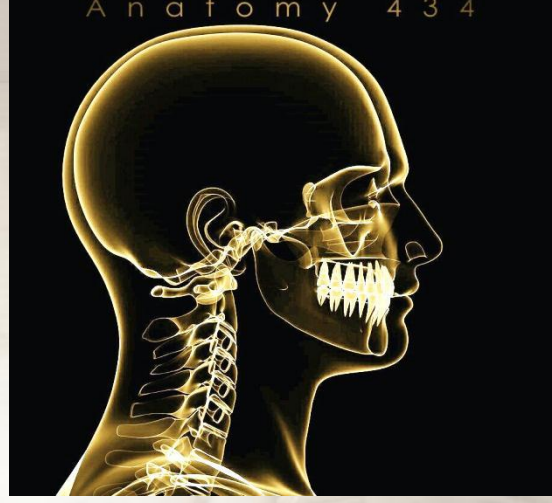


Anatomy teamwork

Lecture 3

The nervous system

Color coding

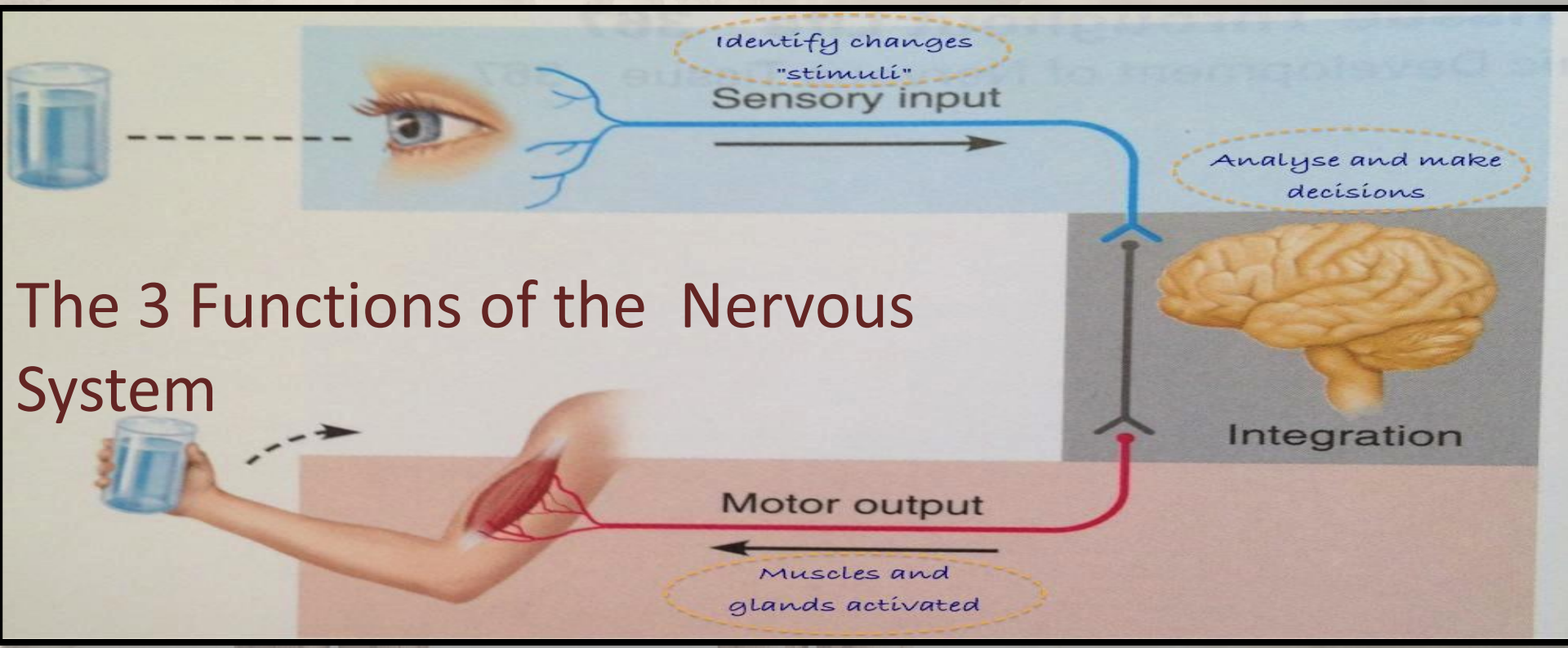
- Very important
- Notes

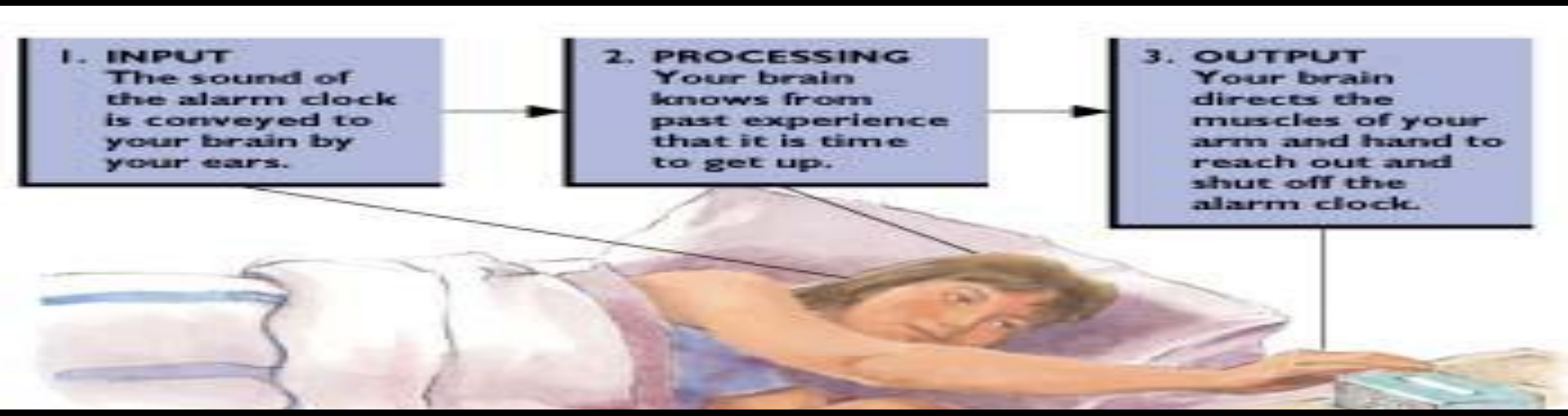
هذا العمل لا يغني عن المصدر الأساسي للمذاكرة

