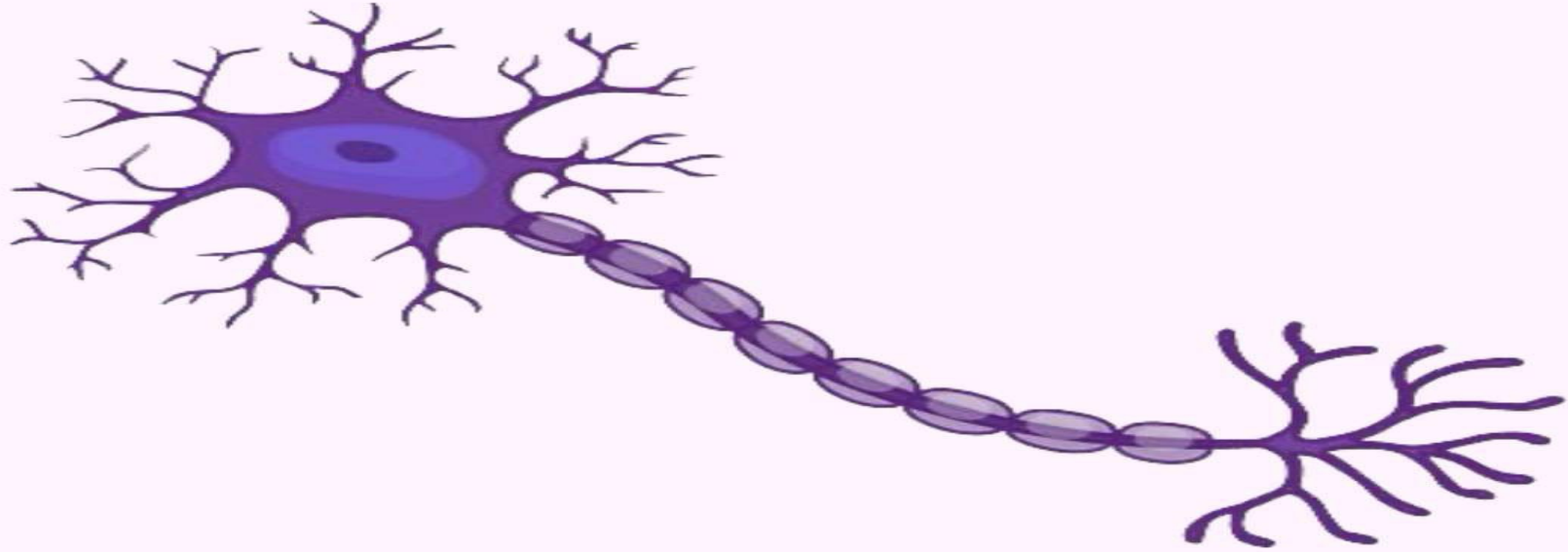


# PHYSIOLOGY



LEC NO. : 22

DONE BY : Nour Al-amoush

## Sensations from the Head and Face

\* The somatic sensations from the head carried mainly by the

الحصْبُ الْكَبِيرُ

**Trigeminal nerve**. Its divisions carry the cutaneous sensations

from the face, forehead, and anterior part of the scalp,

فُرُوعُ الرَّاسِ .

Related to eye الملتحمة رشي قرنية العين

conjunctiva, cornea and nasal mucosa. It also carries the

الحس العميق

proprioceptive sensations from the mandibular muscles.

## Headache

صداع

felt in superficial part ↑

Headache means; pain felt in the head region. It is referred to

the surface of the head from deep structures.



## Causes and types:

### A) Extracranial headache:

خارج المخ

Resulting from **the stimulation of pain receptors located in the extracranial structures e.g.**

1. Eyes: e.g. **in cases of Errors of refraction and glaucoma.**
2. Nose: e.g. **in chronic sinusitis** (inflammation of the nasal mucosa and sinuses).
3. Oral causes: e.g. **teeth caries.**
4. Psychogenic headache e.g. **in cases of emotional tension with excessive contraction and spasm of the scalp and neck muscles.**

زيادة الضغط في العين  
↑

مشاكل مثل:  
قصر النظر/طول النظر

التهابات في الجيوب الأنفية

تسوس الأسنان

حاجة نفسية

دائماً متشنج

B) Intracranial headache: داخل المخ

Results from the stimulation of pain receptors in the intracranial pain sensitive structures which include;

متذكرين  
dura+pia  
مصل

- Meninges; specially the basal part of the **dura** and **tentorium cerebelli**.

