Cerebral cortex

The cerebral cortex has
4 functional areas

1) Motor areas
2) sensory areas
3) Limbic Areas
4) Association Areas

Association areas

Function of cortical association areas
Receive, Analyze, & integrate cortical & subcortical signals

Most important association areas:
- Prefrontal Area
- Parieto-Occipito-temporal (POT) Area

1) Parieto-Occipito-temporal (POT)

Parieto-Occipito-temporal (POT) association Area

Site: من الاسم
Between Parietal, occipital & temporal lobes
(In cortical region between sensory areas)

Parieto-Occipito-temporal Area has
5 Functions (areas)

1) Body position analysis (area)

Site: Between
somato-Sensory **PARIETAL**& superior **OCCIPITAL** areas

Function:
Detect body position by understanding signals from:
- visual receptors
- Proprioceptors

2) written words analysis (reading area)

Site: angular gyrus
behind language comprehension area

Function:
Recognize meaning of received words (while reading)

Lesion:
Cause Word blindness (dyslexia)

3) naming objects (area)

Site: inferolateral region
Of Parieto-Occipito-temporal area

Function:
Connects auditory (input) info with objects' physical nature

4) face Recognition (area)

Site: Medioventral surface
Of occipital & temporal lobes

Function:
Enables recognition of familiar faces

Lesion: cause (prosopagnosia)

5) language comprehension (wernicke's area) (General interpretative area)

Site: posterior part
Of superior temporal gyrus

Functions:
- **Higher level language comprehension**
- **Understand meaning of spoken words**
- **Form thoughts & select** right words to express speech
- **Process & recall** memory info

Lesion: causes deterioration of intellectual functions
1) **unable to understand** what seen or heared
2) **Cant express** (aphasia)

2) prefrontal

Prefrontal association Area
Site: anterior frontal cortex

Prefrontal association Area has
5 Functions

1) Planning complex pattern voluntary movement

It receives analyzed sensory info from POT about body parts' position and relation to surroundings (motor plan), then cortical motor areas execute specific movements.

2) sustain mental concentration

3) Elaboration of thoughts

4) Adjust personal behavior

- **It understands ongoing events & predict future behavior**
- **It adjust behavior according to socials & morals**

5) a working memory

- **collect bits of information** (simulationsly)
- **Store it** & makes it readily accessible (temporary)
- **Recall it** when needed

DAMAGE OF Prefrontal association Area
Leads to:

- **inability to plan or sequence complex actions**
- **Mental distractions**
- **Inappropriate social behavior.** معندكش سوشيالبوليتيكال كوميريهينشن

Give up & go waste your time, pleaseeeeeeeeeeeeeee

Cerebral cortex

Neurological basis of language

Neurological basis of language (speech)

Language:

- highest mental function in humans used to **express thoughts & communicate by spoken or written words**

- it's a complex process
requires integrity of **dominant hemisphere**
(left hemisphere in right handed & vice versa)
because it has sensory & motor functions

The cerebral cortex has
2 language involved areas

1) Language comprehension areas (sensory)

2) Language expression areas (motor)

1) language comprehension areas

1) Language comprehension area (sensory aspect)

- **Wernick's area :**

A) Wernick's area receives input
about spoken & written words
From auditory & viusual association areas.
Important in reading comprehension

B) Wernick's area is also responsible for
Forming meaningful speech patterns

2) language expression areas

2) Language expression areas (motor aspect)

- **Broca's area :**

Site: *In posterior inferior* frontal gyrus
In dominant hemisphere
In front of ***1ry motor cortex***
(initiates laryngeal & mouth muscles)

Function:
integrate language signals from Wernick's area
Then transmit it into regular motor commands pattern
Then area 4 in 1ry motor area start & regulate speech
Muscles so vocal production is done

- **Exner's area :**

Site: *In frontal cortex, in* premotor cortex
In front of 1ry motor cortex of hands & fingers

Function:
Needed for writing
The language signals from wernick's area
go to **Exner's area**
where it coordinate hand movements for writing.

Aphasia

Aphasia
Speech abnormality
due to damage in specific language areas in dominant hemisphere
Not due to visual or hearing defects of speech muscles paralysis.

Aphasia cause
- **vascular stroke affecting cerebral blood vessel of the language region**

Types of aphasia	Receptive (Sensory)	Expressive (Motor)
Subtypes	- Auditory failure - Visual failure - Wernick's type	- Speech failure - Writing failure

- **there is a third type called global aphasia**
which is both sensory (association) & motor related in the areas of leison
So the patient can't understand or express a language

Aphasia Subtype	Site	Characters
Auditory aphasia	**Area 22** Auditory association area	Can't understand spoken words (Auditory Agnosia)
Visual aphasia	**Area 18,19** Visual association areas	Can't understand written words (Visual Agnosia)
Wernick's type	**Wernick's area**	Can't understand both spoken & written words + can't form speech
Speech apahsia	**Area 44,45** Broca's area	Can't articulate speech
Writing apahsia	**Area 46** Exner's area	Can't write (Agraphia)