Flashcards

Absorptive Phase.

The phase of metabolism that occurs during and immediately after a meal in which insulin is released by the pancreas gland. It contrasts with the post- absorptive phase where glucagon is secreted by the pancreas gland.

Acetylcholine (Ach).

An excitatory neurotransmitter that is used at the neuromuscular junction, in ganglia of the autonomic nervous system, and throughout the brain.

Acetylcholinesterase (AchE).

An enzyme found in the synapse that inactivates acetylcholine.

Action Potential.

Otherwise known as the nerve impulse. It is produced by a brief change in the voltage across the axon membrane due to the flow of certain ions into and out of the neuron.

Adenosine.

A chemical which has a variety of roles in the nervous system including that of an inhibitory neurotransmitter at some sites.

Adenosine Triphosphate (ATP).

A molecule which is the main source of energy in the cells of all living organisms.

Adenylyl Cyclase.

Membrane-bound enzyme that in some neurons is activated by G proteins to catalyze the synthesis of cAMP (a second messenger) from ATP.

Adrenaline.

Also known as epinephrine. A substance that acts as both a hormone (released from the adrenal glands) and a neurotransmitter in certain regions of the brain.

Agnosia.

A partial or complete inability to perceive sensory information which is not explainable by deficits in basic sensory processing such as blindness.

Agonist.

A drug which mimics or facilities the action of a given neurotransmitter – normally by acting on its receptor.

Agraphia.

A difficulty or inability to write, although reading (alexia) is often unimpaired.

Akinesia.

Absence or poverty of movement.

Alcohol Dehydrogenase.

An enzyme found in the liver (and lesser extent the stomach) that metabolizes alcohol.

Alexia.

An inability to read although the person has no visual deficits.

Allele.

A variant form of a gene.

Alpha Motor Neuron.

A neuron which arises from the ventral horn of the spinal cord and whose activation contributes to muscle contraction.

Alzheimer’s Disease.

A degenerative disease of the brain, especially the cerebral cortex and hippocampus, characterized by amyloid plaques and neurofibrillary tangles.

Amino Acids.

A group of simple carbon-based compounds that can be linked together by peptide bonds to make larger and more complex molecules called proteins.

Amnesia.

A partial or total loss of memory.

Amphetamine.

A stimulant which facilitates the release of catecholamines such as noradrenaline and dopamine from nerve endings.

Amygdala.

A group of nuclei located in the anterior part of the medial temporal lobe which forms an important part of the limbic system.

Amyloid.

A protein that forms the main constituent of neuritic plaques which are found in high amounts in Alzheimer’s disease, which is derived from the much larger beta amyloid precursor protein.

Amyloid Cascade Theory.

The theory that the deposition of amyloid is the critical factor in the development of neural degeneration associated with Alzheimer’s disease.

Amyloid Precursor Protein.

A 695 amino acid protein that is found in the cells of the brain and certain tissues of the body.

Androgen.

A steroid male sex hormone which includes testosterone.

Angular Gyrus.

A region of the posterior parietal lobe, bordering the primary visual cortex, where damage can lead to reading problems and word blindness.

Anomia.

A difficulty in finding the ‘right’ word, especially when naming objects, which is associated with Broca’s aphasia.

Anosmia.

An inability to detect certain smells.

Antagonist.

A drug which opposes or inhibits the effects of a particular neurotransmitter – normally by competing at a receptor site.

Anterior Thalamus.

A group of thalamic nuclei which forms an important link in the circuitry of the limbic system. It receives input from the hippocampus and sends output to the cingulate gyrus.

Anterograde Amnesia.

An inability to create new memories following an insult or injury to the brain.

Anterolateral Pathway.

A sensory pathway conveying somatosensory information to the brain mainly concerned with relaying pain and temperature information. It also forms an ascending white tract of fibres in the spinal cord known as the anterolateral system.

Aphagia.

Cessation of eating. Most notably known to be one consequence of damage to the lateral hypothalamus.

Aphasia.

An inability to produce or comprehend language.

Aplysia.

A large marine snail that has provided a simple animal model by which to examine the synaptic basis of learning and memory.

Apolipoprotein E Gene.

A gene which comes in three different forms (alleles) one of which have been linked with late-onset Alzheimer’s disease.

Apoptosis.

The process of programmed cell death that occurs when cells are no longer needed or have started to function abnormally.

Apraxia.

An inability to make voluntary movement in the absence of paralysis or other peripheral motor impairment.

Arcuate Fasciculus.

A neural pathway that connects Wernicke’s area with Broca’s area, with damage to this structure causing conduction aphasia.

Artificial Intelligence.

The use of computer systems to simulate and model human intelligence.

Asomatognosia.

An inability to detect tactile information from one’s own body.

Astereognosis.

An inability to recognize objects by touch.

Ataxia.

An impairment of muscle cordination which is often associated with damage to the cerebellum and basal ganglia.

Auditory Cortex.

Located in the temporal cortex adjacent to the planum temporale which receives sound input from the medial geniculate body of the thalamus.

Autonomic Nervous System.

The part of the peripheral nervous system controlling the autonomic functions of the body, primarily through its action on glands and the smooth muscles of internal organs. It has two divisions – the sympathetic and parasympathetic systems.

Autoreceptors.

Receptors located on the presynaptic neuron whose main function is to regulate the amount of neurotransmitter release.

Autosomal Dominant Inheritance.

Essentially means if one inherits the gene, then one will inherit the characteristic. A prime example of this type of inheritance is Huntington’s disease.

Axon.

A long thin extension that arises from the nerve cell body and carries the nerve impulse to the axon terminal where neurochemicals are released.

Axon Hillock.

A cone-shaped area where the axon joins the cell body, and the critical site where depolarization needs to take place for the action potential to be formed.

Balint’s Syndrome.

A disorder associated with bilateral damage of the parietal lobes which produces optic ataxia, paralysis of eye fixation, and simultanagnosia.

Basal Forebrain.

A region of the brain that lies anterior and below the striatum which forms part of the limbic system.

Basal Ganglia.

A group of subcortical nuclei and interconnected pathways which are important for movement and contain the caudate nucleus, putamen and globus pallidus.

Basal Nucleus of Meynert.

A nucleus located in the basal forebrain which innervates the cerebral cortex with cholinergic fibres.

Basilar Membrane.