يفصل ال Brain  
Ant + Pos ي

- Cerebral and dural blood vessels specially the middle meningeal artery.

- Venous sinuses.

زي ال veins

- Nerves V, IX, X. brain tissue itself is devoid of pain receptors.

5 9 10

Site of reference of intracranial headache

\*If the pain arises from the structures **above tentorium cerebelli** → pain (forhead) felt in front of the ears (*Frontal headache*).

\*If the pain arises from structures **below the tentorium cerebelli**, → pain felt in the posterior part of the head (*occipital headache*).

## Causes of intracranial headache:

### 1- Meningeal causes: e.g.

- i) **Inflammation of meninges** (Meningitis). التهاب في dura أو pia
- ii) Trauma or injury. مثل خبطة أو قلع فيها
- iii) **Irritation of the meninges** as in cases of, excess alcohol drinking or constipation; where certain toxic substances are absorbed and irritate the meninges. تصيب إسهال

### 2. Brain tissue causes: e.g. **Brain tumours which causes pressure,** traction and irritation of the intracranial pain sensitive structures. حالات الورم تزيد وزن الدماغ و بصير ينزل لحتة و بيشد meningis معه

### 3. CSF causes: **Cerebro spinal fluid** → الدماغ موجود جواهر fluid.

Decrease in CSF pressure e.g. **by removal of about 20 ml of CSF especially if the person is erect,** the brain try to descend producing traction on the meninges.



زردن ارضفط لدرجة انه الجدار صباره stretch

نتاج من hypertension

4. **Vascular headache: resulting mainly from the overstretching of the walls of the intracranial blood vessels** specially the arteries in the following conditions:

- i) **Hypertension:** Over-distension of the wall of the intracranial arteries with each cardiac cycle “throbbing headache”.  
صون الدم ريفط  
ع جدار الاعوية الدموية  
فالشخص حس بالانم
- ii) **Fever:** Over-distension of the cerebral arteries due to: (a) direct effect of temperature and (b) toxins produced by the organism.
- iii) **Migraine:** Characterized by sudden or paroxysmal attacks of throbbing pain with blurring of vision even nausea and vomiting.  
بجي دبروح  
غاة

**Mechanism:** It is due to sudden V.D. that is preceded by vasospasm.

## Somatic Sensory Cortex → المذنان يلقى الاستقبال الأحاسيس وترجمتها

It is the part of the cerebral cortex concerned with the perception and interpretation of the sensory information. It is divided into 3 areas:

### A) Primary sensory cortex (3, 1 & 2):

طريق sulcus المركزي

**Location:** in the parietal cortex (in the post-central gyrus) consists of 6 layers from surface to inside.

**Body representation:** the body is represented.

↪ 1- Contra-lateral (crossed): i.e. → التي تأتي من left ضمة  
في Right والقلب صحيح

Sensory information from the right Side of the body is perceived in the left sensory cortex & vice versa.



## 2- Inverted or upside down: i.e.

Sensation from the **face** is perceived in the **lowermost** part of the primary **sensory cortex**, and those from the **lower** limbs are perceived in the **upper** neurons.

