



THE NERVOUS SYSTEM

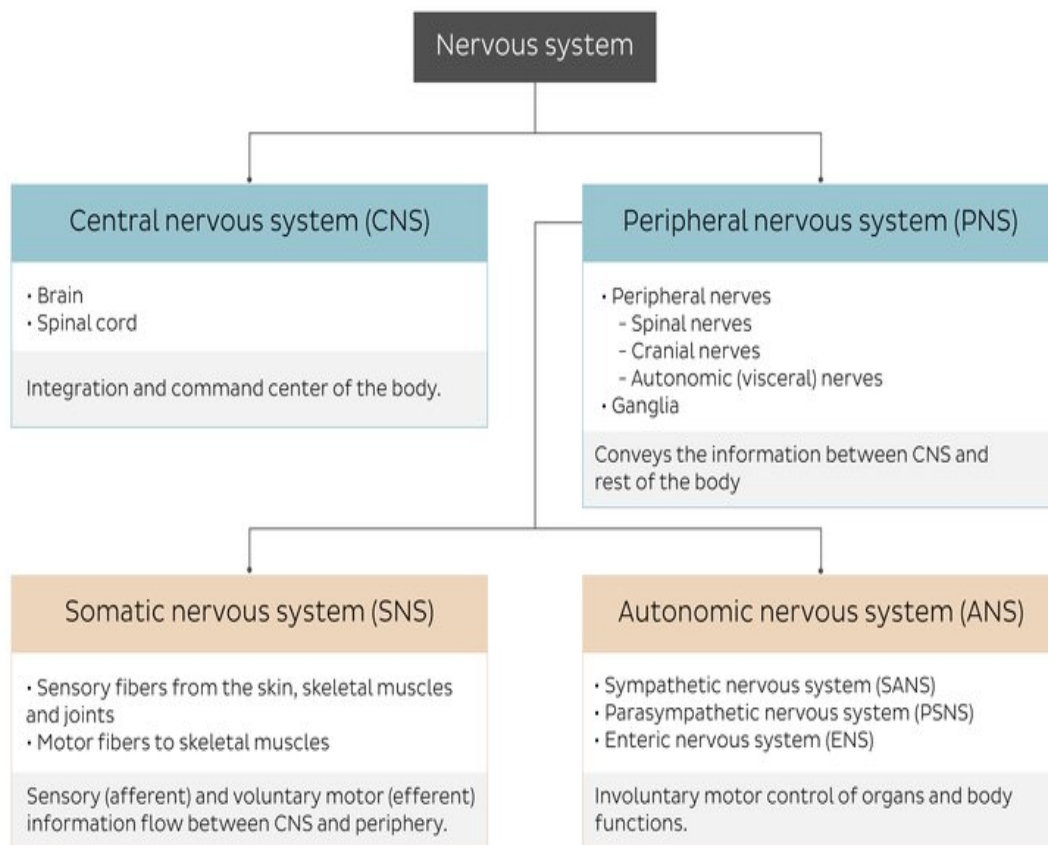
PART 2

An Overview on the Nervous System

The nervous system is a network of neurons whose main feature is to generate, modulate and transmit information between all the different parts of the human body. This property enables many important functions of the nervous system, such as regulation of vital body functions (heartbeat, breathing, digestion), sensation and body movements. Ultimately, the nervous system structures preside over everything that makes us human; our consciousness, cognition, behaviour and memories.

The nervous system consists of two divisions;

- Central nervous system (CNS) is the integration and command center of the body
- Peripheral nervous system (PNS) represents the conduit between the CNS and the body. It is further subdivided into the **somatic nervous system (SNS)** and the **autonomic nervous system (ANS)**.



Nervous tissue contains two major cell types, neurons and glial cells. Neurons are the cells responsible for communication through electrical signals. Glial cells are supporting cells, maintaining the environment around the neurons.

Neurons are polarized cells, based on the flow of electrical signals along their membrane. Signals are received at the dendrites, are passed along the cell body, and propagate along the axon towards the target, which may be an other neuron, muscle tissue, or a gland. Many axons are insulated by a lipid-rich substance called myelin. Specific types of glial cells provide this insulation.