A stiff elongated structure found in the cochlea of the inner ear which holds the organ of Conti.

Benzodiazepines.

A class of drugs which are used for their anxiolytic and sleep- inducing properties including Valium and Librium.

Beta-adrenergic Receptor.

A class of noradrenergic (NA) receptor that is linked to the cAMP second messenger system.

Biochemistry.

The branch of science that investigates the chemical processes within cells and living organisms.

Bipolar Cells.

Interneurons found in the retina and other sensory systems that have axon-like processes at both ends of their cell body.

Bipolar Depression.

A psychiatric disorder characterized by periods of depression and euphoria – sometimes known as manic depression.

Blindsight.

The ability of ‘blind’ subjects with visual cortex damage to accurately point towards or track objects in their environment.

Blood–brain Barrier.

A barrier formed by tightly packed cells in the capillaries, and their covering by astrocytes (glia cells), which prevents the passage of many harmful substances into the brain.

Bradykinesia.

Slowness and poverty of movement and speech.

Brainstem.

The old part of the brain that arises from the spinal cord which includes the medulla oblongata, pons and midbrain. It is also contains the reticular formation.

Broca’s Aphasia.

A form of aphasia characterized by slow and poor speech articulation which also lacks the intonation and inflection of normal language.

Broca’s Area.

A region of the posterior frontal cortex, located close to the face area of the primary motor cortex, involved in the production of speech. It is normally dominant (bigger) in the left hemisphere.

Cannon–Bard Theory.

A theory proposed by Walter Cannon and Philip Bard that views emotional stimuli as events which trigger feelings and physical reactions at the same time.

Capsaicin.

An active ingredient found in chilli peppers which has also been used to understand the receptor basis of pain.

Catastrophic-dysphoric Reaction.

Feelings of despair, hopelessness and anger that are sometimes observed in people with damage to the left hemisphere.

Catecholamines.

A class of monoamines that contain a catechol nucleus which includes noradrenaline and dopamine.

Caudate Nucleus.

A large bilateral C-shaped grey mass sitting below the cerebral cortex which forms the striatum along with the putamen.

Central Nervous System.

The brain and spinal cord.

Central Nucleus of The Amygdala.

The main output post of the amygdala with projections to the brainstem and hypothalamus.

Cerebellum.

A large brain structure meaning ‘little brain’ located at the back of the brainstem (near the pons) and predominantly involved in motor co-ordination.

Cerebral Cortex.

The six-layer covering of the cerebral hemispheres, with an outer appearance of various distinct gyri and fissures, which is responsible for our higher cognitive functions, consciousness and self-volition.

Cerebrospinal Fluid (CSF).

The fluid that fills the ventricles of the brain and the subarachnoid space surrounding the brain and spinal cord.

Cholecystokinin (CCK).

A hormone secreted by the duodenum that regulates gastric mobility and is involved in the satiation of hunger. It is also found in the brain where it may have a neurotransmitter function.

Cholinesterase Inhibitor.

A drug that inhibits the enzyme acetylcholinesterase which breaks down acetylcholine. These drugs are commonly used to treat the early stages of Alzheimer’s disease.

Chromosome.

A long strand of DNA, coupled with protein, that acts as a carrier for genetic information. Human beings have 23 pairs of chromosomes which are found in the nucleus of nearly every cell in the body.

Cingulate Cortex.

A large arc of ‘old’ limbic cortex that lies above and spans the corpus callosum which receives input from the cerebral cortex and thalamus.

Clinical Neuropsychology.

A branch of psychology that examines the behaviour of brain damaged individuals. A clinical neuropsychologist is also concerned with the diagnosis and treatment of those with brain disorders and injury.

Cochlea.

A small bony chamber of the inner ear which houses the basilar membrane that is crucial for hearing.

Cochlea Nerve.

Cranial nerve eight (CN VIII) projecting from the ear to the brain.

Cochlea Nuclei.

A small nucleus found in the medulla which receives input from the cochlea nerve.

Codon.

A sequence of three bases in DNA which provides a code for making an amino acid.

Cognitive-arousal Theory.

A theory proposed by Stanley Schachter and Jerome Singer which maintains that in order to experience an emotion an individual has to experience physiological arousal and be able to attribute that arousal to an appropriate stimulus.

Cognitive Neuroscience.

A discipline which rose to prominence in the 1980s, which predominantly uses brain scanning techniques such as fMRI to examines cognitive and mental processes.

Cognitive Reserve.

The idea that increased mental activity early in life may increase the brain’s resilience to later neural degeneration and dementia.

Commissurotomy.

Another name for the surgical operation in which the corpus callosum is severed thereby disconnecting the two cerebral hemispheres.

Computerized Axial Tomography (CAT).

A non-invasive scanning technique that takes detailed three-dimensional pictures of brain structure by computer analysis of X-rays taken at different points and planes around the head.

Conduction Aphasia.

A language disturbance caused by damage to the arcuate fasciculus which connects Wernicke’s and Broca’s areas, characterized by an inability to fluently repeat words and sentences.

Cones.

A photoreceptor found in the retina which is responsible for fine detailed vision and colour. There are three types of cone with sensitivities to wavelengths of light roughly corresponding to blue, green and red.

Corpus Callosum.

A broad thick band of around 20 million axon fibres which provides a channel for communication between the two cerebral hemispheres.

Cortical Module.

In the primary visual cortex a module is a cube-like unit which consists of two ocular dominance columns, a range of orientation detectors, and two cylindrical colour processing blobs. Other types of module probably exist throughout the cerebral cortex.

Corticospinal Pathway.

The motor pathway originating in the motor cortex (and surrounding areas) of the cerebral cortex, and terminating in the grey matter of the spinal cord. The majority of its axons cross in the medulla to influence the opposite (contralateral) side of the body.

Cortisol.

A glucocorticoid hormone released by the adrenal glands, vital for life, and secreted in higher amounts during times of prolonged stress.

Creutzfeldt-Jacob Disease.

A form of dementia caused by an infectious agent that has some similarities with bovine spongiform encephalopathy.

Cutaneous Senses.

Sense information from the skin.

Cyclic AMP.

A chemical involved in many biochemical reactions of the cell including a role as a second messenger – one function of which is to cause the opening of ion channels following certain types of receptor activation.

Cytochrome Blobs.

Peg-like structures found in the primary visual cortex, which are stained by the enzyme cytochrome oxidase and have an important role in colour processing.

