



THE NERVOUS SYSTEM

LEARNING OBJECTIVES

- To state the function of the Nervous system.
- To describe the structure and workings of the nervous system.
- To name the major parts of the nervous system.
- To describe the effects of the Nervous System on movement.
- Understanding the relationship of the nervous system with the other systems in the body.

WHAT ARE THE FUNCTIONS OF THE NERVOUS SYSTEM?

- Controls all the functions of the human body.
- Collects information from inside and outside of the body.
- Relays messages to the brain and spinal cord.
- Processes the information to determine the best response.
- Send messages to muscles, glands and organs so they can respond correctly.

WHAT MAKES UP THE NERVOUS SYSTEM?

Neurons join together to form a complicated communication network that is the Nervous system. The Nervous System is made up of the:

- Brain
- Spinal Cord
- Nerves

The Brain and Spinal cord are so delicate that they are surrounded by bone for their protection. The brain is protected inside the skull or cranium and the spinal cord inside the backbone or vertebral column.



THE BRAIN

THE BRAIN IS A JELLY-LIKE ORGAN LOCATED IN THE CRANIAL CAVITY AND IS DIVIDED INTO 3 PARTS:

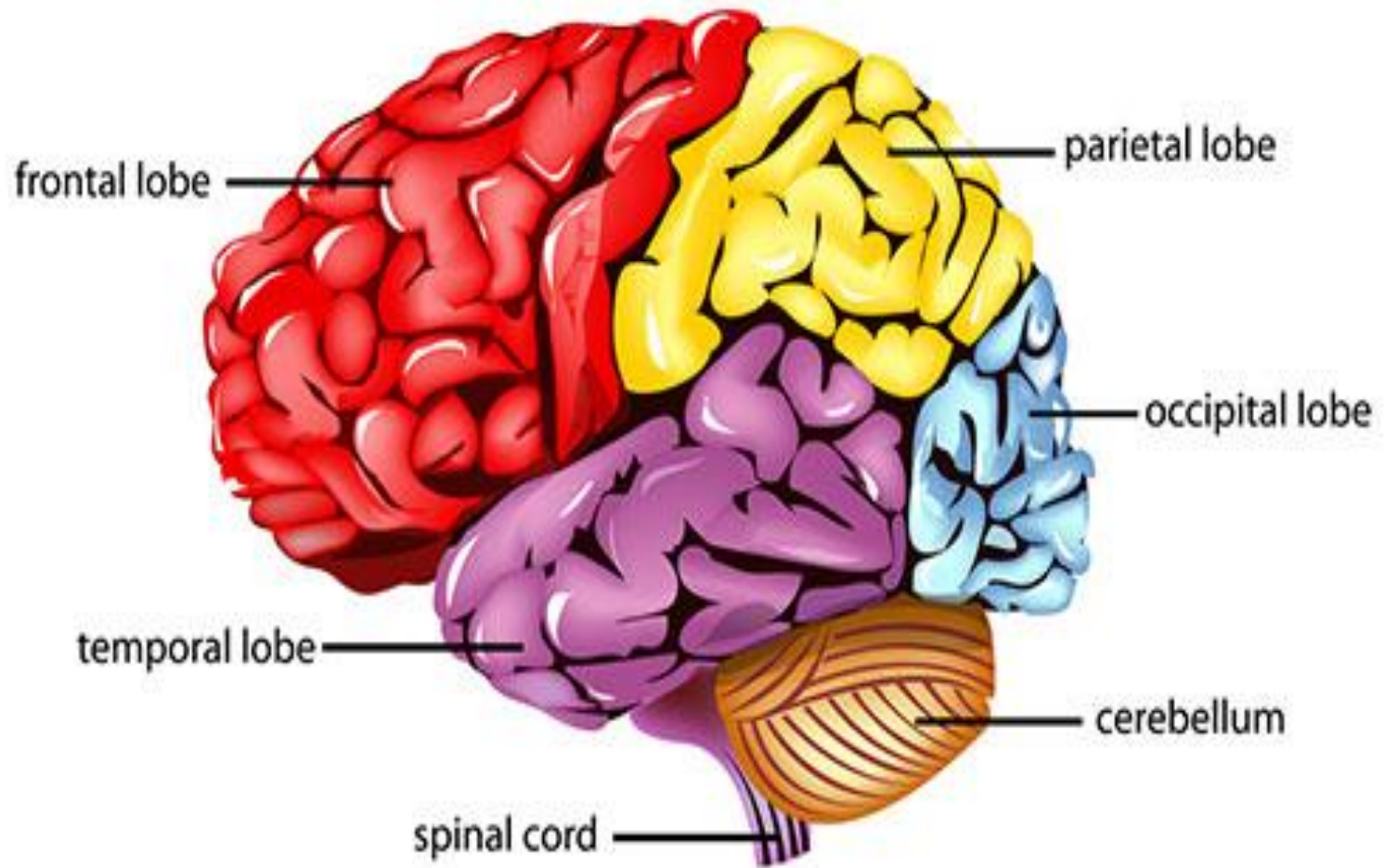
THE BRAIN STEM

THE CEREBRUM: CONTAINS 4 LOBES

THE CEREBELLUM

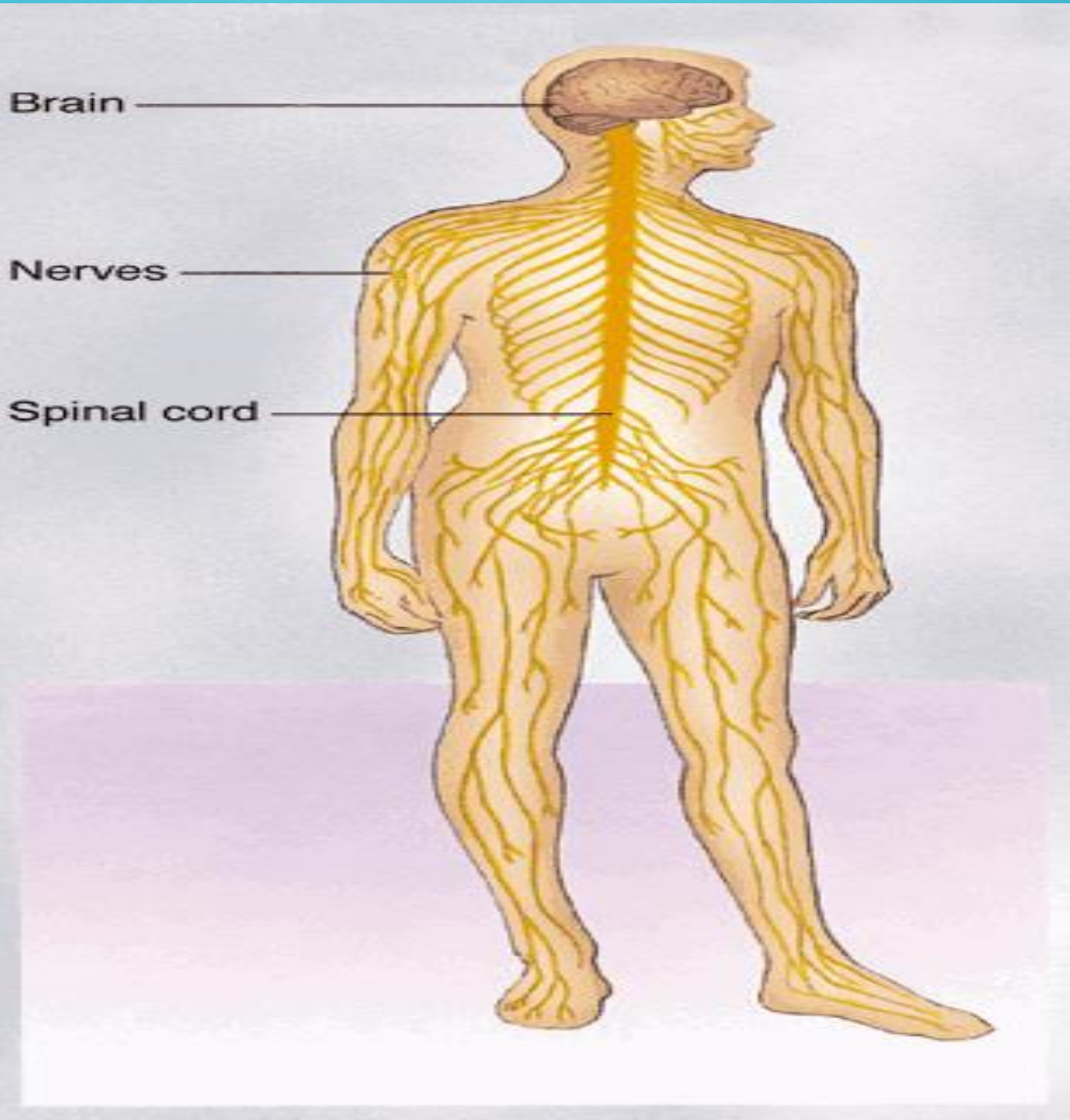
ITS SURFACE RESEMBLES WRINKLED FOLDS AND IS PROTECTED BY NOT ONLY THE SKULL BUT THERE IS A FLUID BETWEEN THE BRAIN AND SKULL THAT AVOIDS FRICTION OF THE TWO CALLED **CEREBROSPINAL FLUID**.