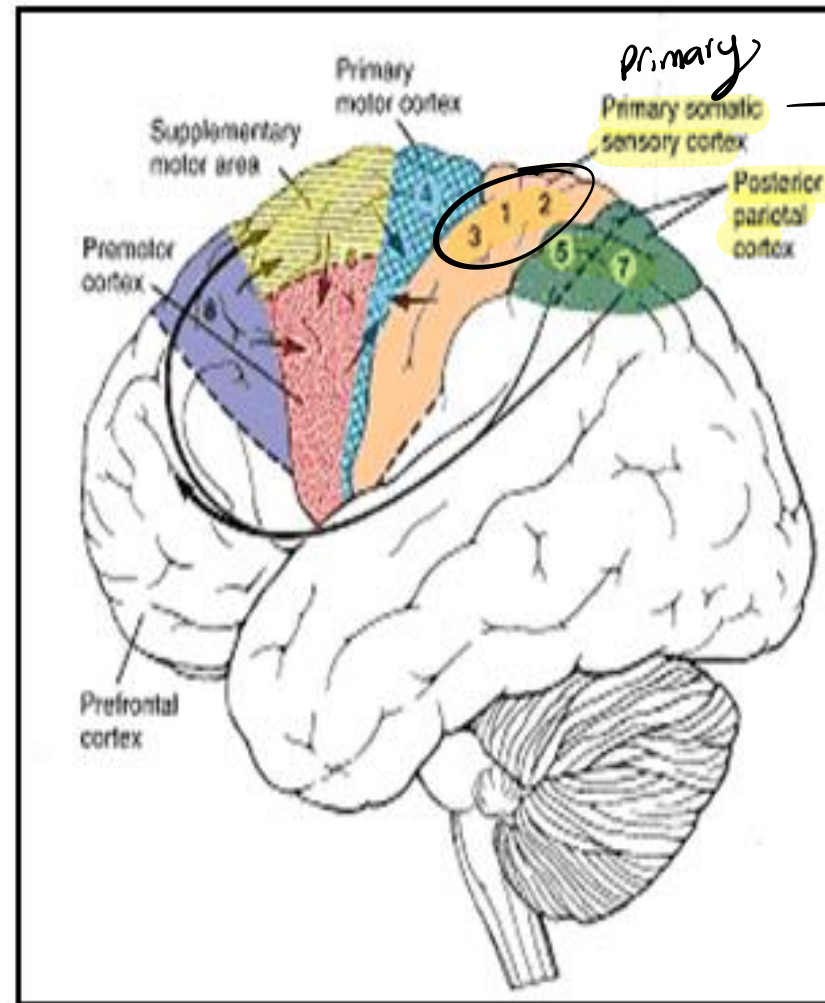
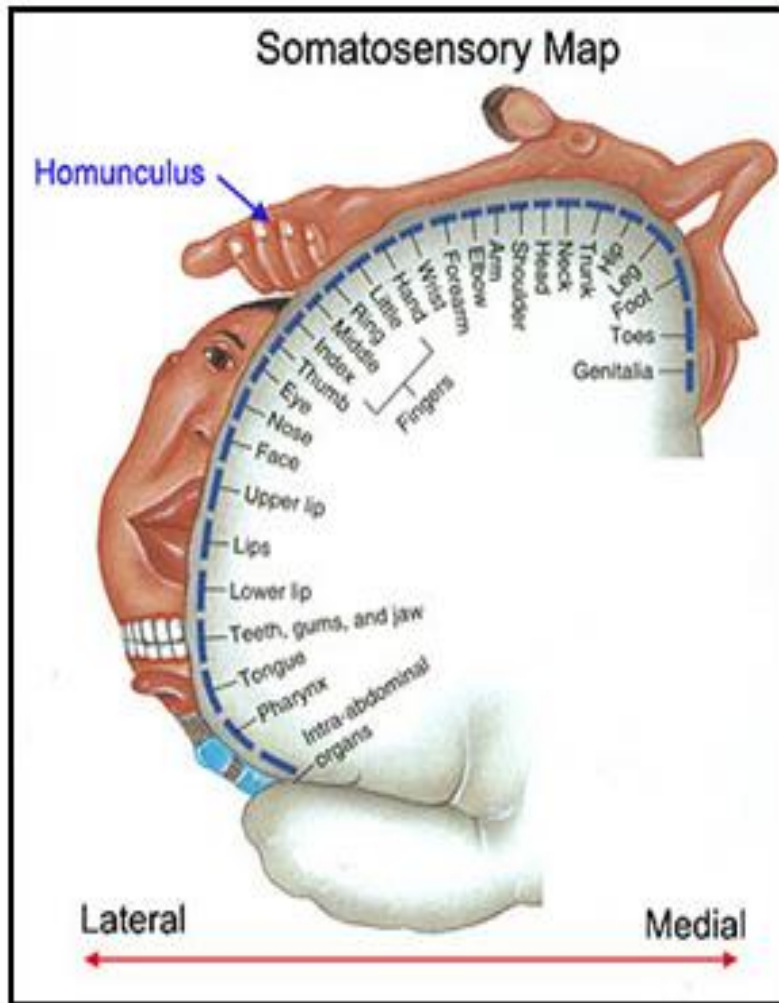
3- The peripheral parts of the body are widely represented i.e. the sensory information from them perceived by a great number of receptors.

The **greater** is the number of specialized receptors in the peripheral part of the body, the **wider** the area of representation

upper + lower  
limbs

## Function:

It is concerned with the perception of various somatic sensory senses e.g. touch (fine) stereognosis, pressure, vibration, and kinesthetic sensations. It seems to be concerned with the perception or discrimination of the intensity, <sup>قوة المؤثر</sup> locality and fine grades of changes of the sensory stimuli without disclosing their meanings.