Declarative Memory.

A type of memory that can be voluntarily ‘declared’ to consciousness and verbally expressed. In effect, it refers to an ability to recount what one knows.

Deep cerebellar Nuclei.

A group of three nuclei (fastigal, interposed and dentate) within the cerebellum which receive input from the Purkinje neurons of the cerebellar cortex, and together provide the sole output of the cerebellum.

Delta-9-tetrahydrocannabinol (THC).

The main psychoactive ingredient in marijuana.

Dendrite.

Tree-like branched extensions of the neuron’s body that typically contains large numbers of neurotransmitter receptors.

Deoxyribonucleic Acid (DNA).

A long nucleic acid composed of two helical strands (made from the sugar deoxyribose and phosphate) and four bases (adenine, thymine, cytosine, and guanine) which houses the genes necessary for genetic inheritance.

Dermatome.

An area of skin whose sensory fibres all innervate the same dorsal root.

Diabetes Mellitus.

A disease caused by the pancreas gland secreting insufficient amounts of insulin which is a hormone enabling the uptake of glucose into cells. Consequently, untreated diabetics have high levels of blood sugar.

Diencephalon.

The part of the forebrain that contains the thalamus and hypothalamus.

Dizygotic Twins.

Twins that develop from two different eggs, and thus two different sperms, which makes them genetically different. Sometimes called fraternal twins.

Dopamine.

A neurotransmitter that makes up about 80% of the catecholamine content of the brain which is predominantly found in the striatum, nucleus accumbens, amygdala and frontal cortex.

Dopamine Theory of Schizophrenia.

The idea that schizophrenia is due to increased dopaminergic activity in the brain.

Dorsal.

An anatomical term that refers to structures towards the back of the body, or the top of the brain (e.g. the dorsal fin of a fish is located on its back or upper surface).

Dorsal-column Medial-lemniscus Pathway.

A pathway carrying cutaneous (touch) information from the spinal cord to the ventral posterior nucleus of the thalamus via the medial lemniscus.

Dorsal Columns.

White matter of the dorsal spinal cord containing ascending axons to the brain.

Dorsal Raphe.

A nucleus found in the upper brainstem, which along with the medial raphe, provides the forebrain with its serotonergic innervation.

Dorsal Roots.

Bundles of peripheral nerves providing sensory information that enter the dorsal (towards the back) part of the spinal cord.

Dorsolateral Frontal Cortex.

A region of the frontal lobes lying above the orbital frontal region which receives input from dorsomedial thalamus. It is associated with executive functions including working memory.

Dorsomedial Thalamus.

A large nucleus of the thalamus which relays information from the limbic system, particularly the amygdala and entorhinal cortex, to the frontal lobe.

Dual-centre Set-point Theory of Hunger.

A theory developed in the 1950s that viewed the lateral hypothalamus as being the initiator of hunger and feeding, and the ventromedial hypothalamus as the satiety centre.

Duodenum.

The first part of the small intestine which also includes the pancreatic duct.

Dyskinesia.

A category of movement disorders characterized by involuntary muscle movements.

Dyslexia.

A term that refers to a group of reading disorders of varying severity.

Dystonia.

Lack of muscle tone.

Edinger-Westphal Nucleus.

A small nucleus in the midbrain that sends fibres into the parasympathetic nervous system which controls contraction of the pupil.

Electroencephalogram (EEG).

An apparatus that enables the gross electrical activity of the brain to be recorded from electrodes placed on the scalp.

Endorphin.

A natural opiate neuropeptide used as a chemical messenger often released in response to pain or stress.

Engram.

Another term for the anatomical, biochemical and/or physiological site of memory.

Entorhinal Cortex.

A form of transitional cortex found on the medial surface of the temporal lobes that provides the main neural gateway to the hippocampus.

Epinephrine.

An American term for adrenaline.

Equipotentiality.

The idea that all parts of the association cerebral cortex play an equal role in the storage of memories. This view contrasts with the theory that different parts of the cerebral association cortex have highly specialized functions.

Excitatory Postsynaptic Potential.

A small change in the electrical potential of a neuron towards a positive direction, produced by excitatory neurotransmitters, that increases the likelihood of an action potential.

Exocytosis.

A form of active transport that involves the fusion of the vesicles with the cellular membrane in the axon terminals leading to neurotransmitter release.

Extrapyramidal System.

The motor system of the brain whose output fibres to the spinal cord do not cross in the pyramidal region of the medulla. The term is commonly used to refer to the cerebellum, basal ganglia and an array of brainstem nuclei.

Fight-or-flight Response.

A pattern of physiological responses (e.g. increased heart rate, faster respiration, pupil dilation etc.) produced by the sympathetic nervous system that helps mobilize the body’s resources to threat.

Follicle Stimulating Hormone.

A hormone released by the anterior pituitary gland that causes maturation of the ovarian follicle and the secretion of oestrogen and progesterone.

Forebrain.

A term that refers to all of the brain tissue lying above the midbrain, including the hypothalamus, thalamus, basal ganglia, limbic system and neocortex.

Fornix.

A long arching fibre tract that extends from the hippocampus to the mammillary bodies, anterior thalamus and hypothalamus.

Fovea.

A pit in the centre of the retina containing colour-sensitive cones where visual acuity is at its greatest.

Free Nerve Ending.

Small diameter nerve endings (also known as naked endings) which act as pain receptors in the skin.

Free Radicals

Highly reactive and short- lasting breakdown products of oxygen which contain an unpaired outer electron, believed to be involved in ageing and certain types of degenerative disease.

Frontal Lobe.

The front portion of the cerebral cortex which contains several important anatomical areas including the orbitofrontal and dorsolateral regions, Broca’s area, and primary motor cortex.

GABA.

The abbreviation for gamma- Aminobutyric acid – an amino acid neurotransmitter that is the most common inhibitory substance in the CNS.

Gamma Motor Neuron.

A nerve cell located in the ventral horn of the spinal cord that innervates muscle spindles.

Ganglion Cells.

Neurons whose cell bodies form the final output of the retina and whose axons give rise to the optic nerve.

Gate Control Theory of Pain.

A theory proposed by Melzack and Wall which views pain as being modified by a gate mechanism located in the spinal cord, whose functioning can also be modified by brain activity.

Genes.

A long sequence of paired bases found in DNA that contain various codons, and which acts as a functional unit to make one or more proteins.

