* Function of CNS :- 1#

By Shahed Jumah

① Sensation (Changes, Stimuli) ↔ external / internal environment

② integration ③ output ↔ muscle / Gland

* Nervous tissue :-
- highly cilling

↳ neurons (Functional unit) → signal transduction "Don't Decide"
→ high metabolic, exitable (AP)
↳ have Cell body, Dendrites, axon

↳ neuroglia (support) Can Decide ↔ 2 PNS
subtle support ← Schwann cells — velocity

4 CNS:
- microglia — monocyte — immune
- oligodendrocyte — myelin sheath
- astrocyte — BBB
- Ependimic cell — space CSF

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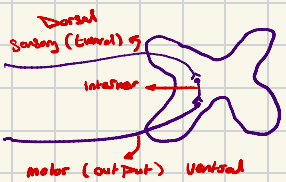
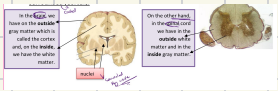
* neurons *



* White matter → myelinated, unmyelinated (processes)
* Gray matter → neuronal Cell body *

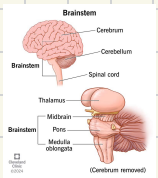


* Nerve * Bundle of Process, Axon (no Body) outside CNS
↳ have CT
* Tract * " " " inside CNS → No CT
* Ganglion * Group Cell body outside CNS
* Nucleus * " " " inside CNS → surrounded by white matter
↳ not surrounded — "cortex"

Nervous System

CNS → Brain + Spinal Cord
PNS → Nerves — 31 spinal, 12 Cranial

- Brain
  - Fore Brain — Cerebrum (Cortex telencephalon)
    - Diencephalon (thalamus)
  - mid Brain
  - hind brain — Pons, medulla, cerebellum

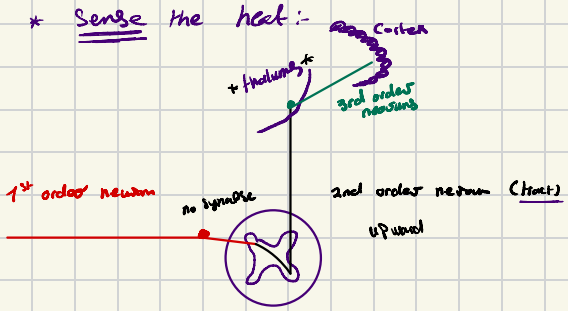


* Brain Stem * جذع الدماغ
Mid Brain — Pons — Medullen

- PNS :- Sensory (Afferent) — Somatic / Visceral
  Motor (efferent) — muscle / Gland

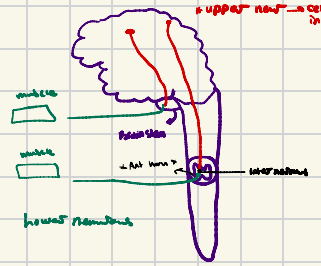
* Somatic — sensory / motor — voluntary
* Autonomic — sensory / motor — involuntary

* Sense the heat :-

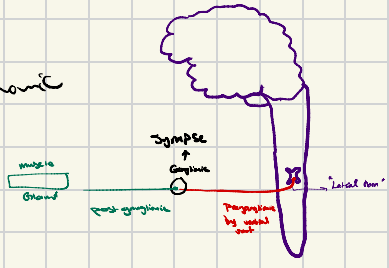


* Motor * Somatic / autonomic
Lower M. Spinal UPP M. *

Somatic



Autonomic



* Spinal Cord *

Location → Vertebral Canal

Foramen magnum — Start
L1-2 Disc — end

Conus medullaris

* 31 spinal nerve — 31 segment — all mixed — not uniform

* Cauda equina — lower nerve equina lower 1/3 → Longer root

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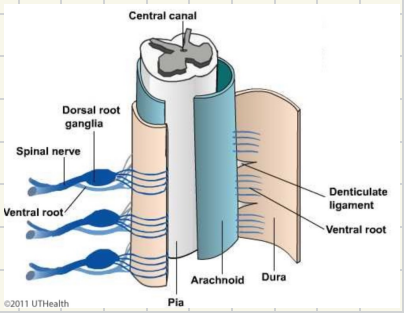
* Layers :-

* Dura → outermost (magnum — S2)
  ↳ continues as filum externum

* arachnoid → ends S2 ↳ have space

* Pia matter — transparent
  ↳ anterior as filum internum
  ↳ Denticulate ligament from Pia to Dura