Parts of the Human Brain



SPINAL CORD

The spinal cord runs from the base of the brain through the vertebral column. It connects a large part of the Peripheral Nervous System to the brain. There are 31 spinal nerves branching out of the spinal cord, carrying messages to and from many areas of the body?

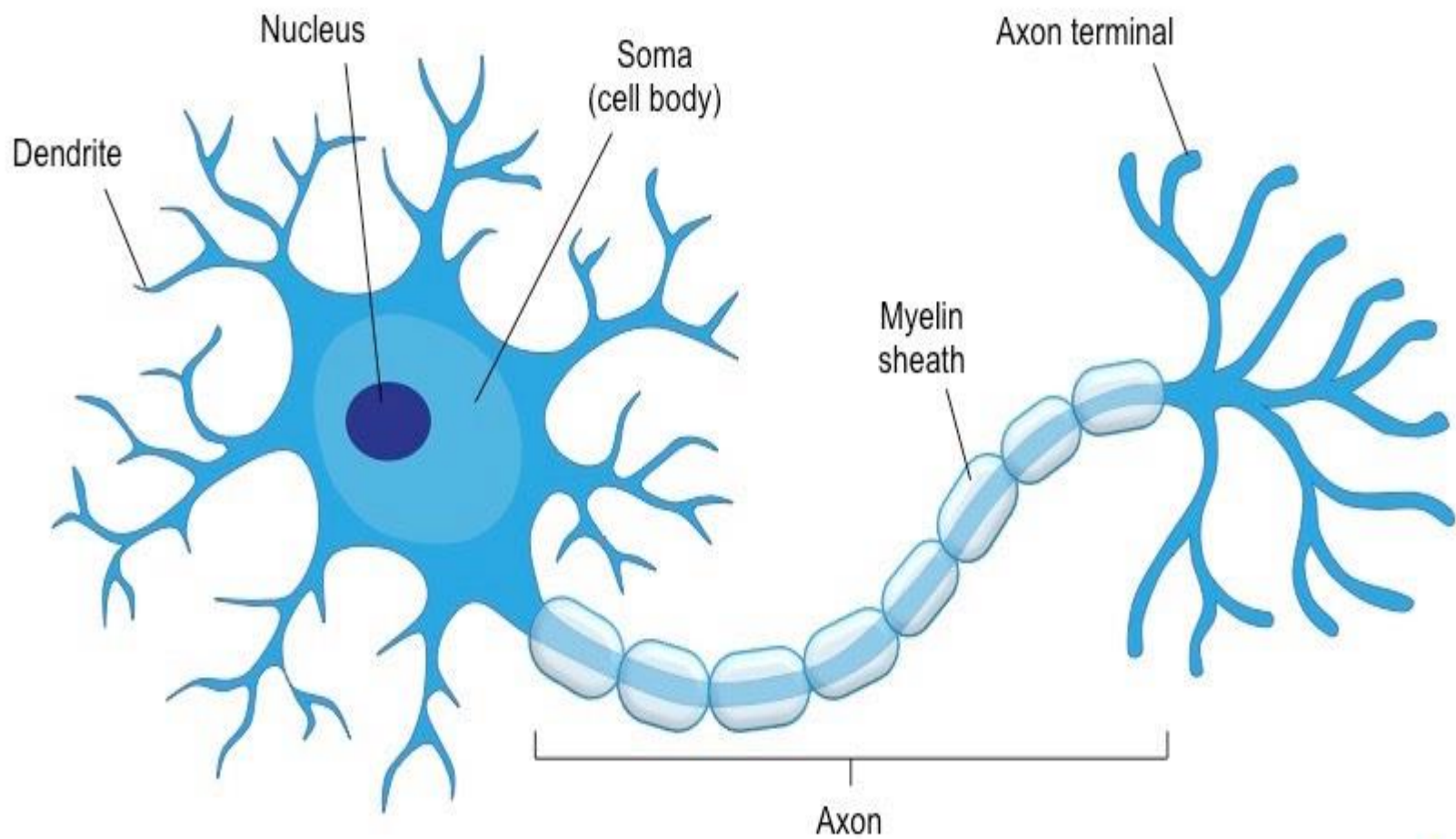


THE NEURON

The Nervous System is made up of nerve cells also called neurons. They send messages from one cell to another so that communication among all body parts takes place. A neuron consists of three main parts.

