant**

An adjuvant is a pharmacological or immunological agent that modifies the effect of other agents, such as a drug or vaccine. They are often included in vaccines to enhance the recipient's immune response to a supplied antigen, while keeping the injected foreign material to a minimum.

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### **Aerobic glycolysis**

The conversion of glucose to lactate in the presence of oxygen.

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### **Atherogenesis**

The process of forming atheromas, plaques in the inner lining (the intima) of arteries.

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### **Anion**

A charged molecule (ion) having a negative charge.

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### **Apoptosis**

A process resulting in programmed cell death.

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### **Astrocytes**

Astrocytes are characteristic star-shaped glial cells in the brain and spinal cord. They provide nutrients to nerve cells, support endothelial cells in the blood-brain barrier, maintain extracellular ion balance, and facilitate repair following brain injury.

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### **ATP**

ATP (Adenosine-5'-triphosphate) is a multifunctional molecule with widespread uses in cells as a

coenzyme. It is often called the “molecular unit of currency” of intracellular energy transfer. It transports chemical energy within cells for metabolism.

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### **Biota**

The plant and animal life of a region

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### **Cachexia**

Cachexia is loss of weight, muscle atrophy, fatigue, weakness, and significant loss of appetite in someone who is not actively trying to lose weight. The definition of cachexia is the loss of body mass that cannot be reversed nutritionally: even if the affected patient eats more calories, lean body mass will be lost, indicating there is a fundamental pathology in place.

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### **Cardiomyopathy**

Cardiomyopathy, which literally means “heart muscle disease,” is the deterioration of the function of the myocardium (i.e., the actual heart muscle) for any reason. People with cardiomyopathy are often at risk of arrhythmia or sudden cardiac death or both.

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### **Cation**

A charged molecule (ion) having a positive charge.

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### **Caveolae**

Caveolae (Latin for little caves), are small invaginations of the cell wall, associated with lipid rafts, in many vertebrate cell types, especially in endothelial cells and fat cells. They are enriched in cholesterol and sphingolipids, and have several functions in signal transduction. They are also believed to play a role in the uptake of pathogenic bacteria and viruses.

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### **Ceramide**

Ceramides are a family of lipid molecules. A ceramide is composed of sphingosine and a fatty acid. Ceramides are found in high concentrations within the cell membrane of cells. The most well-known functions of ceramides as cellular signals include regulating cell differentiation and proliferation, and programmed cell death.

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### **Cerebroside**

Cerebrosides is the common name for a group of glycosphingolipids which are important components in animal muscle and nerve cell membranes. They consist of a ceramide with a single sugar residue (either glucose or galactose).

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### **Chaotropes**

A chaotropic agent is a substance which disrupts the structure of, and denatures, macromolecules such as proteins and nucleic acids (e.g. DNA and RNA). Chaotropic solutes increase the entropy of the system by interfering with intramolecular interactions mediated by non-covalent forces such as hydrogen bonds, van der Waals forces, and hydrophobic effects. Large ions or ions with low charge density (such as bromide, iodide, potassium(1+), caesium(1+)) are chaotropes.

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### **Chlorophyll**

Chlorophyll is a green pigment found in almost all plants, algae, and cyanobacteria. It is critical in photosynthesis, which allows plants to absorb energy from light.

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### **Stratum Corneum**

The stratum corneum (Latin for horned layer) is the outermost layer of the epidermis, consisting of dead cells (corneocytes) that lack nuclei and organelles. It forms a barrier to protect underlying tissue from infection, dehydration, chemicals and mechanical stress.

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### **Cysteine**

Cysteine is one of the sulfur-containing amino acids. The other two are methionine and taurine.

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### **Cytokines**

Cytokines are small cell-signaling protein molecules that are secreted by numerous cells which are used extensively in intercellular communication. Cytokines can be classified as proteins, peptides, or glycoproteins; the term “cytokine” encompasses a large and diverse family of regulators produced throughout the body by cells of diverse embryological origin.

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### **Dialysis**

In medicine, dialysis is a process for removing waste and excess water from the blood, and is used primarily to provide an artificial replacement for lost kidney function in people with renal failure.

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### **Eczema**

Eczema is a form of dermatitis, or inflammation of the epidermis (the outer layer of the skin).

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### **Encephalopathy**

Encephalopathy/means disorder or disease of the brain. In modern usage, encephalopathy does not refer to a single disease, but rather to a syndrome of global brain dysfunction; this syndrome can be caused by many different illnesses.

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### **Endothelium**

The endothelium is the thin layer of cells that lines the interior surface of blood vessels and lymphatic vessels, forming an interface between circulating blood and lymph in the lumen and the rest of the vessel wall. The cells that form the endothelium are called endothelial cells.

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### **Endotoxin**

Endotoxins are a component of the cell wall of certain bacteria. Bacteria which contain endotoxin are known as gram negative bacteria. The endotoxins are released from the bacteria as they are destroyed and elicit a strong response from the immune system by activating various components of the immune system and inducing cytokine release.

