The motor pathways are classified into

- **Medial Motor system**: axial & proximal muscles. Medial Motor system include:
  - Anterior corticospinal tract.
  - Extrapyramidal pathway in general
- **Lateral Motor system**: distal muscles mainly, lateral Motor system include
  - lateral corticospinal tract
  - Rubrospinal tract distal muscles mainly (and proximal).

COMPARISON BETWEEN UMN AND LMN

Features	Upper motor neuron lesions(UMN)	Lower motor neuron lesion(LMN)
	UMN starts from motor cortex to the cranial nerve nuclei in brain and anterior horn cells in spinal cord	LMN is the motor pathway from anterior horn cell(or Cranial nerve nucleus)via peripheral nerve to the motor end plate
Bulk of muscles	No wasting	Wasting of the affected muscles (atrophy)
Tone of muscles	Tone increases (Hypertonia)	Tone decreases (Hypotonia)
Power of muscles	Paralysis affects movements of group of muscles Spastic/ clasp knife	Individual muscles is paralyzed Flaccid (flaccid paralysis)
Reflexes	Exaggerated. (Hyperreflexia)	diminished or absent. (Hyporeflexia)
Fasciculation	Absent	Present
Babinski sign	Present	Absent
clasp-knife reaction	Present	Absent
Clonus	Present	Absent

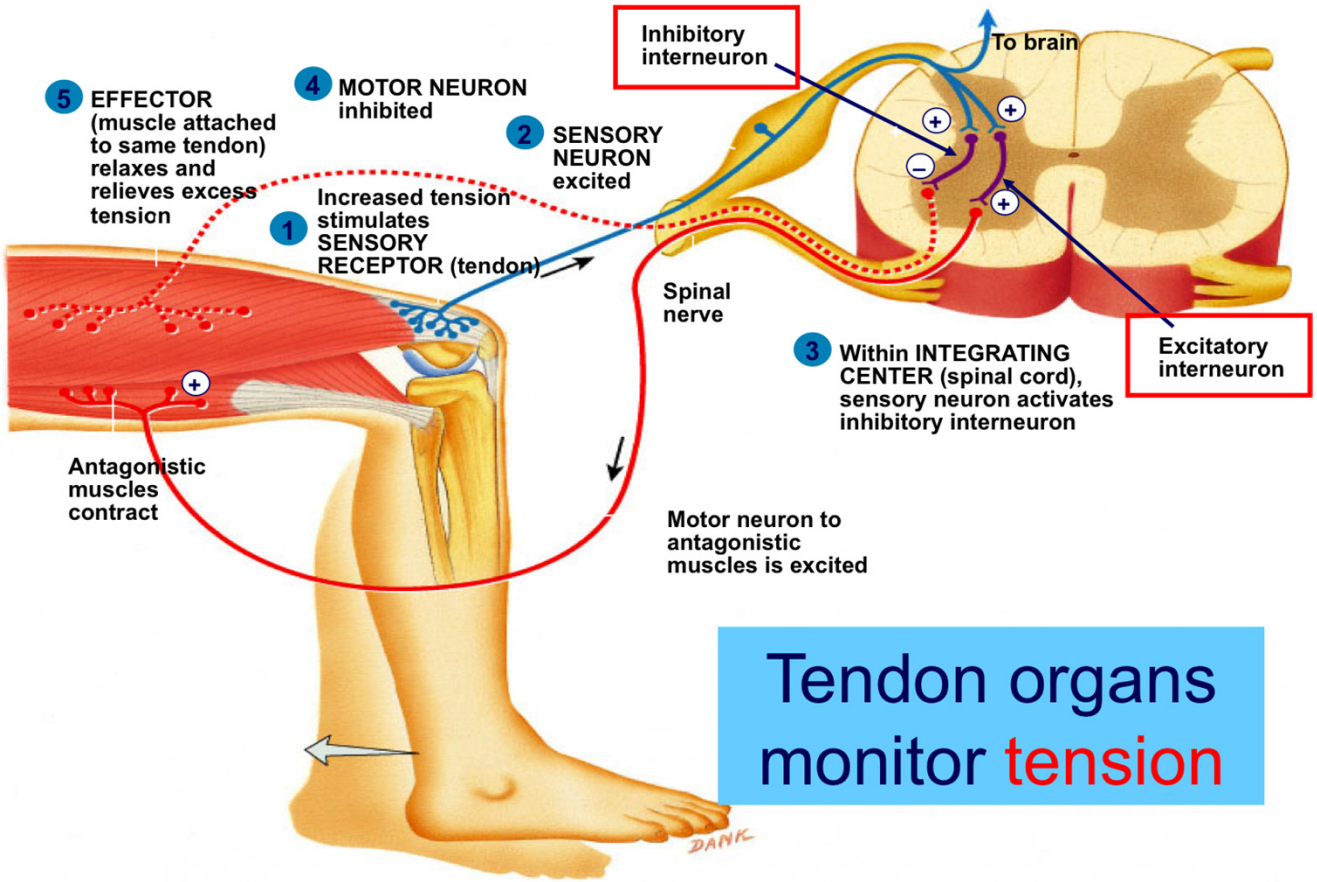
hypertonia and hyperreflexia, is the result of an increase in gamma motor neurons activity