Genetic Engineering.

A group of techniques, including the formation of transgenic animals, that involve altering the natural state of an organism’s genome.

Genetics.

The scientific study of genes and inheritance.

Gigantocellular Tegmental Field.

An area of the medullary reticular formation involved in sleep, which contains large neurons and whose axons innervate the thalamus and cerebral cortex.

Glial Cells.

The supporting cells of the CNS that also help maintain the functioning of neurons. In the brain these consist of astrocytes, oligodendrocytes and microglial cells.

Globus Pallidus.

Part of the basal ganglia involved in movement which receives input from the striatum and whose main output goes to the ventral lateral nucleus of the thalamus and motor cortex.

Glucagon.

A hormone released by the pancreas gland which acts on the liver to convert glycogen into glucose

Glutamate.

An amino acid which is the major excitatory neurotransmitter in the CNS.

Glycogen.

A stored form of sugar, found mainly in the liver, which can be converted into glucose by the pancreatic hormone glucagon.

Gonadotropin Releasing Hormone.

A releasing factor secreted by the hypothalamus which acts on the anterior pituitary gland to help secrete luteinizing hormone, and follicle stimulating hormone.

G-protein.

A type of protein which is often likened to a switch. Some G proteins are attached to certain types of neurotransmitter receptor, where they activate a cascade of chemical events inside the cell, including the formation of cAMP (a second messenger).

Growth Hormone.

A hormone produced by the anterior pituitary which stimulates growth during development. It is also secreted in adults, reaching its peak levels about an hour after falling asleep.

Gyri.

The raised ridges of the cerebral cortex (the fissures between the gyri are called sulci) which provide helpful landmarks in the identification of various cortical areas.

Hebbian Synapse.

A hypothetical synapse that is strengthened every time a presynaptic and postsynaptic neuron fire together, which is believed to be an important mechanism in the neural basis of learning and memory.

Hemiplegia.

Paralysis or loss of muscle tone of one half of the body.

Heschl’s Gyrus.

Part of the temporal lobe containing the primary auditory cortex.

Hippocampus.

A complex brain structure located in the medial temporal cortex composed of folded primitive three-layered cortical tissue (archicortex). The hippocampal formation consists of the subiculum, the hippocampus proper, and dentate gyrus. Regarded as part of the limbic system, it is most strongly implicated in memory.

Homeostasis.

The requirement of the body to maintain a consistent internal environment, despite exposure to various chemical changes and external fluctuations.

Homovanillic Acid (HVA).

A breakdown product of dopamine that is found in the cerebrospinal fluid.

Hormone.

Chemical messengers that are secreted directly into the blood, sometimes from endocrine glands, where they are transported to their target of action.

Huntingtin.

The abnormal protein produced by the gene that is responsible for causing Huntington’s disease.

Huntington’s Disease.

A genetic disorder, inherited in an autosomal dominant manner, which leads to degeneration of the basal ganglia – normally in middle age. The mutation is caused by an excess number of the triple base CAG repeats in the gene which is located on chromosome 4.

Hyperphagia.

Excessive eating and weight gain, as seen, for example, following lesions of the ventromedial hypothalamus

Hypothalamic-pituitary-adrenal Axis.

This term refers to a complex set of interactions and feedback loops between the hypothalamus, pituitary and adrenal glands. More specifically, it involves the anterior pituitary gland secreting adrenocorticotropic hormone (ACTH) into the blood, which stimulates the adrenal cortex to release glucocorticoids such as cortisol.

Hypothalamus.

A small but hugely important collection of various nuclei lying just below the thalamus, which governs a wide range of homeostatic processes and species typical behaviours. The hypothalamus is also involved in the regulation of the autonomic nervous system, and exerts executive control over the pituitary gland.

Implicit Memory.

A type of memory which involves no explicit or conscious intention to learn or memorize.

Inferior Colliculi.

Small protrusions found near the upper surface of the midbrain that relay auditory information from the ears to the medial geniculate nucleus.

Inhibitory Postsynaptic Potential.

A small change in the electrical potential of a neuron towards a negative direction, produced by inhibitory neurotransmitters, that decreases the likelihood of an action potential.

Insulin.

A hormone released by the pancreas gland that enables glucose to enter the cells of the body. It plays an important role in allowing nutrients to be quickly stored after a meal.

Interneuron.

A type of neuron, typically with a short axon, that is located within a given nucleus or structure.

Interstitial Nuclei of the Anterior Hypothalamus.

In humans, these form four small cell groups which are located in the anterior preoptic region of the hypothalamus. Two of these nuclei (INAH 2 and 3) have been shown to be larger in the male.

Inverse Agonist.

A drug that produces a neurochemical or behavioural effect opposite to that of a normal agonist.

Ion Channel.

A specialized protein complex in the plasma membrane of neurons that allow certain ions, most notably sodium, potassium and calcium, to pass into the cell. Ion channels can be voltage dependent (i.e. they open when the membrane potential reaches a certain level), or neurotransmitter dependent (i.e. they open when the neurotransmitter activates the cell).

Ionotropic Receptor.

A receptor complex where the binding site for a neurotransmitter and the ion channel form part of the same unit (e.g. the GABA receptor). Activation of the receptor leads directly to a configurational change in the shape of the channel that allows ions to pass through.

James–Lange Theory.

A theory which holds that emotions result initially from physiological reactions involving the autonomic nervous system to events prior to mental interpretation.

Ions.

Atoms (or sometimes molecules) which have lost or gained an electron, which then alters their electrical charge (i.e. they become positively or negatively charged). Ions are particularly important in the formation and transmission of the nerve impulse.

Klinefelter’s Syndrome.

A genetic condition where males inherit an extra X chromosome (YXX) resulting in increased feminization.

Korsakoff’s Syndrome.

A syndrome whose main feature is anterograde amnesia, due to thiamine deficiency brought on by chronic alcoholism. Traditionally, it has been associated with damage to the mammillary bodies and dorsomedial thalamus.

Kuru.

A rare form of brain degeneration which is transmitted by ingesting a infectious protein (prion) found in contaminated brain tissue. It is associated with the practice of cannibalism.

Lateral Geniculate Nucleus.

A region of the thalamus that receives input from the optic nerve and projects to the primary visual cortex.

Lateral Hypothalamus.