Objectives

- ✓ List the subdivisions of the nervous system
- ✓ Define the terms: grey matter, white matter, nucleus, ganglion, tract and nerve.
- ✓ List the parts of the brain.
- ✓ Identify the external and internal features of spinal cord.
- ✓ Enumerate the cranial nerves
- ✓ Describe the parts and distribution of the spinal nerve.
- ✓ Define the term ‘dermatome’
- ✓ List the structures protecting the central nervous system

The 3 Functions of the Nervous System





Structural Organization

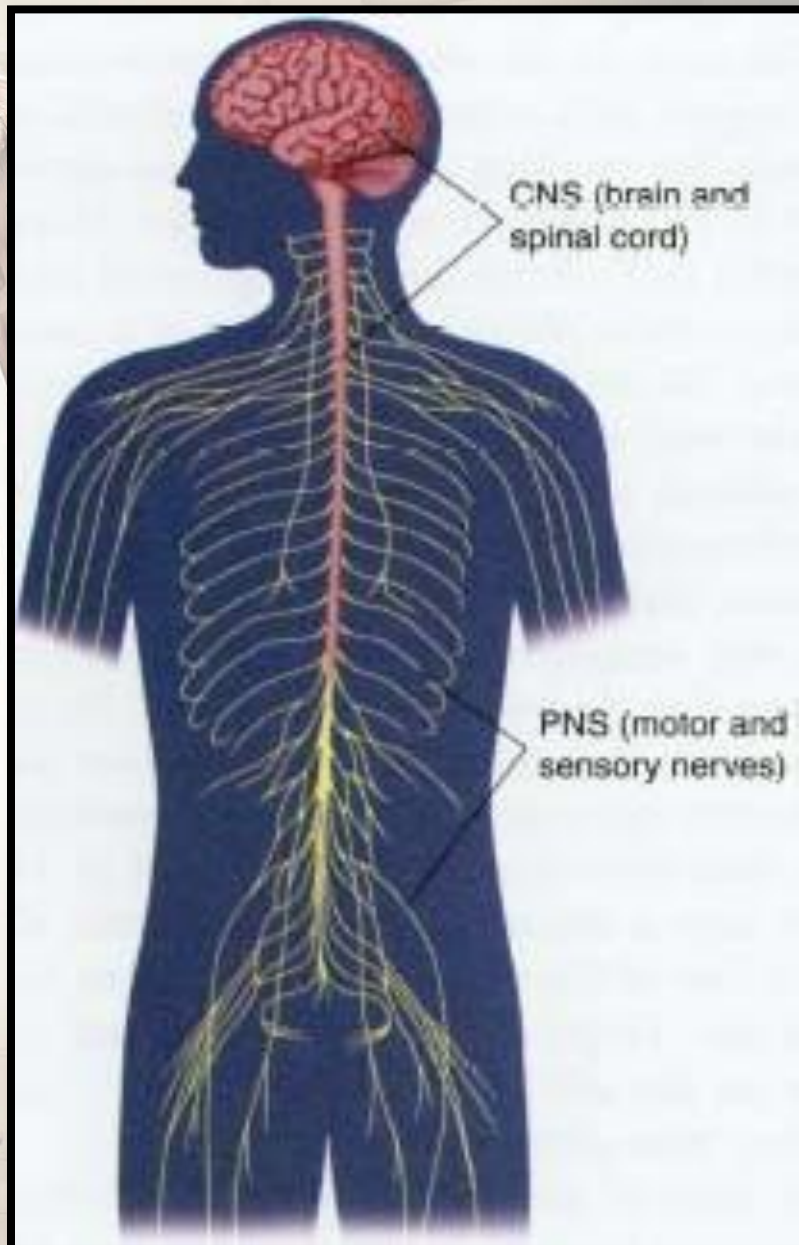
Nervous System

Central nervous system (CNS)