Cells of the nervous system: Two basic types of cells are present in the nervous system;

- a- Neurons**, or nerve cell, are the main structural and functional units of the nervous system. Every neuron consists of a body (soma) and a number of processes

(neurites). The nerve cell body contains the cellular organelles and is where neural impulses (action potentials) are generated. The processes stem from the body, they connect neurons with each other and with other body cells, enabling the flow of neural impulses. There are two types of neural processes that differ in structure and function;

- **Axons** are long and conduct impulses away from the neuronal body.
- **Dendrites** are short and act to receive impulses from other neurons, conducting the electrical signal towards the nerve cell body.

Every neuron has a single axon, while the number of dendrites varies. Based on that number, there are four structural types of neurons; multipolar, bipolar, pseudounipolar and unipolar.

The morphology of neurons makes them highly specialized to work with neural impulses; they generate, receive and send these impulses onto other neurons and non-neural tissues.

The site where an axon connects to another cell to pass the neural impulse is called a **synapse**. The synapse doesn't connect to the next cell directly. Instead, the impulse triggers the release of chemicals called **neurotransmitters** from the very end of an axon. These neurotransmitters bind to the effector cell's membrane, causing biochemical events to occur within that cell according to the orders sent by the CNS.

b- Glial cell : one of the various types of neural tissue cells responsible for maintenance of the tissue, and largely responsible for supporting neurons

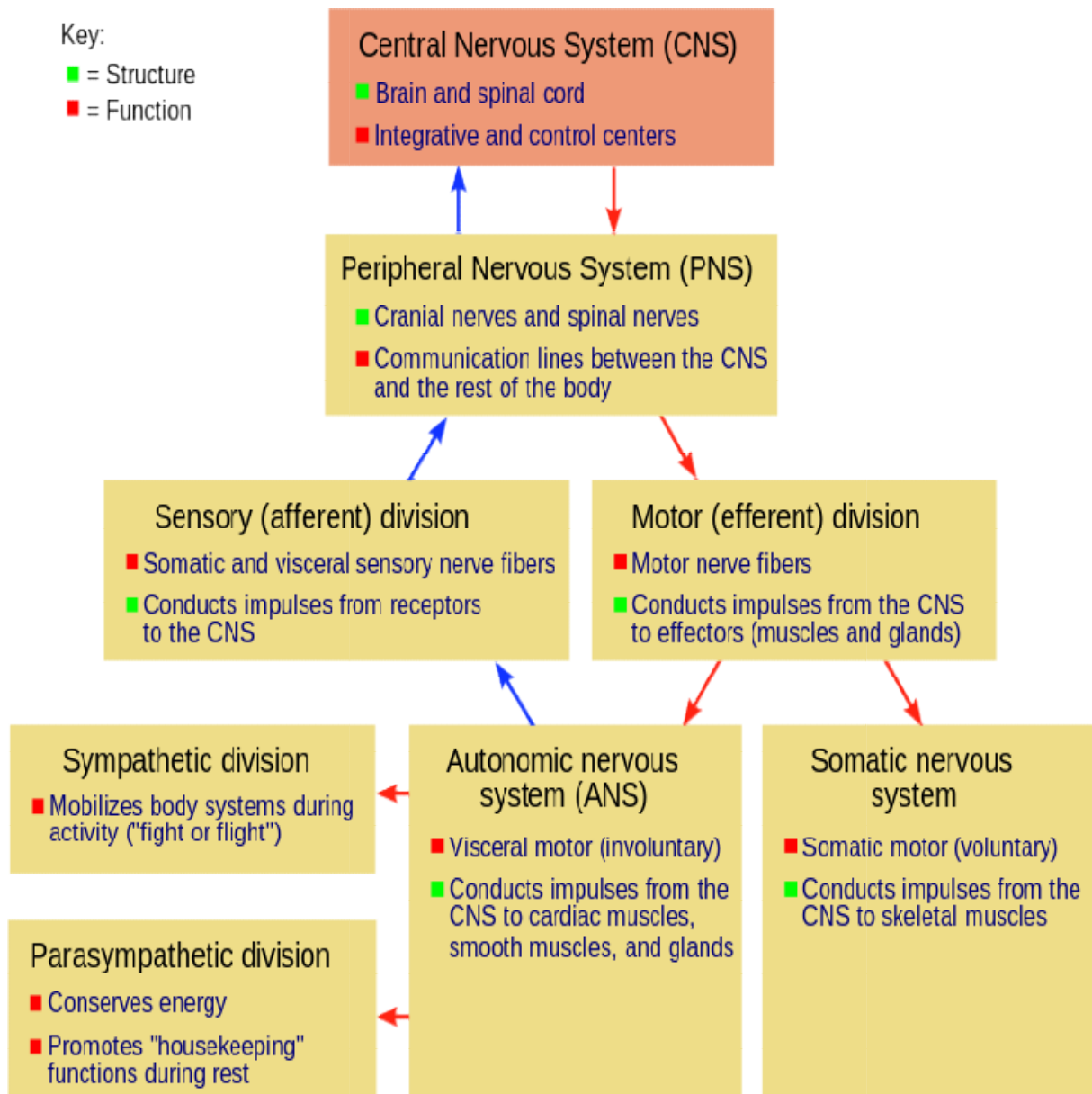


Diagram showing the major divisions of the vertebrate nervous system.