A region of the hypothalamus that has been implicated in a wide range of fundamental behaviours, including feeding, aggression, sleeping, waking and motivation.

Lateral Superior Olive.

A nucleus located in the medulla which receives auditory information from both ears and is important in identifying a sound’s location.

Leptin.

A hormone manufactured and secreted by adipose cells that communicates to the brain how much fat is being stored. It also appears to be involved in the regulation of food intake.

Leydig Cells

The cells in the testes that produce testosterone.

Limbic System.

A group of interconnected brain regions that includes an arc of phylogenetically old cortex at the base of the cerebrum, and several other regions, including the hippocampus amygdala, fornix, mammillary bodies, hypothalamus and anterior thalamus.

Locus Coeruleus.

A dark blue pigmented nucleus in the pons region of the brainstem which is the main origin of noradrenaline containing neurons in the forebrain.

Long Term Potentiation.

A stable and enduring increase in the excitability of a neuron due to its repeated activation by high-frequency stimulation, which is believed to underlie the neural basis of learning and memory.

Luteinizing Hormone.

A hormone released by the anterior pituitary gland that causes ovulation (the release of the egg from the ovary) and the development of the follicle into a corpus luteum. In males, luteinizing hormone stimulates the Leydig cells to produce testosterone.

Magnetic Resonance Imaging (MRI).

A non-invasive scanning technique that measures the magnetic resonance of hydrogen atoms in the brain, induced by a strong magnetic field and radio waves, to build up a detailed three-dimensional image of brain structure.

Mammillary Bodies.

Two nuclei located in the posterior region of the hypothalamus which receives a large input from the hippocampus via the fornix.

Materialism.

A philosophical position holding that nothing but physical matter exists which also supports the idea that all mental states are the result of material interactions.

Mechanoreceptor.

A receptor whose primary function is to detect stretching and pressure movements of the skin.

Medial forebrain Bundle.

A large bundle of fibres that courses through the lateral regions of the hypothalamus which interconnects regions of the forebrain with midbrain.

Medial Geniculate Bodies.

A region of the thalamus that receives information from the inferior colliculus and sends output to the auditory cortex located in the temporal lobe.

Medial Hypothalamus.

This part of the hypothalamus contains several important regions, including ventromedial, dorsolateral and arcuate nuclei (the latter being connected with the pituitary gland) and is involved with motivation – especially feeding, emotion and aggression.

Medial Prefrontal Cortex.

The region of the prefrontal cortex that lies adjacent to the cingulate gyrus.

Medial Preoptic Area.

An area of the anterior hypothalamus implicated in sexual behaviour, temperature regulation and sleep.

Medial Septum.

A nucleus found in the limbic system (close to the hypothalamus) which sends cholinergic fibres into the hippocampus.

Medial Temporal Lobes.

A complex area of the brain which includes the hippocampus, amygdala and surrounding regions of the cortex, including the subiculum, entorhinal cortex and perirhinal cortex.

Medulla Oblongata.

The part of the brainstem which emerges from the spinal cord. It is the origin of several cranial nerves, and contains centres for vital functions such as respiration, sneezing, vomiting and swallowing.

Melatonin.

The hormone released by the pineal gland which plays an important role in the regulation of the body’s circadian rhythms.

Mesofrontal Dopamine Pathway.

The dopamine projection arising from the ventral tegmental area that passes to the frontal cortex.

Mesolimbic Dopamine Pathway.

The dopamine projection arising from the ventral tegmental area that passes to parts of the limbic system including the nucleus accumbens.

Messenger RNA.

A single stranded nucleic acid that transcribes the genetic message from DNA and transports it into the cytoplasm for protein synthesis.

Metabotropic Receptor.

A receptor linked to a G-protein, which initiates a number of chemical events inside the neuron, including the activation of second messengers, which leads to the opening of certain ion channels.

Microglia.

Glia cells that act as phagocytes (part of the immune system) in the CNS.

Millisecond.

One thousandth of a second.

Mitochondria.

Organelles in the cytoplasm of the cell responsible for generating adenosine triphosphate (ATP) which is used as energy to drive a wide variety of chemical reactions.

Molecular Biology.

The branch of science that investigates the structure and interactions of molecules within the cell including enzymes, nucleic acids and proteins.

Monoamine.

A class of neurotransmitters that contain an amine in their chemical structure which includes serotonin, dopamine, noradrenaline.

Monoamine Oxidase (MAO).

An enzyme found in neurons and glial cells that breaks down and inactivates monoamine neurotransmitters.

Monoamine Oxidase Inhibitors.

Chemicals that inhibit the action of monoamine oxidase, thereby increasing the amount of monoamines in the synapse, which have been shown to be effective antidepressants.

Monoamine Theory of Depression.

The hypothesis that depression is due to a synaptic deficiency, or under-activity of one or more monoamines in the brain (especially noradrenaline and/or serotonin).

Monozygotic Twins.

Genetically identical twins who develop from the same egg.

Motor Cortex.

The region of the cerebral cortex, located in the precentral gyrus of the posterior frontal cortex, which is topographically organized and sends its fibres into the corticospinal tracts to produces voluntary muscle movement.

Motor End Plate.

The specialized site on a muscle fibre which receives input from a motor nerve ending.

Muscle Spindles.

Long thin fibrous capsules that lie embedded between muscle cells, which provide information about stretching to neurons located in the spinal cord.

Myelin.

The fatty sheath that covers and insulates the axon produced by the extensions of certain glial cells (oligodendroglia in the CNS, and Schwann cells in the peripheral nervous system).

**Myofibrils** Small thin fibres within individual muscle cells, made up of short segments called sarcomeres, which contain fine filaments of actin and myosin.

Naloxone.

An opiate antagonist.

Narcolepsy.

A condition where the person is suddenly overcome by bouts of intense sleepiness which is typically accompanied by a loss of muscle tone (cataplexy).

Negative Feedback.

An important mechanism in homeostasis and most hormone systems. It refers to the process by which a physiological variable, or hormone, once it reaches a certain level, feeds back to decrease its own activity or production.

Neocortex.

The most recently evolved part of the brain consisting of six layers which forms the ‘crumpled’ outer surface of the cerebral cortex.

Neuritic Plaques.

Extracellular microscopic discs composed largely of amyloid which are one of the defining pathological features of Alzheimer’s disease.

Neurofibrillary Tangles.