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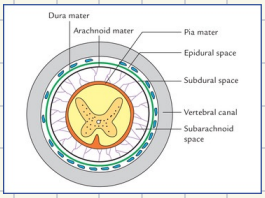
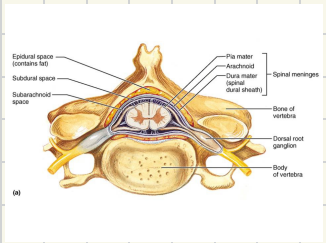
* Spaces :-

+ Epidural → fat filled — Anesthetic — Labour



* Subdural → Serous fluid



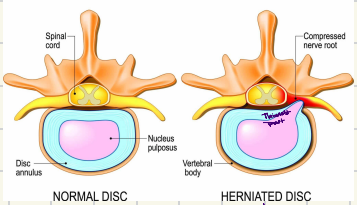
** * Subarachnoid → between Pia, arachnoid filled CSF
↳ is major BV
↳ Lumbar puncture L3 — L4 (Space)

2#

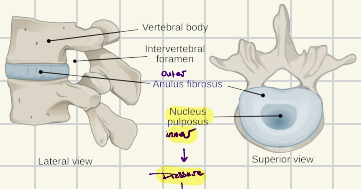
* Segment :-

* each spinal nerve under corresponding vertebra except cervical (C1 — C7)
↳ C8 under

Nerve T1 — C1



95% L4-L5 // L5-S1 / Posterior Lateral /



Pressure
Leakage, rupture
Pressure Spinal nerve

Common lumbar disc problems

Disc	Root	Percentage	Motor weakness	Sensory changes	Reflex affected
L3-L4	L4	3-10%	Knee extension (Quadriceps femoris)	Anteromedial leg (saphenous)	Knee jerk
L4-L5	L5	40-45% Common	Big toe dorsiflexion (EHL) and (TA) Anterior Leg's muscle	Big toe, Anterolateral leg (CPN)	Hamstring jerk
L5-S1	S1	45-50% Very common	Foot planter flexion (Gastrocnemius)	Lateral border of foot (sural)	Ankle jerk (Achilles tendon)

EHL: external hallucis longus, TA: tibialis anterior, CPN: common peroneal nerve

* Dermatome → area of skin supply by single spinal nerve
* Myotome → Group by muscle supply by single nerve

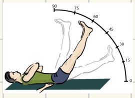
* test L5 → Stand on heels
↳ Dorsiflex
* test S1 → on toes
↳ Flexion

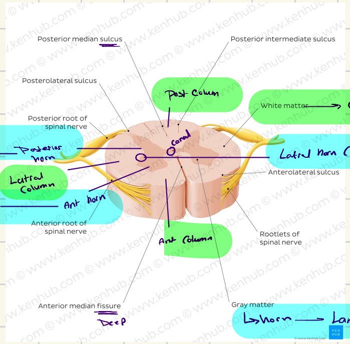
* Low Back Pain :

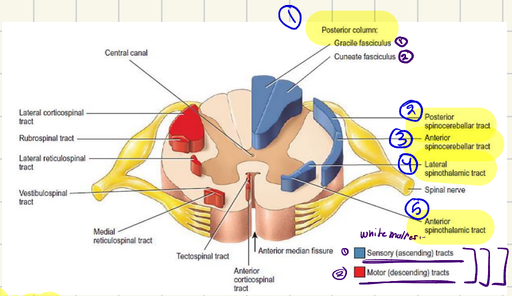
Spinal Nerve have meningeal nerve (recurrent N) — supply Dura

↳ Pressure on Spinal N — effect Dura

*** Straight leg raise test ⟶ if Pain ⟶ disc







Sensory ⟶ Start as receptor in Pariphery (many type) ↓ transmitted by fibers

* activation of receptor *

∘ Mechano Receptor ⟹ Pressure

— Rapidly adapting — fad away

— Slow adapting — Contenous firing (Long signal)

∘ thermoreceptor ⟹ heat

— free nerve ending

∘ Nociceptor ⟹ Pain

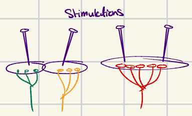
— free nerve ending — multimodal (over load)

* Sensory fibers *

Aα > Aβ > Aδ > C

↓ Larger faster | ↓ thermo | ↓ fast Pain Noci | ↓ Slow Pain

* Receptive field *



* every receptor recive Sensation from certain area of Skin ⟶ reciptive field

* حطيت فرجار على الايد رح تحس نقطتين لو بعاد عن بعض

⟸ الـ field صغيرة يعني تركيز الـ fiber أكثر

يعني هاي الأطراف فيها كثير receptor بتقدر تميز من وين

* الـ field لما بتلاقي الـ 1st, 2nd neuron

ممكن يكون في أكثر من 1st بتعطي الـ 2nd واحد

في حقيقة field واحد

* كيف العقل بيميز هاد وجع، حرارة، لمس ....