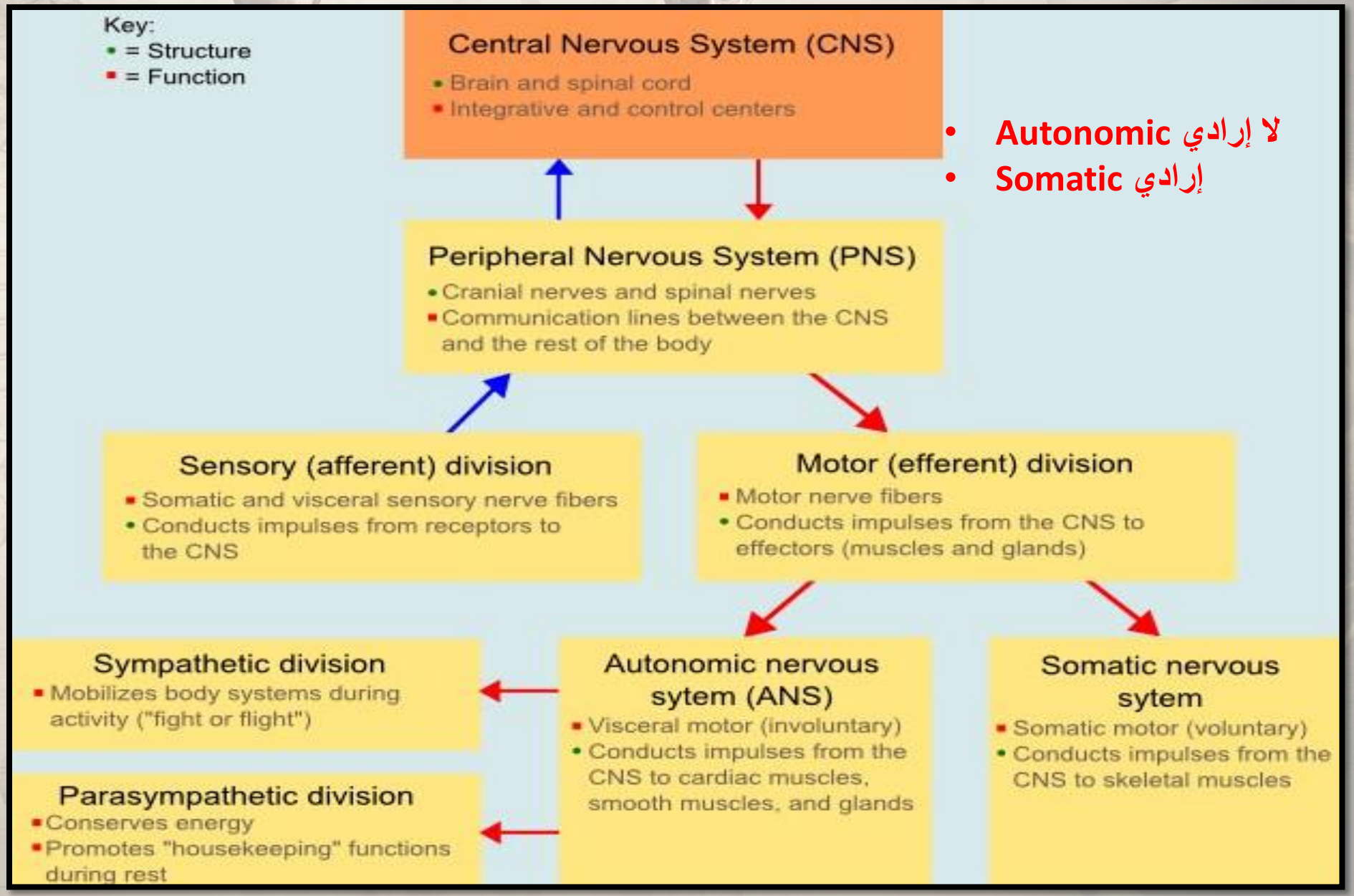
Brain & Spinal cord

Peripheral nervous system (PNS)

Nerves (cranial, spinal) & ganglia.

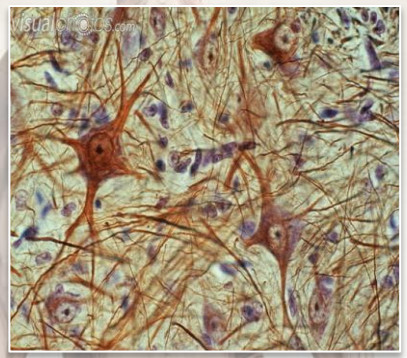


Functional Organization



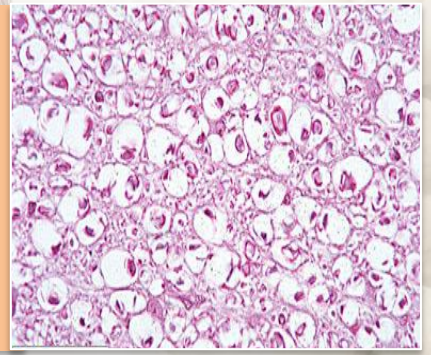
- **Autonomic لا إرادي**
- **Somatic إرادي**

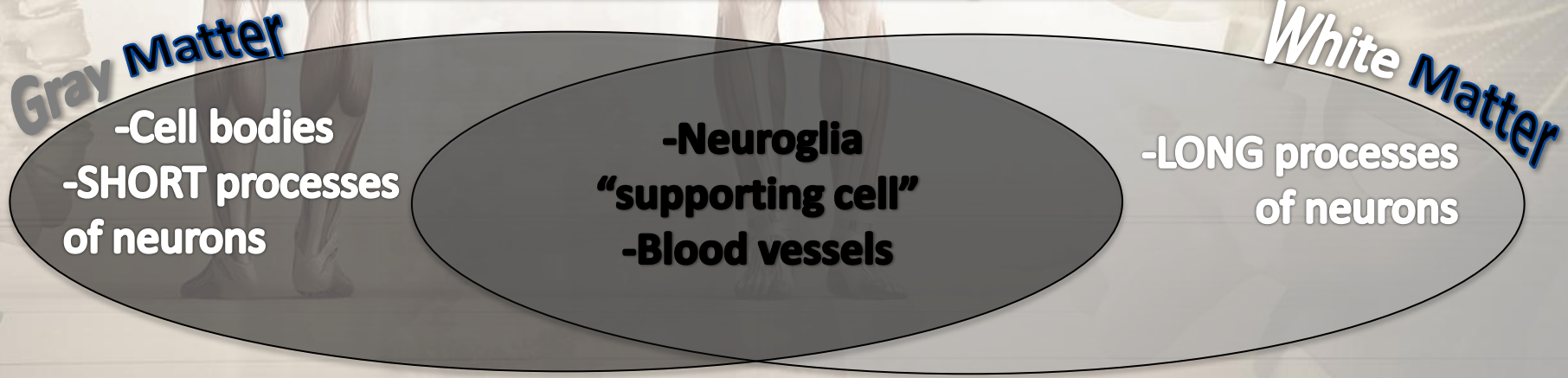
Nervous Tissue



Gray matter: which contains the cell bodies & the short processes of the neurons, the neuroglia and the blood vessels.