Tangles of fine fibres or neuronal filaments, made from tau protein, which are predominantly found in the cytoplasm of cortical nerve cells and are a distinguishing feature of Alzheimer’s disease.

Neuromuscular Junction.

This is the synapse that exists between the motor neuron and the motor end plate of skeletal muscle which uses acetylcholine as its neurotransmitter.

Neuron.

Essentially a specialized cell for generating and conducting electrical information which forms the fundamental unit of the nervous system. Also called a nerve cell.

Neuropeptide Y.

A peptide which acts as a neurotransmitter in the hypothalamus and is involved in the regulation of feeding behaviour.

Neuropeptides.

Chemical messengers which are composed of amino acids or small proteins. They are typically involved in slow-onset but long-lasting modulation of synaptic transmission.

Neuroscience.

A discipline that encompasses a broad range of fields concerned with the structure and functioning of neurons and their systems, including molecular and cell biology, anatomy, biochemistry, physiology and psychology.

Neurotransmitter.

A chemical that is released by an axon terminal into a synapse following the arrival of a nerve impulse, and which diffuses in the synapse to bind (attach itself) to receptors of another nerve cell, muscle fibre, or some other structure.

Nigral-striatal Pathway.

A dopaminergic pathway that extends from the substantia nigra to the striatum which shows marked degeneration in Parkinson’s disease.

Nociceptor.

Another name for a pain receptor.

Nodes of Ranvier.

A small gap in the myelin sheath surrounding the axon, where the action potential is renewed by the process of saltatory conduction.

Noradrenaline.

A catecholaminergic neurotransmitter, also known as norepinephrine, found in the brain and the sympathetic division of the autonomic nervous system.

Nucleus Accumbens.

A major component of the ventral striatum which receives a dopaminergic projection from the ventral tegmentum, involved in signalling reward or possibly stimulating feelings of pleasure.

Nucleus of The Solitary Tract.

A nucleus located in the medulla which receives information from the stomach, duodenum, liver and tongue.

Nucleus Raphe Magnus.

One of the raphe nuclei which has descending projections to the spinal cord and is involved in gate control of pain processing.

Obsessive-compulsive Disorder.

Classified as an anxiety disorder where the person is afflicted with uncontrollable thoughts (obsessions) and engages in seemingly senseless rituals (compulsions).

Ocular Apraxia.

An inability to voluntarily shift attention to a new visual stimulus. It is a symptom of Balint’s syndrome and associated with damage to occipital-parietal regions of the brain.

Olfactory Bulb.

The first area of the brain to receive olfactory information from the nose.

Olfactory Epithelium.

A layer of tissue in the nasal cavity containing olfactory receptors

Olfactory Tract.

The main pathway arising from the olfactory bulb which forms the lateral and medial olfactory stria.

Oligodendroglia.

A type of glia cell with many branches that wraps around axons to form the myelin sheath.

Opiate.

A drug with similar properties to opium including morphine and heroin.

Molecular Biology.

The branch of science that investigates the structure and interactions of molecules within the cell including enzymes, nucleic acids and proteins.

Optic Chiasm.

The point on the underside of the brain, just anterior to the pituitary gland, where the two optic nerves join, and where the majority of fibres cross to the opposite side of the brain.

Optic Radiations.

The axon fibres that project from the dorsal lateral geniculate region of the thalamus to the primary visual cortex.

Orbitofrontal Region.

The part of the prefrontal cortex that lies above the eyes which receives information from the dorsomedial thalamus.

Orexins.

Also known as hypocretins, orexins are hypothalamic neuropeptides (produced by the lateral hypothalamus and perifornical region) which have an important role in the regulation of sleep and arousal states.

Organ of Conti.

A structure found in the cochlear of the inner ear which houses specialized sensory hairs forming part of the basilar membrane that turns sound into neural impulses.

Otolith Organs.

The otolith organs are found under the semicircular canals of the inner ear which convey information about head movement to the brain.

Oval Window.

The part of the cochlea which is hit by the small bone called stapes to transmit sound.

Ovulation.

The monthly process in which a mature ovum (egg) is released by the ovaries into the upper fallopian tubes. At this point fertilization can occur if the ovum is impregnated by a sperm cell.

Pancreas Gland.

An endocrine gland located in the duodenum which releases insulin and glucagon.

Papez Circuit.

A limbic system circuit, first described by James Papez in 1937, which connects the hypothalamus, thalamus, cingulate gyrus and hippocampus. Believed to be important in emotion and certain aspects of memory processing.

Parahippocampal Gyrus.

A region of the limbic cortex adjacent to the hippocampus which can be regarded as a continuation of the cingulate gyrus.

Parasympathetic Nervous System.

A major branch of the autonomic nervous system (along with the sympathetic nervous system) whose main function is to conserve and restore the body’s resources (i.e. reduce arousal).

Parietal Lobe.

The part of the cerebral cortex directly behind the central fissure (i.e. the frontal lobe) and above the Sylvian fissure (i.e. temporal lobe).

Parkinson’s Disease.

A brain disorder caused by degeneration of cells in the substantia nigra leading to poverty of movement, tremor and rigidity.

Periamygdaloid Cortex.

Part of ‘old’ cortex close to the amygdala and a site known to process olfactory information.

Periaqueductal Grey Area.

The area that surrounds the cerebral aqueduct in the midbrain. It is the major centre through which the hypothalamus enacts behaviours critical to the survival of the self and of the species.

Peripheral Nervous System.

All the nerves and neurons beyond the brain and spinal cord including the autonomic nervous system and somatic nervous system.

Perirhinal Cortex.

A region of the limbic cortex lying underneath the anterior parts of the hippocampus.

Pharmacology.

The scientific study of drugs and their effects on the body.

Philosophy.

A word that means love of wisdom, philosophy generally tackles subjects that are not amenable to scientific investigation such as the nature of logic, truth, reality and beauty.

Phenylketonuria.

A hereditary disorder that can lead to brain damage caused by a recessive gene which causes the absence of phenylalanine hydroxylase (an enzyme that converts phenylalanine into tyrosine).

Physiological Psychology.

A branch of neuroscience that studies the physiological causes of behaviour. Traditionally this subject has been associated with brain lesioning along with electrical recording and stimulation.

Pineal Gland.

A small gland which in humans is located behind the third ventricle in an area known as the epithalamus. It secretes the hormone melatonin responsible for the regulation of circadian rhythms.

