SNS COLLEGE OF PHYSIOTHERAPY

COIMBATORE - 641035

COURSE NAME: PHYSIOTHERAPY IN NEUROLOGICAL SCIENCES

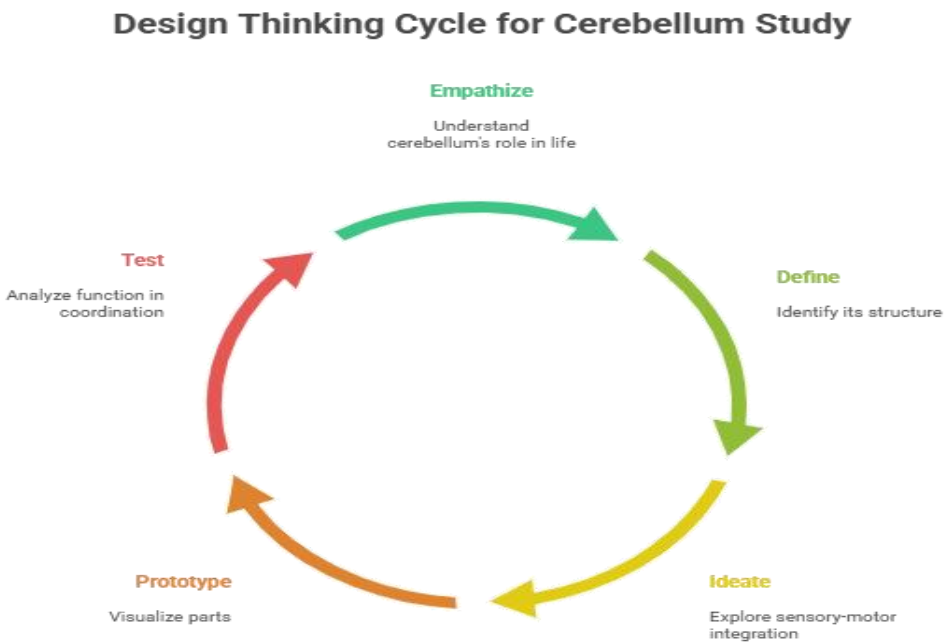
SUBJECT CODE: 6288

IV YEAR

TOPIC: STRUCTURE AND FUNCTION OF CEREBELLUM

Structure and Function of Cerebellum

- Precision, Coordination, and Balance in Motion and Mind



Design Thinking Approach to Neuroanatomy

Empathize → Understand cerebellum's role in life

Define → Identify its structure

Ideate → Explore sensory-motor integration

Prototype → Visualize parts

Test → Analyze function in coordination

Empathize: Why Study the Cerebellum?

Crucial for coordination, posture, and motor learning

Links sensory input with motor output

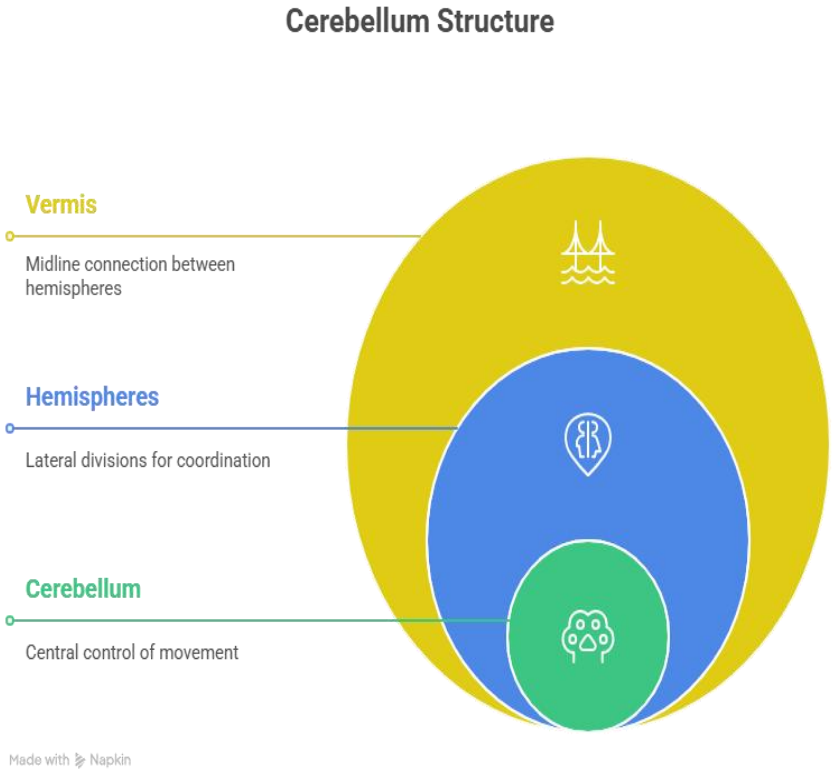
Damage leads to ataxia, imbalance, tremors

