

Nervous system (N.S.) or nervous tissue extend to almost every part of our body & every part is linked in one way or another to the N.S.

N.S. together with endocrine system controls & integrates the activities of different parts of the body.

It's not equally distributed within the body, the distribution is differ from one part to another.

N.S. is concentrated within the skull as *brain* & part of it is concentrated within the vertebral column as *spinal cord*.

Both brain & spinal cord are considered as the **Central nervous system** (C.N.S.).

From these two structures, nerves & nerve fibers originate to supply different parts of our body. These nerves are simply known as the **Peripheral nervous system** (P.N.S.).

Another system exist & known as **Autonomic nervous system** (A.N.S.). It control different activities of the body without the awareness of the C.N.S. like the viscera, glands & all smooth muscles in the body.

From it's name, it works independently of the higher centre of the C.N.S.

* *Functionally* , the N.S. can be further divided into :

- somatic N.S.: which controls voluntary activities of the body
- autonomic N.S.: which controls involuntary activities of the body

* C.N.S. *

It compose of large number of nerve cells (neurons), with all it's processes which are two types, dendrites: short processes of cell body & an axon: longest process of cell body. The nerve cells & their processes supported by specialized tissue called neuroglia.

The interior of C.N.S. is organized into :

- gray matter: consist of nerve cells embedded in neuroglia.
- White matter: consist of nerve fibers (axons) embedded in neuroglia.

* P.N.S. *

It compose of cranial & spinal nerves & their associated ganglia.

a- **Cranial nerves**: there are 12 pairs of cranial nerves that leave the brain & pass through foramina in the skull.

All cranial nerves are distributed in the head & neck *except* the Vagus nerve (10th.) which also supplies structures in the thorax & abdomen.

b- **Spinal nerves**: a total of 31 pairs of spinal nerves leave the spinal cord & pass through intervertebral foramina in the vertebral column.

Spinal nerves are named according to the region of the vertebral column with which they are associated, they arranged as follow :

1. 8 pairs cervical [C1_C8]
2. 12 pairs thoracic [T1_T12]
3. 5 pairs lumbar [L1_L5]
4. 5 pairs sacral [S1_S5]
5. 1 pair coccygeal spinal nerves

* The typical spinal nerve :

Each spinal nerve arises from the spinal cord by two roots :

1- **posterior root** (dorsal, sensory, afferent) fibers.

2- **anterior root** (ventral, motor, efferent) fibers.

The posterior root characterized by a ganglion called **posterior root ganglion** which is a collection of nerve cell bodies of the sensory nerve fibers related to the dorsal root of spinal cord.

The two roots will unite together at each intervertebral foramen to form a trunk of spinal nerve which remains as small distance { made up of a mixture of motor & sensory fibers }, then it'll divides again into 2 branches called **rami** as a small dorsal (posterior) & large ventral (anterior) ramus.

These rami are characterized by mixed nerves pass through them i.e. it contain both motor & sensory nerves.

* *posterior ramus* of every spinal nerve passes posteriorly around the vertebral column to supply the muscles & skin of the back.

* *anterior ramus* continues anteriorly to supply the muscles & skin over the anterolateral body wall & all the muscles & skin of the limbs.

It also gives a small branch to the adjacent **sympathetic trunk ganglion** & receives branch from it.

* A.N.S. *

part of the nervous system concerned with the innervation of involuntary structures like the heart, smooth muscles & glands.

It distributed throughout the central & peripheral nervous system (independent)

It's under control of hypothalamus of the brain.

It's divided into two parts :

1. **Sympathetic** : it prepare the body for an emergency situation { increases heart rate, blood pressure, decreases peristalsis, close sphincters }
2. **Parasympathetic** : conserve & restore energy of the body { reverse action }

Both parts of A.N.S. have afferent & efferent nerve fibers.