لستقبلهم هون  
بتعرف عليهم  
هون  
ممكن تبي اسوال

Fig. (17): Somatosensory cortex

**B) Secondary Somatic sensory cortex (area 40):**

**Site: Behind and lateral to face representation area in SMI.**

-It receives direct input from VPN of thalamus and from the primary somatic sensory cortex.

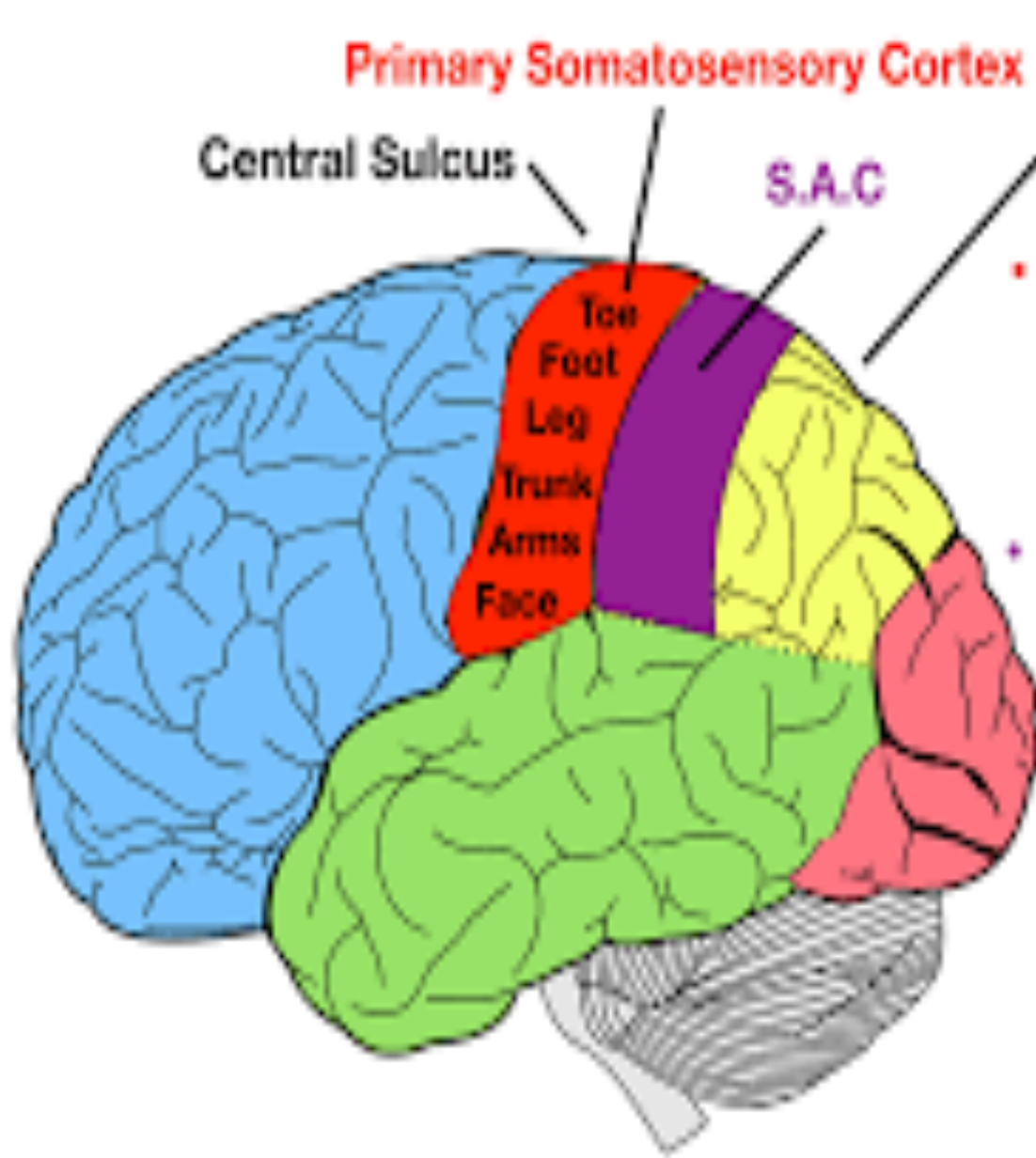
- Its damage causes defects in learning based on tactile discrimination.