Introduction to Cerebellum

Second largest part of brain

Lies posterior to pons and medulla

Divided into two hemispheres by vermis

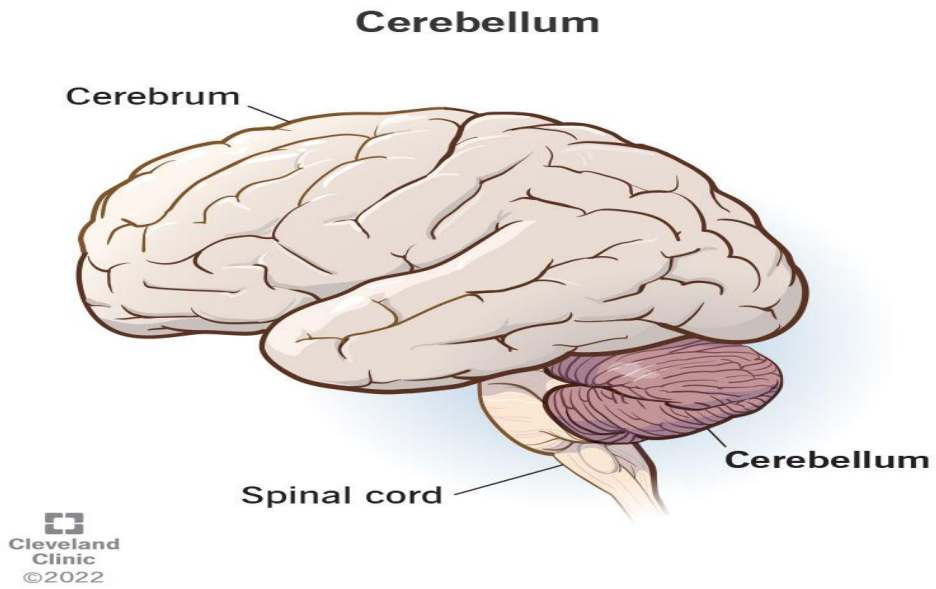


Position and Relations

Located in posterior cranial fossa

Covered superiorly by tentorium cerebelli

Lies dorsal to the 4th ventricle

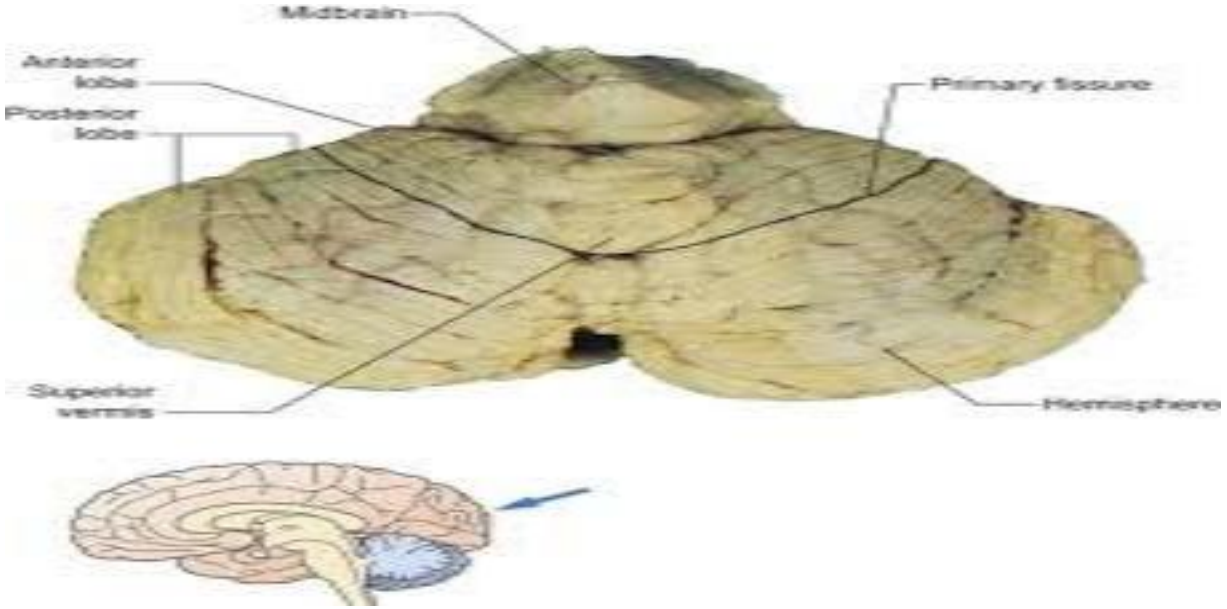


