* L 12

* In this lecture we will talk about the Motor nerve system

* The cerebral Cortex contain the central sulcus behind it is the sensory cortex While in front of central sulcus we have the motor area and this represent by the frontal lobe and it contain many area * all the motor activity which are related to the voluntary act is starting at the cerebral cortex

* When we talk about the higher center we are talking about the brain and it represent the site for (planning + initiation of movement)

→ the pathway which send the impulses to lower motor neuron which are present in the spinal cord and HW does the Gamma produce regulation of this motor activity

The impulse which goes down from the brain to the lower motor neuron that is go toward to S.C passing through 4 main tract → all this tract send the impulse to S.C and in S.C there will be coordination between all these impulse to get specific regulated and planned movement of the muscle ① pyramidal tract (come down from) → cerebral cortex ② Extra-Pyramidal: → other area of the brain either that that of the S.C ③ cerebellar tract → cerebellum ④ Inter-Connection with Share the impulses between the cerebellum + Basal ganglia + Thalamus.

* pyramidal system → the impulse will descend down either by spontaneous discharge from these cell in the precentral or these cell send their impulses according to input from the sensory area So that the Pyramidal system produce initiation of movement or sending of impulse for movement either by them self or through input from the sensory area about 80% of the movement should be regulated by the movement by sensory N.S

gyrus

these nerve Fiber which is starting in the precentral and then it will descend down at the medulla oblangata there will be a process of the decussation means crossing of the N.F and after decussation it will descend downward in to the S.C In such away that the right side of brain will control the left side of the body and the left side of the brain will control the right side of the body. So in the arrangment of the pyramidal tract 80% of the Fiber are crossed and deseend down

The cell which control the body is arranged in such away the left hemisphere of the brain will control the right side and the right side will control the left side of the body Sowe call it a (right to left)

* upside down means the N.F which control the movement of the lower limb is present in upper pole of the pre central gyrus while those which control the face and the tongue are present on the lateral limb or down ward on the lateral side of the prefrontal cortex

All the muscle are supplied by unilateral pathway from the cerebral cortex to the muscle except the upper part of the Face → bi lateral it is supplied by 2 side which means that the forehead of the subject is supplied by the right and left hemisphere of the body while the rest of the muscle a unilateral innervated + the left side

* since the thumb is responsible For fine movement the Finger are responsible For Fite delicated movements the Face is involved with the fine delicabe movement so the cell which control these Skeletal muscle are very large in number it is proportinal to the skillfulness that is produce by that specific muscle

* Cutting the pyramidal tract will cause No paralysis Why? → because the skeletal musck have 2 type of movement either skill/movement like lefting very thin paper from table or righting or fixing a watch fixing a certain instarmen → cutting it → loss its function but still we have the gross movement so that there is no paralysis but loss of skilled fine movement

→ associated movement means → moving the left hand with the right + moving the right had with the left leg

IF we look on the subject he get CVA then this pateint when he wake he can't move the affected limb with that the opposite leg so that there will be loss of the associated movements * clumsy means → loss of precision of muscle movement

UMND → upper motor neuron disease

→ Dorsi-Flexion of Babinski's reflex → stretching the foot then this pateint will get fanning of the toes and there will be Dorsi-Flexion of the big toe

In normal subject if we do stretching of the foots then there will be adduction of the toe and planty flexion or the big toe planty flexion of the foot.

* Extra prymidal pathway * means →

All the motor fiber will ascend down ward from the brain to S.C which are orginated away from C.C

→ Starting from basal ganglia,

* Function of E.P.S

If we got damage of the pyramidal we will still have the gross movement of the Extra-pyramidal S. and this gross close not only voluntary act by its including and involuntary act that is the regulation of posture and tone.