* Labelled line theory *

↳ Carry information from Certin type of receptor

الـ fiber الها نوع واحد من الـ receptors

* طيب لو الـ fiber الها أكثر من نوع receptor, كيف بميز؟

* هاد حكي بعدين *

* Adequat Stimulus *

Amount + type of energy required to specific Sensory receptor

* Sensation

Modality ⟶ type of signal

Locality ⟶

Intensity ⟶

Cortex ⟶ encoding

Contenous Sensory :- 3#

① ⟶ all Receptor except free

* Posterior Column :- ⟶ (Aα Aβ) high velocity — unconcious ⟶ reach cerebellum — واحد aware ⟶ (Cortex)

— Modality (type) :- Discriminative touch (2 Diff points), Conscious Proprioception

muscle joints Sense ⟹ الجسم وين باتجاه → Position of my body * — motor Coordination —

— Anatomically :

1st order Neuron ⟶ Dorsal root Ganglia ⟶ (cell body in) fibers ascend epsilateral (Same side)

reach Lower Part of medulla oblongata happen Synapse with 2nd order (cell body)

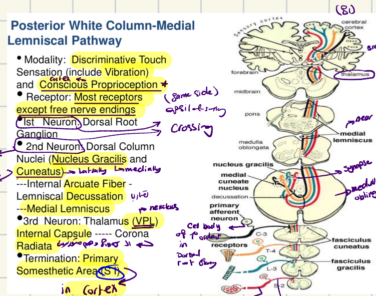
** Crossing of midline ⟶ بتروح للجهة الثانية ⟹ Sensory

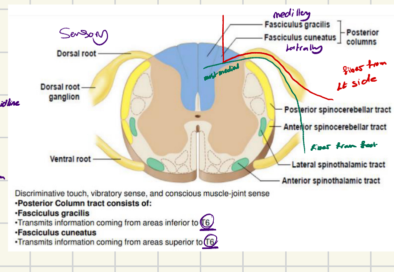
the 2nd neurone when ascend make arch Called "internal arcuate fibers", Close to midline the fibers make "medial Lemniscus"

⟶ * بالنسبة الـ medial lemnisc بيكون على شكل ...

the medial reach the thalamus (Gray matter) ⟹ many necleus

the fibers (VPL) out from thalamus Passing by critical area "internal capsule", then the fibers radiated to Cortex (S1)

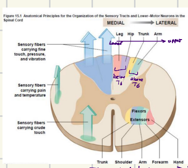


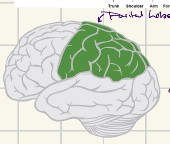


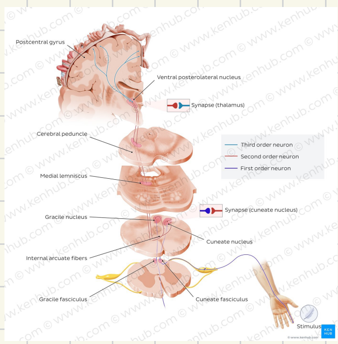
(inferior T6)

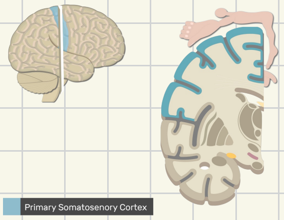
— Gracilis ⟹ trasmit formation from lower Body ⟩ Same function

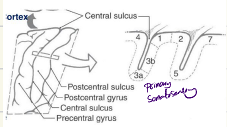
— Cuneatus ⟹ " " " upper





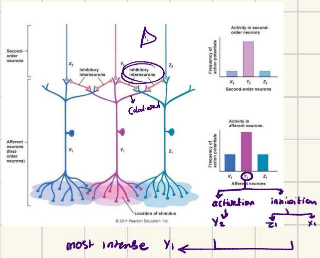






* Brodmann areas
  - 1 — Cotanous, Pain, temp
  - 2 — Golgi tendon, joint
  - 3a — muscle spindle
  - 3b — Cotanous pain, temp

