



NEUROFLIX X PHYSIO CITY

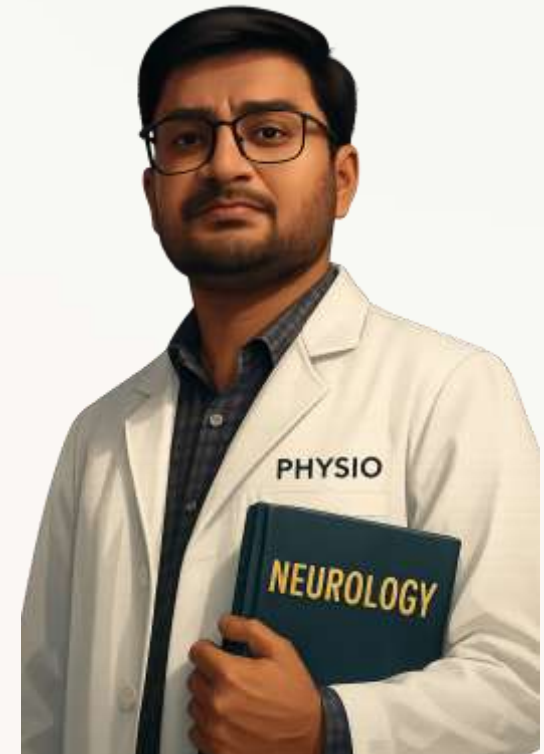
Presents

Human Neurological Reflexes



By

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The Reflex Arc

MONOSYNAPTIC & POLYSYNAPTIC ARCS

Monosynaptic Arc

loop consisting of only two neurons (one sensory, one motor) with a single synapse.

Muscle spindle stretch activates heavily myelinated **Ia afferent fibers**, synapsing directly onto agonist **alpha motor neurons** in the anterior horn.

Example: All human Muscle Stretch Reflexes (e.g., Patellar knee-jerk).

Polysynaptic Arc

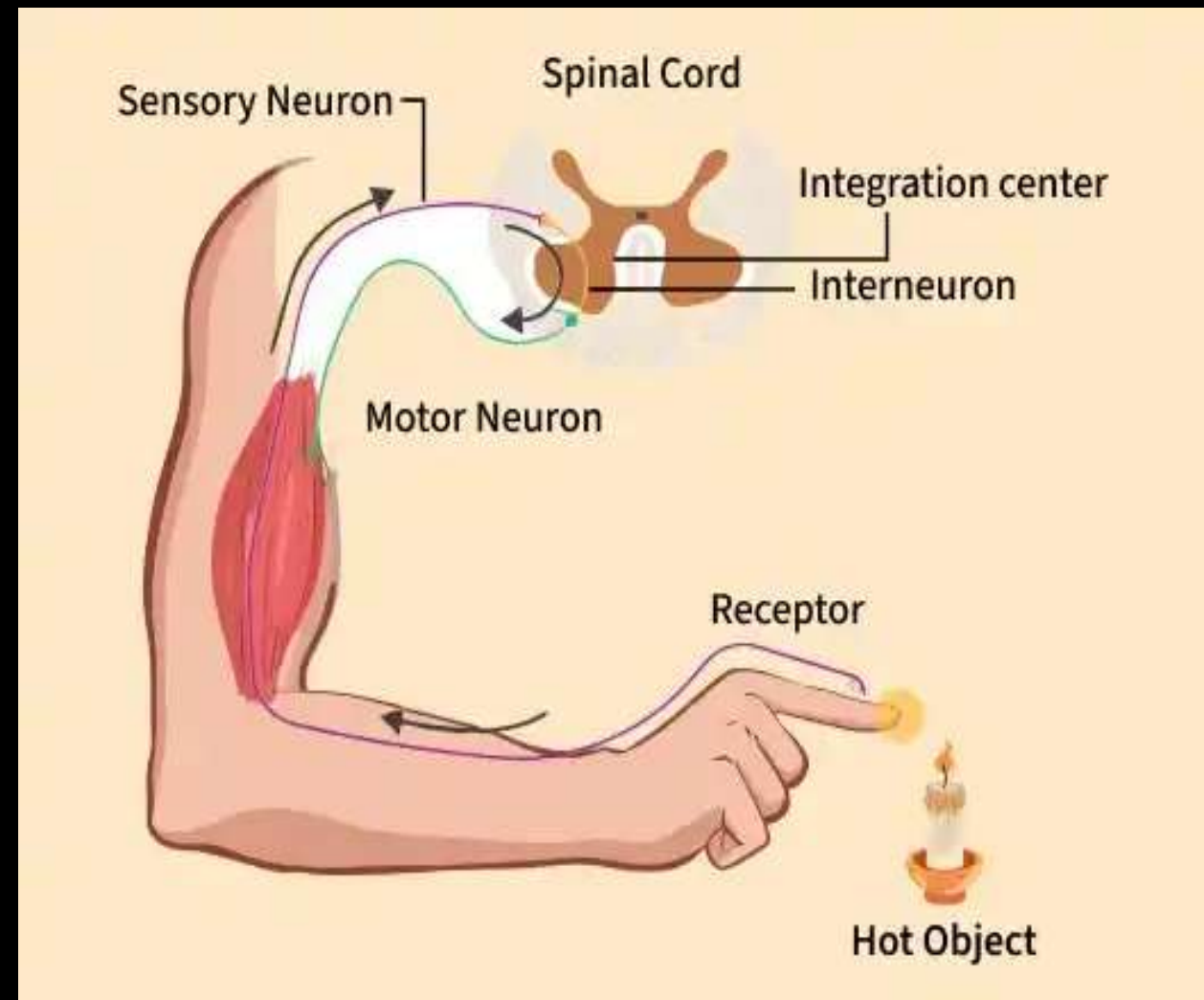
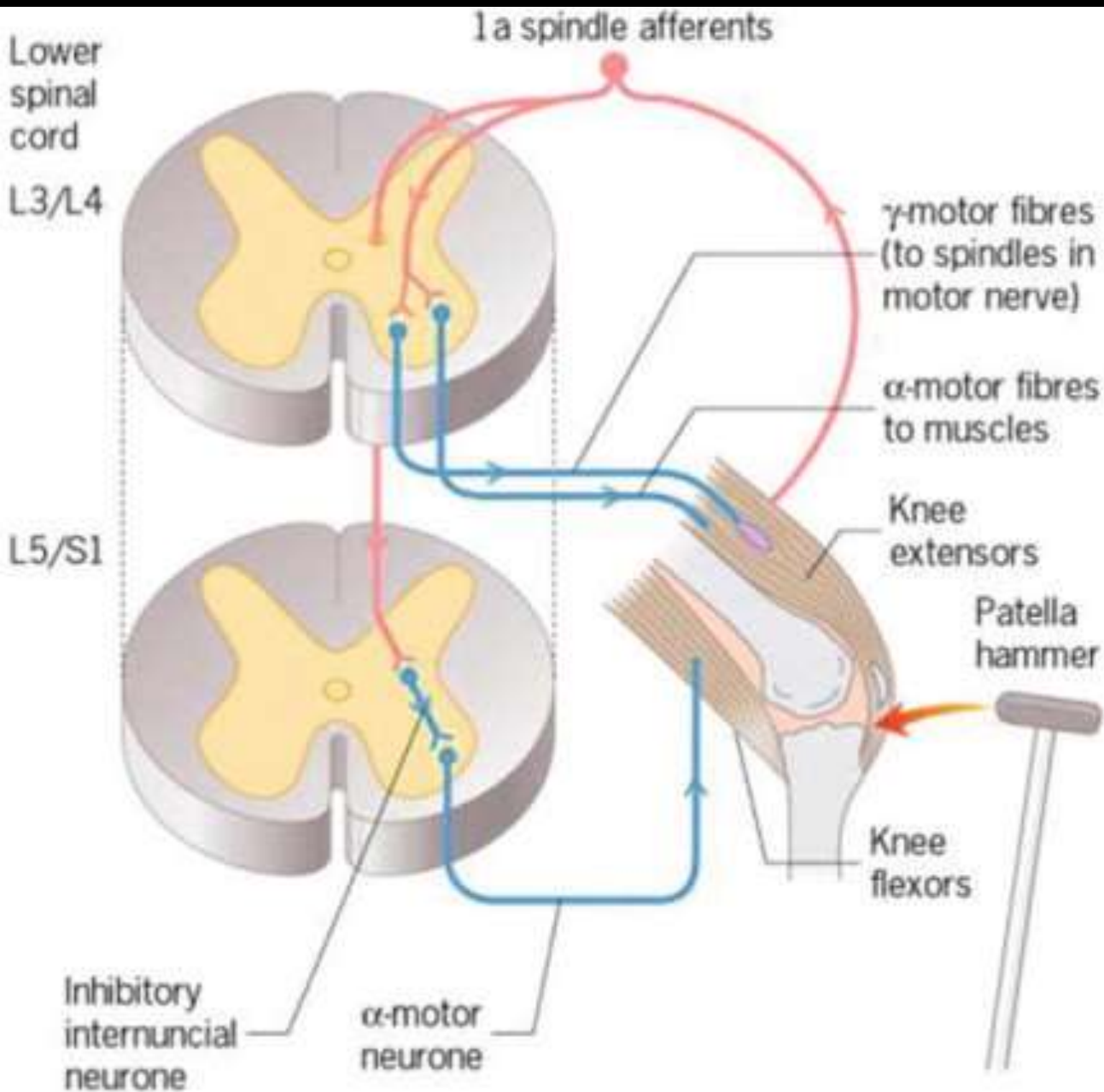
containing one or more interneurons between the sensory afferent and motor efferent fibers.