External Surface Anatomy

Two hemispheres connected by vermis

Three surfaces: superior, inferior, anterior

Horizontal fissure divides lobes

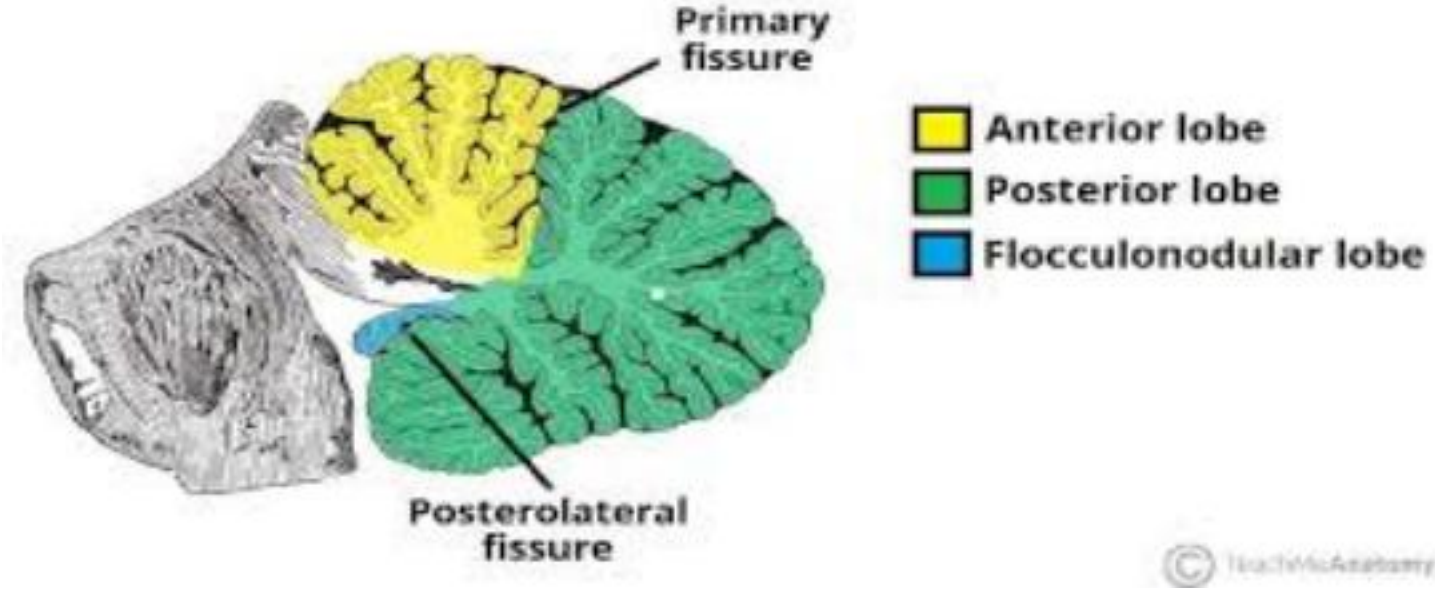


Lobes of the Cerebellum

Anterior lobe – limb movement

Posterior lobe – fine motor control

Flocculonodular lobe – balance and eye movement