* Lateral inhibition :- → ↑ Localization of site of stimulus



Y1 ← more stimuli — have collateral neuron → exitator → Y2; inhibitory → Z1, X1

يمنع السيال الضعيف الي

* most intensely activated pathway halts transmission of impulses in less intensely pathway through lateral inhibit

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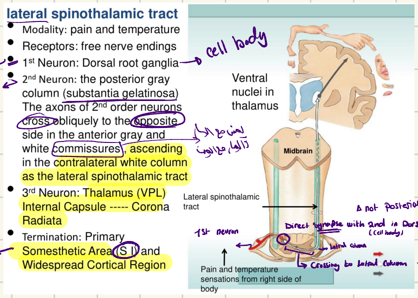
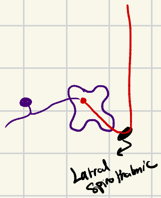
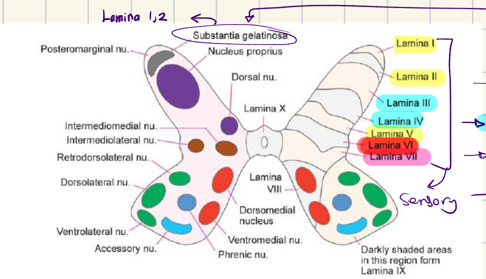
(2) * Lateral Spino thalamic tract *

- modality → Pain, tempreture
- Receptor → free nerve ending





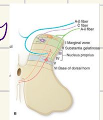
* the region that 2nd order synapses in dorsal horn called Lamina 1,2



- Lamina I, II → Pain, Tempreture
- Lamina III, IV → touch (neucleus Porous)
- Lamina V, VI → Proprioception — (Lumber, cervical enlargement) (present)
- Sensory → Vescral pain

* wide spread Cortical Region :-
  ↳ Slow pain → Complicated → emotional (long duration) → Diffuse

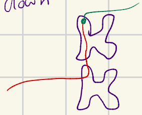
fibers of pain: Aδ, C → Diff anatomicaly
- Fast P ← Aδ — Lamina 1,5
- Slow P ← C — Lamina 1,2

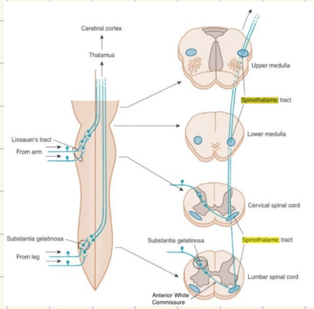


↳ fast pain → critical injury (short duration) → Sharp
الشعور الخطير

Laminae 1&2 → receive C fibers → unmyelinated and smaller → SLOW PAIN
Laminae 1&5 → receive A delta → wide diameter and myelinated → FAST PAIN

* Posterolateral tract of Lissaur *
fibers not necessarly synapse with same segment can up to another segment → make local tract
down



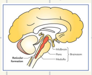


* spinal cord injury
لا توصل الإحساس للمخ والإحساس
من الجسم → Loose LT

other terminations

في الدماغ → in Brain Stem

* Reticular formation → Conscious mind
Switch on, off of the Cortex



→ (Slow) Pain activat reticular
→ keep aware → chronic pain

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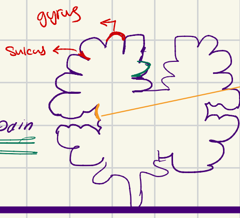
* cingulate gyrus *
وسط
middle
↳ important for limbic → emotional pain



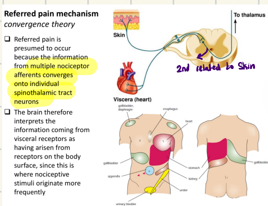
* insular gyrus
middle cortex → autonomic response of pain → vesceral sensation
heart pain → sweating

4

Fast Pain (initial pain)	Slow Pain
Sharp, pricking	Dull, burning
(Aδ) fiber — Larger	(C) fiber — Smaller
Short latency	Slower onset
Well localized	Diffuse
Short duration — no memory	Long duration
Less emotional	Emotional, autonomic response → Chronic
Mostly from superficial structures	Superficial & deep structures
Spinothalamic [1st – 2nd – Cortex]	* Spinoreticular → Can activate reticular formation Cor. Brain stem
lamina I & V	lamina I & II
VPL nucleus	VPL & intraluminar nucleus → related to reticular it self

why? fast pain, 1st neurone synapse with 1 2nd
Short pain, 1st // synapse with more than 1 2nd
↲ الـ signal تتوزع