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### **Epithelium**

Epithelium is one of the four basic types of animal tissue, along with connective tissue, muscle tissue and nervous tissue. Epithelial tissues line the cavities and surfaces of structures throughout the body, and also form many glands. Functions of epithelial cells include secretion, selective absorption, protection, transcellular transport and detection of sensation.

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### **Extracellular matrix**

In biology, the extracellular matrix (ECM) is the extracellular part of animal tissue that usually provides structural support to the animal cells in addition to performing various other important functions. The extracellular matrix is the defining feature of connective tissue in animals.

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### **Filaggrin and Profilaggrin**

Filaggrin is a filament-associated protein that binds to keratin fibers in epithelial cells. Filaggrin is essential for the regulation of epidermal homeostasis, and is responsible for the skin barrier function. Profilaggrin is the precursor to filaggrin.

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### **GAG**

Glycosaminoglycans (GAGs) or mucopolysaccharides are long unbranched polysaccharides consisting of a repeating disaccharide unit. GAG chains may be covalently linked to a protein to form proteoglycans. They are highly sulfated, and this gives them a net negative charge, which is important for their function.

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### **Glutathione**

Glutathione (GSH) is a tripeptide formed from cysteine, glycine and glutamine. It is an antioxidant, preventing damage to important cellular components caused by reactive oxygen species such as free radicals and peroxides.

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### **Glycation**

Glycation is the result of, typically covalent, bonding of a protein or lipid molecule with a sugar molecule, such as fructose or glucose, without the controlling action of an enzyme. It impairs the functioning of biomolecules.

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### **Glycoproteins**

Glycoproteins are important integral membrane proteins, that play a role in cell-cell interactions.

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### **Heparan sulfate**

Heparan sulfate (HS) is a linear polysaccharide found in all animal tissues. It occurs as a proteoglycan (HSPG) in which two or three HS chains are attached in close proximity to cell surface or extracellular matrix proteins. It binds to a variety of protein ligands and regulates a wide variety of biological activities, including developmental processes, angiogenesis, blood coagulation and tumour metastasis.

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### **Homocysteine**

Homocysteine is a homologue of the amino acid cysteine, differing by an additional methylene (-CH<sub>2</sub>-) group. It is synthesized from methionine by the removal of its terminal methyl group. Homocysteine can be recycled into methionine or converted into cysteine with the aid of B-vitamins. It is also a substrate for sulfate synthesis.

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### **Interleukins**

Interleukins are a group of cytokines (secreted proteins/signaling molecules). Interleukins are pro-

duced by a wide variety of body cells. The function of the immune system depends in large part on interleukins.

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### **Keratin**

Keratin refers to a family of fibrous structural proteins. Keratin is the key structural material making up the outer layer of human skin. It is also the key structural component of hair and nails.

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### **Keratinocytes**

Keratinocytes are the predominant cell type in the epidermis, the outermost layer of the skin, constituting 95% of the cells found there.

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### **Kosmotropes**

Kosmotropes are solutes that contribute to the stability and structure of water-water interactions. Kosmotropes cause water molecules to favorably interact, which also stabilizes intermolecular interactions in macromolecules such as proteins. Ionic kosmotropes tend to be small or have high charge density. Some ionic kosmotropes are sulfate, phosphate, magnesium(2+), lithium(1+), zinc (2+) and aluminium (+3).

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### **Lipoprotein**

A lipoprotein is a biochemical assembly that contains both proteins and lipids, bound to the proteins. Important examples include the high-density (HDL) and low-density (LDL) lipoproteins, which enable fats to be carried in the blood stream.

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### **Lysosome**

Lysosomes are cellular organelles that contain acid hydrolase enzymes to break down waste materials and cellular debris. They can be described as the stomach of the cell.

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### **Macrophages**

Macrophages are specialized phagocytic cells that attack foreign substances, infectious microbes and cancer cells. They function in both non-specific defense (innate immunity) as well as specific defense mechanisms (adaptive immunity) of vertebrates. Their role is to phagocytose (engulf and then digest) cellular debris and pathogens. They also stimulate lymphocytes and other immune cells to respond to pathogens.

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### **Methylglyoxal**

Methylglyoxal is a highly cytotoxic agent that leads to the development of advanced glycation end products (AGEs). It is formed as a byproduct of the breakdown of glucose and fructose. Due to increased blood glucose levels, methylglyoxal has higher concentrations in diabetics, and has been linked to arterial atherogenesis. Damage by methylglyoxal to low-density lipoprotein through glycation causes a fourfold increase of atherogenesis in diabetics.

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### **Microglia**

Microglia are a type of glial cell that are the resident macrophages of the brain and spinal cord, and thus act as the first and main form of active immune defense in the central nervous system.

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## **Mitochondria**

In cell biology, a mitochondrion (plural mitochondria) is a membrane-enclosed organelle found in most eukaryotic cells. Mitochondria are sometimes described as “cellular power plants” because they generate most of the cell’s supply of adenosine triphosphate (ATP), used as a source of chemical energy.

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## **Mucins**

Mucins are a family of high molecular weight, heavily glycosylated proteins (glycoconjugates) produced by epithelial tissues in most metazoans. Mucins’ key characteristic is their ability to form gels; therefore they are a key component in most gel-like secretions, serving functions from lubrication to cell signalling to forming chemical barriers.