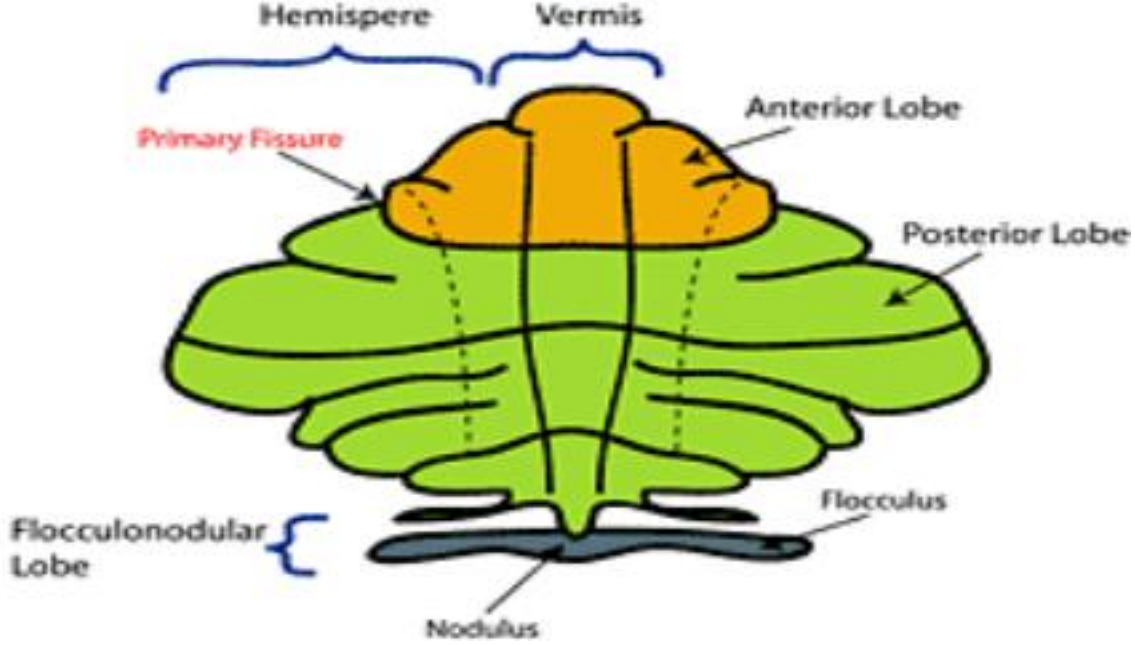


Functional Subdivisions

Vestibulocerebellum – equilibrium

Spinocerebellum – posture and tone

Cerebrocerebellum – planning and coordination



Internal Organization

Cortex → gray matter

Medulla → white matter

Deep nuclei: dentate, emboliform, globose, fastigial

Cerebellar Cortex Layers