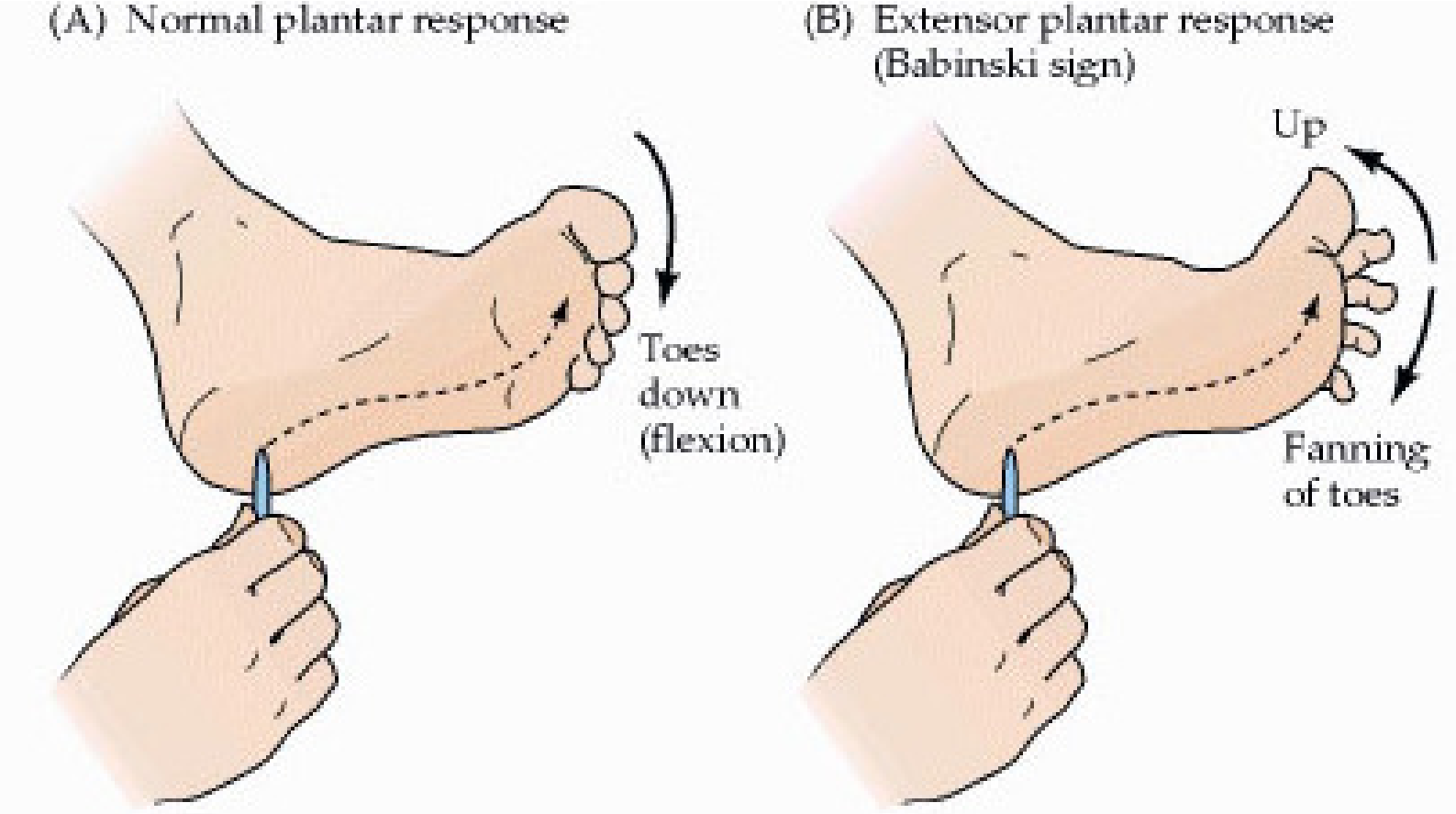
Clasp knife reaction

- Overactivity of the pointine excitatory system (spasticity)
- **Initial resistance:** Exaggerated stretch reflex
- **Sudden release:** After applying pressure, the tension in the muscle will increase and will be enough to activate the **Golgi tendon organs** which will cause the relaxation