Pituitary Gland.

Sometimes referred to as the master endocrine gland, the pituitary is connected to the hypothalamus and consists of two lobes – the anterior and posterior. The former is connected to the hypothalamus by blood vessels, whilst the latter contains many nerve endings.

Place cells.

Neurons found in the hippocampus that become highly active when the animal is in a particular location. They appear to be important for spatial navigation and forming a cognitive map of the environment.

Planum Temporale.

A region of the temporal lobe that is part of Wernicke’s area lying adjacent to the primary auditory cortex, which is generally found to be larger on the left side of the brain.

Pons.

The region of the brainstem above the medulla and lying below the midbrain. It contains a number of important nuclei including the locus coeruleus and the raphe.

Pontine Nucleus.

A large nucleus found in the pons which receives motor input from the cerebral cortex and sends projections to the cerebellum.

Positron Emission Tomography (PET).

A non-invasive technique for examining brain function in humans that measures the brain’s metabolic activity by use of short- lasting radioactive substances (usually 2-deoxyglucose) which emits subatomic particles called positrons.

Prefrontal Cortex.

The most anterior region of the frontal lobes consisting of association cortex which receives input from multiple regions of the brain. It contributes to a wide variety of executive functions, including focusing attention and setting goals.

Premotor Area.

An area of the cerebral cortex located just in front of the primary motor cortex involved in the initiation and selection of movement.

Primary Visual Cortex.

An area in the occipital lobes, in the vicinity of the calcarine fissure, which receives visual information from the lateral geniculate thalamus.

Prion.

A protein that is capable of self- replication and acts as an infectious agent responsible for several types of degenerative brain diseases.

Procedural Memory.

A type of memory that is ‘remembered’ when an individual performs an action (such as riding a bike). Unlike declarative memory, it is not affected by damage to the hippocampus.

Proprioceptive Senses.

Sense information from the joints and muscles.

Prosopagnosia.

The inability to identify people by sight of their faces, although other features such as their voice can be recognized.

Proteins.

A class of large molecules composed of smaller chains of amino acids that have a wide range of functions in the body and are vital for life.

Psychiatry.

A branch of medicine concerned with the understanding and treatment of mental illness.

Pulvinar Region.

A large thalamic nucleus overhanging the superior colliculus and geniculate bodies, believed to be involved in vision and possibly speech.

Putamen.

A large round structure that connects with the caudate nucleus to form the striatum.

Pyramidal System.

A large system of fibres originating in the motor regions of the cerebral cortex which form the pyramidal tracts that project to the spinal cord. Also known as the corticospinal tract.

Raphe Nuclei.

A group of nuclei located in the medulla, pons and midbrain. Of particular importance are the dorsal and median raphe which together account for about 80% of the serotonin found in the forebrain.

Receptive Field.

The receptive field is a portion of sensory space that can elicit neuronal responses when stimulated. In vision, this is the part of the visual world, whereas with touch it may be the mechanical pressure on a receptor or nerve ending.

Receptor.

In neuroscience, a receptor is a specialized protein molecule, most often found in the membrane of a neuron, muscle or endocrine organ, which is sensitive to a specific neurochemical, which in turn typically causes some chemical or voltage effect inside the cell.

Recessive Gene.

A gene that does not express its characteristics unless it is present in a ‘double dose’. That is, a copy has to be inherited from both parents.

Recombinant DNA.

Genetic material made outside the living cell by splicing two or more pieces of DNA from different sources to create a combination of genes not normally found in nature.

Red nucleus.

A large nucleus located in the midbrain tegmentum that receives inputs from the cerebellum and motor areas of the cerebral cortex, and which in turn sends axons to the spinal cord via the rubrospinal tract.

Resting Potential.

The membrane potential of a neuron when it is at rest, and not being altered by excitatory or inhibitory postsynaptic potentials. The resting potential inside a neuron is generally around –70mV compared to its outside.

Reticular Activating System.

A network of neurons located in the brain stem that ascend primarily to the thalamus and cortex, and whose activation is responsible for the desynchronized cortical EEG patterns that regulate waking and sleep.

Reticular Formation.

A complex network of dispersed nuclei and fibre tracts which extend throughout the core of the brainstem to the thalamus. It is involved in a wide range of functions including those that are vital for life.

Retrograde Amnesia.

An impairment of memory for information that was acquired prior to the onset of amnesia.

Reuptake.

The reabsorption of a neurotransmitter into a neuron by a special transporter protein that is normally found in the membrane of presynaptic neurons.

Ribonucleic Acid (RNA).

A single stranded nucleic acid that contains the sugar ribose. There are three main types of RNA (messenger, transfer and ribosomal), all of which are involved in protein synthesis.

Ribosomes.

Spherical structures found in the cytoplasm of the cell, sometimes likened to work benches, where the production of proteins takes place.

Saccadic Eye Movements.

Involuntary, rapid and small movements of the eyes that are used to monitor our visual surroundings.

Saltatory Conduction.

The means by which the action potential is propagated down the axon from one node of Ranvier to the next.

Schachter–Singer Theory.

A theory which holds that emotion results from physiological arousal which has to be cognitively interpreted within the context of each situation before the emotional experience occurs.

Schizophrenia.

A severe mental illness, classified as a psychosis, which is typically characterized by hallucinations, delusions, incoherent thought, paranoia and emotional withdrawal.

Second Messenger.

An intracellular signalling molecule that acts to transmit signals from a receptor to a target. One example is cAMP which is synthesized after a neurotransmitter binds to certain a G protein-linked receptor, which then causes protein phosphorylation (i.e. the opening) of ion channels.

Semicircular Canals.

A group of three looping chambers in the inner ear whose main function is to relay information regarding rotational movement of the head to the brain.

Sensory-specific Satiety.

The tendency to get bored eating one type of food if consumed over a long period.

Septum.

A subcortical structure found in the midline of the brain, some of which partitions the two lateral ventricles, that also contains a cluster of septal nuclei with connections to the hippocampus, amygdala and hypothalamus.

**Serotonin** A monoamine neurotransmitter, also called 5-hydroxytryptamine (5-HT), which is implicated in a wide range of functions including mood, cognition, reward and arousal.

Serotonin Uptake Blocker.

A class of drug that includes fluoxetine (Prozac) which selectively blocks the reuptake of serotonin from the synaptic cleft.