* Referred Pain :- important
Pain from organ and feel it in skin
أصل الوجع غير عن مكان وجوده



* أصل الوجع القلب, بس بحس إنه في الجلد
يوصل الدماغ الي الـ signal من الـ skin
بس أصلها الـ Brain

* The Gating theory :

* تخفيف الوجع

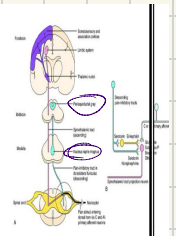
nociceptors: Aδ & C fibers → 2nd → Brain
mechanical: Aβ fibers → (inhibit) inter neuron
Active then active
عن طريق الفرك

* if Aβ is activated the Gate pain is closed

* origin of pain :
- Cutaneous → Skin
- Deep Somatic → muscle, bone, joint ... [Dull, Diffuse]
  → intermittent Claudication → Calf muscle (excersize) Ø Blood supply ↓ get rid of metabolizme (* lactic acid *)
- Vesceral → Poorly Localized by C fibers → have receptors (chemo, osmo, baro)
  → ischemia (chest pain), spasm (bladder), damage (chemical) ...

VI

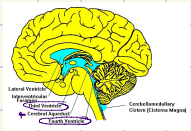
2. **Descending control (VIP):**
- **Spinoreticular fibers** (coming from spinothalamic fiber (pain fiber)) stimulates **periaqueductal gray in mid brain (PAG)**
- Excitatory neurons of PAG projects to **Nucleus raphe magnus** (NRM)
- (NRM) neurons produces serotonin which activates **inhibitory neurons** that secretes **enkephalins** and the **endorphins** (morphine like actions) in substantia gelatinosa. This leads to termination of pain.
  Note: Locus coeruleus (in Pons) is thought to directly inhibit substantia gelatinosa neurons **(not scientifically confirmed).**
- **Extra Info:**
- ✓ Periaqueductal gray is the gray matter surrounding cerebral aqueduct.
- ✓ Cerebral aqueduct is within the midbrain, it contains cerebrospinal fluid (CSF) and connects the third ventricle to the fourth ventricle.
- ✓ Nucleus raphe magnus is located in medulla oblongata



We are done with the lateral spinothalamic tract.

* Descending Control of Pain (VI) :

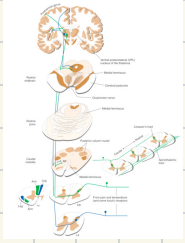
* when fibers Go up it is Stimulate "PAG", Located in midbrain around "Cerebral aqueduct" which is Passage way bet 3rd, 4th Ventricle → important in descending Control of Pain
the Spinoreticular fibers (from spinothalamic tract) Stimulate the neurons in PAG, this PAG descend nucleus raphe magnus which is excitatory neurons that activated neurons (inhibitory neurons) ⇄ enkephalins endorphins morphine like action, the ? projection of inhibitory neurons reach "Substantia gelatinosa" ⟹ inhibit pain "-ve FB"



(3) * Anterior Spinothalamic tract :

- Modality : Crude touch and Pressure
- Receptors : free nerve ending
- 1st neuron : Dorsal root Ganglia
- 2nd neuron : Nucleus Proprius in Dorsal horn Lamina 3-4

2nd neuron cross Contralateral to Ant gray and white Commissure and ascending up reach thalamus synapse with 3rd neurons (VPL) and radiate to Cortex "Corona radiata" and terminate in area S1 (primary)



(4) * Spinotectal tract :

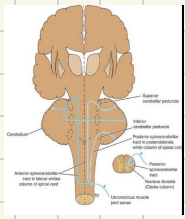
↳ posterior aspect of midbrain
- Composed of quadrigemina (4 Colliculi) ⟹ 2 Superior → Visual Reflex ↳ Inferior → Auditory Reflex
- ascend in Anterolateral white Column terminate in Superior Colliculus
  Provide afferent Spinovisual Reflex
  → 1st synaps with 2nd in Spinal Cord

Coordination
* Superior Colliculus ⟹ important in reflex + vision + head and neck + eye ball