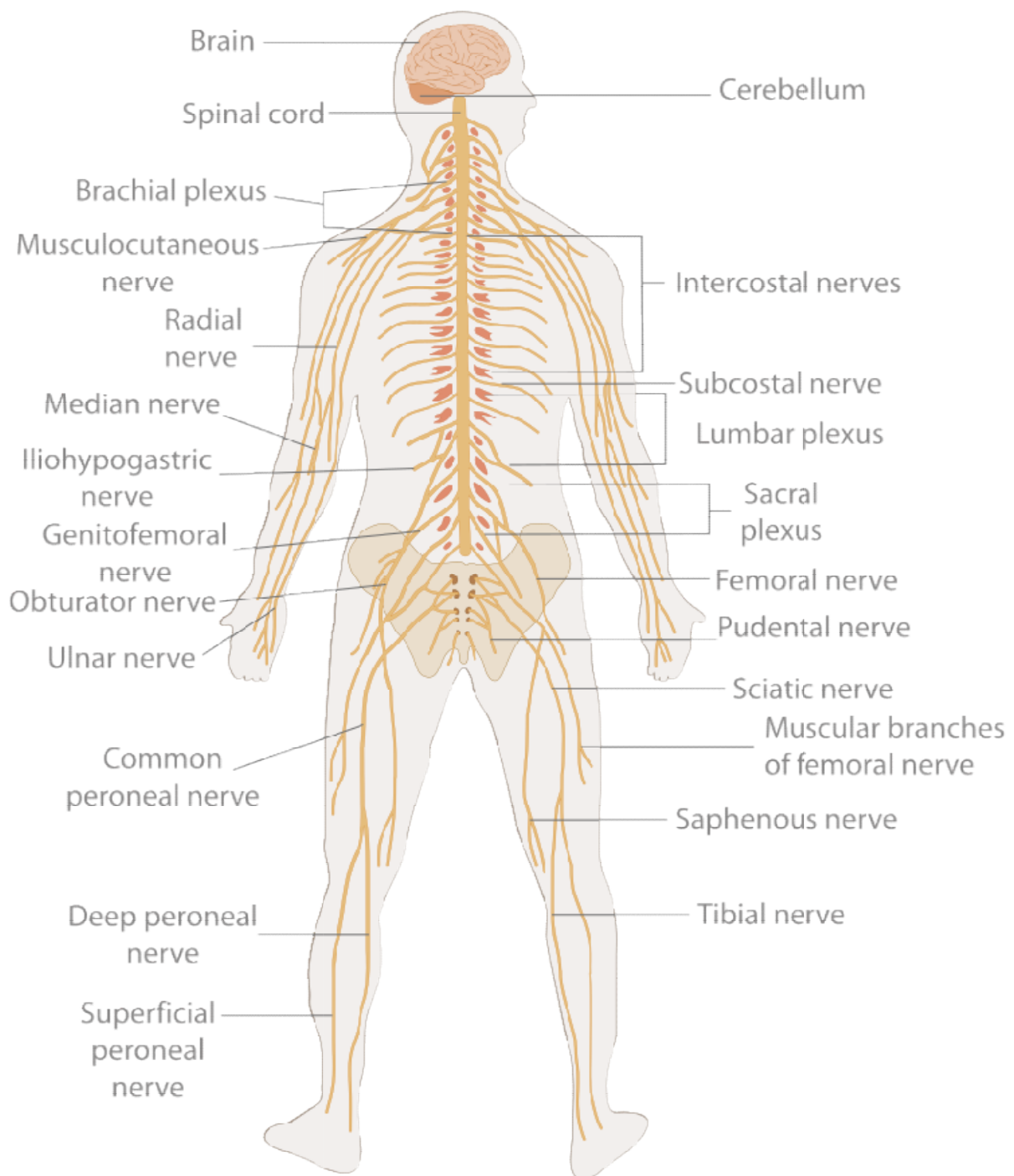


FIGURE .1. The different human nerves

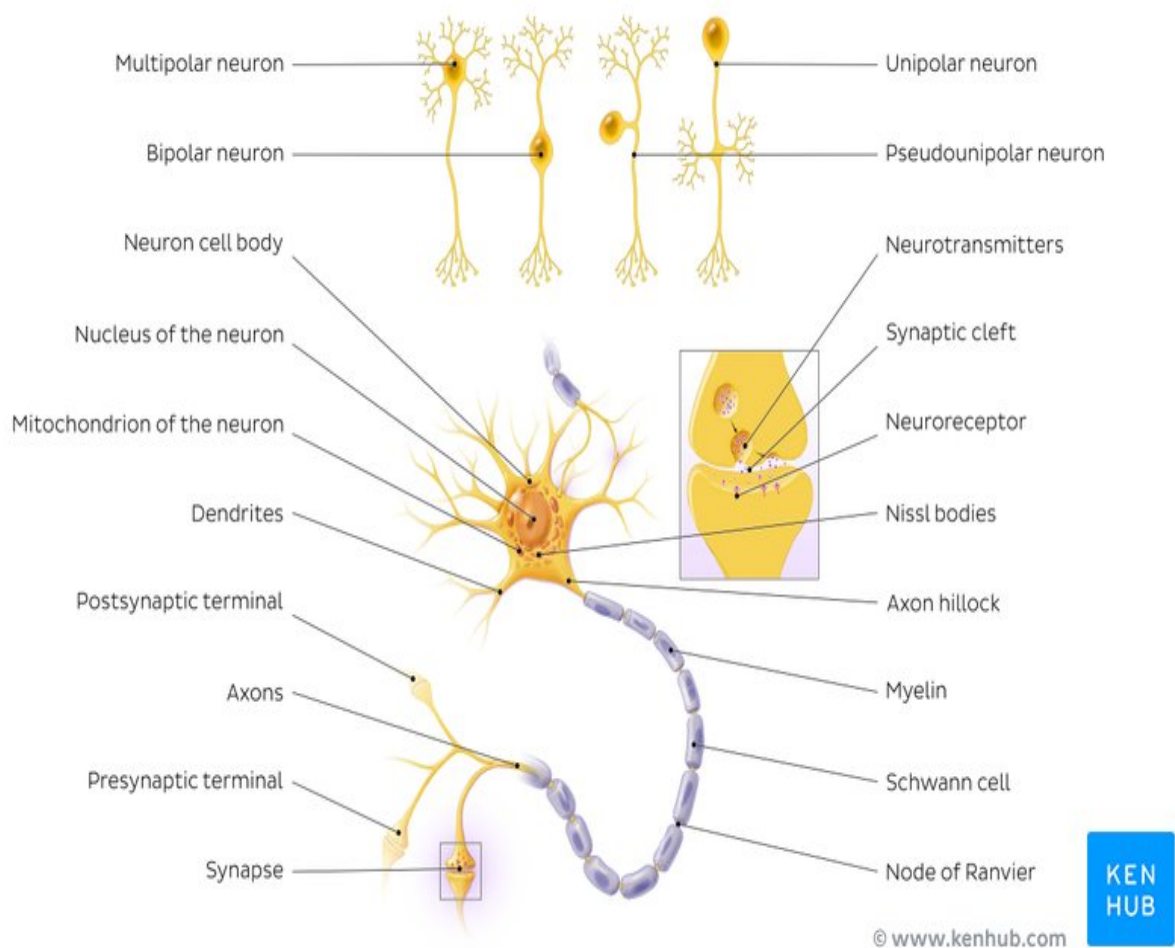


Figure .2. Neurons structure and types

References:

-<https://www.kenhub.com/en/library/anatomy/the-nervous-system>

-Jana Vasković MD • Reviewer: Nicola McLaren MSc

Last reviewed: April 12, 2023

-Blumenfeld, H. (2018). Neuroanatomy through clinical cases. Sunderland, MA: Sinauer.

-Goodfellow, J., Collins, D., Silva, D., Dardis, R., & Nagaraya, S. (2016). Neurology & neurosurgery. New Delhi, India: Jp medical pub.

-Patestas, M. A., & Gartner, L. P. (2016). A textbook of neuroanatomy. Hoboken: Wiley Blackwell

-Waxman, S. G. (2010). Clinical neuroanatomy. New York: McGraw-Hill Medical.