**C) Sensory "Somatic" association cortex (5 & 7) →**

**Site: behind the upper most part of SMI.**

بأخذ Sensations من  
1, 3, 2 و يتخزن  
صون و تتعرف عليه و كماله.

**Body represented contra-lateral, upside down and the peripheral parts are widely represented. Same as 1, 3, 2**



**Primary Somatosensory Cortex**

Central Sulcus

S.A.C

# Parietal

## Functional Areas

- **Primary Somatosensory Cortex**
  - + Awareness of Somatic Sensations
  - + Touch, Pain, Temperature
- **Somatosensory Assoc. Cortex**
  - + Processing/Analyzing Somatic Sensations
  - + Memory of Sensations
  - + Recognition of Sensations
  - + Proprioception

## Functions:

1. The various types of sensations **received from primary sensory areas are built up and their meanings are disclosed** **in this area.**

*association*

*حالة المعرفة*

2. Transmit the pre-analyzed kinesthetic sensory information to brain motor centers that helps in control and coordination of movements.



# THE SOMATIC MOTOR SYSTEM



- حول بعد ما انتقلت الأحاسيس  
وتم تفسيرها

- **The somatic motor system** consists of **higher** motor centers located in the cerebral cortex and brain stem, **and their axons form descending motor tracts** that descend to and synapse with the neurons of **lower** motor centers **in the brain stem** (cranial nuclei) and spinal cord (A.H.Cs) from which **peripheral somatic nerves arise to supply the skeletal muscles.**

□ The Somatic motor system is thus composed of two sets of neurons:

*lower* *نزل من* *Axons* *أخس*

1) **Upper motor neurons (U.M.N.); whose cell bodies lie in the higher motor centers and their axons** constitute the descending motor tracts.

*in Brain stem*

2) **Lower motor neurons (L.M.N.); whose cell bodies lie in the spinal ventral horns or the corresponding cranial nuclei, and their axons** constitute the efferent motor fibers **in the peripheral somatic nerves**

*Skelcal muscle* *PN* *تغذي*

# THE CORTICAL MOTOR AREAS

## (MOTOR CORTEX)

- هي التي تبدأ الحركة

The initiation and performance of voluntary movements are the result of motor commands signals from the motor cortex to the lower motor centers via the descending motor tracts.

The motor cortex is located in the frontal lobe, and comprises:

- a) The Primary motor area (area 4).
- b) The Premotor area (area 6).
- c) The Supplemental motor area.

# (1) THE PRIMARY MOTOR CORTEX, AREA 4 (M I)

## \* Location:

- It lies in the **precentral gyrus** of the **frontal lobe**.