- The cell body
- Dendrites
- Axon

THE CELL BODY	The part that contains the nucleus.
DENDRITES	These are projections from the cell body.
AXON	A long fiber from the cell body that end at the axon terminals.



Direction electrical impulse travels 

HOW DO NEURONS RELAY MESSAGES?

Messages are in the form of **electronic signals called impulses**. A neuron relays impulses in only one direction. Messages are relayed from one neuron to another at the **synapse**. The axon terminals of one neuron are very close to the dendrite of another, allowing messages to jump from one neuron to the next. In this way, messages are carried very quickly to the brain from all parts of the body via the spinal cord and from the brain, through the spinal cord, back to the entire body.

THE DIFFERENT TYPES OF NEURONS

Neurons	Functions
Sensory neurons or afferent neurons	These relay messages from the sensory organs to the brain and spinal cord.
Motor neurons or efferent neurons	These relay messages from the brain and spinal cord to muscles or glands. In response to impulses, muscles contract and glands secrete hormones.
Interneurons	These connect sensory and motor neuron and relay messages between them. Interneurons are found only in the Central Nervous System.

DIVISIONS OF THE NERVOUS SYSTEM

CENTRAL NERVOUS SYSTEM (CNS)

PERIPHERAL NERVOUS SYSTEM (PNS)

THE DIVISIONS OF THE NERVOUS SYSTEM.

- **The Central Nervous System (CNS)**

The CNS is the control centre of the body. The brain and the spinal cord make up the CNS. The spinal cord relays messages from the body to the brain. The brain analyzes and interprets the message. Response messages are then relayed from the brain through the spinal cord to the rest of the body.

- **The Peripheral Nervous System (PNS)**

All the neurons outside of the brain and spinal cord make up the PNS. Their main function is to relay messages towards and away from the CNS.

The PNS can be divided into:

- *The Sensory Nervous System*
- *The Motor Nervous System.*

• The Sensory Nervous System.

This comprises neurons that relay messages from the sense organs- the eyes, ears, nose, tongue and skin-to the CNS.

• The Motor Nervous System

Motor neurons relay messages from the CNS to the muscles or glands.

The Motor Nervous System is divided into:

- Voluntary Nervous System
- Involuntary Nervous System

The Voluntary Nervous System

This system regulates activities that are under conscious control such as contraction of a skeletal muscle. Many nerves within this system are part of reflexes and can act automatically.

A REFLEX ACTION

IF THE BODY IS IN DANGER, A REFLEX ACTION CAN HELP KEEP IT SAFE. IN A REFLEX ACTION, THE MESSAGE IS NOT SENT TO THE BRAIN BEFORE THE RESPONSE IS MADE. THE MESSAGE GOES DIRECTLY TO THE MOTOR NEURONS.

EXAMPLE: IF YOU PLACE YOUR HAND ON A HOT SURFACE.

- SENSORY RECEPTORS IN THE SKIN ARE STIMULATED AND THE SENSORY NEURONS RELAY THE MESSAGE TO THE SPINAL CORD.
- THE INTERNEURON IN THE SPINAL CORD RELAYS MESSAGE DIRECTLY TO THE MOTOR NEURONS.
- THESE MOTOR NEURONS MAKE THE MUSCLES IN YOUR ARM CONTRACT, CAUSING YOU TO PULL YOUR HAND AWAY.

THE INVOLUNTARY NERVOUS SYSTEM

The Involuntary Nervous System controls those functions of the body that are automatic or not under conscious control. The involuntary Nervous System controls our heartbeat and the workings of our organs such as the stomach, liver and kidneys. This system is mainly concerned with keeping the body functioning properly.