Sexually Dimorphic Nucleus.

A nucleus found in the preoptic area of the anterior hypothalamus that is larger in males than in females. In humans these are also known as the interstitial nuclei.

Sleep Cycle.

A sequence of four slow wave sleep stages that progress from predominantly theta activity (4–7 Hz) to delta activity (1–4 Hz), followed by a period of REM sleep. Each cycle lasts for about 90 minutes.

Slow Wave Sleep.

Sleep characterized by slower EEG brain waves than those found in waking, made up predominantly of delta activity (1–4 Hz).

Sodium/Potassium Pump.

A transport mechanism within the plasma membrane of a neuron that regulates the concentration of sodium and potassium ions inside and outside the neuron.

Somatic Nervous System.

A division of the peripheral nervous system that controls skeletal muscles, and which also sends sensory input from the skin, muscle, tendons joints etc. to the spinal cord and brain.

Somatosensory Cortex.

A band of tissue in the post-central gyrus of the parietal lobes, adjacent to the primary motor cortex, which receives touch, pain and temperature information. It also obtains motor feedback from the muscles.

Spinoreticular Tract.

The part of the anterolateral pathway conveying pain and temperature information from the spinal cord to the reticular formation.

Spinotectal Tract.

The part of the anterolateral pathway conveying pain and temperature information from the spinal cord to the upper brainstem (tectum).

Spinothalamic Tract.

The part of the anterolateral pathway conveying pain and temperature information from the spinal cord to the thalamus.

Splenium.

The rear part of the corpus callosum which transfers visual information between the hemispheres.

Spongiform Encephalopathy.

A group of transmissible progressive and invariably fatal neurodegenerative diseases caused by infectious proteins (prions). Human examples include Jacob-Creutzfeldt disease and Kuru.

Stem Cells.

A primitive and undifferentiated cell (first discovered in the early embryo) with the unique ability of being able to develop into just about any other type of cell, including neurons.

Stereochemical Theory of Olfaction.

The theory that there are different types of olfactory receptor which distinguish between smells.

Striatum.

An important component of the basal ganglia that is composed of the caudate nucleus and putamen, and so called because of its striped appearance. It is one of the key areas of the brain that regulates movement.

Subiculum.

An area of limbic cortex in the parahippocampal gyrus that innervates the hippocampal formation which is important for memory.

Substantia Gelatinosa.

An area of the spinal cord containing cell bodies and inter neurons.

Substantia Nigra.

A dark pigmented nucleus found in the midbrain tegmentum composed of two regions: the pars compacta and the pars reticulata. The pars compacta is notable for sending dopaminergic fibres to the striatum, and it also shows marked degeneration in Parkinson’s disease.

Subthalamic Nucleus.

A nucleus involved in motor behaviour that lies below the thalamus, which receives input from the striatum, and innervates the globus pallidus and substantia nigra.

Superior Colliculi.

Bump-like protrusions in the roof of the midbrain which receives input from the optic nerve, and are important in the orientation of the head and eyes.

Supplementary Motor Cortex.

An area lying anterior and adjacent to the upper part of the primary motor cortex, which is involved in the sequencing of goal- directed movements.

Suprachiasmatic Nucleus.

A tiny nucleus lying just above the optic chiasm in the medial hypothalamus which acts as a biological clock and is important in the regulation of circadian rhythms.

Sympathetic Nervous System.

A major branch of the autonomic nervous system (along with the parasympathetic nervous system) whose main function is to mobilize the body’s resources for fight or flight (i.e. increase arousal).

Synapse.

A point of contact, tiny gap, or junction that provides the site of transmission (chemical or electrical) between a nerve and its effector, such as another neuron or muscle cell.

Synaptic Vesicles.

Protective sacs that store molecules of neurotransmitter in the endings of axons.

α-Synuclein.

A small protein which has been implicated in some forms of Parkinson’s disease.

Tau.

A protein that is found in neurofibrillary tangles.

Temporal Lobe.

The area of the cerebral cortex lying below and lateral to the Sylvian fissure and parietal lobe.

Testosterone.

The main sex hormone produced by the male gonads, or testes. It has organizational effects on the body and central nervous system during foetal and pubertal development, and activational effects on certain types of behaviour in adulthood.

Thalamus.

An egg-shaped mass of nuclei located just above the hypothalamus which functions as the principle relay station for sensory information going to the cerebral cortex, and is also crucially involved in regulating its electrical activity.

Thermoreceptors.

Receptors that detect temperature at low levels of activity and pain at higher intensities.

Tolerance.

Drug tolerance occurs when the repeated use of a substance leads to that agent producing less of an effect than it did initially which may be a causal factor in addiction. The reasons for drug tolerance are complex and include biological causes (pharmacokinetic and pharmacodynamic) as well as behavioural causes.

Transfer RNA.

The single-stranded nucleic acid that is responsible for bringing amino acids found in the cytoplasm to the ribosome for protein synthesis.

Transgenic Animals.

Animals that have been genetically engineered or modified using DNA from another organism.

Trunk.

The central portion of corpus callosum situated between the anterior ‘genu’ and the more posterior ‘splenium’.

Turner’s Syndrome.

A condition in which the female inherits only one X chromosome and does not develop functional ovaries.

Ventral Tegmental Area (VTA).

An area of the midbrain which receives input from the medial forebrain bundle and is the main source of dopaminergic neurons to the forebrain.

Ventricles.

The hollow spaces in the brain that contain cerebrospinal fluid. In humans these consist of the two lateral ventricles: the 3rd ventricle and the 4th ventricle.

Ventromedial Hypothalamus.

A large nucleus in the hypothalamus which has been shown to be important in feeding and female sexual behaviour.

Viscera.

Another term for the main internal organs of the body.

Visual Cortex.

A region of the occipital lobes which is the primary cortical region and receives, integrates and processes visual information from the eyes.

Vomeronasal Organ.

A sensory organ found in reptiles and most mammals (including humans) that responds to certain types of olfactory information, including pheromones.

Wernicke’s Aphasia.

A language impairment characterized by fluent and meaningless speech, and poor language comprehension.

Wernicke’s Area.

A region of auditory association cortex in the temporal lobes that is involved in language comprehension and the production of meaningful speech.

Working Memory.

A form of short-term memory that is able to concurrently hold information whilst we process other information or perform a task. Also known as an executive function.