

CNS Motor Tracts

Motor Tracts	Pyramidal Tracts (Corticospinal Tracts)	Extrapyramidal Tracts
Origin	Cerebral Cortex	Brainstem
Cortex Area (they both start from areas 4,6,312)	Mainly from area 4	Mainly from area 6 (Premotor area: uses external cues) (Supplementary motor area: uses internal cues)
Under the control of	Cerebral Cortex	Cerebral Cortex
Control Type	Conscious control of skeletal muscles	Subconscious regulation of balance, muscle tone, eye, hand and upper limb position
Contents	-Lateral Corticospinal Tract -Anterior Corticospinal Tract -Corticoneuclear Tract (Corticobulbar)	-Vestibulospinal tract -Reticulospinal tract -Rubrospinal tract -Tectospinal tract

Motor Tract		Pyramidal Tracts (Corticospinal Tracts)		
Tract Type	Lateral Corticospinal Tract	Anterior Corticospinal Tract	Corticoneuclear Tract (Corticobulbar)	
Fibers Origin	Precentral gyrus of the cerebral cortex	Precentral gyrus of the cerebral cortex	Precentral gyrus of the lower quarter of the motor cortex	
Fibers Pathway	<ul style="list-style-type: none"> -In Midbrain: Middle 3/5 of basis pedunculi -In Medulla Oblangata: Pyramids (decussate) -In Spinal Cord: Descends the full length of the spinal cord synapsing mainly by interneurons in laminae: IV, V, VI, VII, VIII (mainly). ☞ Exception: 3% originate from the fifth layer of area 4 (giant cells of betz) synapse directly without interneurons (accurate movements). 	<ul style="list-style-type: none"> -Those corticospinal fibers which do not decussate in the medulla continue descending on the same (ipsilateral) side of the cord and become the anterior corticospinal tract (ACST) 	<ul style="list-style-type: none"> -The descending fibers terminate in the motor nuclei of cranial nerves: Midbrain: III, IV Pons: V, VI, VII Medulla: IX, X, XI, XII 	
Decussation	<ul style="list-style-type: none"> -Fibers cross over (decussate) to the opposite side in the pyramidal decussation, the lower part of the medulla, where they continue to descend in the lateral funiculus of the spinal cord as the lateral corticospinal tract (LCST). 	<ul style="list-style-type: none"> -Cross over at the level of the spinal cord (fibers leave the tract at various levels to cross over in the anterior white commissure to synapse on interneurons in the anterior gray horn) 	<ul style="list-style-type: none"> -The corticobulbar fibers from one side of the brain project to the motor nuclei on both sides of the brainstem (bilateral input) 	
Function	<ul style="list-style-type: none"> -For fine skilled movement 	<ul style="list-style-type: none"> -Acts on the proximal muscles of upper limb (shoulder muscle) of the ipsilateral and contralateral sides 	<ul style="list-style-type: none"> -Supplies upper motor neuron innervation to the cranial nerves supplying head and face 	
Additional Notes	<ul style="list-style-type: none"> -LCST fibers synapse with alpha and gamma nuclei of: ☞ The Cervical region (55%) (great effect on the upper limb), Thoracic 20%, Lumbar and Sacral 25% 		<ul style="list-style-type: none"> The corticoneuclear input is bilateral EXCEPT: 1- Part of 7th (which supplies LOWER facial muscle) 2- Part of 12th (which supplies genioglossus muscle) 	

Motor Tract

Pyramidal Tracts (Corticospinal Tracts)