Cutaneous or visceral afferents activate interneuronal pools, leading to complex agonist excitation and antagonist inhibition (

Example: Flexor Withdrawal Reflex; Corneal Blink Reflex.

Note to Remember

Mnemonic "One vs. Many": Deep tendon reflexes are the ONLY monosynaptic reflexes in the human body. Every other reflex (superficial, pupillary, pathological, primitive) requires interneurons (polysynaptic) to coordinate complex, multi-joint muscular arrays.



GAMMA LOOP & SPINDLE DYNAMICS



Fusimotor System

Alpha Motor Neurons: Innervate extrafusal muscle fibers to drive contraction and load bearing.

Gamma Motor Neurons: Innervate intrafusal muscle fibers located inside the muscle spindle, continuously adjusting spindle tension.

Co-activation: Concurrent alpha-gamma activation prevents the spindle from going slack during muscle contraction, maintaining reflex sensitivity.



Sensitivity Calibration

Static Gamma: Enhances the steady-state, tonic discharge of II afferent fibers.

Dynamic Gamma: Promotes highly responsive, phase-sensitive discharge of IA afferents during rapid velocity changes.

Upper Motor Influence: Descending corticospinal pathways inhibit gamma activity; UMN lesions release this block, causing spastic hyperreflexia.



Clinical Pearl: Gamma motor neurons act as the muscle spindle's "sensitivity dial". When descending cortical inhibition is lost (as in stroke or spinal cord injury), this dial is turned up to maximum, causing hyperreflexia and spasticity.

VISCERAL VS. SOMATIC REFLEXES



Visceral Reflex Arc

Efferent Pathway: Utilizes a two-neuron chain (preganglionic and postganglionic autonomic fibers).

Targets: Smooth muscle, cardiac muscle, and exocrine glands.

Anatomy: Slower conduction velocities due to unmyelinated postganglionic C fibers.



Somatic Reflex Arc

Efferent Pathway: Directly synapses on neuromuscular junctions without intermediate ganglionic synapses.

Targets: Skeletal muscle fibers.

Anatomy: Rapid conduction mediated by heavily myelinated A-alpha motor axons.



Memory Key: "Somatic is Direct; Autonomic takes a Detour." Somatic axons run unbroken from spinal cord to skeletal muscle. Autonomic/Visceral pathways must always synapse in a peripheral ganglion first before reaching target tissue.



Pediatric Primitive Reflexes

CNS Level	Structural Neuroanatomy	What It Does(In Simple Words)	The Ultra-Simple Student Analogy	Classic Clinical Examples
Spinal Level	Spinal cord gray matter	Instant Local Panic Button: A split-second, explosive reaction to immediate danger. It doesn't ask the brain for permission; it just acts locally.	💣 The Car Airbag	* Flexor Withdrawal * Crossed Extensor
Brainstem Level	Medulla, pons, vestibular nuclei	Total System Re-Layout: Changes the resting muscle tone of your entire body automatically whenever you turn the head or tip against gravity.	📱 The Phone Auto-Rotate	* ATNR * STNR * TLR

CNS Level	Structural Neuroanatomy	What It Does(In Simple Words)	The Ultra-Simple Student Analogy	Classic Clinical Examples
Midbrain Level	Midbrain (Red nucleus, superior colliculus)	The Horizon Leveller: Actively works to keep your head vertical and your body properly lined up, no matter how much you tilt.	📷 The Camera Gimbal	* Labyrinthine * Optical Righting
Cortical / Basal Ganglia Level	Cerebral cortex, cerebellum, basal ganglia	The Professional Driver: Fluid, smooth, predictive balance adjustments that keep you steady on your feet during movement. Stays on for life.	🏎️ The F1 Driver	* Tilting Reactions * Protective Extension

SPINAL LEVEL: FLEXOR & CROSSED EXT

Flexor Withdrawal

Elicitation: Sharp, noxious stimulus (pinprick or squeeze) applied to the sole of the supine infant's foot.

Response: Immediate, uncontrolled flexion of the stimulated limb (hip, knee, ankle retraction).

Timeline: Emerges at 28 weeks gestation; integrates by 1 to 2 months post-birth.

Significance: Primary spinal protective reflex. Failure to integrate prevents foot contact during walking.

Crossed Extension

Elicitation: Holding one leg extended at the knee, apply a noxious scratch to the sole of that foot.

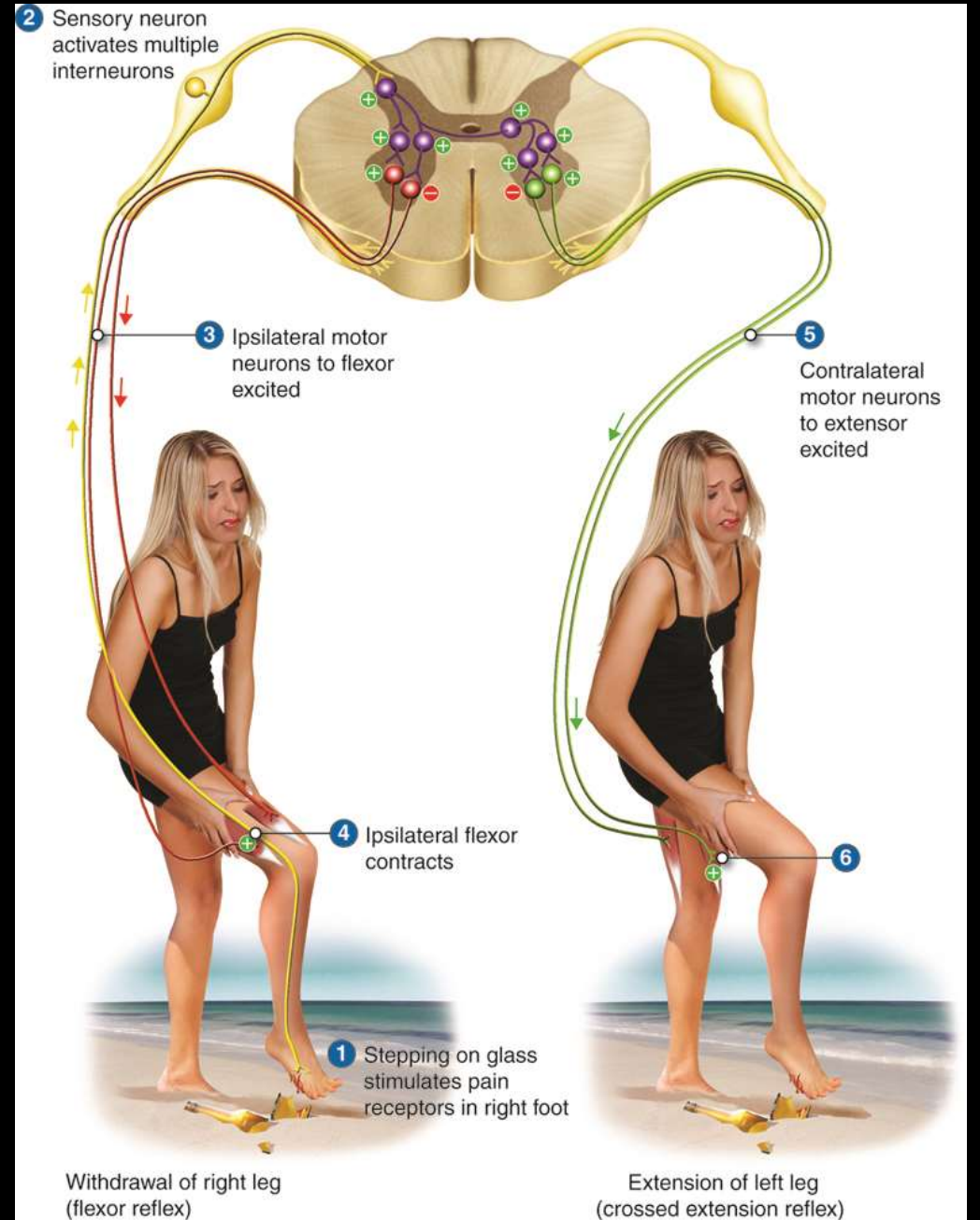
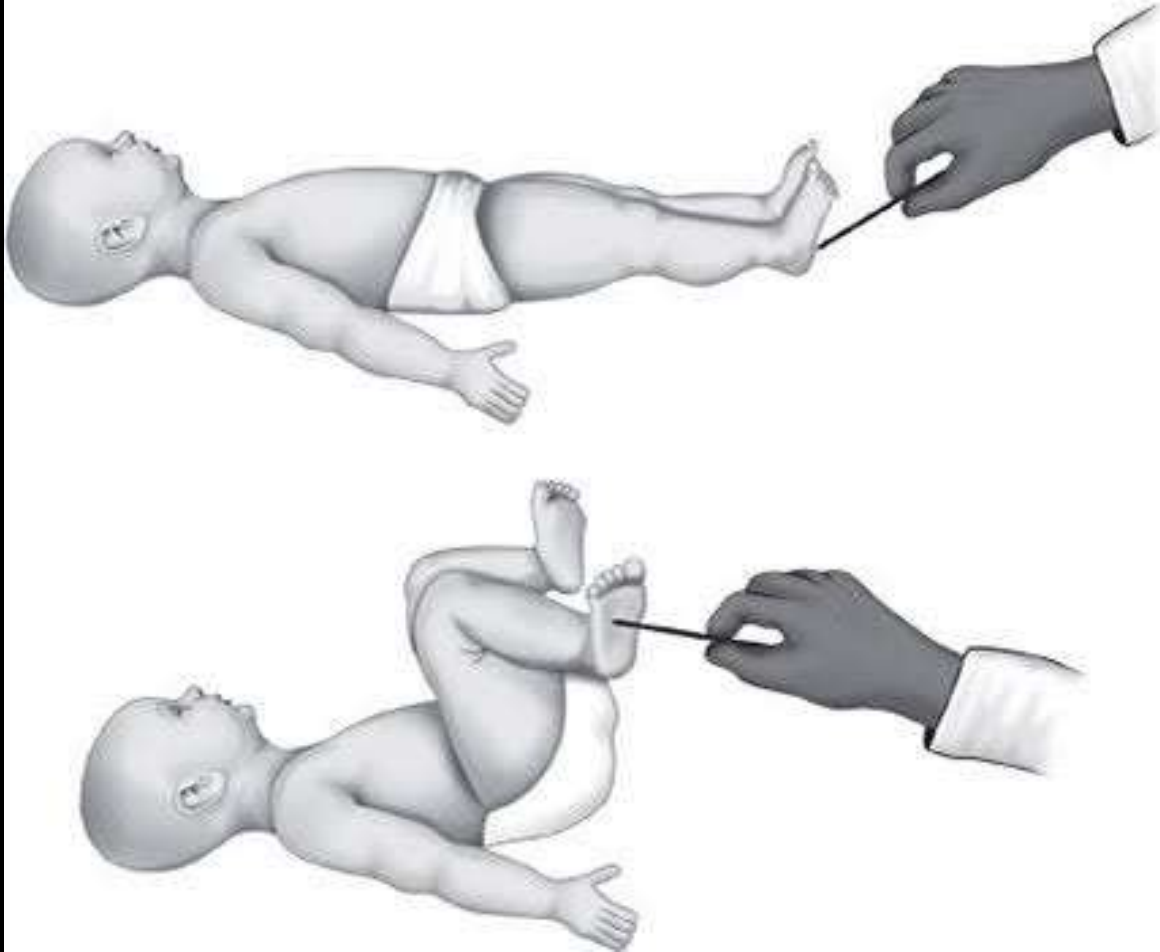
Response: Contralateral limb first flexes, then adducts and forcibly extends to push away the stimulus.