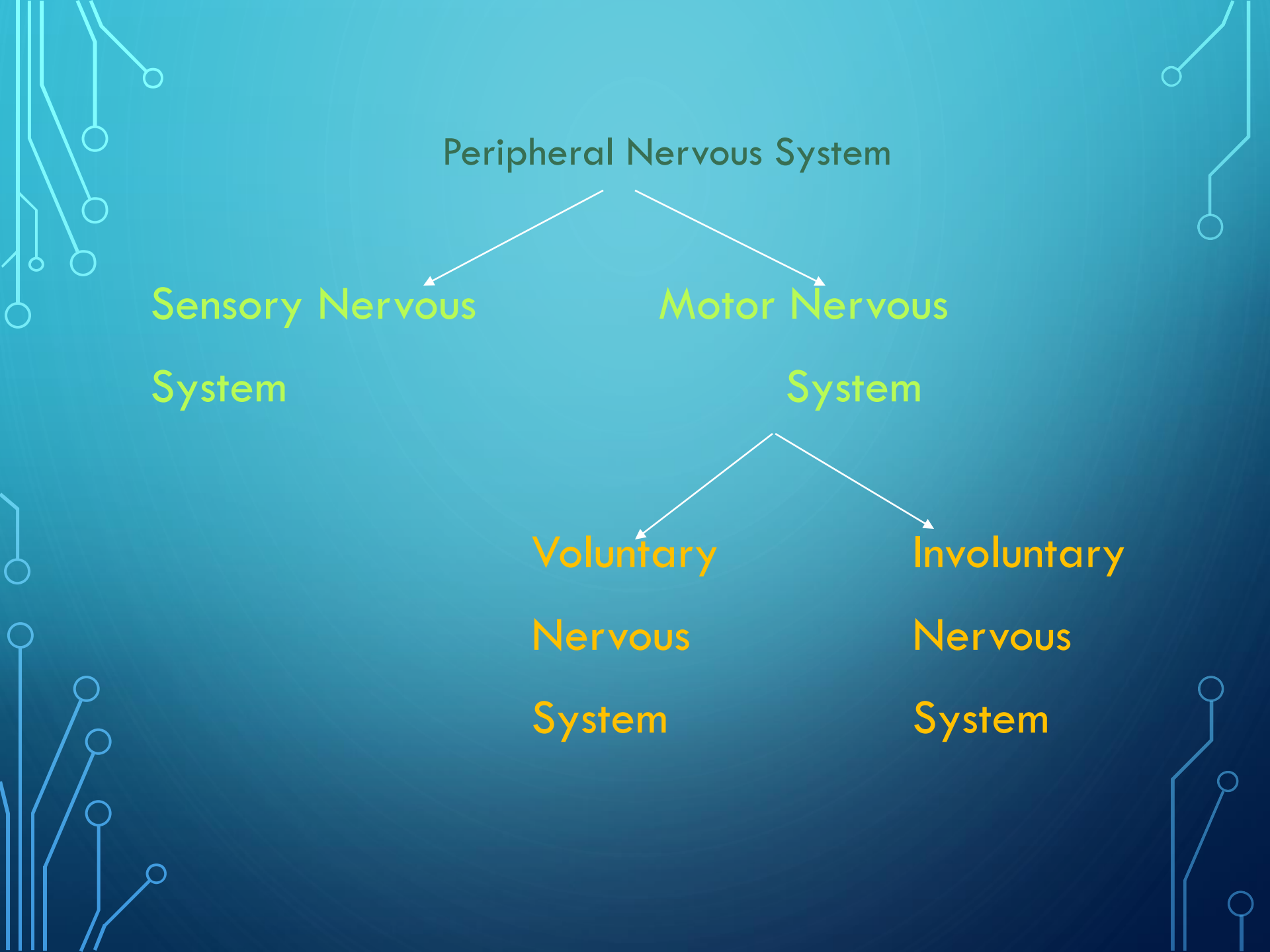
Peripheral Nervous System

Sensory Nervous
System

Motor Nervous
System

Voluntary
Nervous
System

Involuntary
Nervous
System



The Somatic Nervous System

This is part of the nervous system that controls voluntary movements in the body, such as those performed by the skeletal muscles. The somatic nervous system also includes the special nerve fibres that help keep the body in touch with its surroundings, such as those involved in touch, hearing, and sight.

Autonomic Nervous System

The **autonomic nervous system (ANS)** regulates the functions of our internal organs such as the heart, stomach and intestines. The ANS is part of the peripheral nervous system and it also controls some of the muscles within the body. We are often unaware of the ANS because its functions are involuntary and reflexive. For example, we do not notice when blood vessels change size or when our heart beats faster. However, some people can be trained to control some functions of the ANS such as heart rate or blood pressure.

The **Autonomic Nervous System**

is divided into three parts:

- The **sympathetic nervous system**
- The **parasympathetic nervous system**
- The **enteric nervous system**

○ The **Sympathetic Nervous System** prepares the body for emergency situations and produces rapid mobilizations to avoid the danger. This may require us to **"fight" or take "flight"** (run away)

The **Parasympathetic Nervous System** is responsible maintaining conserving functions when the body is at rest (**rest- and – digest**)

The **Enteric Nervous System** is a meshwork of nerve fibres that supply/ stimulate (gastrointestinal tract, pancreas, and gall bladder).

