

Chapter 1 : Neuroscience: A Journey Through the Brain - Basic Anatomy of the Nervous System

Hank resists the urge to devour a slice of pizza so that he can walk you through the way we experience our major special senses. It all boils down to one thing: sensory cells translating chemical.

Found in the retina eye. Assists in the transduction of light into a neural impulse. Somatosensory cell Found in the skin. Involved with the tactile senses, such as touch, kinesthesia, pain, and proprioception. Motor cell The cell body is found in the spinal cord, and the neuron projects to the muscles. Pyramidal cell Found in the cortex. They have a pyramid-shaped cell body and send information from the cortex to another brain area. Purkinje cell Found in the cerebellum. The cerebellum is mainly involved in the learning of motor skills. Association cell Found in the thalamus. Acts to connect other neurons passing through the thalamus. Glial Cell Provides structural support and repairs neurons. Oligodendroglia Insulate and speed transmission of central nervous system CNS neurons. Microglia Perform phagocytosis of damaged or dead cells. Ependymal cells Matter Types back to top The different parts of the nervous system typically appear gray, white, or mottled. Gray matter consists of regions of capillary blood vessels and neuron cell bodies. Reticular matter, which appears mottled, is an area where cell bodies and axons are mixed. Nuclei and Tracts back to top In the CNS, a large number of cell bodies grouped together are called a nucleus. These nuclei each have a particular function. For example, the medial geniculate nucleus in the thalamus is one part of the auditory pathway. Nuclei typically appear gray see gray matter above because of the cell bodies. A large collection of axons in the CNS is referred to as a tract or a fiber pathway. These tracts carry information from one place to another in the brain, much like axons do. For example, the optic tract carries information from the eyes to the occipital lobe in the brain. Created and Maintained by: Melissa Davies Last Updated: April 09,

Chapter 2 : Olfactory nerve - Wikipedia

The nervous system must receive and process information about the world outside in order to react, communicate, and keep the body healthy and safe. Much of this information comes through the sensory organs: the eyes, ears, nose, tongue, and skin.

The kidneys are tucked up close to the liver toward the spine. The organ systems include: The cardiovascular system cat dog includes the heart and blood vessels. The cardiovascular system performs the function of pumping and carrying blood to the rest of the body. The blood contains nutrients and oxygen to provide energy to allow the cells of the body to perform work. The lymphatic system includes the lymph nodes and lymph vessels. The lymphatic system is part of the immune system that helps the body fight off disease. The lymphatic system also works with the cardiovascular system to return fluids that escape from the blood vessels back into the blood stream. The digestive system cat dog includes the mouth, teeth, salivary glands, esophagus, stomach, intestine, pancreas, liver and gall bladder. The digestive system absorbs and digests food and eliminates solid wastes from the body. The skin protects the underlying organs. The fur helps insulate against heat loss. Dogs and cats do not sweat through their skin. They only sweat from their footpads and nose. They lose water by panting rather than sweating. The musculoskeletal system includes all the muscles, bones and joints. The respiratory system cat dog includes the mouth, nose, trachea, lungs and smaller airways bronchi and bronchioles. The respiratory system is responsible for taking in oxygen and eliminating waste gases like carbon dioxide. Because dogs and cats do not sweat through the skin, the respiratory system also plays an important role in regulation of temperature. The urogenital system cat dog includes the kidneys, ureters, urinary bladder, urethra and the genital organs of box sexes. The urinary system is responsible for removing waste products from blood and eliminating them as urine. The genital organs are involved in reproduction. The nervous system includes the brain, spinal cord and all the nerves that communicate between tissues and the brain and spinal cord. The endocrine system includes several glands that produce hormones. Hormones are substances that travel through the blood stream and affect other organs. Endocrine organs include the thyroid glands, parathyroid glands, adrenal glands and part of the pancreas. The organs of special senses cat dog allow the animal to interact with its environment; sight, taste, smell and hearing. The hematopoietic system includes the bone marrow which is located inside the bones. Three types of blood cells are made in the bone marrow: Washington State University assumes no liability for injury to you or your pet incurred by following these descriptions or procedures.

Chapter 3 : Cat and Dog Anatomy

Involved with the tactile senses, such as touch, kinesthesia, pain, and proprioception. Motor cell The cell body is found in the spinal cord, and the neuron projects to the muscles.