Tendon reflex

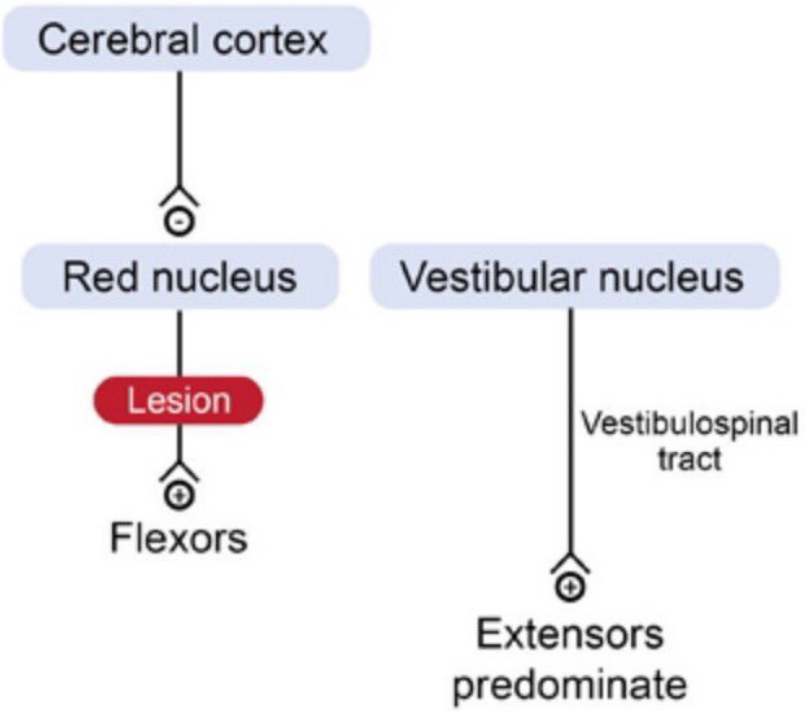
- Polysynaptic reflex arc
- law of reciprocal innervation



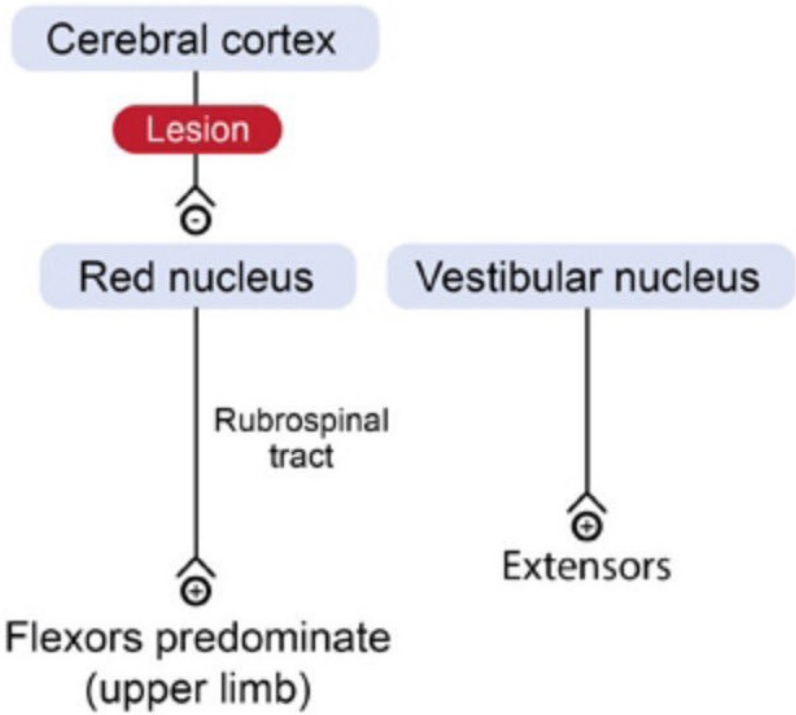


When the corticospinal tracts are nonfunctional, the influence of the other descending tracts on the toes becomes apparent, and a kind of withdrawal reflex takes place in response to stimulation of the sole, with the great toe being dorsally flexed and the other toes fanning out.