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## **Mucopolysaccharides**

These are the same thing as GAGs (see above).

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## **Myocarditis**

Myocarditis or inflammatory cardiomyopathy is inflammation of the heart muscle (myocardium). Myocarditis is most often due to infection by common viruses, such as parvovirus B19, less commonly nonviral pathogens such as *Borrelia burgdorferi* (Lyme disease) or *Trypanosoma cruzi*, or as a hypersensitivity response to drugs.

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## **Myoglobin**

Myoglobin is an iron- and oxygen-binding protein found in the muscle tissue of vertebrates in general and in almost all mammals. It is related to hemoglobin, which is the iron- and oxygen-binding protein in blood, specifically in the red blood cells.

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## **Nitric oxide synthases**

Nitric oxide synthases (NOSs) are a family of enzymes that catalyze the production of nitric oxide (NO) from L-arginine. NO is an important cellular signaling molecule, having a vital role in many biological processes. It controls vascular tone (hence blood pressure), insulin secretion, airway tone, and peristalsis, and is involved in angiogenesis (growth of new blood vessels).

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## **Oligomerization**

An oligomer is a polymer that consists of two, three or more monomers bound together. Oligomerization is a chemical process that converts monomers to an oligomer.

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## **Opioids**

An opioid is a psychoactive chemical that works by binding to opioid receptors, which are found principally in the central and peripheral nervous system and the gastrointestinal tract. The receptors in these organ systems mediate both the beneficial effects and the side effects of opioids.

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## **Phagocytes**

Phagocytes are the white blood cells that protect the body by ingesting (phagocytosing) harmful foreign particles, bacteria, and dead or dying cells. They are essential for fighting infections and for subsequent immunity.

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**Protamine**

Protamines are small, arginine-rich, nuclear proteins that play an important role in fertilization. Protamine is used in cardiopulmonary bypass surgery to neutralize the anti-clotting effects of heparin.

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**Retinoids**

The retinoids are a class of chemical compounds that are related chemically to vitamin A.

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**ROS**

Reactive oxygen species (ROS) are chemically reactive molecules containing oxygen. Examples include oxygen ions and peroxides. Reactive oxygen species are highly reactive due to the presence of unpaired valence shell electrons.

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**Serum cholesterol**

Serum cholesterol is a term that includes the total level of cholesterol that is found in the bloodstream.

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**SLOS**

Smith-Lemli-Opitz Syndrome (SLOS) is a metabolic disorder caused by a mutation in the DHCR7 (7-dehydrocholesterol reductase) gene on chromosome 11. This gene codes for an enzyme that is involved in the production of cholesterol. People who have SLOS are unable to make enough cholesterol to support normal growth and development.

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**Sphingomyelin**

Sphingomyelin is a type of sphingolipid found in animal cell membranes, especially in the membranous myelin sheath that surrounds some nerve cell axons. It usually consists of phosphorylcholine and ceramide. In humans, SPH represents 85% of all sphingolipids.

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**Squamous epithelium**

In anatomy, squamous epithelium is the most superficial layer of the epithelium consisting of flat, scale-like cells called squamous epithelial cells.

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**Sulfatide**

Sulfatides are a class of sulfated galactosylceramides synthesized primarily in the oligodendrocytes in the central nervous system. Sulfatides are a type of sulfolipid.

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**Surfactant**

Surfactants are compounds that lower the surface tension of a liquid, the interfacial tension between two liquids, or that between a liquid and a solid. Surfactants may act as detergents, wetting agents, emulsifiers, foaming agents, and dispersants.

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**Tachycardia**

Tachycardia comes from the Greek words tachys (rapid or accelerated) and kardia (of the heart). Tachycardia typically refers to a heart rate that exceeds the normal range for a resting heart rate

(heart rate in an inactive or sleeping individual). It can be dangerous depending on the speed and type of rhythm.

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### **Thrombogenic**

Thrombogenicity refers to the tendency of a material in contact with the blood to produce a thrombus, or clot. It not only refers to fixed thrombi but also to emboli, thrombi which have become detached and travel through the bloodstream. Thrombogenicity can also encompass events such as the activation of immune pathways and the complement system.

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### **Transglutaminase**

Transglutaminases are a family of enzymes that catalyze the formation of a covalent bond between a free amine group (e.g., protein- or peptide-bound lysine) and the gamma-carboxamid group of protein- or peptide-bound glutamine. Bonds formed by transglutaminase exhibit high resistance to proteolytic degradation.

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### **Trypsin**

Trypsin is a serine protease produced by the pancreas. It is found in the digestive system of many vertebrates, where it breaks down proteins.

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### **Villi**

In anatomy, one of the minute, wormlike processes on certain membranes, especially on the mucous membrane of the small intestine, where they serve in absorbing nutriment.

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### **Xenobiotics**

A xenobiotic is a chemical which is found in an organism but which is not normally produced or expected to be present in it. It can also cover substances which are present in much higher concentrations than are usual. Specifically, drugs such as antibiotics are xenobiotics in humans because the human body does not produce them itself, nor are they part of a normal diet.

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