Timeline: Emerges at 28 weeks gestation; integrates by 1 to 2 months.

Significance: Spinal pattern generator for reciprocal locomotion.



Mnemonic "Pull & Push": Flexor withdrawal is "pulling" the endangered foot away from danger; Crossed extension is "pushing" the source of danger away with the opposite leg. Both are integrated within the first 2 months.



SPINAL LEVEL: PALMAR & PLANTAR GRASP



Palmar Grasp

Elicitation: Place examiner's index finger into the infant's palm from the ulnar side, applying light pressure.

Response: Flexion of all digits, producing a tight grip. Pulling upward reinforces the grip.

Timeline: Emerges at 28 weeks gestation; integrated by 4 to 6 months.

Significance: Persistence prevents isolated finger extension, voluntary grasp, and release mechanics.



Plantar Grasp

Elicitation: Apply firm pressure with thumb against the metatarsal heads on the sole of the foot.

Response: Tonic flexion of all toes over the examiner's thumb.

Timeline: Emerges at 32 weeks gestation; integrated by 9 to 12 months.

Significance: Must integrate before independent standing, gait, and mature balance can develop.



Mnemonic "Hand before Foot": The hand grasp integrates early (4-6 months) to allow active manipulation; the foot grasp integrates late (9-12 months) to allow the child to walk flat-footed without curling the toes.

MORO & STARTLE REFLEXES



Moro Reflex

Elicitation: Supporting the semi-upright infant, allow the head to suddenly drop backward 30 degrees relative to trunk.

Response: Symmetrical abduction and extension of upper extremities, followed by adduction and flexion ("hugging").

Timeline: Emerges at 28 wks gestation; integrates by 4 to 6 months.

Significance: Asymmetry suggests brachial plexus injury (Erb's palsy) or clavicular fracture.



Startle Reflex

Elicitation: Sudden, loud acoustic stimulus (clap) or abrupt physical vibration to the support surface.

Response: Sudden, bilateral limb flexion and abduction; elbows remain flexed and hands closed.

Timeline: Emerges at birth; persists for life as a defensive reaction.

Significance: Distinct from Moro; does not require vestibular activation of semicircular canals.

Memory Pearl: "Moro drops, Startle hears." Moro is triggered by a sudden head-drop (vestibular). Startle is triggered by loud noise (auditory). Moro features finger extension (hands open), while Startle features clenched fists.



POSITION 1: ARMS EXTENDED (INITIAL STIMULUS)



POSITION 2: ARMS INWARD (REFLEX COMPLETION)

ORAL REFLEXES: ROOTING & SUCKING

Rooting Reflex

Elicitation: Stroke the perioral skin or corner of the infant's mouth from lateral to medial.

Response: Head turns toward the side of the stimulus with mouth opening, attempting to search.

Timeline: Emerges at 28 weeks gestation; integrates by 3 months post-birth.

Significance: Primary search reflex for feeding. Persistence beyond 3 months limits voluntary head control.

Sucking Reflex

Elicitation: Place a clean finger, pacifier, or nipple into the infant's mouth, touching the hard palate.

Response: Rhythmic, coordinated sucking and swallowing movements.

Timeline: Emerges at 28 weeks gestation; integrates by 3 to 4 months.

Significance: Crucial for neonatal survival. Co-developed with sucking-swallowing-breathing coordination.



Memory Key: "Root to Find, Suck to Feed." Rooting is a localization mechanism; Sucking is the consumption mechanism. Both are highly integrated by the end of the 4th month to allow voluntary, cortical control of eating.

GALANT & PEREZ TRUNK REFLEXES

↵ Galant Reflex

Elicitation: In prone suspension, stroke the paravertebral skin from the lower ribs down to the iliac crest.

Response: Lateral incurvation of the trunk toward the stimulated side (hip hitches upward).

Timeline: Emerges at 28 weeks gestation; integrated by 3 months post-birth.

Significance: Absence indicates spinal cord lesion. Persistence interferes with trunk dissociation during crawling and sitting.

^ Perez Reflex

Elicitation: In prone suspension, stroke firmly along the spinous processes from the sacrum to the neck.

Response: Extension of the neck, trunk, and extremities, with knee flexion and urination.

Timeline: Emerges at birth; integrated by 3 to 4 months.

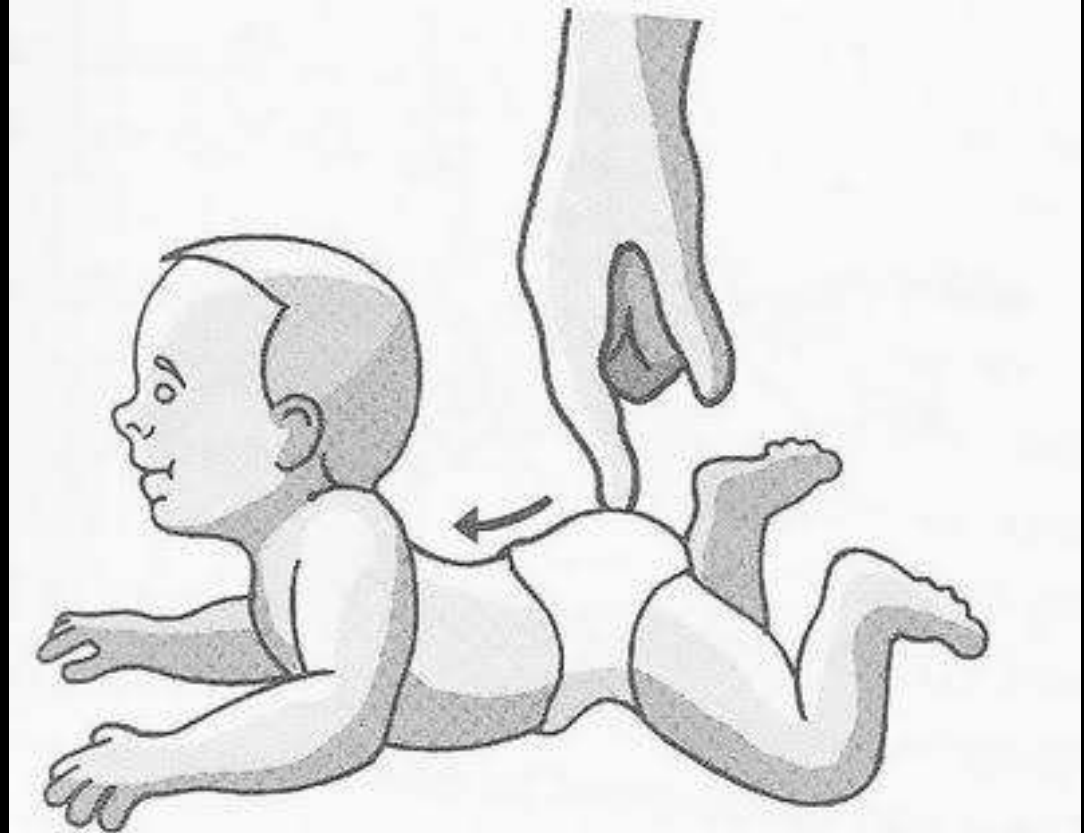
Significance: General spinal arousal reflex. Persistent Perez prevents development of local posture.