Decerebrate posture



Decorticate posture



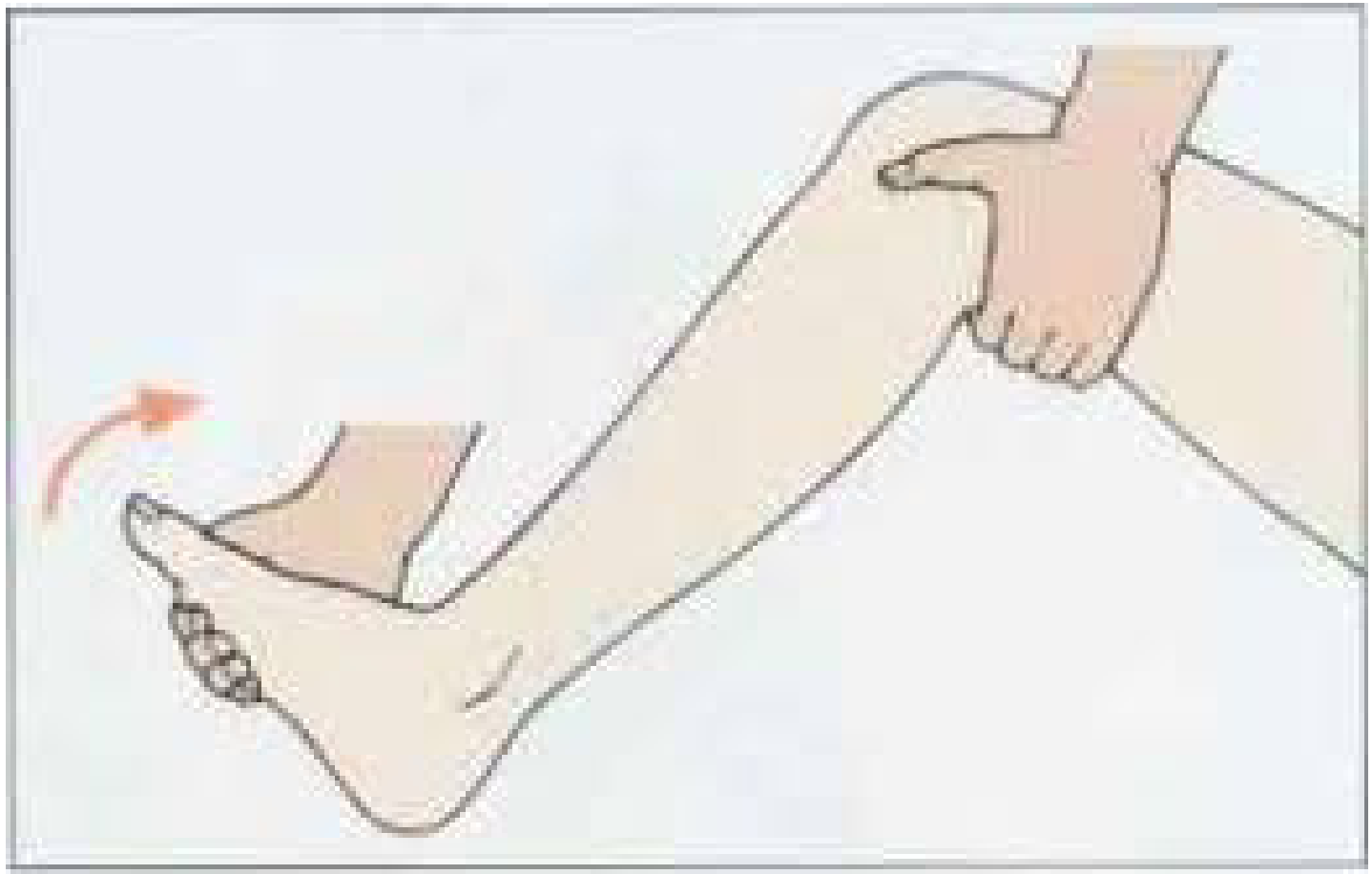


Fig. 6.29 Testing for ankle clonus.

Rhythmic contractions and relaxation of muscles when they are subjected to sudden sustained stretch

Summary of somatic motor control

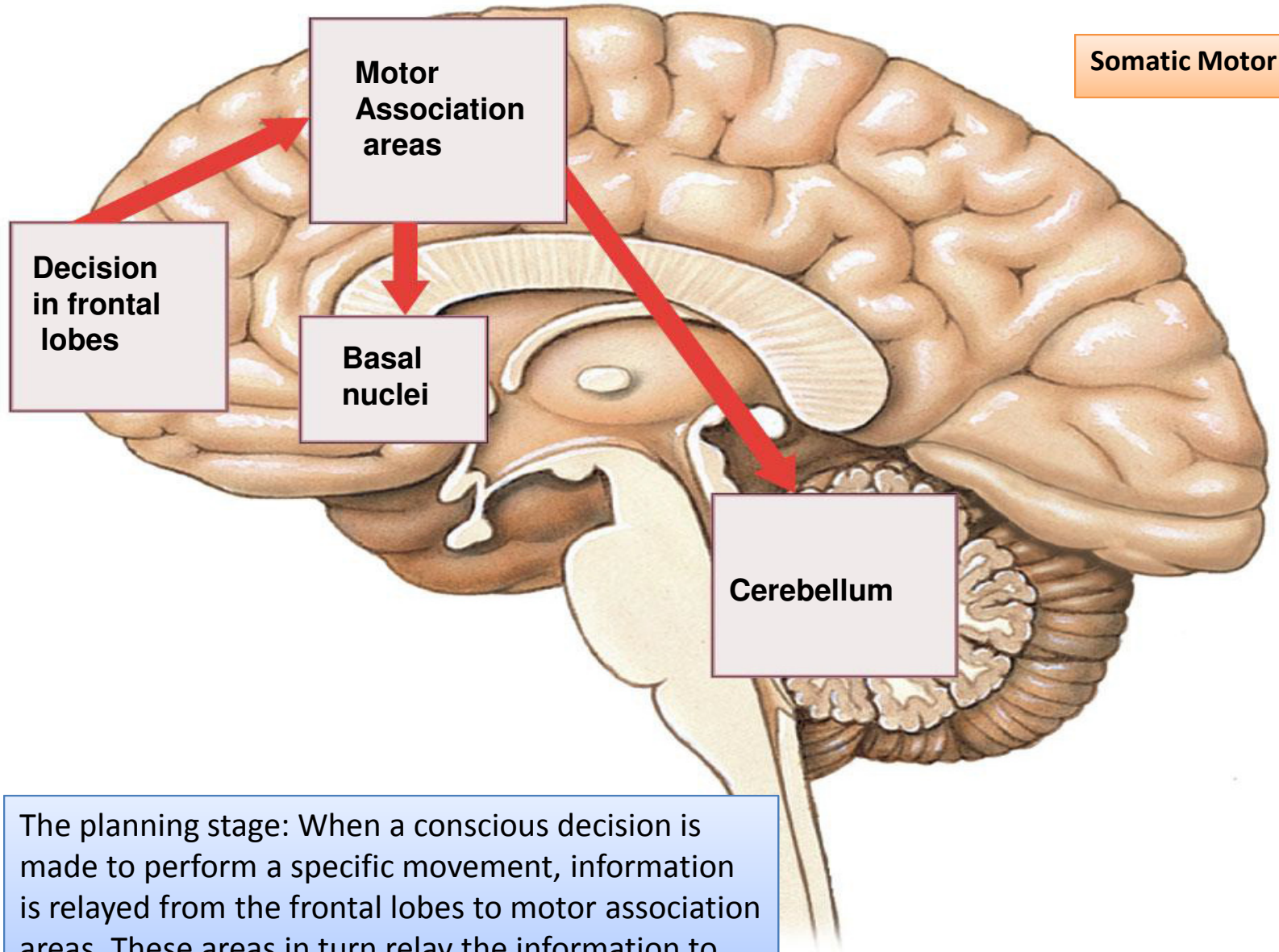
•Cerebral cortex initiates voluntary movement