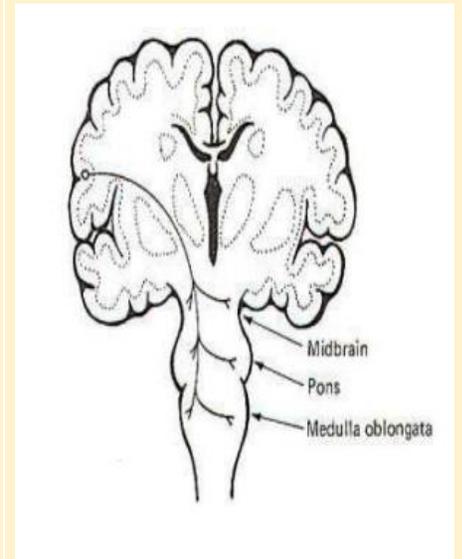
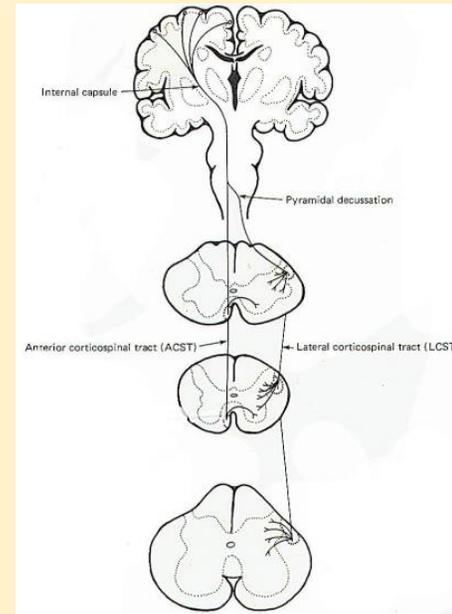
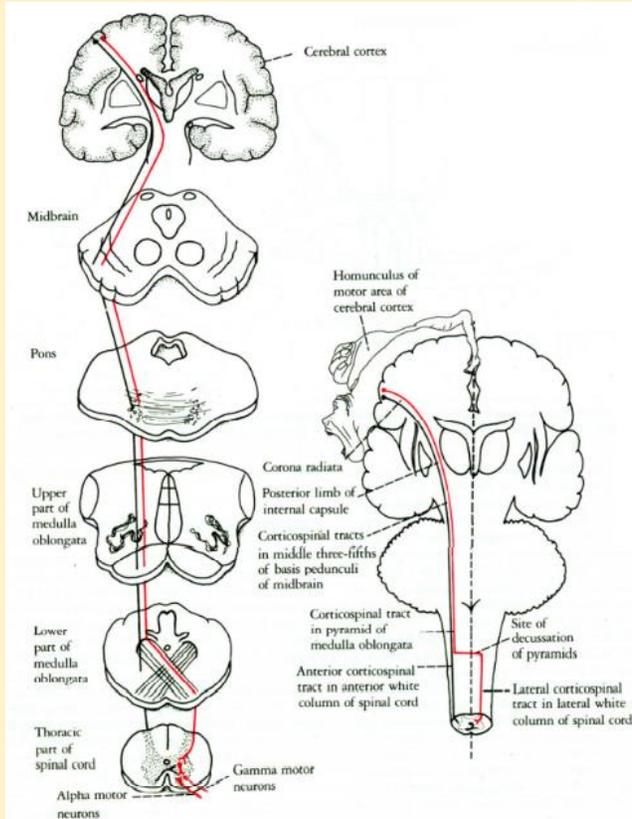
Motor Type

Lateral Corticospinal Tract

Anterior Corticospinal Tract

Corticoneuclear Tract (Corticobulbar)