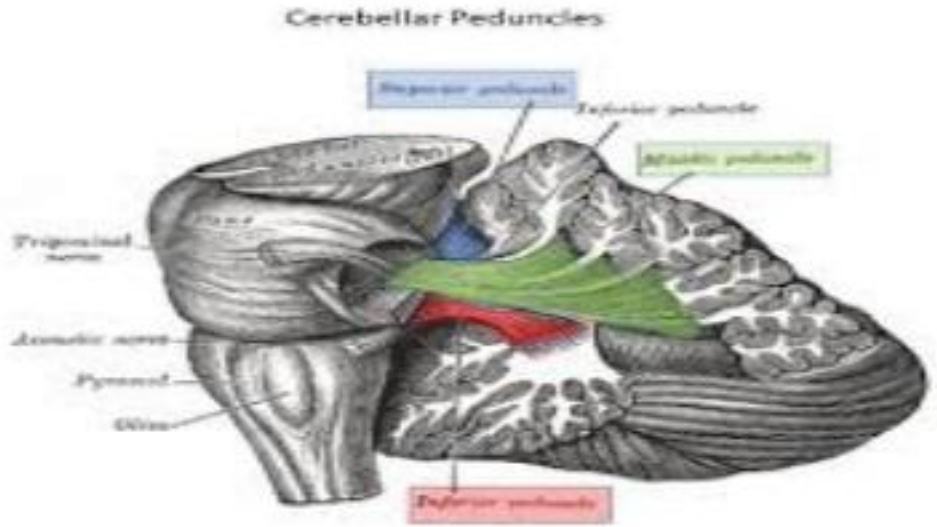
1. Molecular layer – stellate & basket cells
2. Purkinje cell layer – output neurons
3. Granular layer – granule & Golgi cells

Cerebellar Peduncles

Superior – efferent to midbrain

Middle – afferent from pons

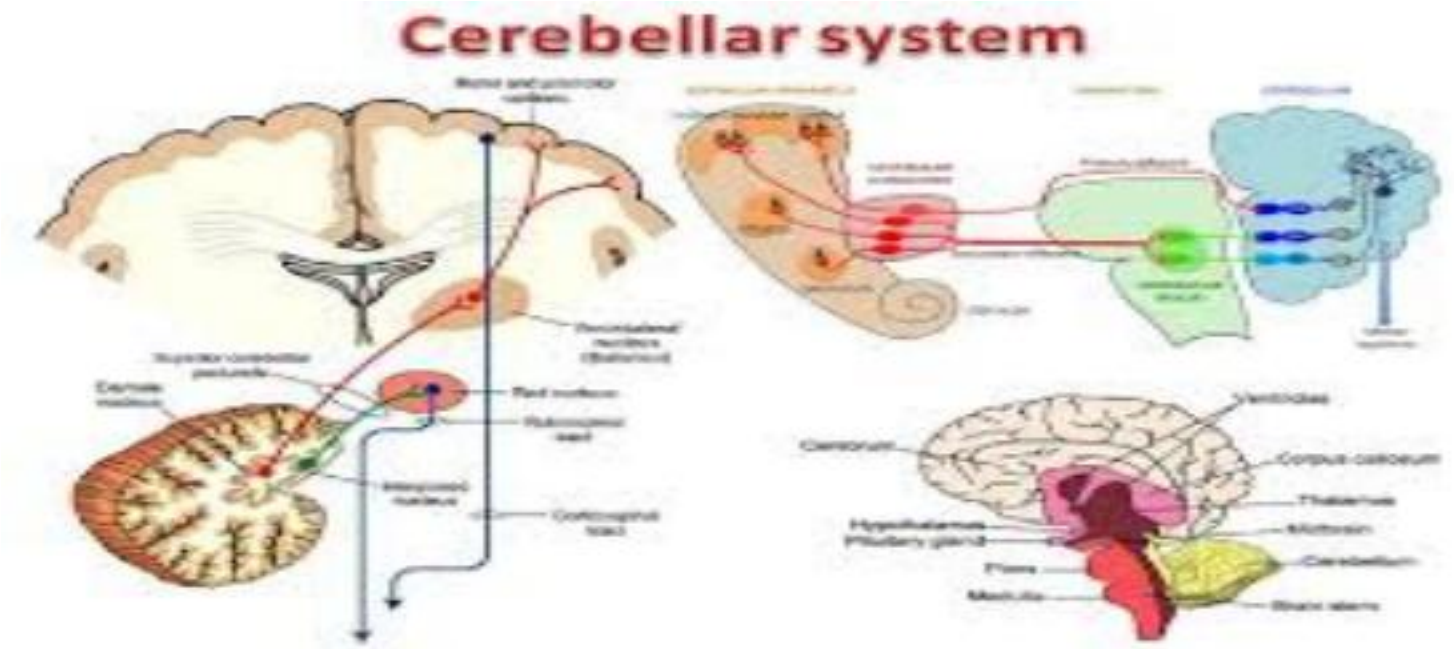
Inferior – connects medulla & spinal cord