•Information goes to the **basal nuclei and cerebellum**

•These structures modify and coordinate the movements so they are performed in a smooth manner

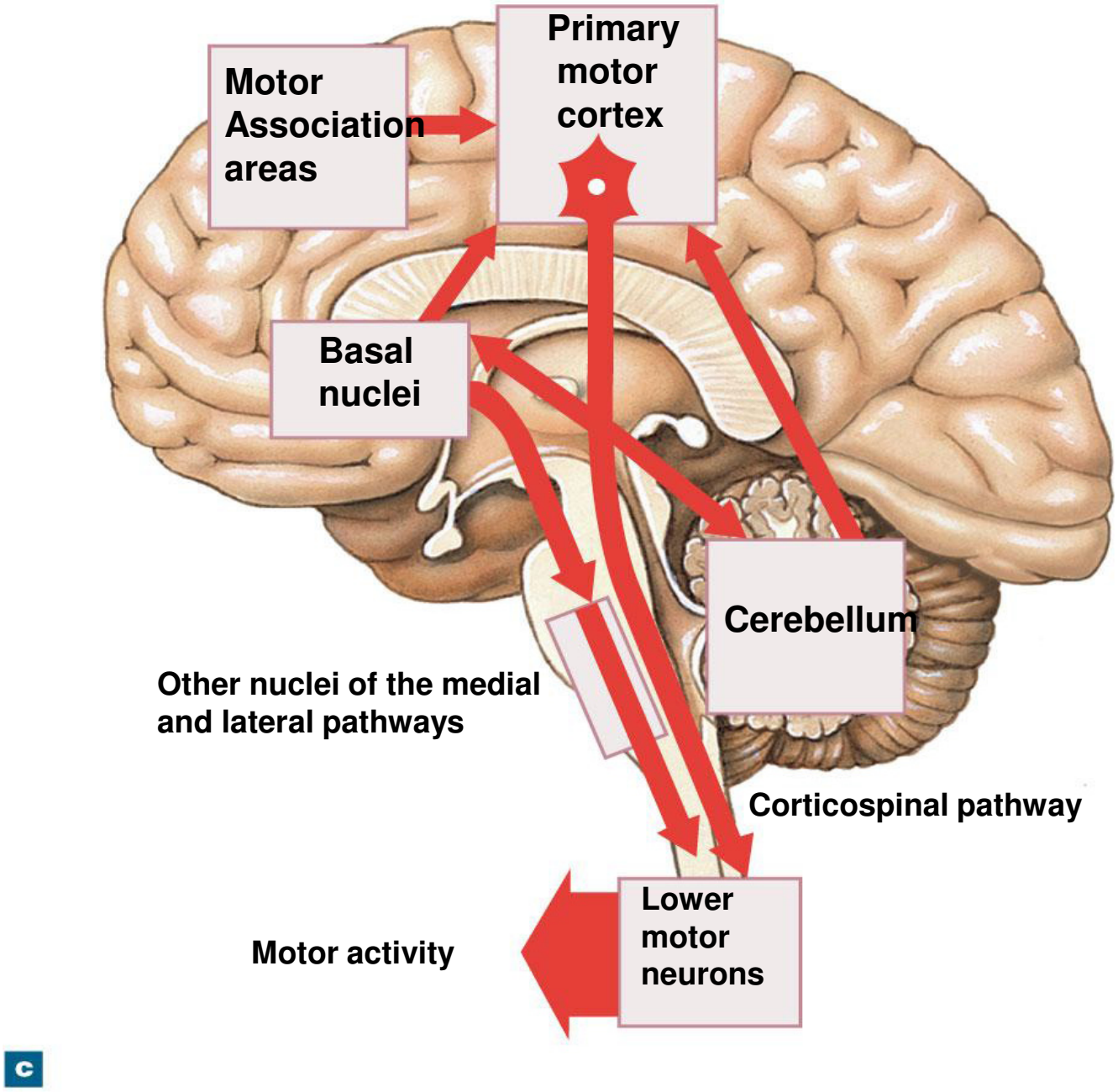
•Information goes from the basal nuclei and cerebellum back to the cerebral cortex to constantly monitor position and muscle tone