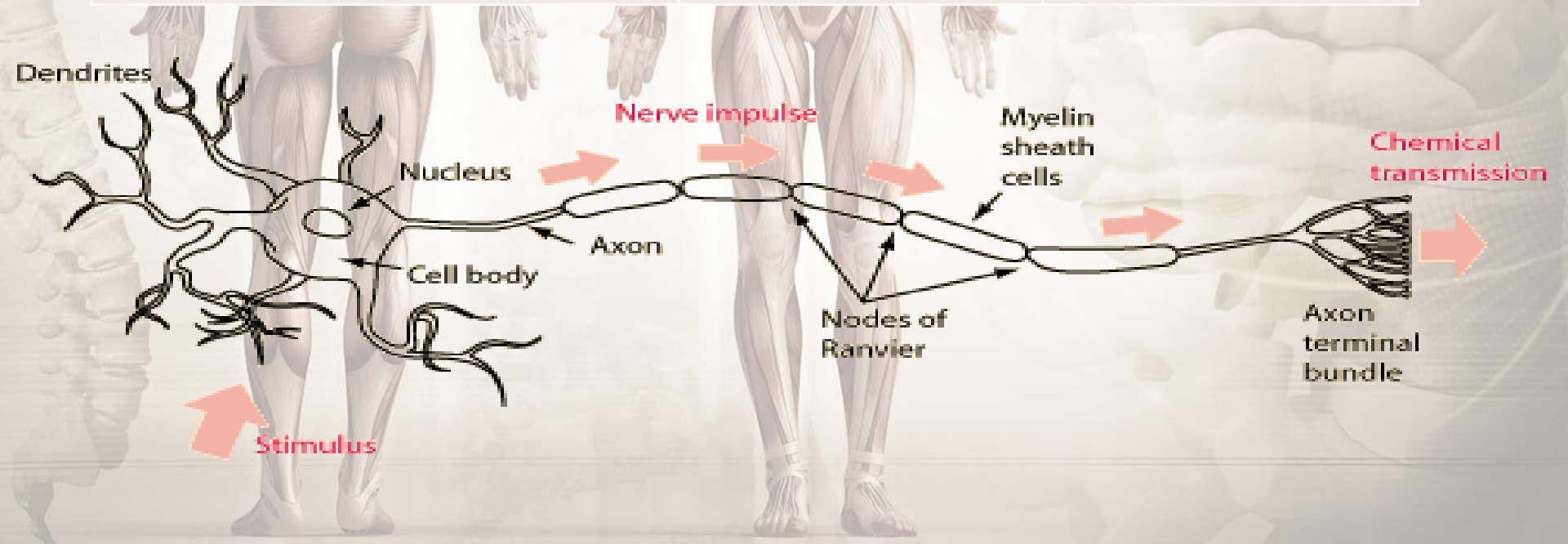
White matter: which contains the long processes of the neurons (no cell bodies), the neuroglia and the blood vessels





Nomenclature of nerve cells

	WITHIN CNS	OUTSIDE CNS "PNS"
Group of NEURONS "Cell bodies"	Nuclei	Ganglia
Group of NERVE FIBERS "AXON"	Tract	Nerves



N.B Nerve cells number is constant (they do not divide).

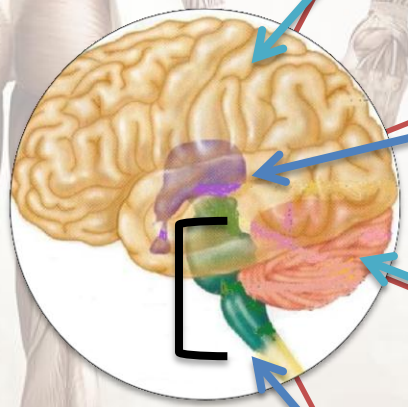
The Brain

The brain is a large mass of nervous tissue located in the cranial cavity. It has four major regions

Has 2 Hemispheres

Cerebrum
المخ

Frontal lobe الفص الجبهي
Parietal lobe الفص الجداري
Temporal lobe الفص الصدغي
Occipital lobe الفص القذالي



Diencephalon
دماغ بيني

Thalamus المهاد
Hypothalamus تحت المهاد
Sub-thalamus المهاد التحتاني
Epithalamus مهيد