List of foramina of the human body After emerging from the brain, the cranial nerves travel within the skull , and some must leave this bony compartment in order to reach their destinations. Often the nerves pass through holes in the skull, called foramina , as they travel to their destinations. Other nerves pass through bony canals, longer pathways enclosed by bone. These foramina and canals may contain more than one cranial nerve and may also contain blood vessels. The olfactory nerve I , actually composed of many small separate nerve fibers, passes through perforations in the cribriform plate part of the ethmoid bone. These fibers terminate in the upper part of the nasal cavity and function to convey impulses containing information about odors to the brain. The optic nerve II passes through the optic foramen in the sphenoid bone as it travels to the eye. It conveys visual information to the brain. The oculomotor nerve III , trochlear nerve IV , abducens nerve VI and the ophthalmic branch of the trigeminal nerve V1 travel through the cavernous sinus into the superior orbital fissure , passing out of the skull into the orbit. These nerves control the small muscles that move the eye and also provide sensory innervation to the eye and orbit. The maxillary division of the trigeminal nerve V2 passes through foramen rotundum in the sphenoid bone to supply the skin of the middle of the face. The mandibular division of the trigeminal nerve V3 passes through foramen ovale of the sphenoid bone to supply the lower face with sensory innervation. This nerve also sends branches to almost all of the muscles that control chewing. The facial nerve then reaches the side of the face by using the stylomastoid foramen, also in the temporal bone. Its fibers then spread out to reach and control all of the muscles of facial expression. The vestibulocochlear nerve reaches the organs that control balance and hearing in the temporal bone, and therefore does not reach the external surface of the skull. The glossopharyngeal IX , vagus X and accessory nerve XI all leave the skull via the jugular foramen to enter the neck. The glossopharyngeal nerve provides innervation to the upper throat and the back of the tongue, the vagus provides innervation to the muscles in the voicebox, and continues downward to supply parasympathetic innervation to the chest and abdomen. The accessory nerve controls the trapezius and sternocleidomastoid muscles in the neck and shoulder. The hypoglossal nerve XII exits the skull using the hypoglossal canal in the occipital bone and reaches the tongue to control almost all of the muscles involved in movements of this organ. The sensory innervation includes both "general" sensation such as temperature and touch, and "special" innervation such as taste , vision , smell , balance and hearing [1] [11] The vagus nerve X provides sensory and autonomic parasympathetic motor innervation to structures in the neck and also to most of the organs in the chest and abdomen. Damage to the olfactory nerve I can cause an inability to smell anosmia , a distortion in the sense of smell parosmia , or a distortion or lack of taste. If there is suspicion of a change in the sense of smell, each nostril is tested with substances of known odors such as coffee or soap. Intensely smelling substances, for example ammonia, may lead to the activation of pain receptors nociceptors of the trigeminal nerve that are located in the nasal cavity and this can confound olfactory testing. A person may not be able to see objects on their left or right sides homonymous hemianopsia , or may have difficulty seeing objects on their outer visual fields bitemporal hemianopsia if the optic chiasm is involved. Visual field testing may be used to pin-point structural lesions in the optic nerve, or further along the visual pathways. Both or one eye may be affected; in either case double vision diplopia will likely occur because the movements of the eyes are no longer synchronized. This object may be a finger or a pin, and may be moved at different directions to test for pursuit velocity. Individuals suffering from a lesion to the oculomotor nerve may compensate by tilting their heads to alleviate symptoms due to paralysis of one or more of the eye muscles it controls. This is due to impairment in the superior oblique muscle , which is innervated by the trochlear nerve. Combined, these nerves provide sensation to the skin of the face and also controls the muscles of mastication chewing. This is where a person is unable to move the muscles on one or both sides of their face. In blunt trauma , the facial nerve is the most commonly injured cranial nerve. Strokes typically also affect the seventh cranial nerve by cutting off blood supply to nerves in the brain that signal this nerve and so

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can present with similar symptoms. The vestibular part is responsible for innervating the vestibules and semicircular canal of the inner ear ; this structure transmits information about balance , and is an important component of the vestibuloocular reflex , which keeps the head stable and allows the eyes to track moving objects. The cochlear nerve transmits information from the cochlea , allowing sound to be heard. Function of the vestibular nerve may be tested by putting cold and warm water in the ears and watching eye movements caloric stimulation. Major effects of damage to the vagus nerve may include a rise in blood pressure and heart rate. Isolated dysfunction of only the vagus nerve is rare, but - if the conflict or lesion is located above the point at which the vagus first branches off - can be diagnosed by a hoarse voice, due to dysfunction of one of its branches, the recurrent laryngeal nerve. Damage to the accessory nerve XI will lead to ipsilateral weakness in the trapezius muscle. This can be tested by asking the subject to raise their shoulders or shrug, upon which the shoulder blade scapula will protrude into a winged position. A case with unilateral hypoglossal nerve injury in branchial cyst surgery. Damage to the nerve at lower motor neuron level may lead to fasciculations or atrophy of the muscles of the tongue. The fasciculations of the tongue are sometimes said to look like a "bag of worms". Upper motor neuron damage will not lead to atrophy or fasciculations, but only weakness of the innervated muscles. When damaged and extended, the tongue will move towards the weaker or damaged side, as shown in the image.

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In human hearing, sound waves enter the outer ear and travel through the external auditory canal. When the waves reach the tympanic membrane, they cause the membrane and the attached chain of auditory ossicles to vibrate.

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The signals travel through the auditory nerve directly to the brain, which interprets these impulses into sound. Humans can normally detect sounds within a range of 20 - 20,000 Hertz. Lower frequencies can be detected solely as vibrations through somatosensory receptors, and frequencies above this range cannot be detected but often can be.

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allow the animal to interact with its environment; sight, taste, smell and hearing.