Mnemonic "Galant Sideways, Perez Upward": Galant causes **lateral** trunk curving. Perez causes **vertical** spinal extension and flexion of the limbs. Both vanish around 3 months to allow symmetric trunk stability.



Galant reflex





PRIMARY STEPPING & PLACING



Primary Stepping

Elicitation: Hold infant vertically upright in space, let the soles of the feet touch the flat supporting surface; lean the body forward slightly.

Response: Rhythmic, reciprocal stepping movements of both lower extremities.

Timeline: Emerges at 38 weeks gestation; integrates by 2 months post-birth.

Significance: Non-cortical stepping generator. Persistence blocks mature independent walking.



Placing Reaction

Elicitation: Hold infant upright, brush the dorsum of one foot against the underside edge of a table.

Response: Flexion of the stimulated hip and knee, raising the foot up, followed by extension to "step" onto the table.

Timeline: Emerges at 36 weeks gestation; integrated by 2 months.

Significance: Early visual-tactile locomotor anticipation reflex.



Memory Key: Stepping and Placing are the newborn's "autonomic walking" programs. They are spinal/subcortical and disappear by 2 months due to weight gain and cortical myelination, only to return as voluntary walking at 12 months.

Level II: Brainstem Reflexes

Tonic static reflexes governed by the brainstem vestibular and vestibular-ocular nuclei. These reflexes align postural tone of the limbs with head position.

ASYMMETRIC TONIC NECK (ATNR)

ATNR Elicitation

Protocol: Place infant in supine, align head in midline; rotate the head passively to one side and hold for 5-10 seconds.

Response: Extension of limbs on the face side ("jaw limbs"); flexion of limbs on the opposite side ("occiput limbs"). Often termed the "Fencer's Pose".

Timeline: Emerges at birth; fully integrated by 4 to 6 months.

Clinical Pathology

Abnormal Status: An obligatory ATNR (infant locked in the pose and cannot break it voluntarily) is always pathological.

Significance: Prevents hands-to-mouth exploration, rolling over, visual tracking of objects, and midline reaching.

Disease Association: Strongly persistent in spastic cerebral palsy.

High-Yield Note to Remember

Mnemonic "Fencer looks at his sword": The arm on the side the head is turned **extends** (holding the sword); the opposite arm **flexes** (cocked shield). Must integrate by 6 months to allow rolling over.



SYMMETRIC TONIC NECK (STNR)

✓ STNR Elicitation

Protocol: Place infant in quadruped position (on hands and knees); passively flex or extend the neck.

Neck Flexion Response: Upper extremities flex; lower extremities extend.

Neck Extension Response: Upper extremities extend; lower extremities flex.

Timeline: Emerges late (4 to 6 months); integrated by 8 to 12 months.

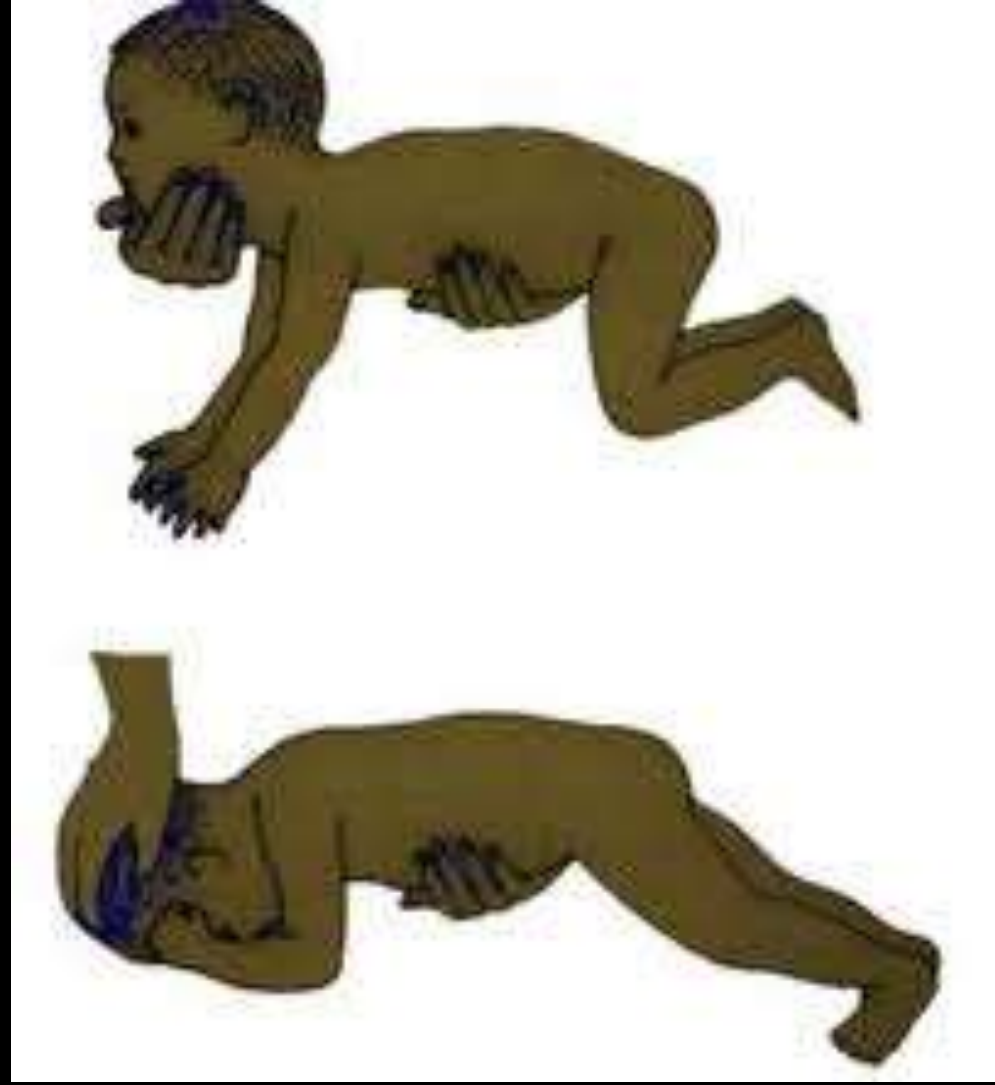
Functional Impact

Normal Role: Breaks up total body extension, allowing the infant to lift the trunk off the ground to sit.

Significance: If STNR does not integrate, the child cannot crawl Segmentally. Instead, they "bunny-hop" because the arms and legs cannot move independently of neck posture.



Mnemonic "Bow & Crouch": When neck bows (flexes), arms bow/flex (legs extend). When neck looks up (extends), arms extend (butt crouches down/legs flex). Required to crawl on hands and knees.



TONIC LABYRINTHINE REFLEX (TLR)

TLR Elicitation

Protocol: Evaluate postural muscle tone in two contrasting, static spatial positions.

Supine TLR Response: Dominance of extensor tone. Resistance to passive neck and hip flexion when pulling to sit.

Prone TLR Response: Dominance of flexor tone. Trunk, arms, and legs remain curled, resisting passive extension.

Timeline: Emerges at birth; integrated by 4 months post-birth.

