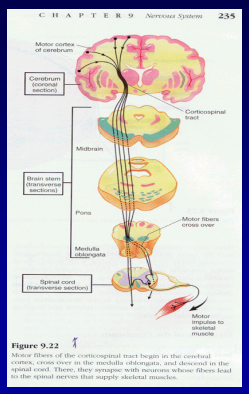
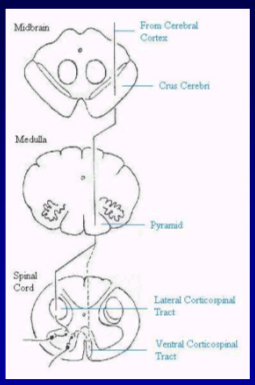


- Nerve cells are in the frontal lobe and adjacent (premotor and supplementary) cortical areas. These axons constitute corticospinal tract, known also as the pyramidal tract.

The upper motor neuron (supranuclear)

- Nerve cells are in the frontal lobe and adjacent (premotor and supplementary) cortical areas. These axons constitute corticospinal tract, known also as the pyramidal tract.
- This tract descends from the cerebral cortex (frontal motor and premotor cortices, Brodman´s area 4,6), transverses corona radiata - subcortical white matter, internal capsule, brainstem and decussates in the lower end of the medulla.



The upper motor neuron (supranuclear)

- Similar to corticospinal tract is corticonuclear pathway, which ends in synapses with motor nuclei of cranial nerves in brainstem.

The upper motor neuron

- Paralysis due to affection of upper (central) motor neuron is known as central (spastic) type of paralysis.
- Tendon reflexes are increased- hyperreflexia. Irradiation or spread of reflexes is regularly associated with spasticity. The hyperreflexic state often takes the form of clonus, a series of rhythmic involuntary muscular contractions in response to an abruptly applied stretch stimulus (clonus of patella, ankle).

The upper motor neuron

- The cutaneomuscular abdominal and cremasteric reflexes are usually abolished.

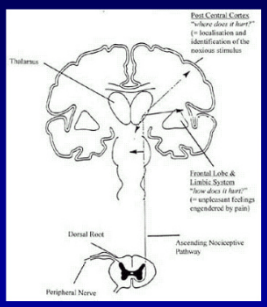
The upper motor neuron

- Characteristic feature of weak muscles is **spasticity**. This term means a specific pattern of response of muscles to passive stretch (resistance increases linearly in relation to velocity of stretch).
- Phenomenon **„clasp-knife“** is characteric of the spastic paralysis.

The lower motor neuron

- **Lower (infranuclear) motor neurons** are the final common path by which neural impulses are transmitted to muscle. Nerve cells of lower motor neurons are situated in the anterior horns of the spinal cord and motor nuclei of the brainstem. Axons of these cells comprise the anterior spinal roots, then the spinal nerves (or cranial nerves) and they innervate the sceletal muscles. These nerve cells and their axons constitute **periferal or lower motor neurons.**

The lower motor neuron



The lower motor neuron

- Paralysis due to affection of lower (periferal) motor neuron is known as **periferal (flaccid) type of paralysis.**

The lower motor neuron

- The muscle becomes lax and soft and does not resist passive stretching. This condition is known as **flaccidity.** Muscle tone (muscle tone is defined as resistence to passive stretch) appears to be reduced- **hypotonia or atonia.**
- The denervated muscles undergo extreme atrophy within 3 to 4 month.

The lower motor neuron

- **Myotatic** tendon reflexes (bicipital, patellar,etc) are diminished or absent- **hyporeflexia or areflexia.**
- **Superficial reflexes are normal.** The term superficial reflexes is given to muscle responses evoked by cutaneous stimuli Those in common clinical use include the abdomunal and cremasteric reflexes.

The lower motor neuron

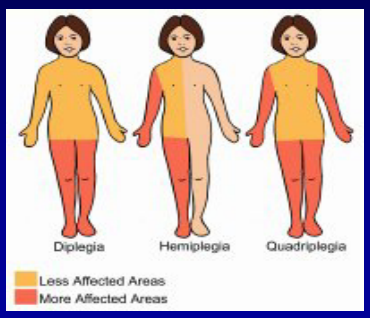
- The result of sporadic contraction of one motor unit is isolated from other muscle units as visible twitch or fasciculation.
- If the motor neuron is completly destroyed, all muscle fibres that it innervates undergo atrophy- denervation atrophy.

	Upper motor neuron paralysis	Lower motor neuron paralysis
Atrophy	slight and due to disuse	pronounced, up to 80%of total bulk
Muscle tonus	increased- hypertonia, spasticity	decreased- hypotonia or atonia, flaccidity
tendon reflexes	hyperreflexia	hyporeflexia or areflexia
abnormal pyramidal signs	present	absent
fascicular twitches	absent	present
EMG	no denervation potentials normal nerve conduction	denervation potentials present (fibrilations, fasciculations in EMG)

- Paralysis (palsy) means loss of voluntary movement due to interruption of the motor pathway at any point from the motor cortex to the muscle fiber.
- Complete loss of motor function is paralysis or plegia. Partial loss of motor function is paresis (lesser degree of paralysis).

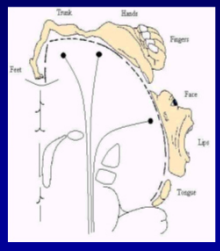
- According to a localisation of the lesion are used terms
- hemiparesis (hemiplegia)
- paraparesis (paraplegia)
- monoparesis (monoplegia)
- quadriparesis (quadriplegia).

The upper motor neuron (supranuclear)



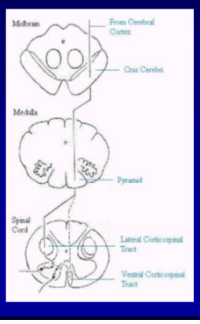
The upper motor neuron (supranuclear)

- Diseases localized to the cerebral cortex manifest themselves by weaknes of the leg or arm or lower face on the opposite side - monoparesis).



The upper motor neuron (supranuclear)

Diseases localized to the cerebral white matter (corona radiata), and internal capsule manifest themselves by weaknes of the leg, arm and lower face on the opposite side - hemiparesis).



The upper motor neuron

- Damage to corticospinal and corticonuclear tract in the upper portion of brainstem causes paralysis of the opposite side (contralateral hemiplagia- face, arm and leg) and lesion may in some patients involve cranial nerves on the same side as the lesion – alternative hemiplegia

The spinal cord lesion

- In acute spinal cord diseases with involvement of corticospinal tracts, the paralysis and weakness affects all muscles below a given level.
- C1-C4 – central lesion of UE and LE
- C5-Th2 – peripheral lesion UE, central LE
- Th2-Th11 – central lesion of LE
- Th12-L3 – peripheral lesion of LE
- In bilateral spinal cord lesion, the bladder and bowel and their sfincters are usually affected- sfincter disease (bladder incontinence)