Cerebellum
المخيخ

Has 2 Hemispheres

Brainstem
جذع الدماغ

Midbrain
Pons القنطرة
Medulla oblongata النخاع المستطيل

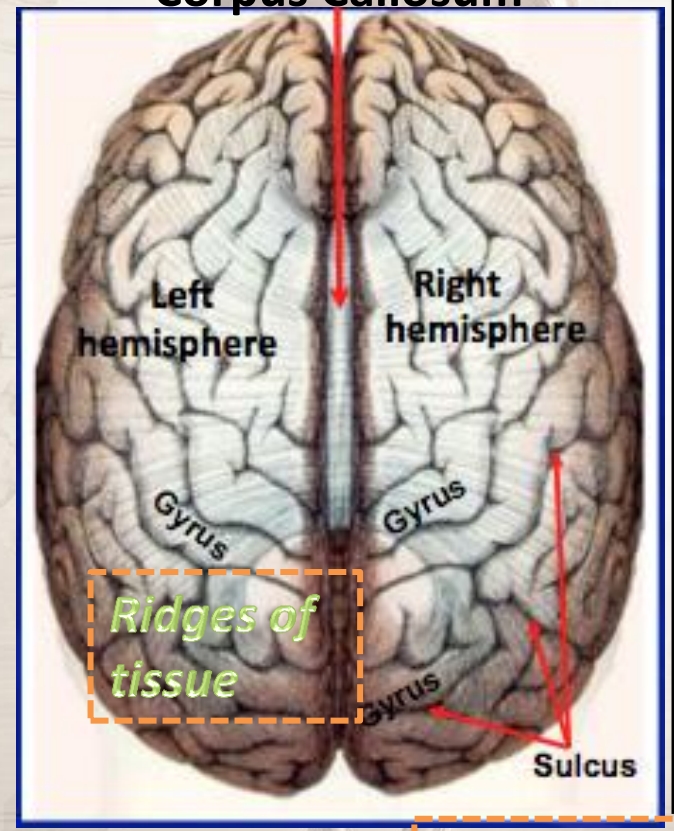
Tissue of Cerebral Hemispheres

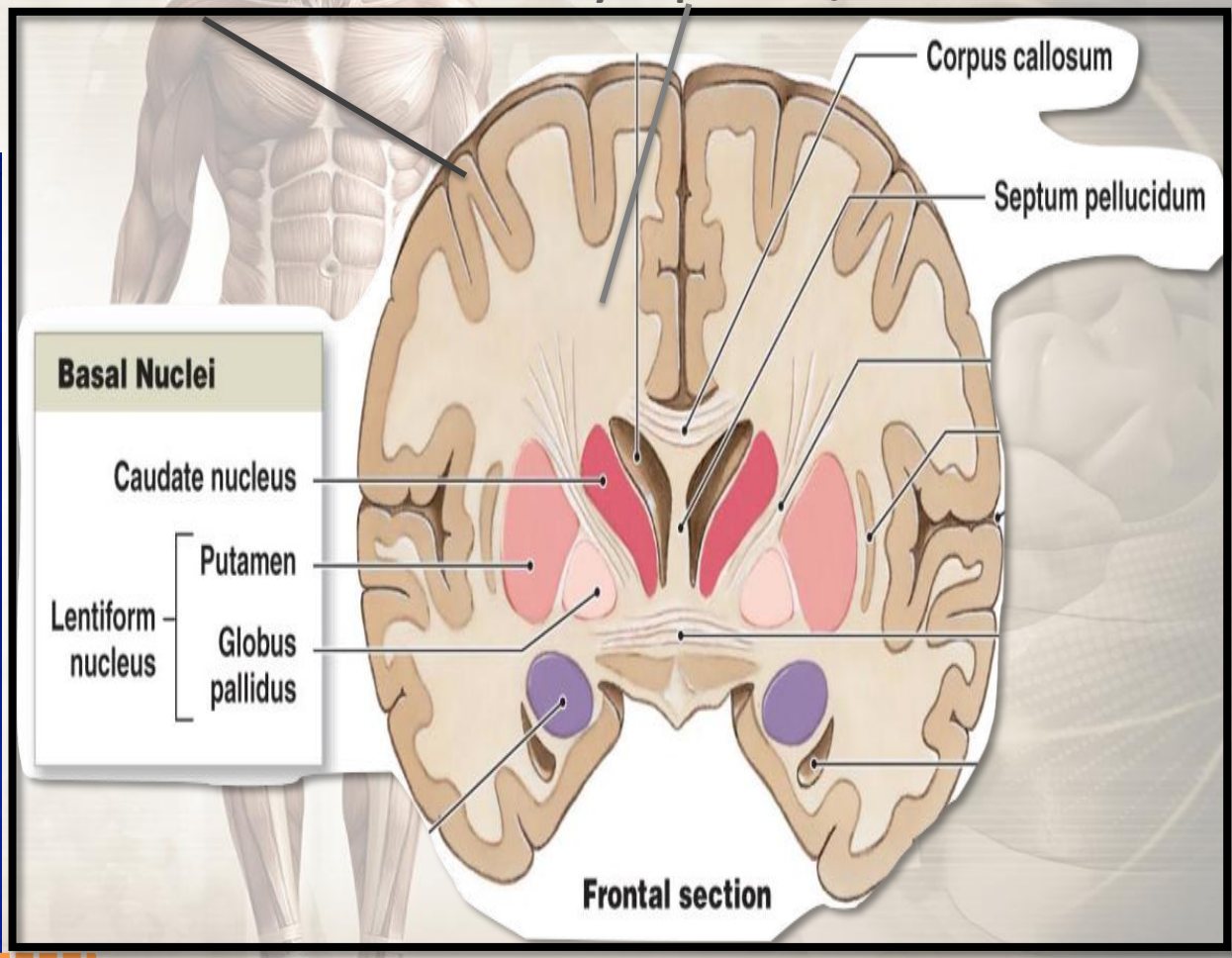
Gray matter/Cortex "outermost"

White matter (fiber tracts/bundle of nerve fibers) "carry impulse to/from cortex

THICK BUNDLE OF NERVE FIBERS

Corpus Callosum



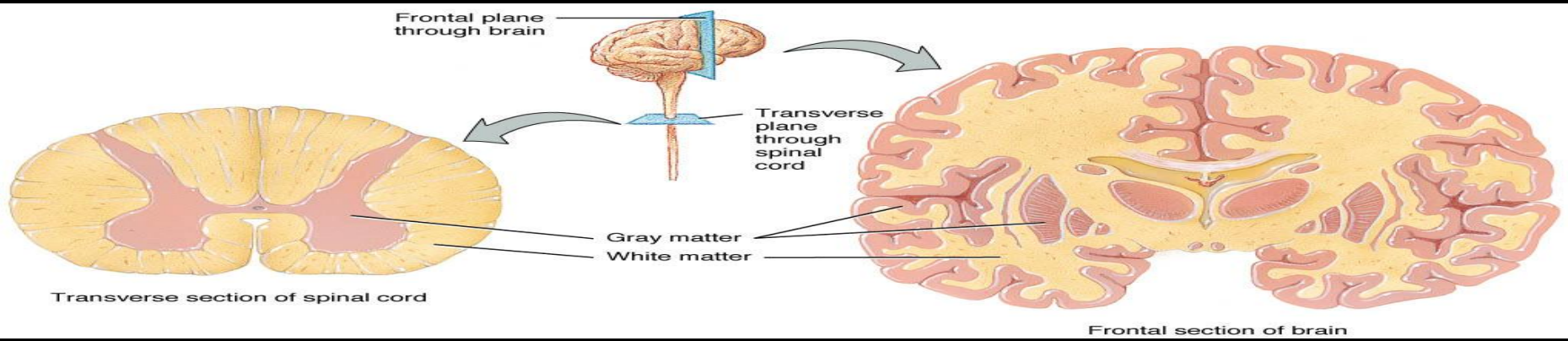


SEPARATED BY GROOVES

Basal Nuclei: Gray matter within white matter, help motor cortex regulate voluntary motor activities

Cross Section of The Brain and Spinal Cord

	The Brain		Spinal Cord
	Cerebrum	Cerebellum	
Cortex “Outer layer “	Gray mater	Gray mater	White mater
Medulla “Inner layer”	White mater	White mater	Gray mater
Extra Note	Located deep within the white matter are masses of grey matter called the basal nuclei . They help the motor cortex in the regulation of voluntary motor activities	Cerebellum has the function of providing precise coordination for body movements and helps maintain equilibrium	The arrangement of gray matter resembles the shape of the letter H, having 2 posterior, 2 anterior and 2 lateral horns



