

Structures and functions of cells in nervous system biology essay



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Neurons are the nerve cells; they contain a cell body, an axon, and dendrites. The cell body is the part that contains the nucleus and cytoplasm. The axon is a piece that extends from the cell body; its job is to send impulses away from the cell body. Most are covered with myelin sheath. This sheath helps protect the axon and speeds the impulse. The dendrites branch off from the cell body also, their job is to send impulses to the cell body.

Neuralgia is a connective tissue that supports the neurons. Their job is to protect the nervous system. Astrocytes look like star-shaped cells; they are the biggest of the neuroglial cells in the central nervous system. Astrocytes surround the brain's blood capillaries to form blood-brain barriers which protect the brain from harmful substances. Microglia are smaller cells that eat cellular debris, waste, and pathogens in nerve tissue. Oligodendrocytes are in the interstitial nervous system, smaller than astrocytes. They wrap around axons to form myelin sheaths. As stated above, the sheaths protect the axons and speed the nerve impulses.

Describe the structures and functions of the peripheral nervous system (PNS). Be sure to include the nerves associated with the PNS, and contrast the functions of the somatic and autonomic nervous systems.

The peripheral nervous system consists of nerves, which transmit impulses from the brain to other parts of the body; and ganglion, which are masses of nerve cell bodies that connect structures. There are two main groups of nerves: the afferent nerves and the efferent nerves. The afferent nerves send information from the body to the brain. The efferent nerves send information from the brain to the muscles. The system is then broken into

the somatic and autonomic nervous systems. The somatic nervous system regulates the voluntary controlled parts of the skeletal muscles, while the autonomic nervous system regulates involuntary controlled parts like smooth muscle, cardiac muscle, the glands, and secretions. The autonomic nervous system is also broken into two parts: the sympathetic and parasympathetic divisions. The sympathetic division responds when the body is in danger, increases heart rate, blood pressure, etc. The parasympathetic division is when the body is relaxed and resting. It is responsible for things like constriction of pupil, slowing of heart, and digestive systems.

Name the two primary components of the central nervous system (CNS). Describe the protective membranes associated with the CNS. Differentiate between afferent and efferent nerve structure and function.

The central nervous system consists of the brain and the spinal cord. The brain is protected by the skull and the spinal cord is, obviously, protected by the vertebrae. They are also surrounded by meninges and by cerebrospinal fluid. The meninges are three protective layers of tissue. The outermost layer is the dura mater, the middle is the arachnoid membrane, and then the pia mater is the innermost layer. The cerebrospinal fluid flows all around the brain and spinal cord. It provides nutrients to the central nervous system. The spinal cord consists of afferent and efferent nerves. The afferent nerves send information from the body to the brain. The efferent nerves send information from the brain to the muscles.

Name and give a brief description of the structures of the brain. Include the functions of these structures.

The four major divisions of the brain are the cerebrum, the cerebellum, the diencephalon, and the brain stem. The cerebrum is the largest part of the brain. It is the whole top portion of the brain; it controls the memory, sensations, and voluntary movements. The cerebellum is attached to the brain stem and its main function is to coordinate body movements and balance. The diencephalon is in between the cerebrum and the midbrain. It consists of the thalamus, which is in charge of the sensory stimuli; the hypothalamus, which is in charge of sensory functions (i. e.: sleep, appetite, etc.); and the pineal body, which is in charge of regulating the body's biological clock. The brain stem is between the spinal cord and the diencephalon and consists of the medulla oblongata, the pons, and the upper part of the midbrain. The brain stem is the path for impulses between the brain and the body.

Choose 10 pathological conditions affecting the nervous system; describe each including diagnosis and treatment, if applicable.

Alzheimer's disease is a progressively fatal disease. It destroys brain cells and causes memory loss. Gradually over time the person will no longer be able to write or perform tasks, and then it gets to the point that the person cannot even control bodily functions such as bowel and bladder movements. There is not really a diagnostic test yet that has identified Alzheimer's. There is no cure for AD, but the use of tacrine hydrochloride is used in mild cases to improve memory.

Bell's palsy is generally a temporary paralysis of the muscles on one side of the face following trauma. Diagnosis is simply the inability to close eye or

drooling because of no control of facial muscle on one side of the face after a trauma has occurred. There is really no treatment needed, however, facial massage, heat, prednisone for swelling, or analgesia for pain all help.

Anencephaly is when there is no brain or spinal cord at birth. The only diagnosis is through an amniocentesis during pregnancy, and there is nothing they can do.

Carpal tunnel syndrome is pressure on the median nerve caused by swelling of the tendons. Doctors diagnose carpal tunnel based on the symptoms of tingling in the fingers or palms of hands, pain in the wrists, or weakness in hands. Treatment uses splints, anti-inflammatory drugs, and sometimes surgery.

Cerebral contusion occurs when the brain hits the inner skull and causes a bruise of the brain, happens most often in car accidents. If doctors suspect a cerebral contusion they can have an MRI or CT scan run. Treatment consists of close observation, if there is a lot of intracranial pressure then surgery may be needed.

Huntington's chorea is an inherited, degenerative disorder. The characteristics are spontaneous involuntary motor movements, speech problems, and restlessness. Since the disease is inherited, genetic testing could be done to diagnose the disease even before it begins. There is unfortunately no cure for this disease. There are many support groups for families affected by the disease.

Narcolepsy is a sleeping disorder where the person can fall asleep randomly for minutes or even hours at a time. A polysomnogram can be performed to evaluate the person's sleep patterns. There is no cure, but medications are used to control the symptoms.

Shingles (herpes zoster) is a viral infection that causes a rash on the body; occurs mostly in adults over 50. Flu-like symptoms, GI disturbances, tiredness, and rash are all symptoms that help to diagnose the disease. Treatments are used to help ease pain and get you better faster (analgesics or antiviral medications).

Paraplegia is caused when there is severe injury to the spinal cord, results in paralysis of the lower half of the body. There is no treatment for paraplegia. However I did see online that there are many support groups for anyone who knows or falls victim to paraplegia.

Multiple sclerosis is an inflammatory disease of the central nervous system. MS destructs the myelin surrounding nerves of the CNS. There are many symptoms that indicate someone could have MS: Unsteady balance, numbness of multiple extremities, facial numbness, and even impotence in males. When a doctor suspects MS an MRI may be performed, complete blood count, and spinal fluid evaluation. As with many of the diseases of the nervous system, there is no cure for MS. There are some medications that have helped prolong remissions, and as always there are support systems to help the family and person's affected by the disease.