Brainstem, cranial nerves and lobes

A = afferent (sensory) · E = efferent (motor)

MIDBRAIN

CN III and IV
A. Orientation
E. Vertical and diagonal eye movements, convergence

PONS

CN V
A. Sensation of the face
E. Muscles of mastication

CN VI
E. Lateral eye movement

CN VII
A. Taste, anterior 2/3 of the tongue
E. Facial expression, tears and saliva

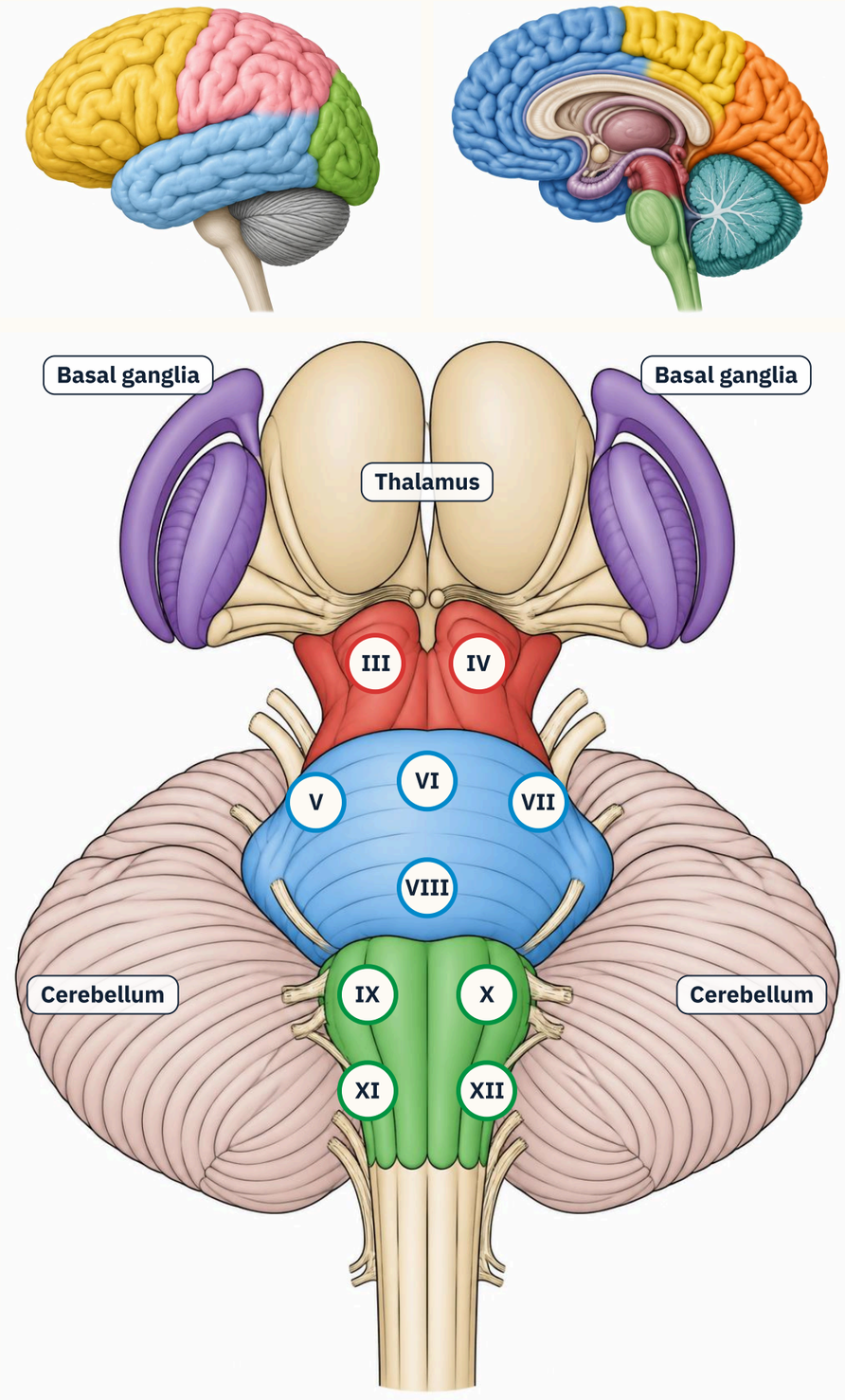
CN VIII
A. Hearing and balance
E. Reflex eye and head movements

MEDULLA

CN IX and X
A. Sensation of posterior 1/3 of the tongue and larynx
E. Swallowing, salivation

CN XI
E. Shoulder movement (trapezius, sternocleidomastoid)

CN XII
E. Tongue movements



FRONTAL LOBE

PLANNING AND BEHAVIOUR CONTROL
- Voluntary movement
- Executive functions
- Social behaviour
- Motivation
- Emotional regulation

ASSOCIATION AREAS
- Prefrontal cortex (planning, judgement, decisions)
- Motor cortex (movement)
- Supplementary motor area

TESTING
- Neurological signs
- Cognitive functions
- Movement, behaviour, emotions

PARIETAL LOBE

SENSATION, INTEGRATION AND SPATIAL ORIENTATION
- Visuospatial integration
- Social cognition
- Visual guidance of movement
- Motor pathways (fronto-pontine)

TEMPORAL LOBE

AUDITORY PROCESSING
- Attention, memory, learning
- Language comprehension
- Balance and coordination
- Memory (hippocampus)

OCCIPITAL LOBE

VISION
- Visual information processing

LIMBIC LOBE

- Motivation
- Emotions
- Memory

SEROTONIN

Produced in
Raphe nuclei of the pons and medulla

Projects to
Frontal cortex, striatum, amygdala, hippocampus

LOW LEVELS
- Anxiety
- Depression
- Aggression
- Impulsivity
- Irritability
- Low self-esteem
- Poor memory
- Sleep problems

NORMAL LEVELS
- CNS modulation
- Good mood
- Healthy sleep and appetite
- Impulse control
- Focus and memory
- Planning

HIGH LEVELS
- Agitation
- Attention problems
- Obsessive thoughts
- Overstimulation
- Seizures
- Headaches

DOPAMINE

Produced in
Midbrain (substantia nigra, VTA)

Projects to
Striatum, nucleus accumbens, frontal cortex

LOW LEVELS
- Depression
- Low motivation
- Fatigue
- Poor concentration
- Apathy
- Low motor activity
- Learning problems
- Risk of addiction

NORMAL LEVELS
- Reward and joy
- Focus
- Motivation
- Attention
- Movement control

HIGH LEVELS
- Aggression
- Hallucinations
- Mania
- Impulsivity
- Poor behaviour control

NORADRENALINE

Produced in
Pons and medulla (locus coeruleus)

Projects to
The entire CNS, all spinal levels

LOW LEVELS
- Low energy
- Poor concentration
- Apathy
- Depression
- Memory problems
- Low motivation
- Physical fatigue

NORMAL LEVELS
- Alertness
- Motivation
- Attention
- Muscle tone
- Stress response

HIGH LEVELS
- High blood pressure
- Anxiety
- Panic attacks
- Insomnia
- Hyperactivity
- Stress disorders