Cranial Nerves 12 pairs

4 pairs are mixed

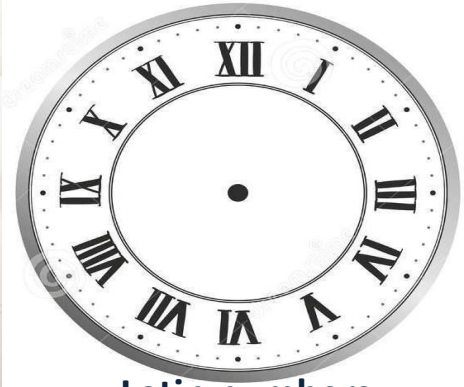
- Trigeminal n. (V)
- Facial n. (VII)
- Glossopharyngeal n. (IX)
- Vagus n. (X)

5 pairs are motor

- Occulomotor n. (III)
- Trochlear n. (IV)
- Abducent n. (VI)
- Accessory n. (XI)
- Hypoglossal n. (XII)

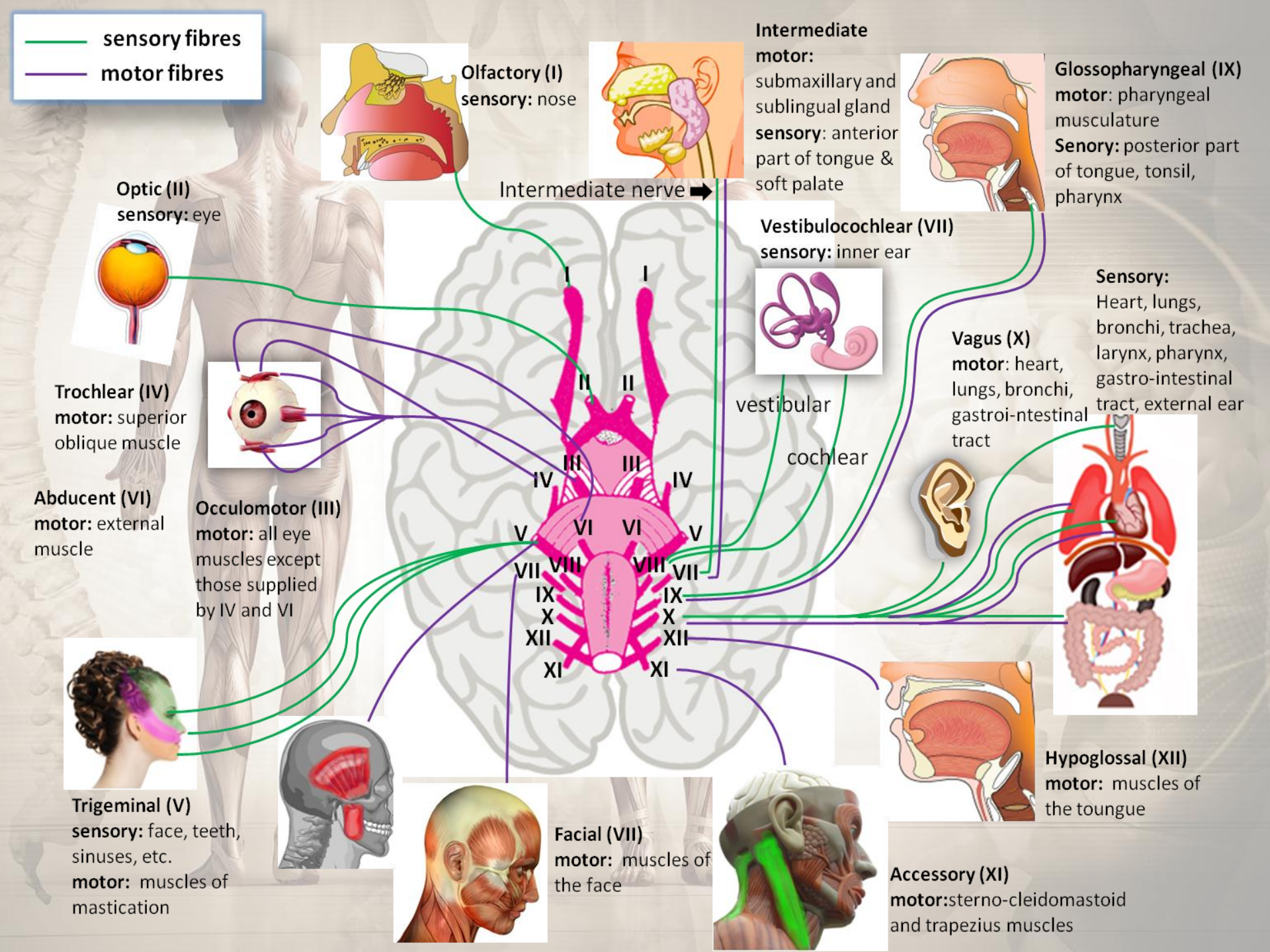
3 pairs are sensory

- Olfactory n. (I)
- Optic n. (II)
- Vestibulocochlear n. (VIII)



Latin numbers

http://www.youtube.com/watch?v=kqNFmBGHs2I&list=PLJOoGrC5B3qeliIaqNydopzuMNT-dXW2t&index=11


sensory fibres
motor fibres
Olfactory (I)
sensory: nose
Intermediate
motor:
submaxillary and
sublingual gland
sensory: anterior
part of tongue &
soft palate
Glossopharyngeal (IX)
motor: pharyngeal
musculature
Senory: posterior part
of tongue, tonsil,
pharynx
Optic (II)
sensory: eye
Intermediate nerve
Vestibulocochlear (VII)
sensory: inner ear
vestibular
cochlear
Sensory:
Heart, lungs,
bronchi, trachea,
larynx, pharynx,
gastro-intestinal
tract, external ear
Vagus (X)
motor: heart,
lungs, bronchi,
gastroi-ntestinal
tract
Trochlear (IV)
motor: superior
oblique muscle
Abducent (VI)
motor: external
muscle
Occulomotor (III)
motor: all eye
muscles except
those supplied
by IV and VI
I
II
III
IV
V
VI
VII
VIII
IX
X
XII
XI
Trigeminal (V)
sensory: face, teeth,
sinuses, etc.
motor: muscles of
mastication
Facial (VII)
motor: muscles of
the face
Hypoglossal (XII)
motor: muscles of
the toungue
Accessory (XI)
motor:sterno-cleidomastoid
and trapezius muscles

