pyramidal tract:

Information

- It contains about one million fibers
  - 60 % of them are myelinated (by oligo dendro glial cell in CNS
    - this myelination becomes complete one year after birth
  - 40% are non myelinated.
- fibers arise from
  - 30 % from the primary motor area "4"
  - 30 % from the pre-motor area "6"
  - 40 % from somatic sensory area (areas 3,1, 2 and area 5,7).
- one way, direct connection between UMN and AHC (one neuron)
- only tract which contains the axons of certain cells called "the Pyramidal" or Betz " cells which are found in the 5th layer in the motor area "4".
  - These cells are never found in any other area except in area (4).

المحطات

- Cerbral cortex — axons of the tract form in the cortical area what is called the "corona radiata"
  - which occupies the anterior 2/3 of the posterior limb of the internal capsule.
- midbrain
  - fibers of the tract are grouped in bundles
  - it from 3/5 of basis pedunculi
- pons — descends in the basis pontis
- medulla — they f rom specif ic elevations called the " pyramid ".

Function

Lesions of the pyramidal tract:-

- Most probably vascular (thrombosis or hemorrhage) or may be due to tumors or traumatic causes
- most common site in internal capsule or medulla.

1- Loss of skilled voluntary movements (paralysis) in **opposite side** =hemiplagia.
2-Pure pyramidal lesion without other extra-pyramidal lesions -causes **hypotonia**.
3- Appearance of Babiniski's sign (dorsiflexion of big toe).

Type	The cortico-spinal tract	The cortico- bulbar tract	the cortico-nuclear tract.
Cerbral cortex	Cerbral cortex — Pyramidal" or "Betz "cells in area (4).	Cerbral cortex — lower parts of area " 4 " and " 6 "	Cerbral cortex — originates form specific area called " frontal eye field " or area " 8 "
Brain stem	Brain stem (im medulla) — 80% cross to the opposite side forming motor decussation; 20% of fibers descends in same side	brain stem — Large part of fibers cross to opposite side; explains little affection of the face in internal capsule lesion.; many fibers innervate same side	Brain stem — (medial longitudinal bundle). — supplies the specific cranial nuclei of both sides; innervate the nuclei of III, IV , and VI
Finally	Spinal cord — forming the lateral cortico-spinal tract — ends around interneurons and A.H.C at different levels of the spinal cord segments.; forming direct or ventral cortico- spinal tract — re-cross to the opposite side in different levels in cervical and thoracic regions to end around A.H.C.; 1% of fibers descend directly without crossing forming Ipsilateral cortico-spinal tract — same side AHC.	terminates on motor nuclei of cranial nerves — that supply muscles and glands of head & neck; cranial nerves number (V, V I I , I X , X , X I a n d X I I).; innervated only from opposite pyramidal tract.; All hypoglossal nucleus (supply tounge) and lower I/2 of facial nucleus	innervate the nuclei of III, IV , and VI — which supplies the extra-occular muscles.; performs conjugated deviation of both eyes to opposite side; accommodation to near and far vision

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The extra-pyramidal tract

Information

Any descending tract other than pyramidal

The extrapyramidal fibers which originate from premotor area during their descend to brain stem nuclei, they mix with pyramidal fibers in the corona radiata and internal capsule (anterior limb), before reaching to the basal ganglia.

محطات

- multi-stations
  - in the cerebral cortex
    - area " 4 " area " 6 " in the frontal lobe l
    - basal ganglia
  - descending fibers originating from more wider area
- brain stem centers
  - reticular formation
  - tectum of mid brain
  - red nucleus
  - olivary nuclei
  - vestibular nucleus
- terminate finally
  - around gamma cells (mainly)
  - anterior horn cells in different levels of the spinal cord.

these tracts descend

- Some descend directly without crossing
- others cross to opposite side
- others may innervate both sides

receive many impulses form higher cortical areas

- pre-motor are
- basal ganglia
- cerebellum
- motor area

greatly controlled by these connections.

from higher cortical area, basal ganglia and cerebellum.

from basal ganglia.