Image



Motor Tract		Extrapyramidal Tracts			
Tract Type	Vestibulospinal Tract	Reticulospinal Tract		Rubrospinal Tract	Tectospinal Tract
		Pontine	Medullary		
Fibers Origin	<ul style="list-style-type: none"> -In the pons and medulla beneath the floor of 4th ventricle -Receives afferent fibers from the inner ear through the vestibular nerve and from the cerebellum 	Pons	Medulla	<ul style="list-style-type: none"> -Red nucleus in the midbrain at the level of superior colliculus -Receives afferent fibers from cerebral cortex and cerebellum 	<ul style="list-style-type: none"> -Nerve cells in superior colliculus of the midbrain
Fibers Pathway	<ul style="list-style-type: none"> -Anterior white column -Synapse with neuron in the anterior gray column of the spinal cord 	<ul style="list-style-type: none"> -Anterior white column -Medial reticulospinal tract (MRST) 	<ul style="list-style-type: none"> -Lateral white column -Lateral reticulospinal tract (LRST) 	<ul style="list-style-type: none"> -Lateral white column -Synapses with alpha and gamma through interneurons 	<ul style="list-style-type: none"> -The tract descends in the anterior white column close to Anterior median fissure -Majority of fibers terminate in the anterior gray column of upper cervical segments of spinal cord
Decussation	<ul style="list-style-type: none"> -Axons descend uncrossed through medulla and through the length of spinal cord 	<ul style="list-style-type: none"> -Axons of RF neurons descend uncrossed into the spinal cord 	<ul style="list-style-type: none"> -Axons of RF neurons descend crossed and uncrossed into the spinal cord 	<ul style="list-style-type: none"> -Crossed (at the level of the nucleus) 	<ul style="list-style-type: none"> -Crossed

Motor Tract		Extrapyramidal Tracts			
Tract Type	Vestibulospinal Tract	Reticulospinal Tract		Rubrospinal Tract	Tectospinal Tract
		Pontine	Medullary		
Function	- Facilitate the activity of extensor muscles and inhibit the activity of flexor muscles in association with the maintenance of balance	- Activate the axial and proximal limb extensors (Antigravity muscles) -Responsible for standing upright (with the vestibulospinal tract)	- Inhibit the axial and proximal limb extensors (Antigravity muscles)	- Facilitate the activity of flexors and inhibit the activity of extensors -Supply the distal flexors muscles mainly with little effect on the proximal muscles	Responsible for reflex movement of head & neck in response to visual stimuli
Additional Notes	-It maintains balance by facilitating the activity of the extensor muscles -Together with the pontine reticulospinal tract → responsible for stranding upright.	- Tonically active -normally under inhibition from cortex	- NOT tonically active -normally under cortex stimulation	-Rubrospinal tract is very close to the lateral corticospinal tract in the spinal cord. Together they form the lateral motor system.	
		-Have also descending autonomic fibers providing a pathway by which the hypothalamus can control the sympathetic and sacral parasympathetic outflow -Most of these fibers are derived from the lateral reticulospinal tract (medullary)			

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		Pontine	Medullary		
Image	<p>A coronal section of the brainstem showing the vestibulospinal tract. The tract originates in the vestibular nuclei (lateral and medial) in the medulla and descends in the anterior white column of the spinal cord. Labels include: Cerebellum, Lateral vestibular nucleus, Vestibular nuclei, Vestibular nerve, Vestibulospinal tract in anterior white column of spinal cord, and Lateral motor neuron.</p>	<p>A coronal section of the brainstem showing the reticulospinal tracts. The pontine reticulospinal tract originates in the reticular formation of the pons and descends in the anterior white column. The medullary reticulospinal tract originates in the reticular formation of the medulla and descends in the anterior white column. Labels include: Thalamus, Cerebellar cortex, Red nucleus, Midbrain, Pons, Medulla oblongata, Cerebellum, Deep cerebellar nucleus, Medullary reticulospinal tract, and Pontine reticulospinal tract.</p>		<p>A coronal section of the brainstem showing the rubrospinal tract. The tract originates in the red nucleus in the midbrain and descends in the lateral white column of the spinal cord. Labels include: Cerebellar cortex, Red nucleus, Midbrain, Caudate nucleus, Putamen, Globus pallidus, and Rubrospinal tract in lateral white column of spinal cord.</p>	<p>A coronal section of the brainstem showing the tectospinal tract. The tract originates in the tectum in the midbrain and descends in the anterior white column of the spinal cord. Labels include: Superior colliculus, Midbrain, Eye, and Tectospinal tract in anterior white column of spinal cord.</p>

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