The Spinal Cord

- It is a two-way conduction pathway to the brain and a major reflex center
- It is 42-45 cm long, cylindrical in shape lies within the vertebral canal
- *spinal cord* is as *thick* as a mans *little finger*
- Extends from **Foramen Magnum** to the **2nd lumbar vertebrae**
- Gives rise to **31** pairs of spinal nerves.
- The spinal cord has 2 enlargements: **cervical** and **lumbosacral**

WHY ?! in order to accommodate the extra neurons involved with the motor control going to, and sensations coming from, the upper and lower limbs.

- Caudal tapering end is called **conus medullaris**
- A group of spinal nerves at the end of the spinal cord are called **Cauda Equina** “horse tail in latin”

The spinal nerves

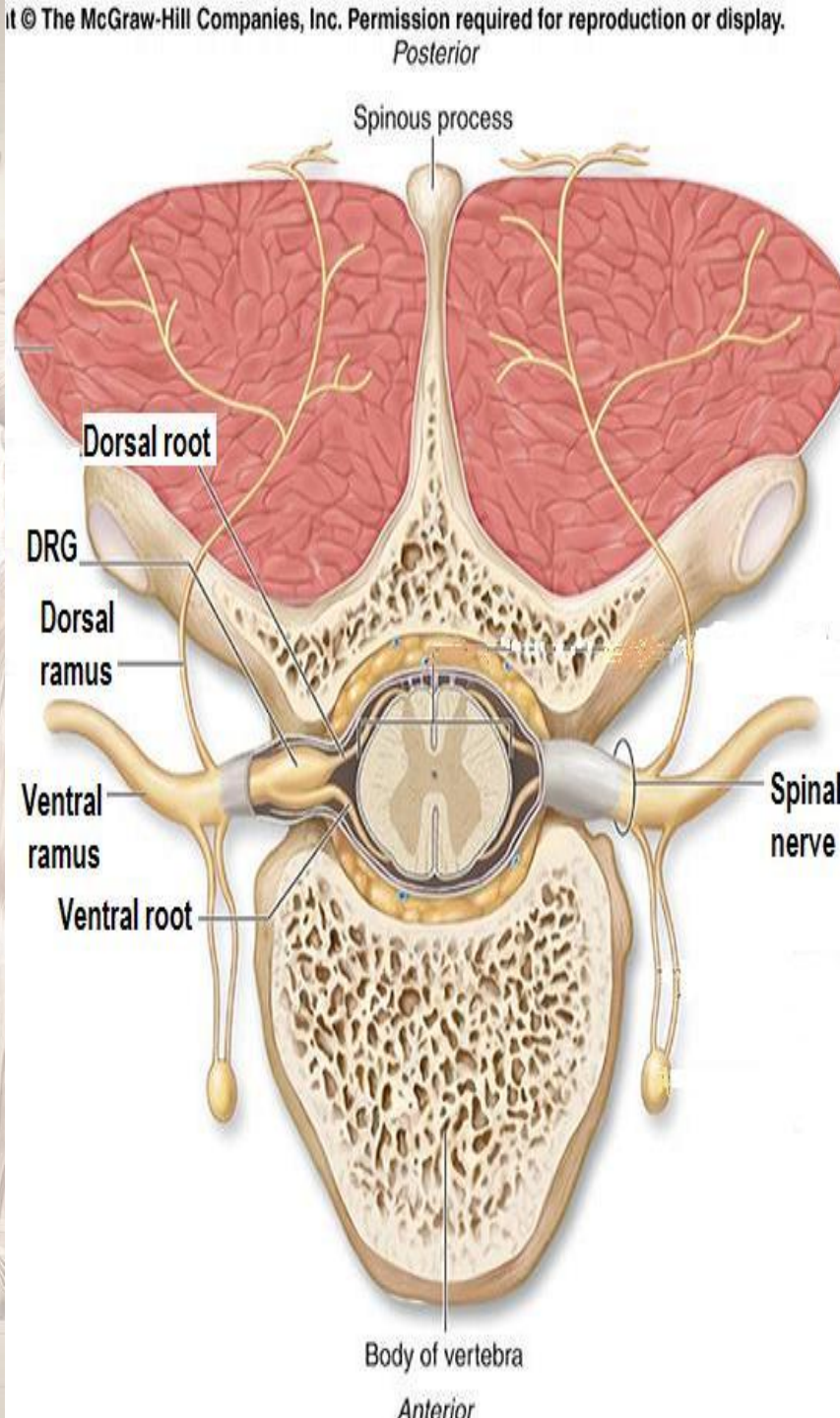
Each spinal nerve is attached to the spinal cord by two roots : Dorsal (Sensory) and Ventral (Motor).