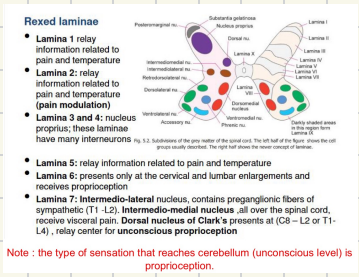
Note: In Medulla: anterior spinothalamic tract + spinotectal + lateral spinothalamic = spinal leminiscus which ends in VPL

Remember : medial leminiscus Related to Dorsal Column

(5) * Spinocerebellar tract (Posterior)

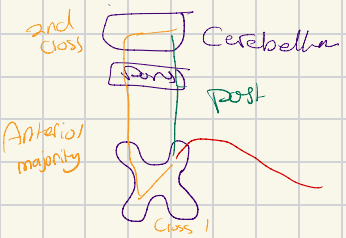


- Receptor : like Post column
- modality : muscle, tendon, joint
- 1st neuron : Dorsal root Ganglia (Cell body)
  ⟹ the other synapse in Dorsal horn in area called (Clarks nucleus) (Nucleus Dors) Lamina 7
- 2nd neuron : Go up (from post part of lat Column)
  Directly Go to Cerebellum (Same side) without Crossing through inferior Cerebellar Peduncle
  → unconscious (but not cortex) ⟹ Sense of Position (Proprioception)



Rexed laminae
- **Lamina 1** relay information related to pain and temperature
- **Lamina 2:** relay information related to pain and temperature **(pain modulation)**
- **Lamina 3 and 4:** nucleus proprius; these laminae have many interneurons
- **Lamina 5:** relay information related to pain and temperature
- **Lamina 6:** presents only at the cervical and lumbar enlargements and receives proprioception
- **Lamina 7: Intermedio-lateral** nucleus, contains preganglionic fibers of sympathetic (T1 -L2). **Intermedio-medial nucleus** ,all over the spinal cord, receive visceral pain. **Dorsal nucleus of Clark's** presents at (C8 – L2 or T1-L4) , relay center for **unconscious proprioception**

Note : the type of sensation that reaches cerebellum (unconscious level) is proprioception.



In Somatic Sensory, ALS eventually the sensation from right Side of the Body will reach the Left Cortex ⟹ Contra
* in Spinocerebellar the sensation from right will reach the right ⟹ Ipsi

- **Peduncle**= bundle of white matter.
- **superior cerebellar peduncle**: connect midbrain to cerebellum.
- **middle cerebellar peduncle**: connect pons to cerebellum.
- **inferior cerebellar peduncle**: connect medulla to cerebellum.

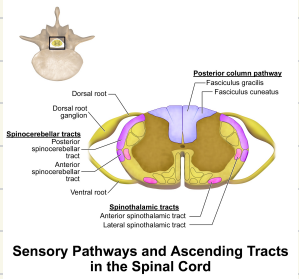
Note 1: in **dorsal column system and anterolateral system** eventually sensation from right side of the body will reach to the left cortex (no matter of the decussation site) and vice versa.

Note 2: in **spinocerebellar tracts** whether anterior or posterior, sensation from right side of the body will reach the right cerebellar cortex and vice versa.

(6) * Spinocerebellar (Anterior) ⟹ Double Crossing

Same as Posterior
↳ Fibers → minority — like Post — up (Same side) — Cerebellum — superior Cerebellar Peduncle
→ majority — Cross midline — ascend Contralateral — Cerebellum — ∩∩∩

End with Sensory



Sensory Pathways and Ascending Tracts in the Spinal Cord

5#

Motor tracts & "Descending tracts"

→ **Pyramidal** area ④ in Cortex → Pyramid in MO
↳ Corticospinal, Conscious → Skeletal movment (Voluntary)
↳ ① aware ↳ ② Coordination (Subconscious)

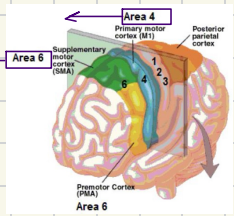
→ Upper motor neuron Down to spinal, and synapse with inter neuron that activat Lower motor neuron in Lamia 8

When you hear the word "**subconscious**", you may think of smooth muscles! However, don't be confused; the **smooth muscles** are totally supplied by **autonomic** NS. On the other hand, the **skeletal muscles** are supplied by **somatic** NS (voluntary movements), but the **control of the skeletal muscle movement** can be on either the conscious level (you are aware of) or the subconscious (coordination / modulation) level.