If there is damge in Extra pyramidal then there will be either postive sign (uncontrol movement by voluntary act) like tremor or there might be negative sign due to loss of initiation of movement so that the patient will get slow initiation of movement called hypokinesia mean → slow " " "

* Parkinson's disease → there will be tremor resting tremor there will be slow intitiation of movemnt and there will be increase in the muscle tone

* Regulation of posture and tone

If you are sitting in chair then there are impulses which are sent continously from the extra-pyramidal area through the extra-pyramidal tract to reach muscle spindle and this receptor will keep the contraction of the extra-fusale muscle keep the contraction of skeletal muscle constant during sitting position When you starting to move you will have change in the tone of the muscle increase the tone at the leg which is holding the body and decrease the tone in other side then you put the other leg on the ground and you will left the first leg and this means that is decrease in tone in the other side this occur also through the basic reflex that produce changes in the tone of muscle according to the movemnt of body

Motor nerve Come From → Gamma motor neuron

Sensory nerve → Send impulse to higher center

If the muscle spindle length is $\frac{1}{2}$ and the length of the skeletal muscle is 100 this ratio 0.01 should be kept Constant if there's sudden stretching of the skeletal muscle or suddun contraction of S.M shortening of S.M this ratio will be change and the muscle spindle will send impulse to the higher center to produce Contraction of relaxation

All of the tracks of the extra-prymidal system is control posture and tone body involuntary according to the Function of the their type ---.

* Spinal Cord

as a cross section is Formed of 2 part i ① the gray matter ② White matter

→ gray matter ⟹ Nerve cells / White matter → N.F

S.C → represent a midway between the peripheral system and the higher center which is the brain, cerebral, cerebullum basal ganglia so that the S.C will carry information

* Gamma motor neuron supply muscle spindle

* Alphal motor neuron supply Skeletal muscle

→ *According of the type of sensation and the pathway we have specific pathway for each type of sensation *

* Carry sensaty impulses → the impulses passing from the skin through the dorsal root ganglia it will be divided Some of the fiber will go upward to the higher center through the dorsal column and anther nerve fiber will cross anther side and ascend high up through the lateral Spinothalamic tract.

* Defecation Center + Urination center : Present within S.C mainly as the Sacro-lumber region of S.C and they will send impulses through the parasympathetic N.F that produce contraction of the bladder and urnation or contraction of the rectum and defecation will occur

* How can the different impulses coordinate the movement?
you are traging to ⟶ left a jar from a table and you think that this jar are is full of water, you will send impulsos through the cerebral cortex in order to produce a forceble contraction but unfortunlty this jar doesn't contain water so it will be lie so if these subject doesn't know that the jar is empty then the movements will be stronger than enough and it will produce distemper in movemant of the limb So that coordination of movemant need impulses from different area and these impulses are coordianted within the S.C to geb the specific type of muscle contraction

* Reflex are
⟶ This pathway from the receptor to the sensory N. cell through the interconnecting through the motor nerve fiber is called as a reflex arc.

Any damage or any rupture in this reflex will lead to loss of the reflex activity.
→ it may be enchated by stimulation of sensory receptor

* Monosynaptic reflex
once we do stimulation on receptor (muscle spindle) It will send impulses directly to the α-motor neuron that produce contraction of the muscle so that there is one single synapse between the sensory N.F and Motor N.F

* Polysynaptic reflex

if some one walk and get a pain that stimulate his foot immedually there will be flexion of the knee pulling the leg upward and there will be change in the movement of the hand and some time there is even jumping and this occur due to the fact that the sensory stimulation will produce stimulation of many segmants of S.C and each segment supply specific muscle either in the same limb or in another limb So that the single sensory nerve fiber will produce excitation of many segment So it need many synapse to produce its reflex (painful reflex)

Properties of the reflex

(*) Adequate means → the tendon jerk need tendon hammer to produce strechig the muscle spindle while the reflex that produce painful stimulation need specific stimulus which is increase in temperture

(*) specific → if we heat the pallelara tendon it will produce movement of the leg it self but if we do (heat) of the Biceps it will produce contraction of the upper limb if we do stimulation (painful) from the outer side of the leg it will produce movement of the side and so on.

(*) central excitabion → the stimulation is excitabed by CNS like if you afraid from painful stimulation once you see the pain you will have increase in reflex activity and opposite to that inhibition can be done

(*) Habitution ⟶ response of the body in which there will be decrease in the response or increase in the respone.

(*) fractionation and occlusion

once we do stimulation (severe) it will produce response in many segment.

(*) re bound ⟶ there is a function which is opposite to the base Function due to loss of inhibitory effect

like ⟶ if you press on the hand and you remove you hand immediatly then the subject may fall down due to loss of the resistance.