Pathological Persistence

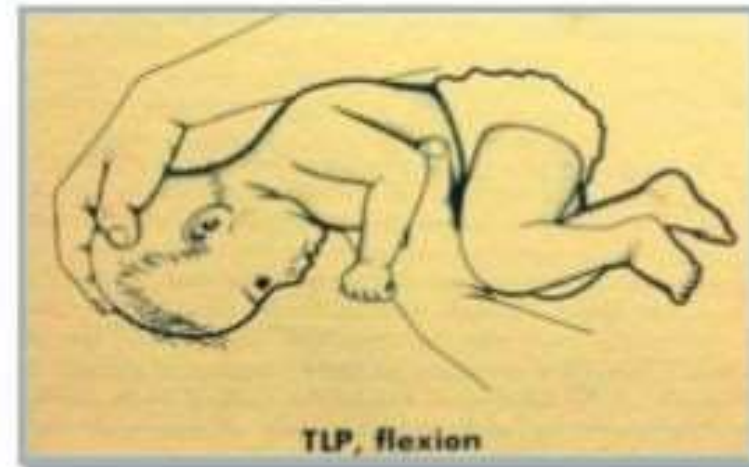
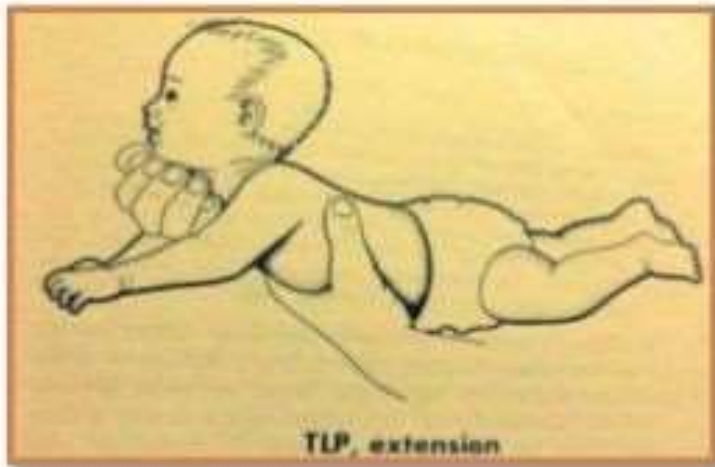
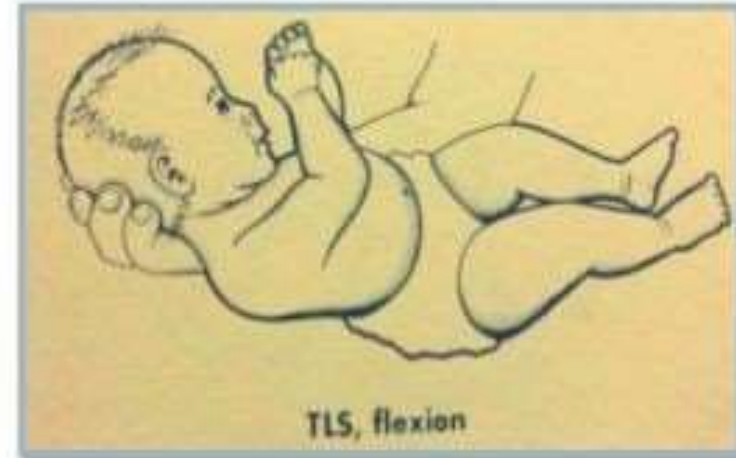
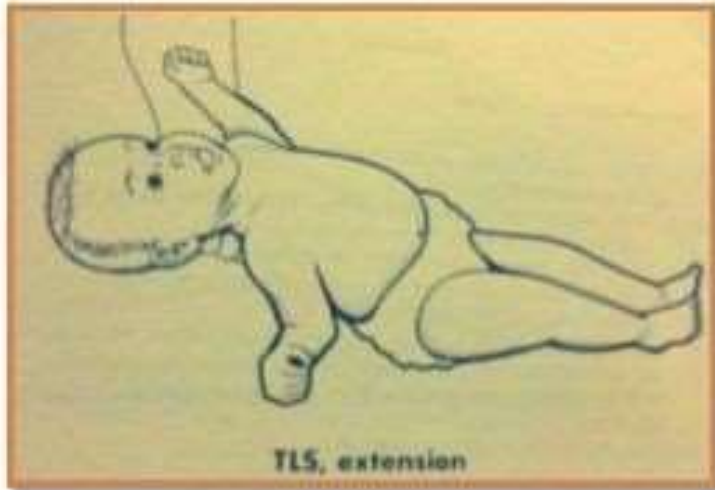
Significance: Driven by gravity's pull on the labyrinthine otoliths of the inner ear.

Impact: If TLR persists, the infant cannot lift head in prone (flexor dominance) or pull-to-sit in supine (extensor dominance), blocking all early motor milestones.



Memory Pearl: "Face Up = Extensor, Face Down = Flexor." Symmetrical TLR is a gravity-driven tone booster. Supine triggers the "stiff" extensor stance; Prone triggers the "ball" fetal flexor stance.

TONIC LABYRINTHINE REFLEX



Level III & IV Posture

Midbrain and cortical reactions that enable the human child to establish upright head control, dynamic rolling, and independent balance in space.

LEVEL III: RIGHTING REFLEXES

Optical Righting

Stimulus: Hold child vertically; tilt body 45 degrees in various planes (eyes open).

Response: Head rights itself vertically, keeping eyes parallel to horizon.

Timeline: Emerges 1-2 mo; persists for life.

Significance: Combines visual inputs with motor cortex for head orientation.

Labyrinthine Righting

Stimulus: Blindfold child; tilt body 45 degrees in various planes in space.

Response: Head rights itself vertically, relying entirely on inner ear vestibular cues.

Timeline: Emerges by 2 mo; persists for life.

Significance: Essential for orienting in low-visibility or darkness.

Body-on-Head

Stimulus: Place infant in supine or prone; let the chest/body touch the floor surface.

Response: Tactile sensation on the trunk triggers reflex lifting of the head.

Timeline: Emerges by 2 mo; persists for life.

Significance: Integrates somatosensory inputs with head postural loops.

Mnemonic "Eye, Ear, Skin": The head rights itself using three separate streams of information: Optical (eyes), Labyrinthine (ears/vestibular), and Body-on-head (skin/tactile). All emerge within the first 2 months and persist throughout life.



B Optical righting (ORR)



 Labyrinthine
righting (LRR)



 Body-on-head
righting (BOH)

ROLLING REACTIONS & LANDAU

Segmental Rolling

Elicitation: Turn infant's head to one side while they lie in a supine position.

Response: Neck-on-body: Segmental rotation of shoulders, then trunk, then pelvis to roll over (replaces the primitive log-rolling response).

Timeline: Emerges at 4 to 6 months; integrated by 5 years of age.

Significance: Core requirement for multi-segmental motor coordination.

Landau Reflex

Elicitation: Hold infant in horizontal prone suspension ("superman hold").

Response: Complete extension of the neck, spine, and lower limbs. Passively flexing the neck breaks the posture, causing the legs to drop.

Timeline: Emerges at 3 to 4 months; integrated by 12 to 24 months.

Significance: Integrates total-body extensor tone across spinal levels.



Mnemonic "Superman Landau": Landing in horizontal prone suspension makes the infant act like "Superman" (neck and spine extended). Dropping the head breaks the spell, flexing the legs immediately.

SEGMENTAL ROLLING



LEVEL IV: EQUILIBRIUM REACTIONS



Tilting Reactions

Elicitation: Place child on a tilting board/supporting surface in supine, prone, sitting, or standing. Tilt the board to one side.

Response: Spine curves toward the high side (upward lateral flexion); extremities on the high side abduct and extend to shift the center of mass back.

Timeline: Sequential (Prone: 6 mo; Sitting: 7-8 mo; Standing: 12-21 mo); persists for life.



Postural Fixation

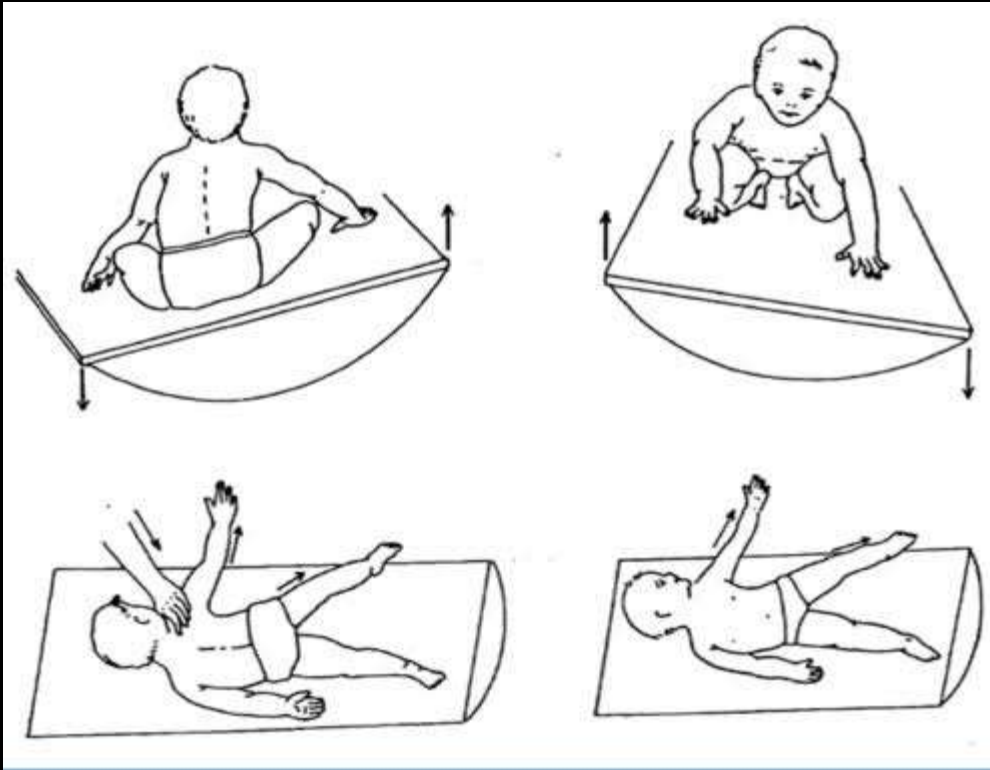
Elicitation: With child sitting or standing, apply a sudden physical push/perturbation directly to the shoulder or pelvis.

Response: Fast brace contraction of the trunk and limb muscles on the pushed side to lock posture and prevent a fall.

Timeline: Follows same milestones as tilting; persists for life.

Significance: Essential cortical balance mechanisms.

Memory Key: "High side holds, Low side folds." In tilting reactions, the side of the spine that goes **up** contracts and bends (holds) to pull the center of gravity back, while the down-side stretches (folds).