* SM ⇒ totally Autonomic * Skeletal ⇒ Somatic but the Control ↳ Sub Cons / Cons

→ **Extrapyramidal** area ⑥ in Cortex
↳ Sub Conscious, regulation of balance (muscle tone)
↳ Vestibulospinal in Brain Stem → Sensory for 8th Cranial Nerve (Vestibular)
↳ reticulospinal Core of Brain Stem → Control Motor Syst
↳ Rubrospinal Red nucleus in midBrain
↳ tectospinal Posterior aspect of midBrain

motor
Coordination



* Difference :-
- Lesion in area 4 → Paralysis
- Lesion in area 6 → no " but Lose of Coordination

Damage → Lose of Coordination

⑥ PMA :- External Cues (ears, eyes)
↳ Vesion, hearing
* SMA :- Internal Cues ⇒ Memory

* Area 321 ⇒ Sensory area but there is some Motor neurone here

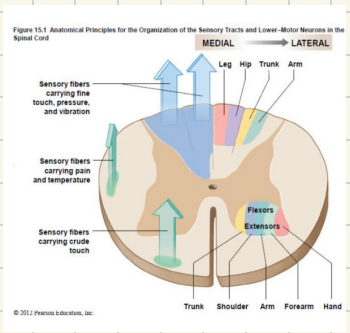
- Lamina 8 ⇒ Synapse Motor interneurone → Ant Aspect of horn
"Lamina 9 in Ant horn"

- Lamina 9 ⇒ Cell bodies of Lower motor neurone → Skeletal M

Lamina of motor system:
- Lamina 8: motor **interneurons**, Commissural nucleus.
- Lamina 9: ventral horn, cell body of **lower motor neuron (LMN)**, divided into nuclei:
  - **Ventromedial**: all segments (extensors of vertebral column).
  - **Dorsomedial**: T1-L2 (intercostals and abdominal muscles).
  - **Ventrolateral**: C5-C8 (arm), L2-S2 (thigh).
  - **Dorsolateral**: C5-C8 (Forearm), L3-S3 (Leg).
  - **Reterodorsolateral**: (In the enlargements) C8-T1 (Hand), S1-S2 (foot) → these are responsible for skilled movement. Notice that these muscles are mainly flexors, so they're retrodorsal.
  - **Central**: Phrenic nerve (C3-C5) → activates lower motor neuron that supplies the diaphragm.

  (Only ventromedial nuclei are shown in all segments, the rest are shown only in specific segments).
- Lamina X or 10: Surrounds the central canal – the grey commissure. Its function is still not clear and controversial (more references in lab 1).

* Motor horns :-



Ant horn
- medial: for medial muscles (muscles close to trunk) → Posture
- Lateral: for Lateral muscle flexors < hand foot → Skilled movemen
- Anterior: extensor muscle Anteriorly
- Posterior: flexors M posteriorly

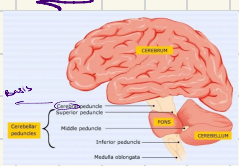
* Corticospinal (area 4) :- Lat / Ant

Summary of the difference between lateral & anterior corticospinal tracts

Anatomically: (the level of crossing-over)	
Lateral: lower part of medulla oblongata	**Anterior**: level of spinal cord
Functionally: (supplied muscles)	
Lateral: lateral muscles→ skilled movement	**Anterior**: axial muscles→ posture and balance

Start from the Cortex then Corona radiation then internal capsul, then middle 3/5 of basis pedundi (Crus cerebri) in midbrain (Brain Stem) as net Bundle ///, then reach the Pones and Scattered, why? bcz of Pontine neclie (cell bodies) + fibers of middle cerebellum Peduncl, then reach MO and the fiber will recollect again and form the Ant aspect of MO (Pyramide); in Lower Part of MO they will Cross to other Side
- these fibers Called [Lateral Corticospinal] → Descend to Ant horn → active Lateral muscle
85% Skilled movment !

- other fibers will descend epsilateral Called "Ant Corticospinal" → No crossing
they are descend to spinal then cross to medial Side of Ant horn
other fibers will descend epsilateral Called "Anterior corticospinal"
15% Posture !



