

FIGURE 22.1 The most important descending pathways that act upon the anterior horn cell of the spinal cord (final common pathway).

TABLE 22.1

Changes in Motor Function

Level	Weakness	Tone	Volume and Contour	Fasciculations	Ataxia	Deep Tendon Reflexes	Abnormal Movements	Pathologic Associated Movements
Motor Unit Lesions								
a. Lower motor neuron	Focal or segmental, bulbar	Flaccid	Atrophy common	Common	Absent	Focally decreased	None except fasciculations	Absent
b. Nerve root, plexus, peripheral nerve	Focal or segmental	Flaccid	Atrophy common	Occasional	Absent	Decreased or absent	None except rare fasciculations	Absent
c. Neuromuscular junction	Diffuse or proximal, bulbar	Usually normal	Usually no change	Sometimes present due to anticholinesterase therapy	Absent	Usually normal	None	Absent
d. Muscle	Diffuse, proximal or distal	Normal or flaccid	Normal, atrophy, hypertrophy or pseudohypertrophy	None	Absent	Normal unless weakness is very severe	None	Absent
Corticospinal tract lesion	Mono-, hemi-, para-, quadric-paralysis, often incomplete (pyramidal distribution)	Spastic	Normal	None	Absent	Increased unless process is acute	None	Present
Extrapyramidal lesion	None or mild	Rigid	Normal	None	Absent	Normal	Present	Absent
Cerebellar lesion	None; ataxia may simulate weakness	Hypotonic	Normal	None	Present	Pendular or normal	None except intention tremor	Absent
Nonorganic disorder	Bizarre, breakaway, no true loss of power, may simulate any type	Normal or variable, often factitiously increased	Normal	None	Absent, but incoordination may simulate ataxia	Normal, may have poor relaxation and erratic, sham jerkiness	May be present	Absent

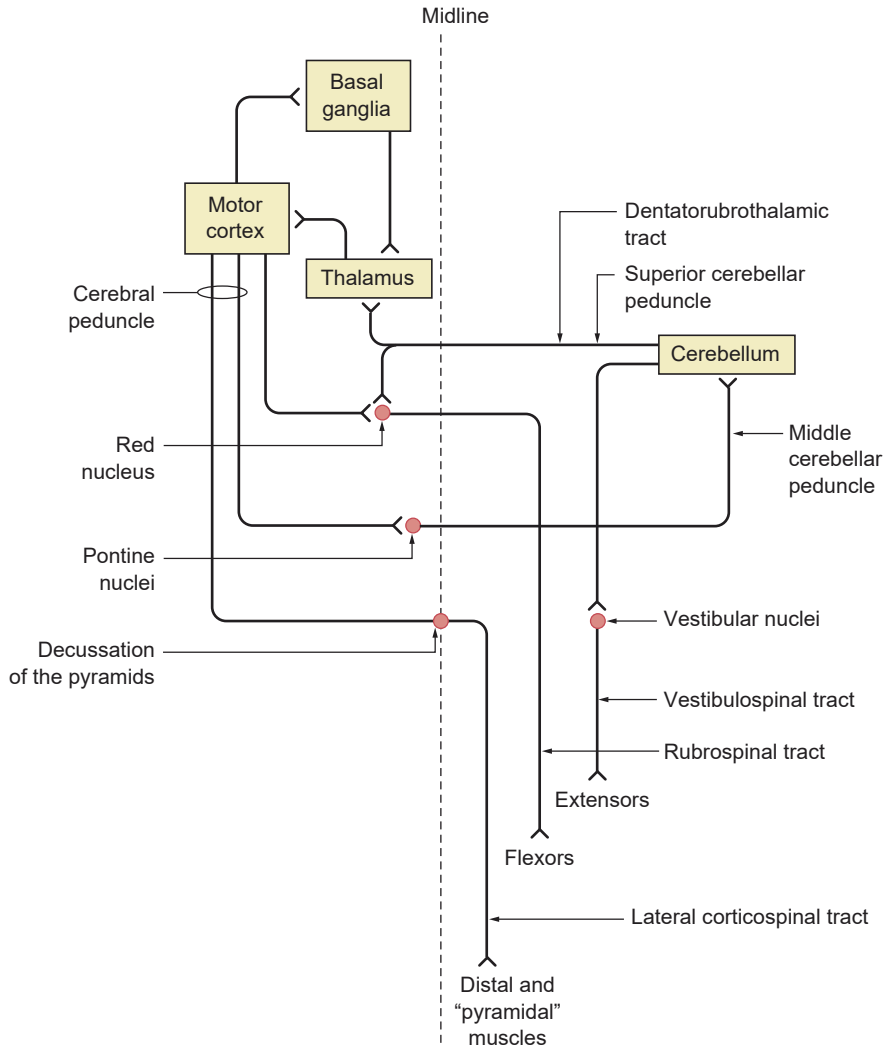


FIGURE 22.2 Major connections of the motor system. Note feedback loops between cortex and cerebellum and cortex and basal ganglia. (Modified from Campbell WW, Pridgeon RP. *Practical Primer of Clinical Neurology*. Philadelphia: Lippincott Williams & Wilkins, 2002.)

As fibers from the motor cortex run downward through the internal capsule, they send collaterals to the basal ganglia. Fibers from the basal ganglia project to VA and VL, which in turn project to the cortex, creating a feedback loop. The substantia nigra also projects to the striatum and influences its activity. The motor cortex and cerebellum are also part of a circuit. The pontine nuclei lie scattered among the descending motor and crossing pontocerebellar fibers in the basis pontis. Corticopontine fibers synapse on pontine nuclei, which then give rise to pontocerebellar fibers that project across the midline to the contralateral cerebellar hemisphere through the

middle cerebellar peduncle. The cerebellum in turn projects to the contralateral VL via the superior cerebellar peduncle, which decussates in the midbrain. The VL nucleus in turn projects to the motor cortex to complete the circuit. The cerebellum also receives unconscious proprioception from muscle spindles and Golgi tendon organs via the spinocerebellar and cuneocerebellar tracts. The cerebellum also projects to the ipsilateral vestibular nuclei, which give rise to the vestibulospinal tracts. The lateral vestibulospinal tract descends from the lateral vestibular nucleus to the spinal cord, where it facilitates ipsilateral extensor muscle tone of the trunk and extremities. As they