Somatic Motor Control



The planning stage: When a conscious decision is made to perform a specific movement, information is relayed from the frontal lobes to motor association areas. These areas in turn relay the information to the cerebellum and basal nuclei.

b



Movement: As the movement begins, the motor association areas send instructions to the primary motor cortex. Feedback from the basal nuclei and cerebellum modifies those commands, and output along the conscious and subconscious pathways directs involuntary adjustments in position and muscle tone

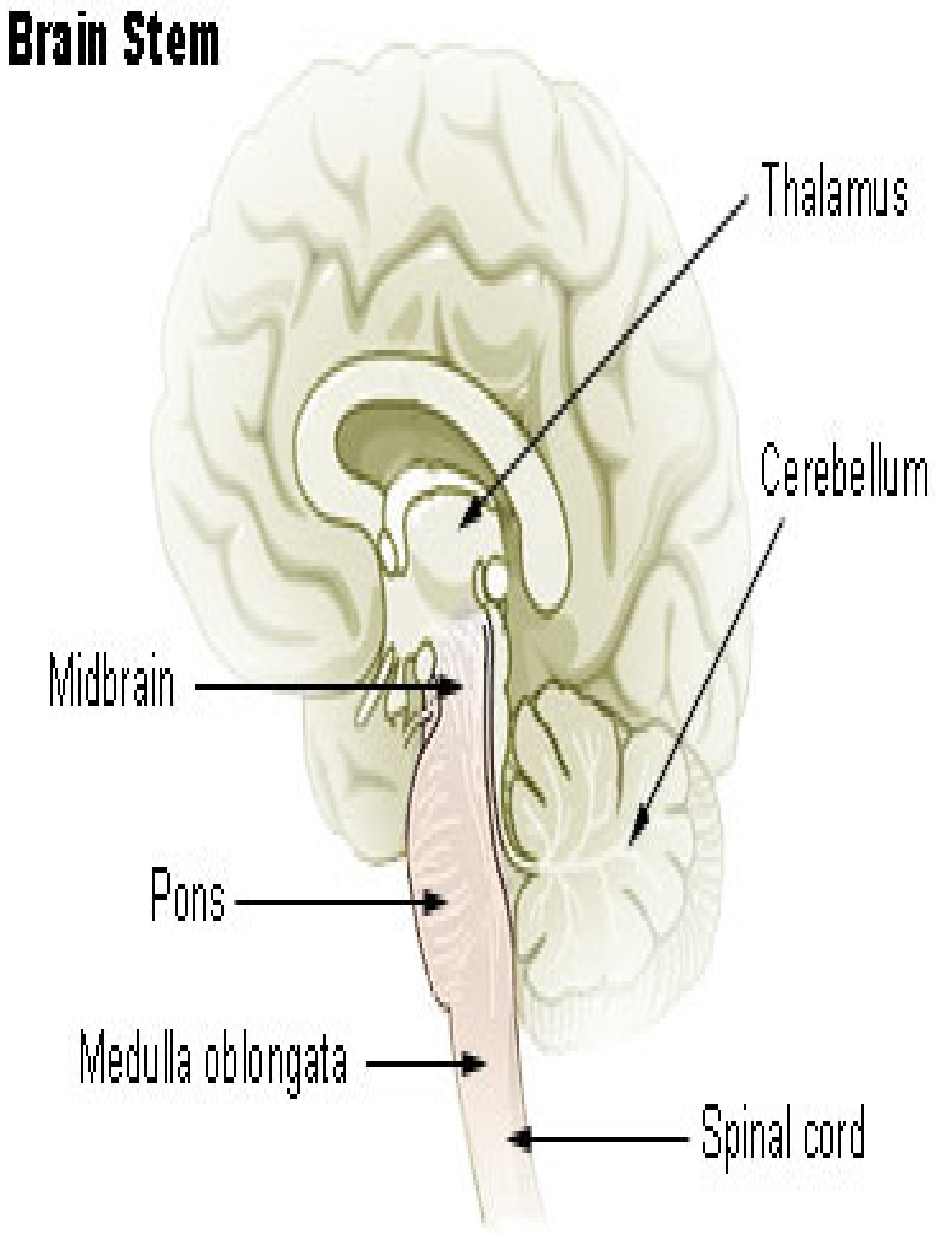
Brain stem

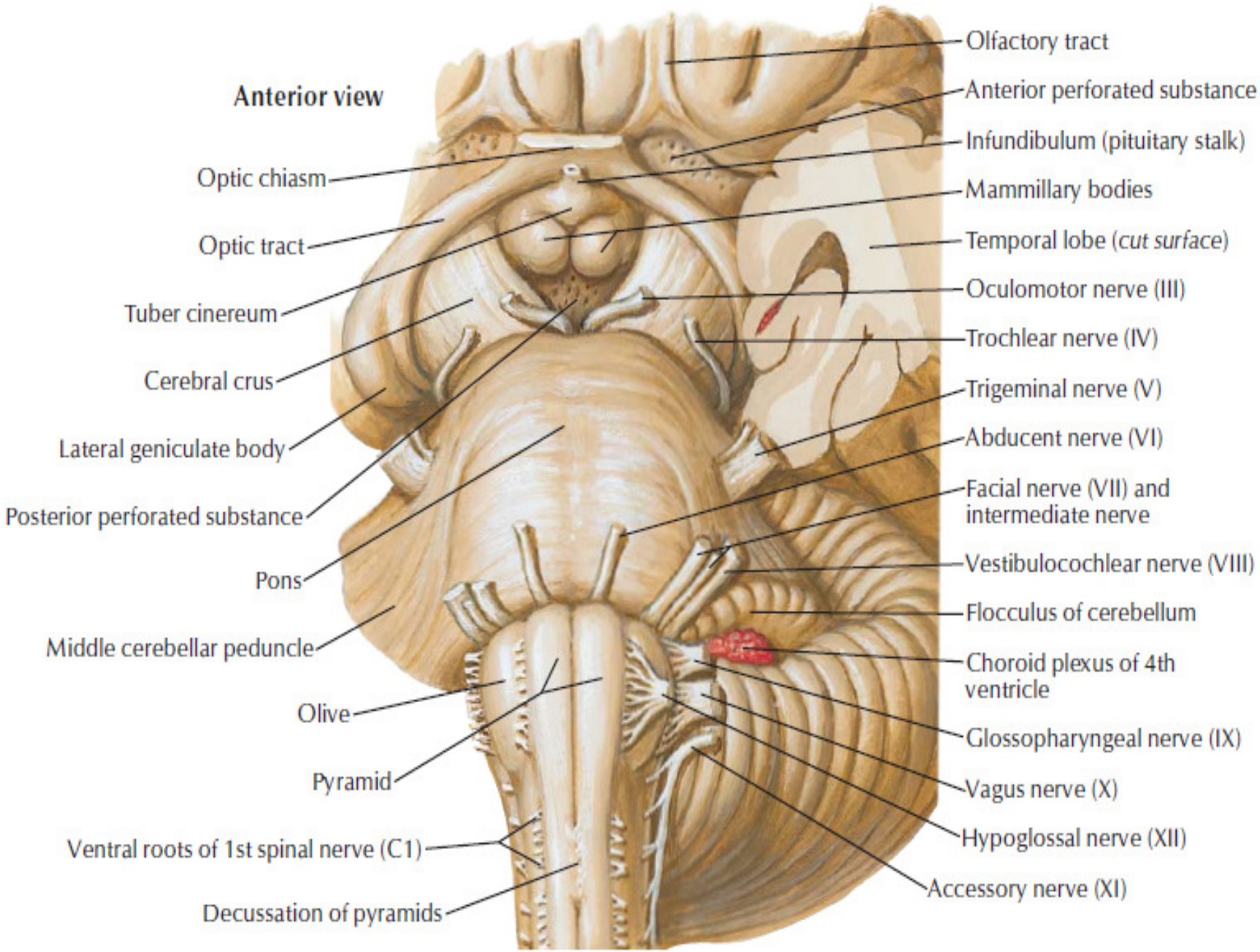
Brain stem

- Stalk like in shape
- Connects spinal cord forebrain

Parts:

1. Medulla oblongata
2. Pons
3. Midbrain



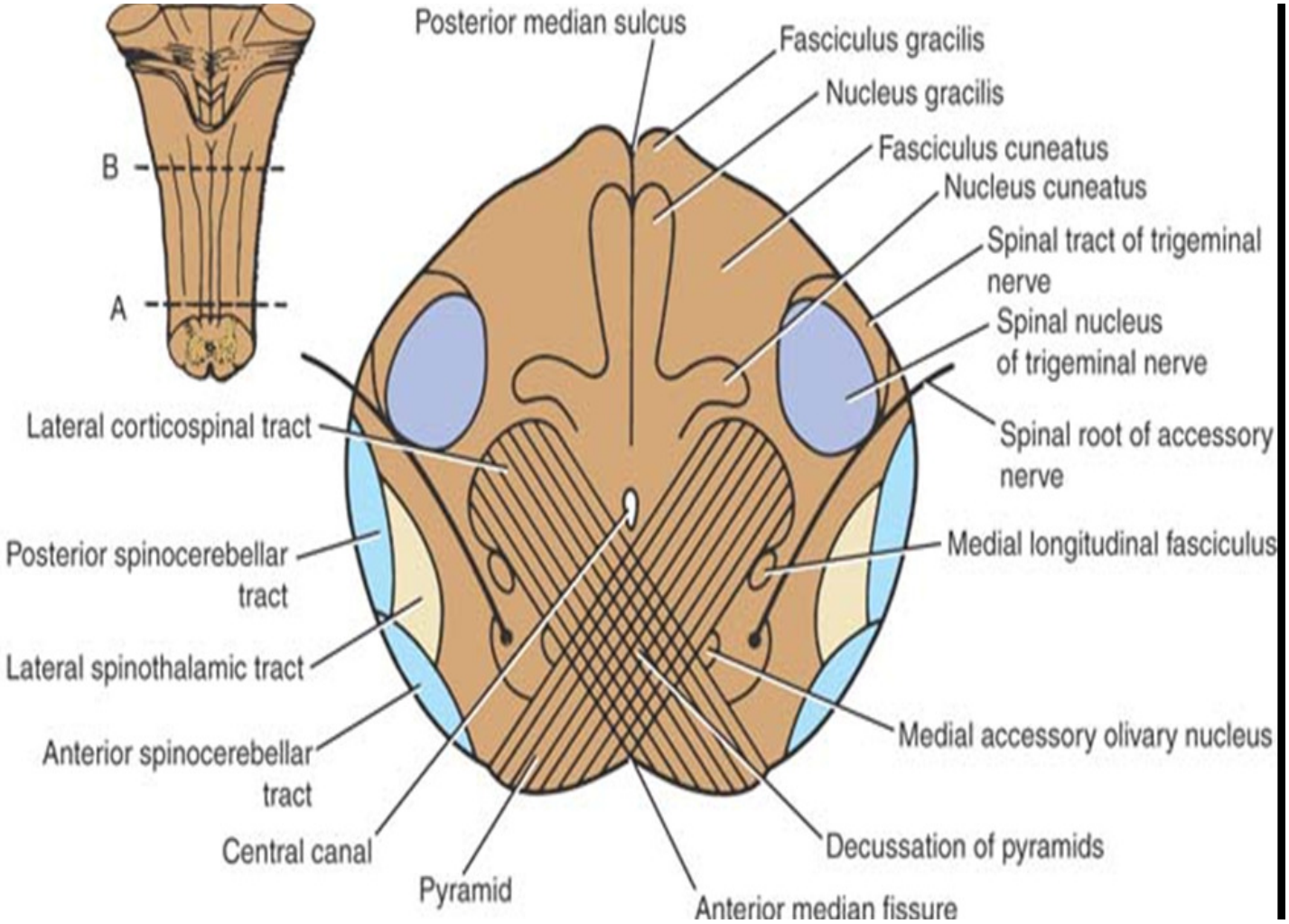

Anterior view
Optic chiasm
Optic tract
Tuber cinereum
Cerebral crus
Lateral geniculate body
Posterior perforated substance
Pons
Middle cerebellar peduncle
Olive
Pyramid
Ventral roots of 1st spinal nerve (C1)
Decussation of pyramids
Olfactory tract
Anterior perforated substance
Infundibulum (pituitary stalk)
Mammillary bodies
Temporal lobe (*cut surface*)
Oculomotor nerve (III)
Trochlear nerve (IV)
Trigeminal nerve (V)
Abducent nerve (VI)
Facial nerve (VII) and intermediate nerve
Vestibulocochlear nerve (VIII)
Flocculus of cerebellum
Choroid plexus of 4th ventricle
Glossopharyngeal nerve (IX)
Vagus nerve (X)
Hypoglossal nerve (XII)
Accessory nerve (XI)

Internal structure of medulla

1. Level of decussation of pyramids(motor / close medulla)
2. Level of decussation of leminisci (sensory/ close medulla)
3. Level of olives (open medulla)
4. Level Just Inferior to the Pons

Level of decussation of pyramids

- Decussation of pyramids
- Fasciculus gracilis and the fasciculus cuneatus
- nucleus gracilis and the nucleus cuneatus (posterior to the central gray matter)
- Spinal nucleus of the trigeminal nerve
- Central canal



- The lateral and anterior white columns of the spinal cord is unchanged

Level of decussation of pyramids