PROTECTIVE EXTENSION (PARACHUTE)

Parachute Elicitation

Protocol: Hold child vertically, suspend in space; tip the body rapidly forward/downward toward a supporting table.

Response: Sudden, symmetrical extension and abduction of both arms with fingers spread wide to "catch" and protect the face.

Timeline: Emerges at 6 to 7 months; persists for life.

Significance: Symmetrical defense reflex. Asymmetric response indicates hemiplegic cerebral palsy or arm weakness.

Lateral & Backward Protective

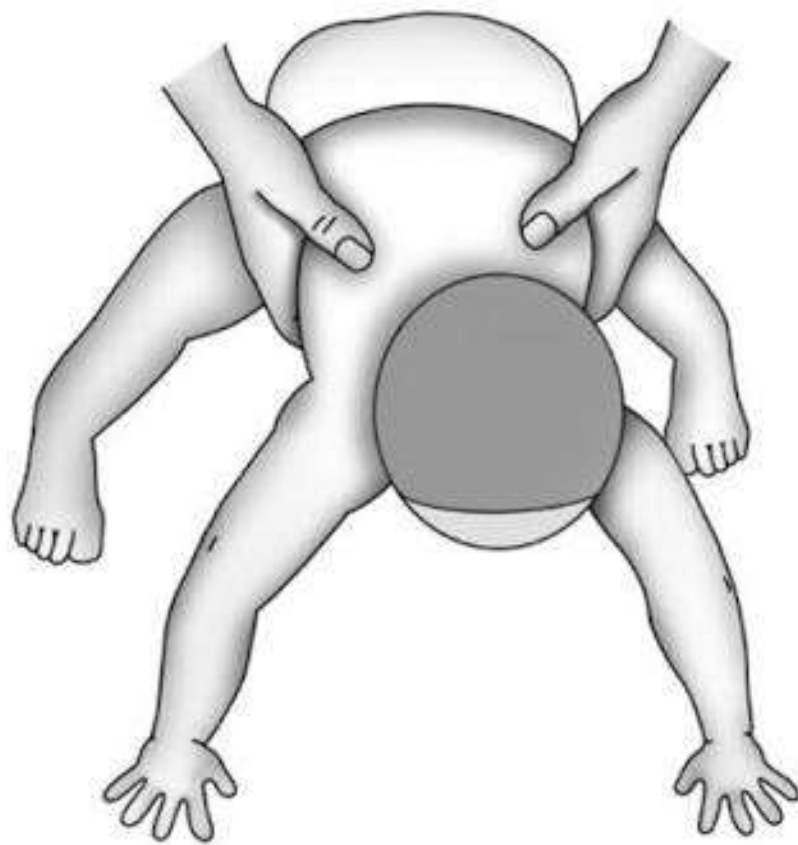
Lateral: Push seated child sideways. Seated child extends arm laterally to support weight on palm (Emerges: 7 to 8 months).

Backward: Push seated child backward. Spine and arms extend backward to catch body on hands (Emerges: 9 to 10 months).

Significance: Failure of development prevents safe sitting without injury.

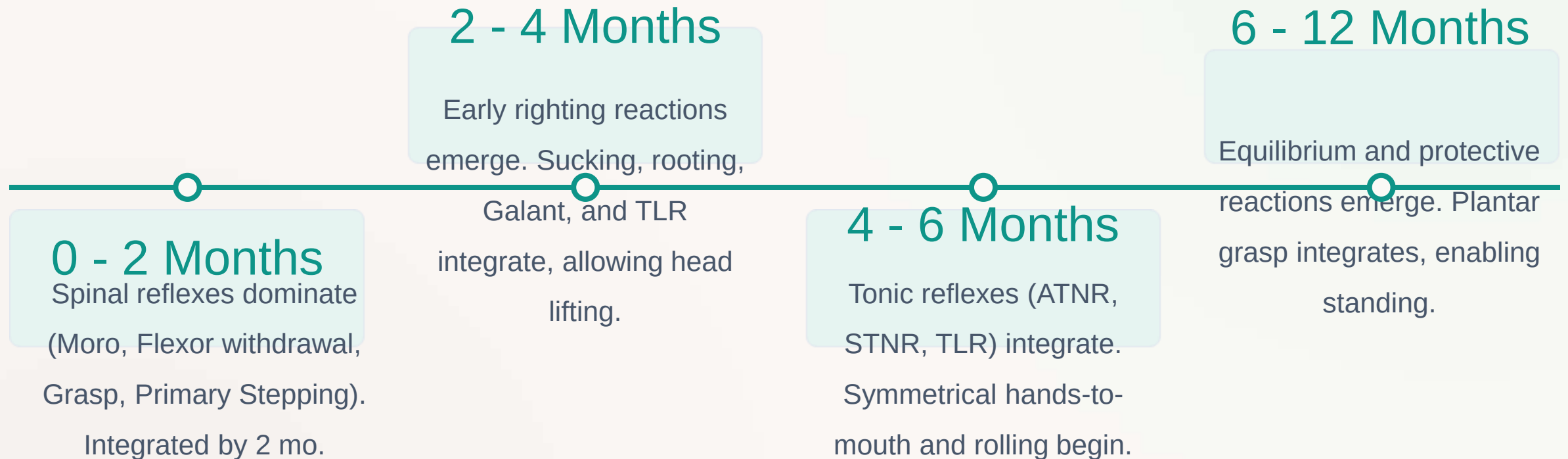
High-Yield Note to Remember

Mnemonic "Forward, Side, Behind": Protective extension develops in sequence like a clock: Front (6-7 months), Sides (7-8 months), Back (9-10 months). Required before standing and walking safely.



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INFANTILE INTEGRATION TIMELINE



Memory Milestone: *"By 6 months, everything primitive must go." If tonic patterns like ATNR or Moro remain active past 6 months, they block cortical voluntary control and signify neurodevelopmental delay.*

Adult Myotatic Reflexes

BICEPS REFLEX (C5 - C6)

Reflex Pathway

Nerve Path: Musculocutaneous Nerve.

Anatomical Root: Segmental spinal cord levels C5 and C6.

Elicitation: Support patient's elbow; place examiner's thumb firmly over the biceps tendon in cubital fossa. Strike the thumb directly with reflex hammer.

Clinical Significance

Normal: Palpable contraction of biceps muscle with slight flexion of elbow joint.

Abnormal: Hyporeflexia indicates C5-C6 herniated disc or Erb's palsy (LMN). Hyperreflexia points to cervical myelopathy (UMN).

BRACHIORADIALIS REFLEX (C5 - C6)

Reflex Pathway

Nerve Path: Radial Nerve.

Anatomical Root: Segmental levels C5 and C6.

Elicitation: Forearm supported on lap in mid-pronation; tap directly on the flat surface of the radius approx 5 cm proximal to styloid process.

Inverted Radial Reflex

Normal: Slight flexion and supination of forearm.

Inverted Response: Finger flexion occurs instead of forearm flexion.

Diagnostic Value: Highly specific for C5-C6 cervical spinal cord compression (myelopathy) with LMN lesion at C5 and UMN release below.

TRICEPS REFLEX (C7 - C8)

Reflex Pathway

Nerve Path: Radial Nerve.

Anatomical Root: Segmental levels C7 and C8.

Elicitation: Support patient's arm horizontally, letting forearm dangle at 90° flexion; tap the triceps tendon directly above the olecranon process.

Pathology

Normal: Contraction of triceps with extension of elbow joint.

Abnormal: Lost or diminished in C7 radiculopathy (disc herniation or osteophyte). Exaggerated in cervical/thoracic spinal cord injury.

PATELLAR KNEE-JERK (L2 - L4)



Reflex Pathway

Nerve Path: Femoral Nerve.

Anatomical Root: Segmental levels L2, L3, and L4.

Elicitation: With patient sitting, legs dangling freely, strike the patellar ligament directly below the lower border of patella.



Clinical Variations

Normal: Rapid quadriceps contraction with extension of knee.

Hung Patellar Reflex: Delayed relaxation phase seen in hypothyroidism (due to delayed calcium reuptake in sarcoplasmic reticulum).

Westphal's Sign: Complete absence of patellar reflex, classic for Tabes Dorsalis / neurosyphilis.

ACHILLES ANKLE-JERK (S1 - S2)

Reflex Pathway

Nerve Path: Tibial Nerve.

Anatomical Root: Segmental levels S1 and S2.

Elicitation: Flex patient's knee, dorsiflex ankle to 90° under passive tension; strike the Achilles tendon directly with reflex hammer.

Diagnostic Value

Normal: Brief plantar flexion of foot against examiner's hand.

Delayed Relaxation: Classic for hypothyroidism ("woltman sign").

Ankle Clonus: Sustained Rhythmic beats (>5 beats) on rapid dorsiflexion indicates severe UMN corticospinal damage.

MASSETER/JAW JERK (CN V3)



Reflex Pathway

Nerve Path: Trigeminal Nerve, Mandibular division (CN V3).

Sensory / Motor: Mesencephalic nucleus (sensory); motor nucleus of CN V.

Elicitation: Patient's mouth slightly open; place index finger horizontally across chin, strike finger with reflex hammer.



Clinical Interpretation

Normal: Very minimal contraction, or complete absence of movement.

Hyperreflexia (Brisk Closure): Pathognomonic for bilateral UMN lesion *above* the level of the pons.