Neural Pathways

Afferent: Corticopontocerebellar, olivocerebellar, vestibulocerebellar

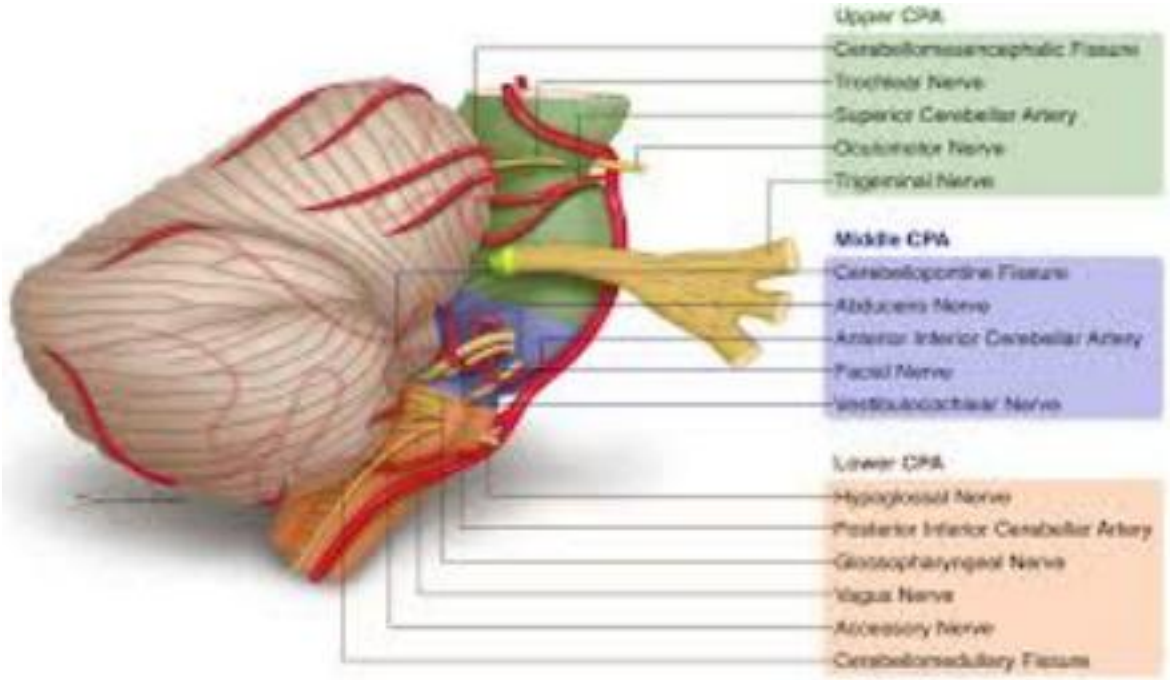
Efferent: Dentatothalamic, fastigiovestibular



