ARDIAN

Ardian Glossary

Afferent nerves: sensory or receptor nerves that transmit signals from organs and peripheral structures towards the **central nervous system**.

Angiotensin I: a hormone created in response to **renin** that is eventually converted in the lungs to Angiotensin II. Angiotensin II causes **vasoconstriction** and serves as a mediator of central sympathetic tone. Angiotensin converting enzyme inhibitors (ACE inhibitors), angiotensin receptor blockers (ARB), renin inhibitors and aldosterone blockers, all common classes of blood pressure medication, treat hypertension by blocking the effects of renin release and subsequent production of Angiotensin I and II.

Autonomic nervous system (ANS): is comprised of the **sympathetic nervous system** and the **parasympathetic nervous system**. The **autonomic nervous system** is the part of the **peripheral nervous system** that acts as a control system, maintaining unconscious **homeostasis** in the body. The ANS affects things such as heart rate, respiration rate digestion, salivation, perspiration, diameter of the pupils, and urination. Whereas most of its actions are involuntary, some, such as breathing, work in tandem with the conscious mind.

Bilateral: on both sides of the body, as in bilateral symmetry. Kidneys and adrenals are bilateral organs; the heart is not.

Blood pressure: the force per unit area exerted by liquid blood against the blood vessels. Since the blood vessels form a closed system, the hemodynamics of blood pressure follow the same rules of physics as water (or mercury, or any other liquid) in a tube. Blood pressure is usually measured in humans at the brachial artery in the upper arm and recorded as millimeters of mercury at two points: **systole** and **diastole**, thus: 115/75mmHg (115mmHg systolic/75mmHg diastolic). Mean arterial pressure, pulse pressure, central aortic pressure and organ specific pressure are often measured. Elevated blood pressure is associated with increased risk of death due to cardiovascular disease, such as stroke.

Cardiovascular: Pertaining to the system that circulates blood, carrying oxygen to distal tissues via the arteries and carbon dioxide back to the lungs via the veins.

Central nervous system (CNS): the brain, brainstem and spinal cord, which control and respond, through the branching **peripheral nervous systems**, to more distal structures: organs, glands and muscles.

Chronic kidney disease: a gradual worsening of the kidneys' ability to filter the blood to eliminate waste products and maintain electrolyte balance.

Circulatory system: The closed system of arteries, capillaries and veins that carry blood oxygenated by the lungs from the heart to all the cells of the body as well as through the filtering systems of the liver and kidneys. After delivering oxygen (O_2) and vital nutrients to tissues through the capillaries, and picking up carbon dioxide (CO_2) and waste products, the blood is carried back through the veins to the

heart, from which it is pumped to the lungs to expire CO_2 and inspire a new load of O_2. The fact that blood circulates in a closed system is fundamental to the physics of **blood pressure**.

Clinical studies: with regard to new medical technology, "clinical" is used to distinguish controlled studies on humans from earlier non-human (pre-clinical) studies in animal (*in vivo*) or laboratory (*in vitro*) models.

Contralateral: on the opposite side of the body. For example, the right kidney is contralateral to the left kidney.

Denervation: modifying or disabling the connection between an organ or structure and the nerves that communicate to the CNS.

Diabetes: a metabolic disease in which the body loses its ability to regulate blood sugar, leading to high blood sugar (hyperglycemia) and many complications, including cardiovascular and kidney damage. **Hypertension** is twice as common in people with diabetes as in those without the disease, and **blood pressure** is harder to control in diabetics.

Diastolic: In measuring blood pressure, diastolic pressure appears as the second, lower figure in the ratio of **systolic** to diastolic, e.g., 70 is the diastolic reading in 115/70 mmHg. Diastole (from Greek dilation), is the period in the ventricular cycle corresponding to ventricular recoil, active chamber relaxation and both passive and active ventricular filling of the heart. Generally diastole is considered to begin after aortic valve closure and to continue until the onset of ventricular contraction.

Diuresis: the excretion of excess water and salt through the **kidneys** into urine to maintain water volume **homeostasis**.

Efferent nerves: nerves that carry signals from the CNS to parts of the body, such as the kidney. Efferent nerves that are part of the sympathetic nervous system can send control signals to organs and glands, such as the heart, kidneys and blood vessels.

Ejection fraction: see left ventricular ejection fraction.

Electrolyte: an element that dissolved in water or blood dissociates into ions that conduct electricity. Key electrolytes regulated by the kidney include: sodium (Na^+), potassium (K^+), calcium (Ca^{2+}) and magnesium (Mg^{2+}).

End-stage renal disease (ESRD): a severe, progressive and fatal breakdown of the kidneys' ability to filter wastes from blood and maintain **electrolyte** and **blood pressure homeostasis**. Often, ESRD patients are treated with kidney transplant or dialysis.

Glomerular filtration rate (GFR): a measure of **renal** function, being the estimated flow rate of fluid through the kidneys. GFR naturally declines through the aging process, and the rate of decline is accelerated by hypertension, diabetes and other illness.

Heart failure: a progressive heart condition whereby the organ is unable to supply sufficient blood flow to the body which may cause fluid to leave the veins and cause edema (swelling). The disease is

characterized by either low output, which causes insufficient blood flow to support the metabolic needs of organs, or volume overload, where the body is unable to maintain water homoeostasis. Symptoms of low output include shock and renal failure, whereas symptoms of congestion include bloating, peripheral dependent edema and shortness of breath.

Hemodynamics: the physics of fluid flow within the circulatory system and each heart or vascular compartment. It is a subset of more general fluid dynamics, which studies the pressure and flow characteristics of liquids, especially when confined within tubes (as blood is within arteries and veins).