## \* Body representation: *upside down, mouth down*

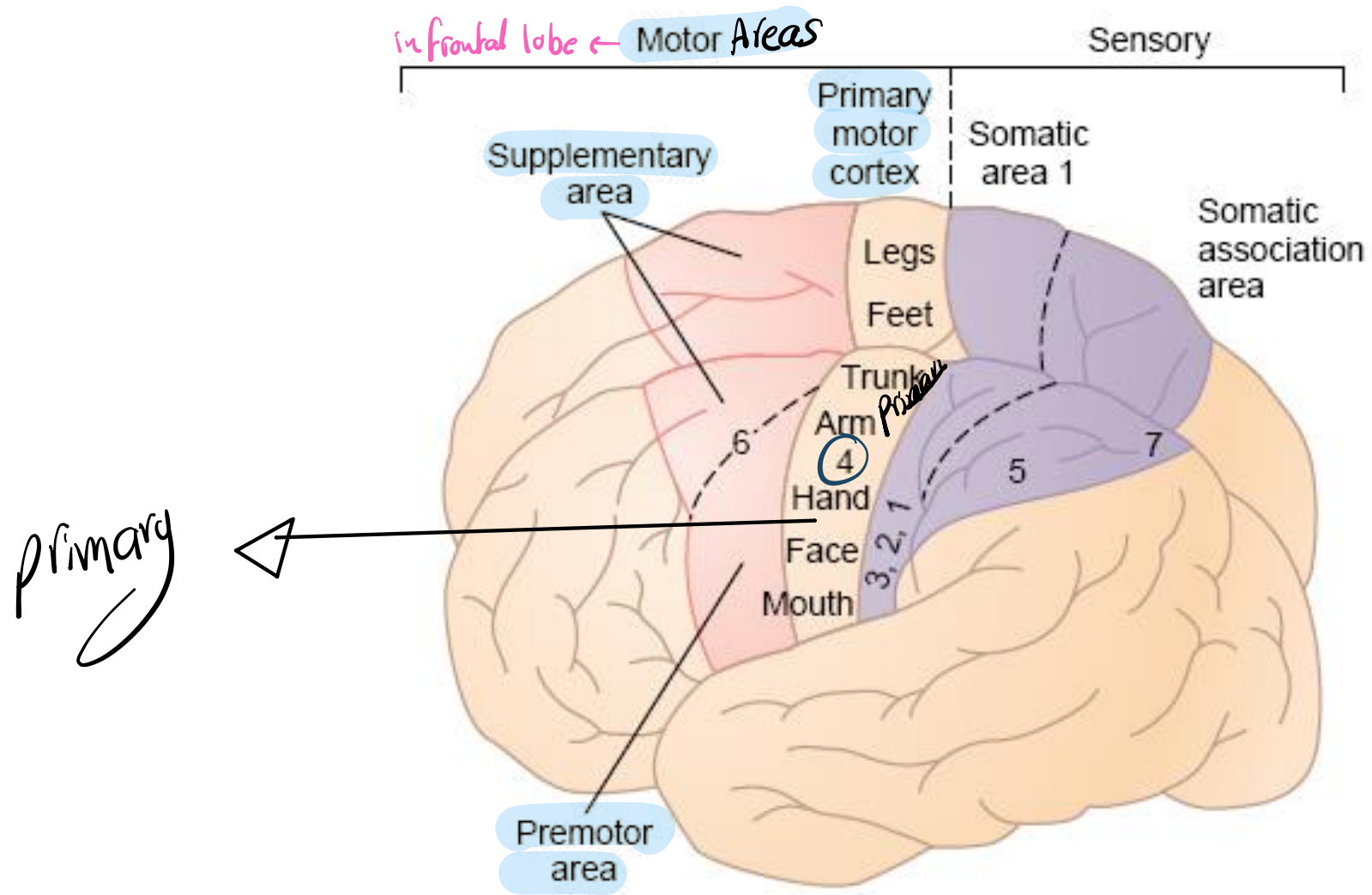
- a) The body musculature in M I area is mostly represented **contralateral** i.e. the muscles of left side controlled by the right motor cortex and vice versa except some **facial** muscles are represented **bilaterally**.
- b) **Muscles involved in fine voluntary movements** are represented by relatively large areas than those involved in gross movements. *such as trunk*  
— تابعاً للإصبع اليمنى من Trunk
- c) The body musculature is represented **inverted** i.e. the muscles of the face are controlled by **the lowermost part of area 4** & muscles of the lower limbs controlled by the upper most part of area 4.

# Functions:

- 1) The Primary motor area **discharges the motor impulses** that produce voluntary movements done by the distal limb muscles.
- 2) It **also sends facilitatory impulses** to the tone of the distal muscles.