Significance: Differentiates ALS or pseudobulbar palsy from lower brainstem pathologies.

STRETCH REFLEX GRADING SCALE

Grade	Clinical Interpretation	Pathological Status	Common Clinical Etiologies
0	Areflexia (No muscle response detected)	Always Pathological	Acute Guillain-Barré, severe root compression, spinal shock.
1+	Hyporeflexia (Diminished; trace contraction)	May be normal / LMN disease	Peripheral neuropathy, early diabetic neuropathy, hypothyroidism.
2+	Normoreflexia (Average, normal response)	Normal / Physiological	Neurologically intact homeostasis.
3+	Hyperreflexia (Brisk; moderate joint movement)	May be normal / early UMN	Anxiety, hyperthyroidism, early corticospinal tract disease.
4+	Clonus (Exaggerated, repetitive oscillations)	Always Pathological	Severe UMN disease: Stroke, MS, Spinal Cord Compression.



Superficial Cutaneous Reflexes

Analyzing polysynaptic, superficial reflexes triggered by stroking the skin or mucous membranes.
Essential for localized level determination and autonomic testing.

ABDOMINAL & CREMASTERIC REFLEXES

✦ Abdominal Reflex (T8-T12)

Elicitation: Stroke abdominal skin from lateral to medial across 4 quadrants.

Normal: Brief contraction of underlying muscles, moving umbilicus toward the stimulus.

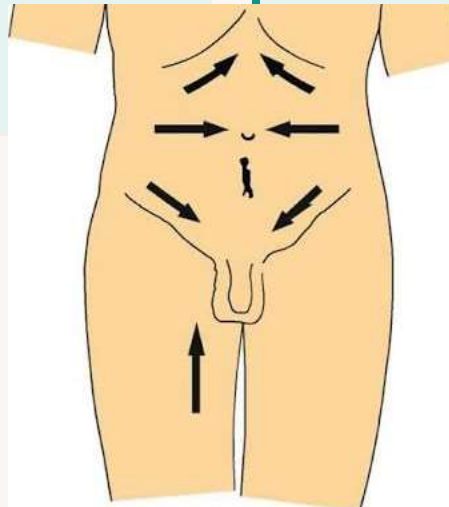
Pathology: Lost unilaterally in ipsilateral UMN lesion above the level tested. Early loss is diagnostic for Multiple Sclerosis.

↕ Cremasteric Reflex (L1-L2)

Elicitation: Lightly stroke skin on upper medial aspect of male thigh.

Normal: Immediate elevation of ipsilateral testis due to cremaster muscle contraction.

Pathology: Lost in L1-L2 nerve root compression, testicular torsion, or descending corticospinal tract lesion.



BULBOCAVERNOSUS & ANAL WINK

Bulbocavernosus (S2-S4)

Elicitation: Squeeze glans penis or clitoris; or pull on an indwelling Foley catheter balloon.

Response: Reflexive contraction of the external anal sphincter muscle.

Clinical Value: Absent in conus medullaris or cauda equina lesions. Its return marks the end of Spinal Shock.

Anal Wink Reflex (S2-S4)

Elicitation: Gently prick or stroke perianal skin with a cotton-tipped applicator or pin.

Response: Visible contraction ("wink") of external anal sphincter muscle.

Clinical Value: Critical for confirming preservation of sacral cord segments in spinal trauma.

HOW IT IS ELICITED

Male

Squeeze the glans penis



Female

Stimulate the clitoris or mons pubis



Catheterized Patient

Apply gentle traction on a urethral catheter

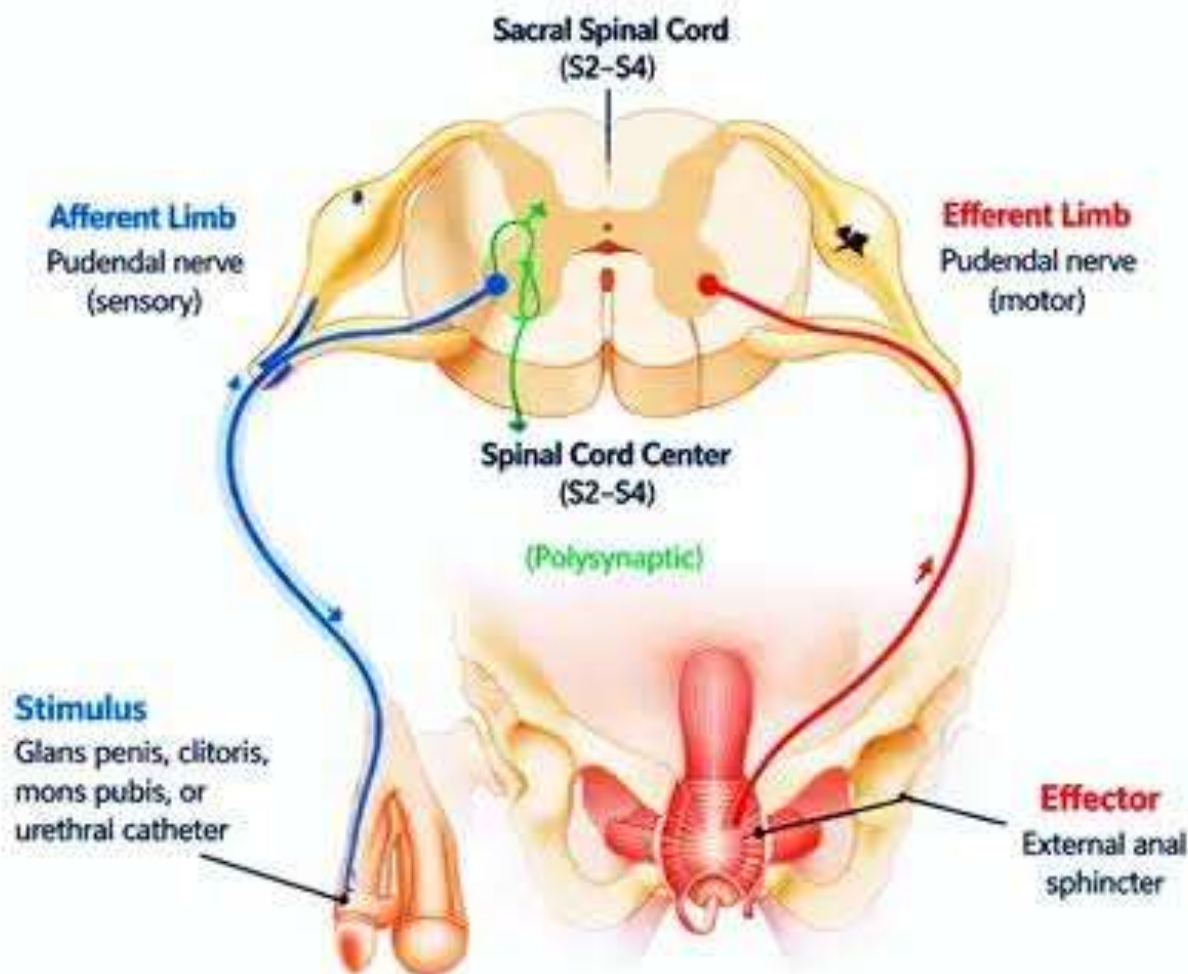


A POSITIVE REFLEX:

Palpable or visible contraction of the anal sphincter.



REFLEX ARC (S2-S4)



CORNEAL & PUPILLARY LIGHT

Corneal Blink Reflex

Afferent / Efferent: CN V1 (Ophthalmic) sensory; CN VII (Facial) motor.

Elicitation: Lightly touch cornea with a clean wisp of cotton swab.

Response: Bilateral, consensual closing of both eyelids.

Significance: Evaluates pontine integrity. Lost in acoustic neuromas (vestibular schwannomas).

Pupillary Light Reflex

Afferent / Efferent: CN II (Optic) sensory; CN III (Oculomotor) motor.

Elicitation: Shine light directly into one eye.

Response: Symmetrical constriction of both pupillary spheres (Direct and Consensual).

Significance: Evaluates midbrain pathways (Pretectal Nucleus/Edinger-Westphal).

Pathological & Release Signs

Delineating pathological responses and frontal release signs that re-emerge when higher cortical inhibition is lost due to trauma, stroke, or degeneration.

BABINSKI SIGN & ITS MIMICS

Babinski Sign

Elicitation: Stroke lateral sole of foot upward, then curve medially across metatarsal heads.

Positive: Slow dorsiflexion of great toe with fanning of other digits.