Blood Supply

Arteries: SCA, AICA, PICA

Venous drainage: Superior and inferior cerebellar veins



Functions of the Cerebellum

Coordinates voluntary movements

Maintains muscle tone & posture

Controls balance

Motor learning and adaptation

Design Thinking Context

Integrates sensory feedback

Predicts motion outcomes

Fine-tunes actions before execution

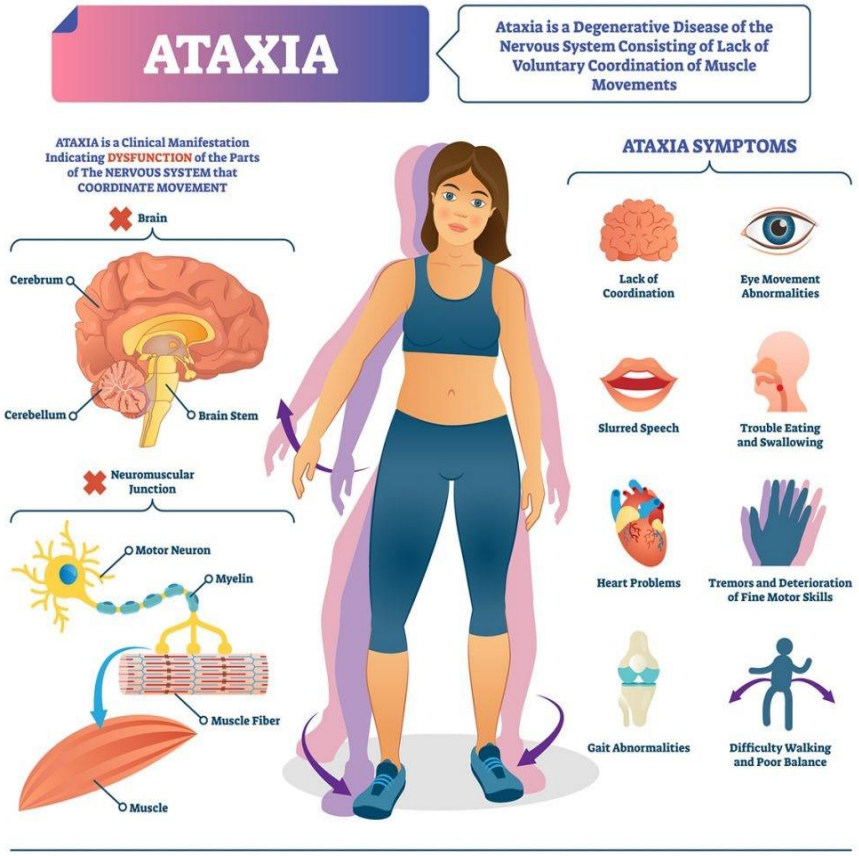
Clinical Correlation

Ataxia – loss of coordination

Intention tremor

Dysmetria – overshooting

Hypotonia



Prototype: Real-Life Examples

Standing balance on one leg

Catching a ball

Learning to play piano

Test: Functional Evaluation

Finger-to-nose test

Heel-to-shin test