Homeostasis: the maintenance of an internal equilibrium in an organism, as in the normal regulation of **blood pressure**. A major function of the kidneys is to maintain homeostasis of internal water volume and electrolytes against the changes of water intake, varying minerals in food and water outflow through sweating.

Hypertension: high blood pressure, generally defined as BP readings over 140/90 mmHg. Prehypertension is defined as more than 121/81 mmHg but less than 140/90 mmHg. Severe (stage 2) hypertension is ≥160/100 mmHg. Uncontrolled hypertension is high blood pressure that has not been controlled to established targets; resistant hypertension is blood pressure that is not controlled despite 3 medications or blood pressure that is controlled on 4 medications.

Hypertrophy (Cardiac): thickening of the heart, which has two components: increased thickness of myocytes and increased interstitial fibrosis.

Hypervolemia: an abnormal increase in blood volume (fluid overload), which can cause edema, or swelling, of the belly, limbs and liver. It can cause kidney, liver and heart failure.

Hypotension: abnormally low blood pressure (<90/60 mmHg), which can be associated with inappropriate organ perfusion and symptoms such as fainting if insufficient blood flow is reaching the brain. Postural hypotension is a sudden drop in blood pressure upon standing up.

Hypothalamus: A brain structure that controls multiple regulatory functions, including circadian rhythm, thermoregulation and **homeostasis** through neurohormonal communication with other organs and structures in the body. It is a key part of the blood pressure homeostasis feedback system.

Ischemia: a reduction in blood supply causing the supply of nutrients or oxygen to fall below the requirements for cells to survive. Ischemia can lead to cellular necrosis and death. The heart, kidneys and brain are particularly sensitive to ischemia.

Kidney or renal failure: see **End stage renal disease (ESRD).**

Left ventricular ejection fraction: the fraction of blood pumped from the ventricles at each heart beat. A reduced ejection fraction is an indication of impaired ability by the heart to pump blood.

Mercury manometer: a device, analogous to a thermometer, which measures liquid pressure in a tube (as in an artery) by moving a column of mercury up or down against air pressure. Thus, blood pressure is measured in millimeters of mercury (mmHg), even though digital sphygmomanometers no longer use tubes of mercury.

Microalbuminuria: a measure of kidney function that detects small amounts of albumin (a water-soluble blood protein) in urine, an early sign that the kidney is leaking protein into the urine, and anatomical abnormalities may exist. Microalbuminuria is often the earliest finding in diabetic kidney disease.

Natriuresis: the excretion of sodium (Na+ from *natrium*) through the kidneys into the urine.

Nephrectomy: surgical removal of the kidney, as for cancer involving the kidney or if the kidney stops functioning. Nephrectomy of normal functioning kidney is done to procure the kidney for transplant.

Norepinephrine: also known as noradrenaline, a common neurotransmitter that is produced at the sympathetic nerve terminals innervating organs throughout the body. The heart, kidneys, and adrenal glands are several of the organs that produce large quantities of norepinephrine. These organs both produce and metabolize norepinephrine. Norepinephrine is a potent **vasoconstrictor**, so excess levels of norepinephrine can raise blood pressure.

Normotension: normal blood pressure, currently defined as 115/75 mmHg. Prehypertension is defined as more than 121/81 mmHg but less than 140/90 mmHg.

Peripheral nervous system: connects the CNS to the limbs and organs, allowing control of various parts of the body.

Preclinical: Studies undertaken before testing in humans; includes *in vitro* ("in glass") laboratory and *in vivo* ("in life") animal studies.

Progressive renal disease: gradual loss of the kidneys' ability to filter blood and preserve electrolyte and blood pressure homeostasis.

Proteinuria: protein excreted into the urine. Proteinuria, which is often associated with progressive renal failure, identifies a fundamental defect, which itself can cause medical illness. Proteinuria is the first finding of renal damage in diabetes, and presages the development of advanced renal disease.

Renal: Pertaining to the kidneys, the paired organs located high and deep in the abdomen, which filter protein waste products from the blood and maintain fluid and blood pressure homeostasis under changing conditions of water and electrolyte inputs and output.

Renal blood flow (RBF): the volume of blood delivered to the kidneys.

Renin: a peptide hormone secreted by the kidneys in response to both sympathetic nervous signaling and reduced blood flow. Renin converts Angiotensinogen to **Angiotensin I** and thereby initiates the RAAS (renin-angiotensin-aldosterone-system) cascade, resulting in elevated blood pressure.

Sphygmomanometer: also known as a "blood pressure cuff" is a device for measuring blood pressure.

Sympathectomy: surgical disabling of sympathetic nerves, via cutting or ablation with heat or radiofrequency energy.

Sympathetic nervous system (SNS): part of the **autonomic nervous system**, the sympathetic system increases the state of readiness in response to threat or stress through the release of epinephrine/adrenaline. The moment to moment regulation of blood pressure is modulated through sympathetic nervous signaling with norepinephrine as the neurotransmitter. It is a key upregulator of blood pressure and heart rate.

Sympatholytic: drugs that inhibit various signals in the sympathetic nervous system, thus lowering blood pressure.

Systolic: In measuring blood pressure, systolic refers to the peak pressure obtained during the cardiac cycle. It appears as the first, higher figure in the ratio of systolic to diastolic, e.g., 115 is the systolic reading in 115/70 mmHg. Systole (from Greek for contraction), corresponds to the active ventricular contraction and includes both isovolumic contraction, and ejection periods.

Thoracolumbar: the region of the spine from the chest cavity to the lower back.

Transection: cutting through the cross-section of a structure, such as a nerve or blood vessel.

Vasoconstriction: muscular narrowing of the blood vessels.

Note: This glossary is not intended to be complete. Please consult a medical dictionary for any additional terms.