

Tikrit University

College of Nursing

Basic Nursing Sciences



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Physiology

Nervous system part two

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Nervous System

Parts of the Brain :

1. Cerebrum (Cerebral Hemispheres)

Cerebrum is the largest part of the human brain, which consists of two hemispheres separated by longitudinal fissure. It covers the superior part of the brain. Cerebral cortex: its functions include speech, memory, logical and emotional response as well as consciousness, interpretation of sensations and voluntary movement.

Lobes of cerebral cortex and functions :

1. **Frontal lobe** : Planning of movement , recent memory, Emotion.
2. **Parietal lobe** : Interprets the body sensation.
3. **Temporal Lobe** : Receives impulses from inner ear.
4. **Occipital Lobe** : Interprets vision.

Broca's area: A specialized area that is very much involved in the ability to speak. It is located in the **left hemisphere**.

2. **Diencephalons (interbrain)**: The major structures of the diencephalons are :

1. **Thalamus**: responsible for : Touch, pain and temperature and control the level and state of consciousness.
2. **Hypothalamus**: (under the thalamus) responsible for :

a) Regulates the body temperature, water balance and metabolism.

b) Regulates the pituitary gland (an endocrine gland) .

3. Epithalamus: The important parts of the epithalamus are the pineal body (part of the endocrine system) and the choroids plexus.

3. Brain stem : It is about the size of a thumb in diameter and approximately 3 inches long. Its structures are :

1. Midbrain : It is the smallest part of brain stem, contains the centers of visual and auditory reflexes and it helps to control skilled muscular movements.

2. Pons : just below the midbrain. It is important in the control of breathing.

3. Medulla oblongata: It is the most inferior part of the brain stem.
Functions:

a. Controls heart rate, blood pressure.

b. Controls breathing, swallowing and vomiting.

4. Cerebellum: The large cauliflower like structure, projects dorsally from under the occipital lobe of cerebrum.

Functions:

a. Provides the precise timing for skeletal muscle activity.

b. Controls balance and equilibrium.

When cerebellum is damaged, ataxia occurs and the patient loss his balance .

Cerebrospinal fluid (CSF): Circulate around the brain and spinal cord. It is like blood plasma but has **very little protein, less K^+ , glucose and HCO_3** , but **more Na^+ , Cl and Mg^{2+}** .

Volume: 150 ml

Specific gravity: 1.005 – 1.008

- **Choroids plexus:** the structure that **produces** CSF
- **Arachnoids villi:** the structure that **drains** CSF.

Functions of CSF:

- i. Acts as shock absorber
- ii. Keeps total volume of cranial contents constant.
- iii. Low K^+ concentration allows neurons to generate very high electrical potentials.

Spinal cord: is a continuation of brain stem. It extends from the large opening (foramen magnum) in the base of skull down to the lower back (1st lumbar vertebrae). It is a cylindrical shaped structure about **42 cm long** and about **2.5 cm in diameter**.

Functions of spinal cord :

- a) It provides a two-way conduction pathway to and from the brain.
- b) It is a major reflex center of the body

Cranial Nerves: Cranial nerves carry information from the brain to other parts of the body, primarily to the head and neck. These nerves are paired and present on both sides of the body. They are mainly responsible for facilitating smell, vision, hearing, and movement of muscles.

Cranial nerves are concerned with the head, neck, and other facial regions of the body. Cranial nerves arise directly from the brain in contrast to spinal nerves and exit through its foramina. Most of the cranial nerves originate in the brain stem and pass through the muscles and sense organs of the head and neck.

There are twelve cranial nerves which are numbered using Roman numerals according to the order in which they emerge from the brain (from front to back).

Cranial nerves are considered as a part of the peripheral nervous system, although olfactory and optic nerves are considered to be part of the Central nervous system. Most of the cranial nerves belong to the somatic system. Some of the cranial nerves are responsible for sensory and motor functions as they contain only sensory fibres and motor fibres. Others are mixed nerves because they include both sensory and motor fibres.

Functions of Cranial Nerves

Following is the cranial nerves list along with the important functions they perform:

Olfactory nerve: This nerve helps to feel the sense of smell. This is the primary nerve that is responsible for the smell. Damage to this nerve may result in distortion of smell and taste.

Optic nerve: The optic nerve II is the agent of vision. This transmits visual information from the eyes to the brain and vice versa. Any damage to this nerve results in problems related to sight and vision.

Oculomotor nerve: Oculomotor nerve helps in the movement of the eye. Damage to this nerve leads to distortion in vision or double vision and even problem in the coordination of eyes.

Trochlear and Abducens nerves: These nerves also help in eye movement. Damage to the Trochlear nerve might cause inability to move eyeball downwards and damage to abducens nerve might result in diplopia.

Trigeminal nerve: This nerve helps you to have facial sensation. This nerve comprises of three parts namely ophthalmic, maxillary and mandibular.

Facial nerve: This nerve is responsible for facial expression. Due to the damage to this nerve, it might cause the inability to move face parts on one or more sides.

Vestibulocochlear nerve (auditory vestibular nerve): Vestibulocochlear (auditory vestibular nerve) is responsible for hearing and balance. This helps eyes to keep track of moving objects while your head is stable. The sensation of spinning and dizziness are the symptoms of damage to this nerve. This nerve branches into the vestibular nerve and cochlear nerve.

Glossopharyngeal: Oral sensation and sense of taste are stimulated by this nerve. Damage to this nerve disables the sense of taste.

Vagus nerve: This nerve monitors the level of oxygen and helps us to feel the sensation of heat or cold near the throat area. Damage to this nerve leads to the inability to swallow. Major damage to the vagus nerve might result in hypertension or high blood pressure and heart attack.

Accessory nerve: This nerve is also known as nerve XI and arises from two roots namely the cranial and spinal bones. This nerve controls swallowing movements and helps in the movement of head and shoulders.

Hypoglossal nerve: This nerve facilitates the movement of the tongue and helps to talk, swallowing etc.