Type			
	المنشاء	الطريق	النهايه
A) Reticulo-spinal tracts:-	arise from reticular formation in the brain stem	then divides into: Medial reticulo-spinal tract= ventral — arises from pontine reticular formation; descends without crossing (direct); facilitatory to muscle tone. Lateral reticulo-spinal tract =dorsal — arises from medullary reticular formation; crosses to opposite side; inhibitory to muscle tone	end mainly around A.H.C
B) Vestibulo-spinal tract:	carries the pathways of postural reflexes arising from the labyrinth. arises from vestibular nucleus to A.H. cells	divides into: lateral, medial — no crossing (direct); facilitatory to muscle tone specially extensors (antigravity muscles)	ends at different levels of the spinal cord.
C) Rubro-spinal tract: -	from red nucleus in mid brain	The tract crosses rapidly in midbrain to the opposite side.; inhibitory to muscle tone (interneuron)	controls many muscle activities through special tract called " cortico-rubro- spinal system".
D) Olivo-spinal tract:	It arises from the inferior olivary nuclei in the medulla	descends without crossing (direct); causing facilitation to muscle tone.	is relatively short tract ends around A.H.C till the cervical region only
E) Tecto-spinal tracts :-	Lateral — from superior colliculus of the mid brain.for vision. Medial — from inferior colliculus of the mid brain.for hearing	crossing: controls movement of the neck muscles; some movements like raising the arms in front of eyes.	both tracts end around A.H Cells in cervical region of the spinal cord

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Crebellum

Functions of the cerebellum:

1.Control of equilibrium
- mainly performed by the flocculo-nodular lobe
  - which is assisted by it's connection to the labyrinth through the vestibular nuclei.

2.Regulation of the muscle tone
- the paleo-cerebellum =anterior cerebellum
  - is inhibitory to the muscle
- neo-cerebellum = posterior cerebellum
  - is excitatory to it.

3.Regulation of the gross involuntary movements:
- through it's connection with
  - basal ganglia
  - motor areas
  - other extra pyramidal system.

4. Role of cerebellum in ballistic movement:
- Most rapid movements ofthebody such as
  - movements of the fingers in typing
  - saccadic movements of the eyes.

5.Control of voluntary movements
- controlling the timing and the progression from one movement to another
- rather than initiation of these movements
- Mainly the function of neo-cerebellum
  - A-Servo-comparator function:
  - B-Damping function of the cerebellum:
  - C- Predictive function:
  - D- Programmer function:

Lesions in cerebellum:

1. Archi-cerebellar syndrome:
- affects mainly folucculo-nodular lobe
- disturbances in equilibrium with a characteristic gait called "drunken gait"
- patient walks swinging from side to side like a drunken person with wide base.

2. Paleo- cerebellum Syndrome:
- In which there is hypertonia
- equilibrium and voluntary movements are more or less normal.

3. Neo- Cerebellar syndrome (Ataxia):
- affect the neo-cerebellum
- characterized by:
  - a-Athenia
    - severe muscle weakness
    - not paralysis in the same side of lesion.
  - b-Hypotonia
    - The tendon jerk takes the characteristic " Pendular knee jerk".
      - because neo-cerebellum facilitates the muscle tone
  - c- Cerebellar ataxia:
    - 1.Dysmeteria
    - 2.Dys-diadocokinesia
    - 3. Stacatto speech
    - 4.Kine tic (inte ntio n) tre mo rs
    - 5.Cerebellar Nystagmus
    - 6. Rebound phenomenon
    - 7. Abnormalgait, Zigzag gait, :
    - 8.Decomposition of movements:

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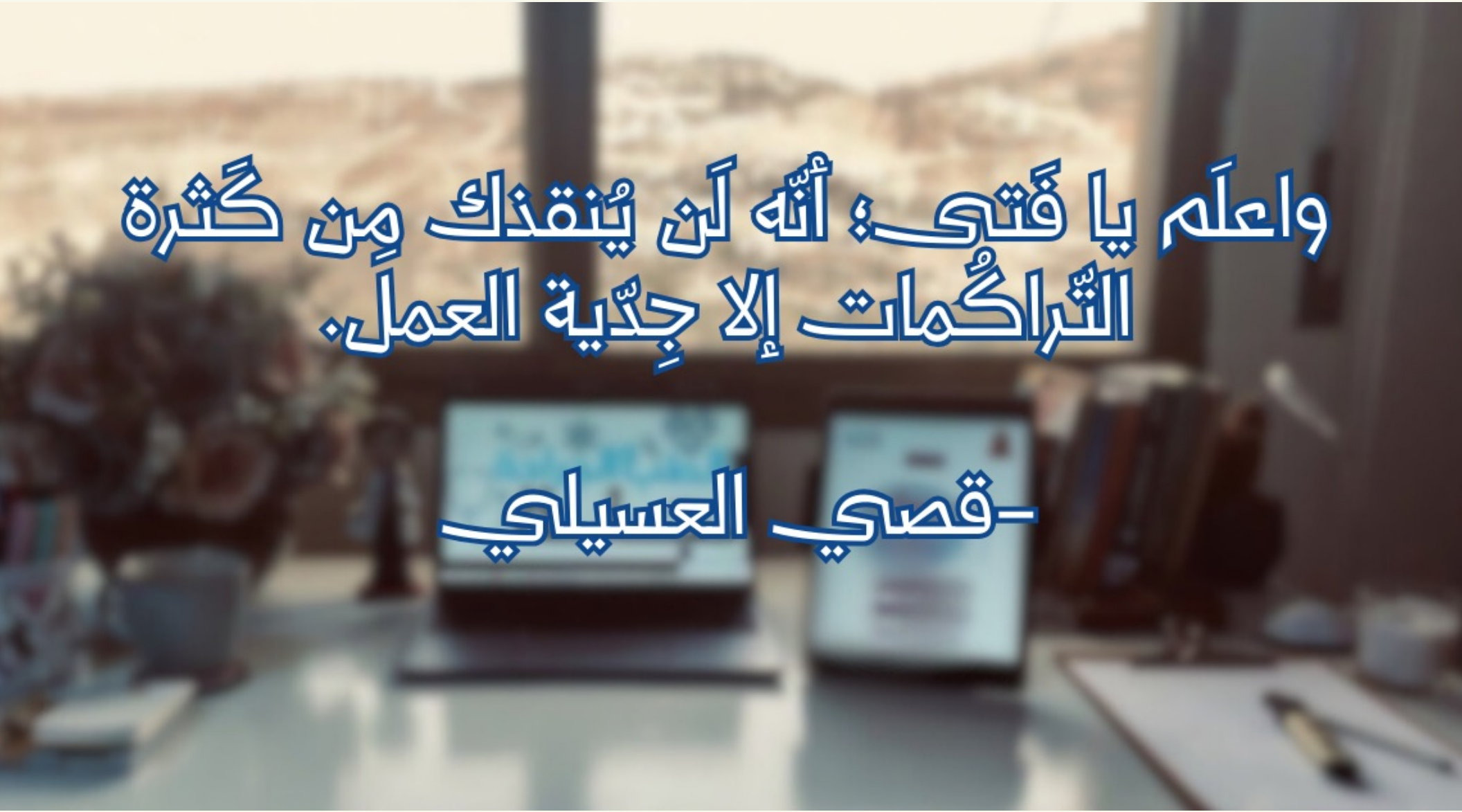
واعلَم يا فَتى؛ أنَّه لَن يُنقذك مِن كَثرة
التَّراكُمات إلا جِدّية العمل.
-قصي العسيلي