* Lateral Corticospinal Fibers *
- Synaps with α, γ
- 55% end in Cervical → ↑↑ Skilled movment (hand)
- 20% thoracic
- 25% Lumbar, sacral

Upper neuroun ——— interneuraun ——— Lower neuroun
↳ mainly Lamina 8 (Synaps) Lamina 9
also in 4, 5, 6, 7 in dorsal horn
↳ not Pure Sensory, also motor (from area 321)

except 3% upper ——— Lower original from Giant Cells of betz in 5th Layer of area (4)
↳ accurate movment Direct

x within Brain Stem ⇒ Collection of Cell bodies → Role like Ant horn Lower motor neurons

→ Bilateral not like spinal epsi, contra..
except *
Part of Facial N (7th) → Lower facial muscle
Contra Lateral Like spinal ←→
Part of hypoglossal (12th) → genioglossus

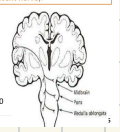
→ Anatomically not Pyramidal
→ Funcially Pyramidal

! Pyramidal !

Corticonuclear Tract (Corticobulbar):
Cranial nerves and muscles of the head & neck area
In the **brainstem** where **cranial nerves** arise, there is no anterior & dorsal horns as in spinal cords. Instead, there is nuclei called **motor nuclei**. This collection of cell bodies in the brainstem can do the same function **as the anterior horn** (having cell bodies of the lower motor neuron that supply skeletal muscles in the head and neck area).
Fibers descend from the **cortex (lower ¼)** to a **nucleus** (motor nucleus), hence the name **Cortico-nuclear Tract.** (you can refer to the homunculus picture to see where the head and neck exist on the cortex)

Muscles supplied by cranial nerves (have motor part):
Hypoglossal nerve → Tongue
Facial nerve (7th) → Motor to muscles of facial expression: orbicularis oris, orbicularis oculi, zygomaticus major and minor, risorius, platysma, buccinator.
Trigeminal nerve (5th) → Muscles of mastication, tensor tympani, tensor veli palatini, Anterior belly of digastric, mylohyoid.
Oculomotor nerve (3rd) → Motor to all muscles of the eye except 2 muscles, superior oblique (by **trochlear nerve**) and lateral rectus (by **abducent nerve**).

The descending fibers terminate in the motor nuclei of the following cranial nerves in:
- The **Midbrain: Oculomotor** (3rd cranial) & **trochlear** (4th cranial).
- The **Pons: trigeminal** (5th cranial).
- **Ponto-medullary junction** (between the pons and medulla): **abducent** (6th cranial) & **facial** (7th cranial).
- The **Medulla: 9-12th** cranial nerves. 40:00



④ Vistibulospinal * ? Inner ear
→ from Inner ear → Deep cerebellar nuc (Fastig)
→ Sensory neuclie !!
→ Position → Gravity
- uncrossed into Ant whit Column
- activate Antigravity muscle
↳ like Pontine function
Both → upright position

* Autonomic *
Autonomic System → ① Post Ganglionic ② Preganglionic ↳ cell body in Lat. horn
under contror from high cent → hypothalamus
most of these fibers Derived from Lateral reticulospinal tract

⑤ tectospinal
- visual and auditory Reflex
↳ Descend fibers then crossed
Majority fibers terminate in ant Grey column of upper Cervical Segment
head and neck Reflex Spontenos

* Sub Conscious Motor tract *
→ axial, Limbs, head and neck..
vistibulo, tecto, Reticulo, Rubro → Cortex وبعدين brainstem origin
→ Function → Balance, Posture, Coorgination movemnte.

① Rubrospinal *
- Synapese with α, γ
- recive from Cortex, Cerebellum → muscle joint Sense (position)
- ↳ Deep cerebellum neuclie

Dorn't Eat Greasy food
Dentate Emboliform Globose Fastigial
↳ interposed

* Cross → level of nucleus ⇒ early
* Function → Facilitate Flexores, inhibit extensors
Skilled movment!
— movment of skilled muscle is flexion !

Rubrospinal tract descends from the **red nucleus** → to **spinal cord** through **lateral white column**, which is related to the activity of **lateral corticospinal tract** (an exception of the extrapyramidal types). So, the **rubrospinal tract** (extrapyramidal) + **lateral corticospinal** (pyramidal) → are collectively named **lateral motor system.**

② Pontine reticulospinal * formed in Pones
↳ Descend into Ant spinal (uncrossed)
↳ tonically active but inhibitory effect (by cortex) ⇒ Disinhibition mechanisme
↳ function → activate Antigravity muscle (upright muscles)
Quadricips femoris, knee joint, axial, extensors

Cortex
active
Remove inhibitione (Decorticate)
overfiring

③ Medullary reticulospinal → crossing or not
↳ opposite to pones
↳ under stimuli
↳ not tonically active → inhibit muscle (extensors)