

GLOSSARY OF TERMINOLOGY

absorption – the “taking in” of substance particles, generally in molecular or ionic form. This is the process by which food nutrients enter the villi of the ileum. Absorption requires transport proteins. In the ileum, the transport mechanism is active transport requiring ATP. See also: “reabsorption”.

acetylcholine (Ach) – neurotransmitter released by exocytosis into the synaptic cleft at the end of specific neurons, like those of the parasympathetic division of the autonomic nervous system. Ach stimulates the adjoining cell to “pass on the impulse” before being broken down by the enzyme acetylcholinesterase (AChE).

acid – a substance that promotes a pH of less than 7.0 by releasing H^+ . Examples of acids include HCl, (a component of gastric juice), and carboxylic acids such as amino acids, and fatty acids. See also “acid group”.

acid chyme – the name given to food material within the stomach. It is a combination of swallowed food (boli) and gastric juice, containing HCl.

acid group – (more correctly carboxylic acid group). This is the functional group of an organic acid consisting of CO_2H . The hydrogen atom tends to dissociate as an ion (H^+), hence making it an acid. Both amino acids and fatty acids have the carboxylic acid group.

acrosome – a gel-like cover of the head of a sperm cell. It functions to orient the sperm to swimming towards the ovum and contains enzymes concerned with penetrating the ovum during fertilization.

actin – a type of protein filament that contributes to the contracting mechanisms in muscle and other cell types.

action potential – the measurable aspect of a nerve impulse (as opposed to resting potential). The action potential is a localized effect caused by the sudden movement of Na^+ into a nerve cell coupled with the movement of K^+ to the outside. See also: “impulse”, “resting potential”.

activated E-S complex – according to the lock and key analogy and the induced fit hypothesis of enzyme activity, the substrate joins with the enzyme to form an activated substrate-enzyme complex, which facilitates the reaction. Failure of this complex to form properly prevents the reaction from occurring. (See also “lock and key analogy”; “induced fit hypothesis”; “enzyme”.

activation energy – the amount of energy that is required by a reaction in order for it to take place. Enzymes lower the activation energy of a reaction.

active site – the portion of an enzyme that combines with the substrate to form the activated enzyme-substrate complex. As the enzyme is a protein, the active site has a specific shape and chemistry, which is determined by the amino acids that border this region. Resultantly, different enzymes have different active sites. An active site is specific to a certain substrate, which has the matching shape and suitable chemistry to make their combination possible.

active transport – a transport mechanism using membrane proteins that requires the input of energy (ATP) as the particles are being moved against the concentration gradient. Examples of active transport include the absorption of food materials in the ileum, establishing and maintaining resting potential along neurons, reabsorption of specific substances in the process of urine formation, and the accumulation of iodine by the thyroid gland for the synthesis of thyroxine.

addition – one of three mechanisms of gene mutations. When addition occurs, an additional nucleotide is inserted into DNA during replication. Addition has a disastrous effect on a gene because it displaces the base sequence making the code after the mutation incorrect, which results in flawed mRNA forming during transcription. See also: “deletion”, “substitution”.

adenine – one of two nitrogenous bases known as purines, which are integral components of all nucleic acids. Adenine is complementary to the pyrimidine base, Thymine (DNA) and Uracil (RNA). See also: “guanine”, “purine”.

ADH – See “antidiuretic hormone”.

adipose – pertaining to fat. Adipose cells, which store neutral fats, make up adipose tissue, a type of connective tissue.

ADP – adenosine diphosphate; forms ATP through the addition of a phosphate group when sufficient energy is available. It is formed by the energy releasing hydrolysis of ATP. See also: “phosphate”, “ATP”.

adrenal glands – are the endocrine (hormone-producing) glands situated adjacent to the tops of the kidneys in mammals. The adrenal glands have a

distinct outer cortical region separate from the inner medullary region. The adrenal cortex produces several hormones including aldosterone, where the adrenal medulla produces epinephrine (adrenaline). See also: “aldosterone”, “epinephrine”.

adrenaline – See “epinephrine”.

afferent arteriole – small artery that delivers blood to the glomerulus, and as such is associated with urine formation. See also: “efferent arteriole”, “pressure filtration”.

agglutinate – clump together. Antibodies cause the agglutination of recognizable antigens. See also: “antibody”, “antigen”.

albumin – a blood protein (or globulin) produced by liver cells. Albumin is responsible for establishing the osmotic gradients required for the return of water (and other substances) during capillary-tissue fluid exchange. Albumin, also a major component of egg whites, is often used in experiments involving the hydrolysis of proteins.

aldosterone – a hormone produced by the adrenal cortex under the influence of the anterior pituitary gland. Aldosterone increases the amount of Na^+ that is absorbed from urine at the distal convoluted tubule, coupled with an increase in the excretion of K^+ . The effect of aldosterone increases water retention from urine, making urine more concentrated and decreasing its volume.

alimentary canal – See “digestive tract”

alkaline – having a pH greater than 7.0. See “base”.

all-or-none response – the effect on a neuron by a stimulus that surpasses threshold. The response is termed all or none because it either causes an impulse or it doesn't. All impulses have the same electrical value. See also: “threshold”, “impulse”.

alpha helix (∞ -helix) – one of two possible secondary structure configurations of proteins. Alpha helices are produced when hydrogen bonds form between nearby amino acids pulling them into a coiled fashion. See also “beta-pleated sheet”, “secondary structure”.

alveoli – microscopic sac-like endings of the bronchioles, forming the lungs. It is through their surfaces that gas exchange for external respiration occurs. They are specialized in several ways to increase the efficiency of gas exchange.

amine group – a functional group of an organic molecule consisting of NH_2 . Amino acids have an amine group. See also: “amino acid”.

amino acid – the monomer of proteins. All amino acids have the same fundamental structure including an amine group, a carboxyl (or acid) group and a R-group. Yet, there are 20 differing R-groups resulting in 20 different amino acids. Amino acids can be recognized by their “N-C-C backbone”.

ammonia – the inorganic molecule, NH_3 . Ammonia is produced in cells through the deamination of amino acids. Ammonia passes from cells into extracellular fluid and then into the blood stream by diffusion. Ammonia is toxic in high concentrations. However, the liver converts ammonia into urea, a less toxic molecule. See also “urea”.

amphoteric – having the properties of an acid and a base. Buffers, such as bicarbonate ions (HCO_3^-) maintain a steady pH because they have amphoteric properties, i.e., they are able to accept protons to prevent pH from dropping or donate protons to prevent it from rising.

anabolism – the opposite of catabolism; “building up”. Metabolic reactions (metabolism) are either anabolic (such as dehydration synthesis reactions) or catabolic (such as hydrolysis reactions). See also: “metabolism”, “catabolism”.

anaerobic bacteria – bacteria that survive in the absence of oxygen. *E. coli* (bacteria) present in the colon are anaerobic.

anal sphincter – the circular muscle at the posterior end of the digestive tract, which relaxes to open and constricts to close the anus.

antagonistic – a feature that works in opposition to another feature. The sympathetic and parasympathetic divisions of the autonomic nervous system are antagonistic in their action. See also “autonomic nervous system”.

anterior pituitary – an endocrine gland situated below the hypothalamus; partnered with the posterior pituitary. The anterior pituitary gland is under the influence of the hypothalamus and releases several different hormones, including growth hormone and gonadotropins (luteinizing hormone and follicle stimulating hormone). See also “neuroendocrine control center”.