The dorsal root has a **sensory ganglion (DRG)**

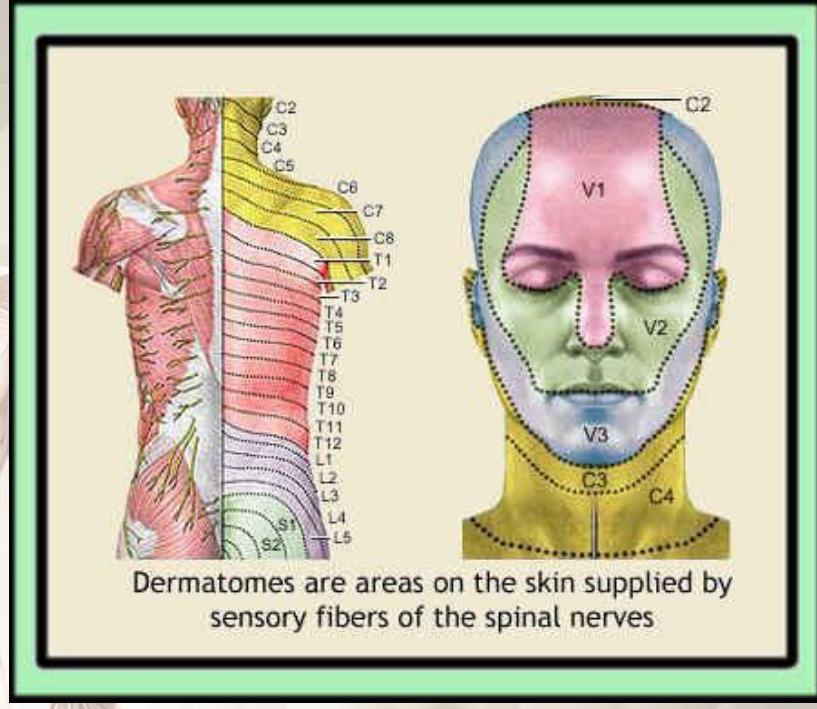
Each spinal nerve exits from the intervertebral foramen and divides into a dorsal and ventral ramus.

The **dorsal** rami supply the skin & muscles of the back

The **ventral** rami supply the anterior part of the body , and it forms plexuses except the thoracic region which forms **intercostal nerves** instead.



Dermatome



What is a dermatome ?

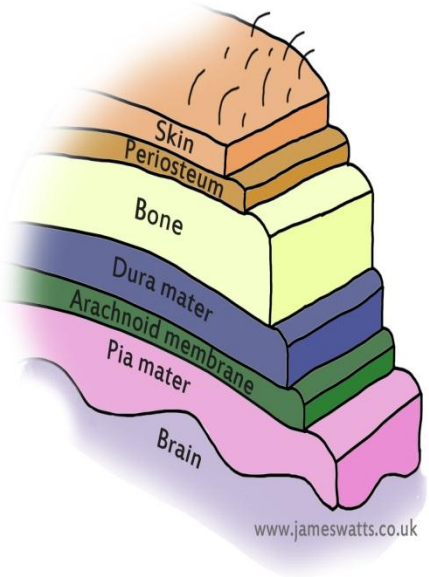
A dermatome is a segment of skin supplied by a segmental spinal nerve.

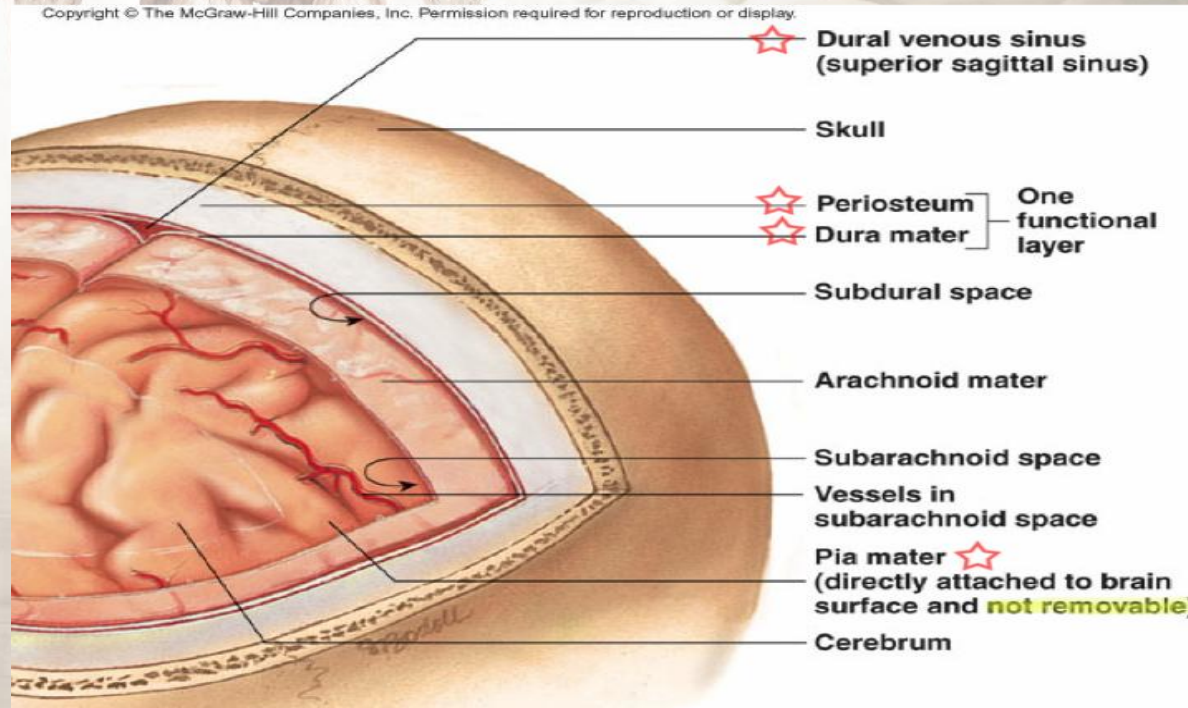
Protection of the central nervous system

Bones
Skull & vertebral column

Meninges
- Dura mater
- Arachnoid matter
- Pia mater

CSF





Cerebrospinal fluid

- CSF is constantly produced by the **choroid plexuses** inside the brain ventricles.

N.B There are 4 ventricles in the brain

- Most of the CSF drains from the ventricles into the subarachoid space around the CNS. A little amount flows down in the central canal of the spinal cord.
- Subarachnoid space = space between arachnoid mater and pia mater

CSF is more in the brain and less in the spinal cord

CSF distributes nutrients

CSF serve as a shock absorber for the central nervous system

Helpful videos

- http://www.handwrittentutorials.com/videos.php?id=18
- http://www.youtube.com/watch?v=zeo19WVQ47w&index=1&list=PLqTetbgey0aekpYHoIPKssY94U-OBMeNE
- http://www.youtube.com/watch?v=tRyp8EdRUiE

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