سَيِّ قَوِي  
↑





**Fig. .The lateral and medial surfaces of the left cerebral hemisphere showing the cortical motor areas.**

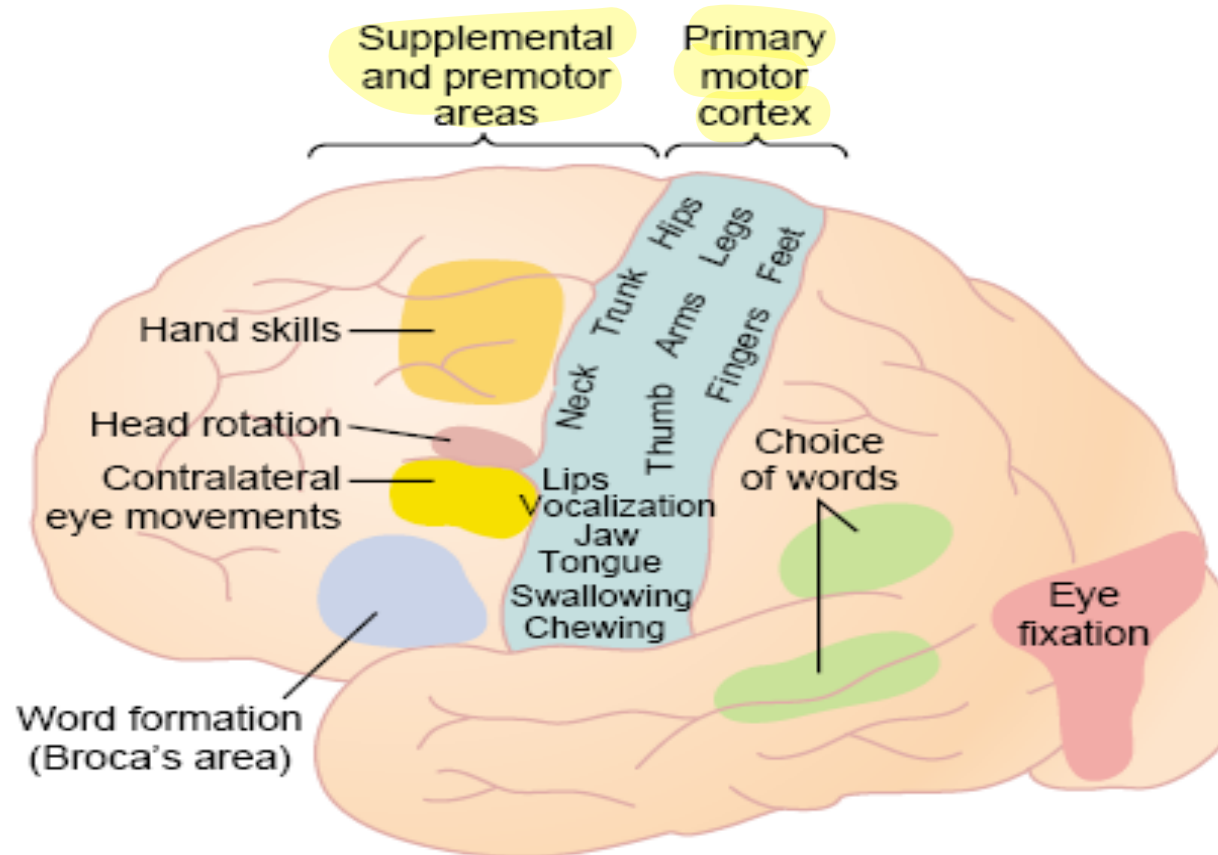
## (II) THE PREMOTOR AREA (AREA 6)

### \* Location:

- It lies in the frontal cortex just anterior to the primary motor area.

### \* Body representation:

- Contralateral, inverted.



## \* Functions:

- 1) It shares **in planning of complex movements** together with area supplemental motor area.   
 - يعني في عتري حركتان  
 لكن دوا بعض لانه المسخ  
 على كطير و حفظه
- 2) It initiates **the gross movements as those done by the trunk.**
- 3) Together with B.G. **involved in postural adjustment during voluntary distal movements.**   
 Basal  
 Ganglia
- 4) It has an **inhibitory effect on muscle tone.**
- 5) Together with basal ganglia, **initiate & control the automatic associative movements done at the subconscious level** e.g. **swinging of arms during walking.**

## 6) Functions related to the special areas in area 6 as:

A- Broca's area → الخصة باللام

- This area is functionally active in the <sup>الساكن/المسيطر</sup> dominant cerebral hemisphere (the left hemisphere in right handed persons). It controls the motor activity of the muscles involved in articulate speech.

B- Frontal eye movement area → توجه العين للمكان يميني  
يدي ايمانه

- This area controls voluntary movements of the eye balls.

C- Head rotation area

- This area directs the head towards visual objects.

D- Area of hand skills (Exener's area) writing, cutting

- This area controls skilled movements of the hand and fingers e.g. writing, cutting with scissor....etc.

### (III) Supplemental motor area

#### \* Location:

-In the upper medial side of the frontal lobe just above the premotor area.

\*.

#### \* Functions:

- 1) It evokes complex movements which often involve both sides of the body e.g.: causing both hands to perform a motor act together.
- 2) It functions with the premotor area (6) in providing suitable background for the performance of the fine skilled movements by hands and fingers that are mediated by the C.B.S tract.
- 3) It shares in the planning and programming of the complex movements with area 6.

Contra lateral  
زیرِ یلی قبل  
من

# صبرك بقدر كبري يعطيك الامانة

و الله لا يضيعلكم ثواب !!

- لا تنسوننا واءخواننا في غزوة

من الدعاء ..



im proud of  
you!

you're doing  
your best,  
keep going!