Rapid alternating movement

Romberg's test

Summary

Empathize – Role in coordination

Define – Structure and divisions

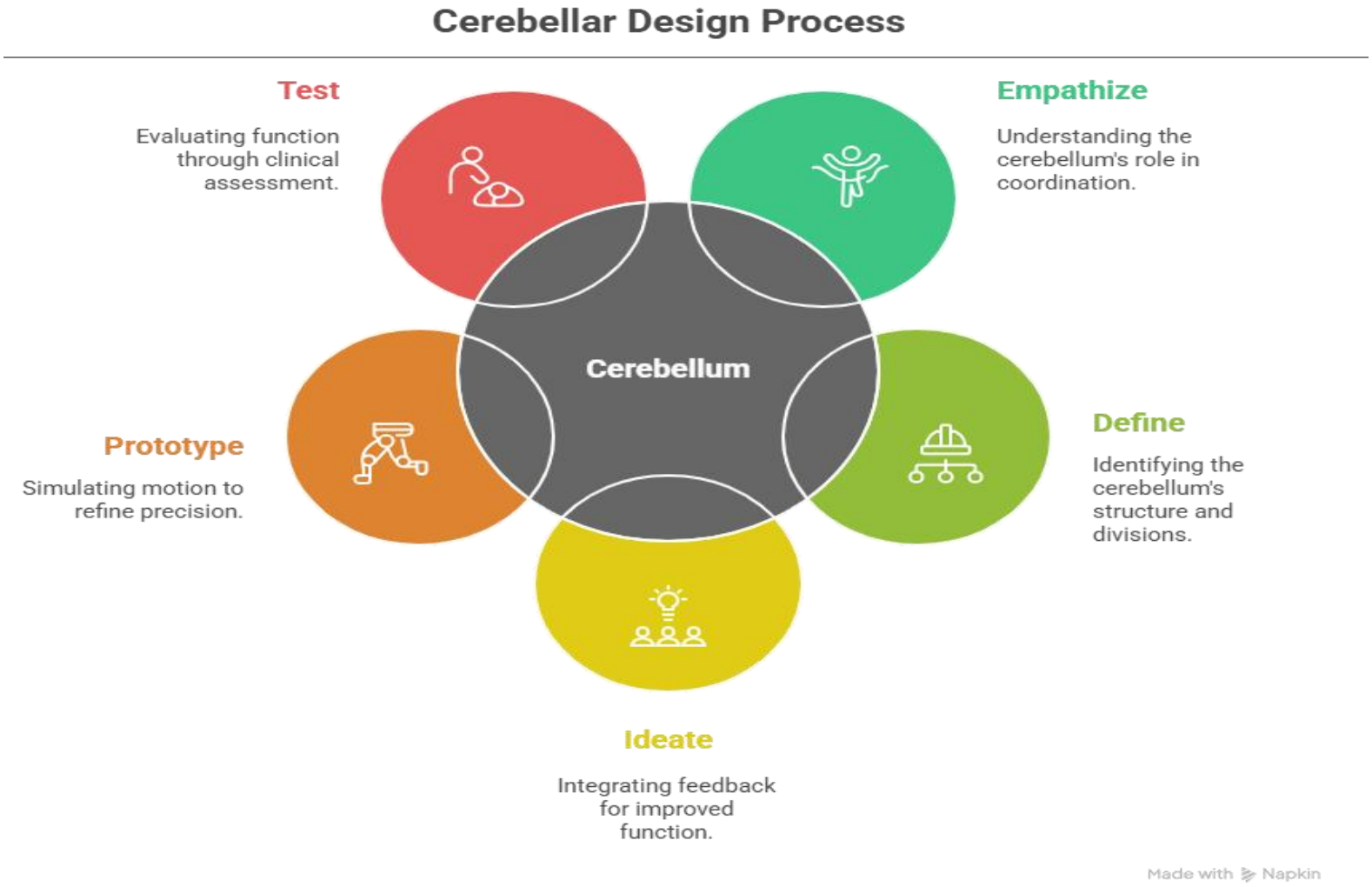
Ideate – Feedback integration

Prototype – Motion simulation

Test – Clinical assessment

'The cerebellum is the designer of precision.'

Thank you


Cerebellar Design Process
Test
Evaluating function through clinical assessment.
Empathize
Understanding the cerebellum's role in coordination.
Cerebellum
Prototype
Simulating motion to refine precision.
Define
Identifying the cerebellum's structure and divisions.
Ideate
Integrating feedback for improved function.
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