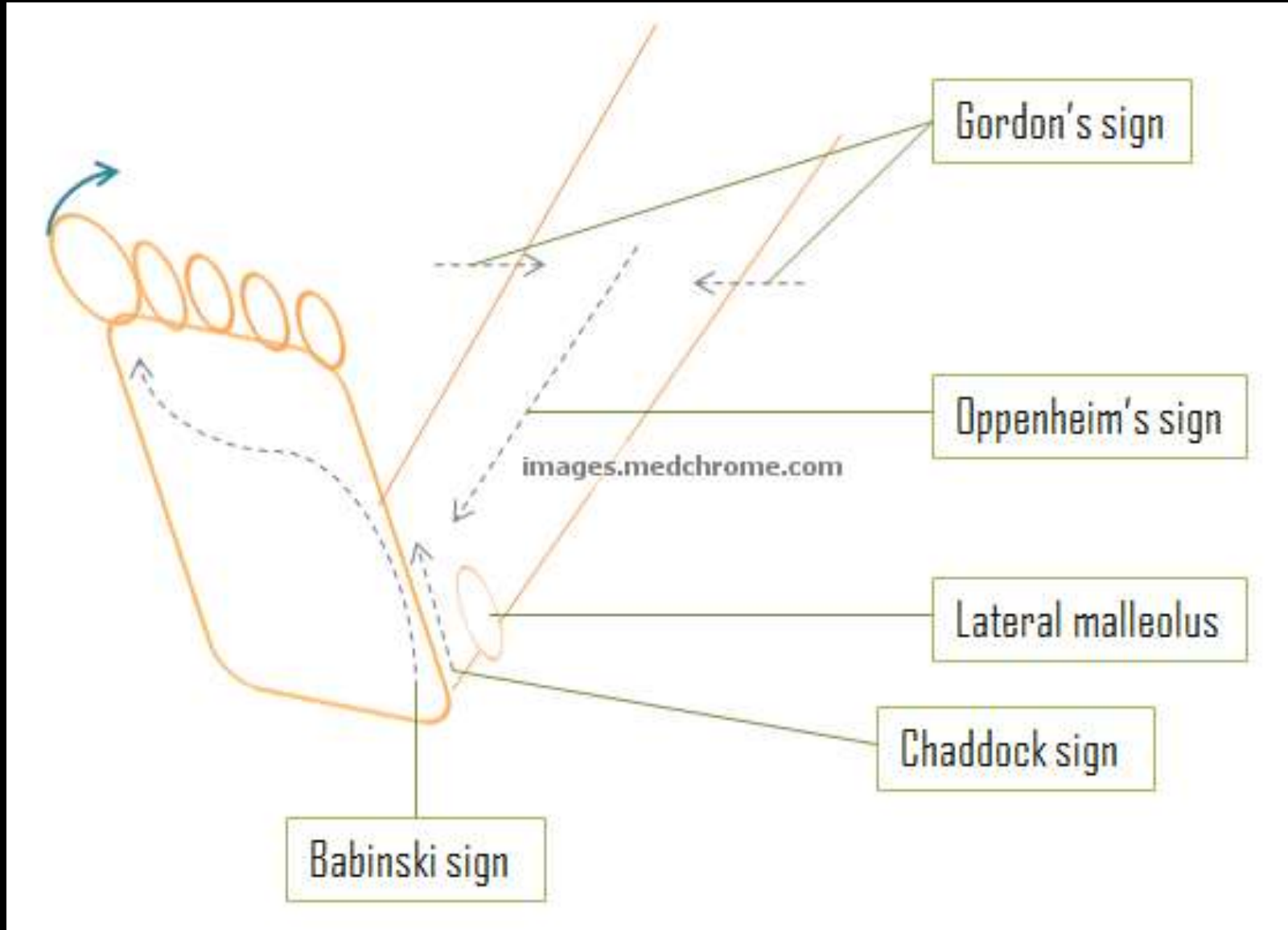
Pathophysiology: Loss of descending pyramidal inhibition allows spinal primitive withdrawal circuits to dominate.

Eponymous Mimics

Chaddock Sign: Stroke lateral malleolus down lateral side of foot. (Great toe extends).

Oppenheim Sign: Apply heavy pressure downward along anterior tibia. (Great toe extends).

Gordon Sign: Squeeze the calf muscle firmly. (Great toe extends).



HOFFMANN'S & TROMNER'S SIGNS



Hoffmann's Sign

Elicitation: Stabilize patient's hand; sharply flick or nip fingernail of middle finger downward, releasing it rapidly.

Pathological: Dynamic flexion and adduction of thumb and index finger.

Pathology: Indicates hyper-excitability of deep finger flexor reflex, localizing to cervical UMN disease (myelopathy).



Tromner's Sign

Elicitation: Hold patient's middle finger loosely, tap or flick palmar surface of distal phalanx upward.

Pathological: Immediate, involuntary flexion of thumb and index finger.

Comparison: Tromner's is highly sensitive for cervical level spinal cord compression (often more sensitive than Hoffmann's).

Hoffman Reflex



Tromner Reflex



ORAL RELEASE: SNOUT & SUCKING



Snout Reflex

Elicitation: Gently tap the midline of patient's upper lip with reflex hammer or index finger.

Pathological: Marked puckering, pouting, or protrusion of lips due to contraction of orbicularis oris.

Mechanism: Prefrontal cortical pathology releasing brainstem motor centers.

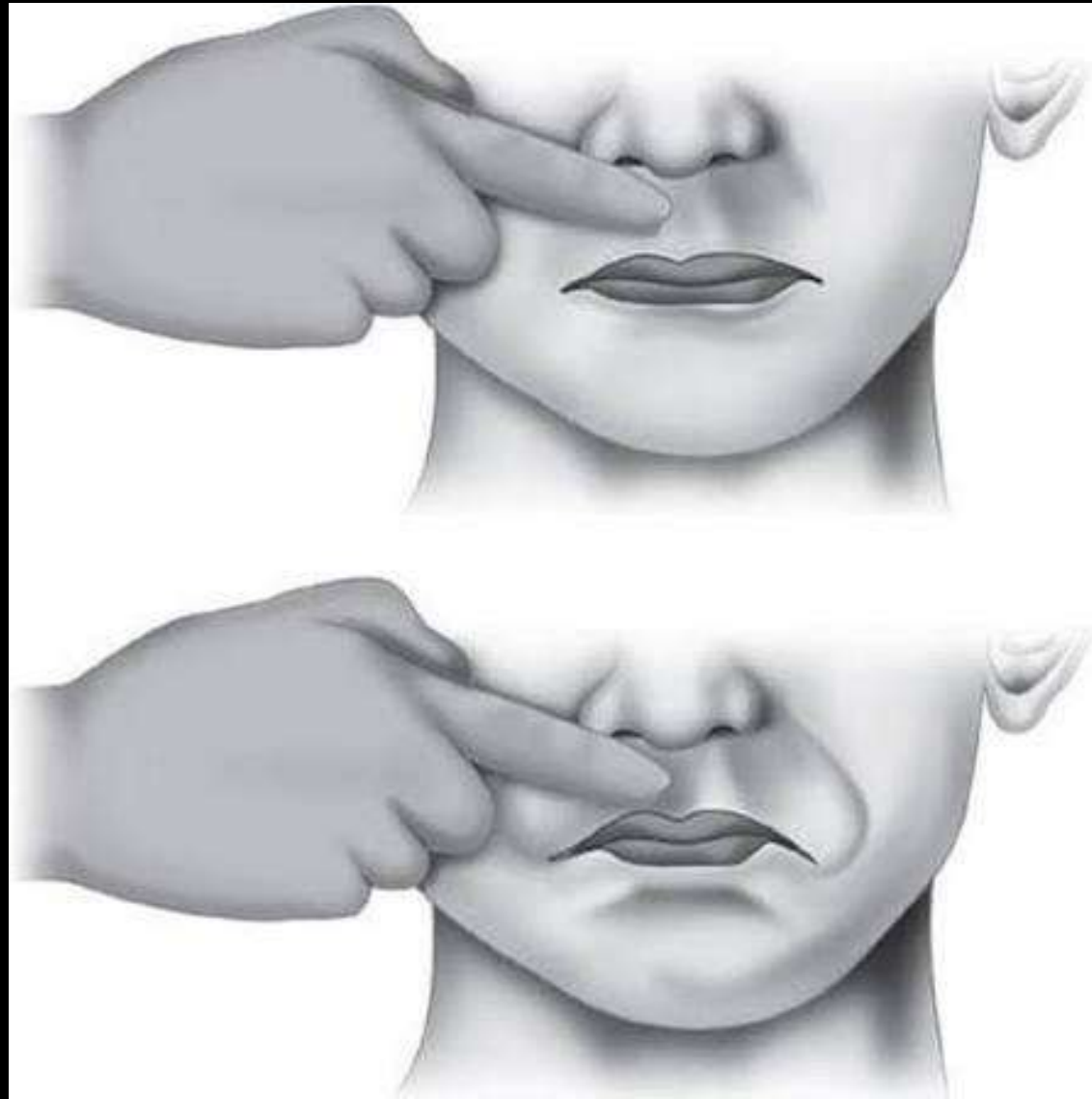


Sucking Reflex

Elicitation: Gently stroke or touch patient's lips with tongue depressor or cotton swab.

Pathological: Involuntary sucking, lip-smacking, or swallowing movements.

Diagnostic Value: Indicates diffuse cerebral atrophy, advanced dementia, or frontal lobe tumors.



GLABELLAR TAP & PALMOMENTAL

Glabellar Tap (Myerson's)

Elicitation: Tap repeatedly on glabella (between eyebrows) from behind patient's field of vision.

Normal: Blinking occurs initially, then completely habituates (stops) after 3-4 taps.

Pathological: Continuous blinking with every tap (Myerson's Sign).

Clinical Association: Pathognomonic for Parkinson's disease and extrapyramidal disorders.

Palmomental Reflex (PMR)

Elicitation: Stroke thenar eminence from thumb base toward wrist with a blunt tip.

Pathological: Involuntary twitch/contraction of ipsilateral mentalis muscle (chin wrinkles).

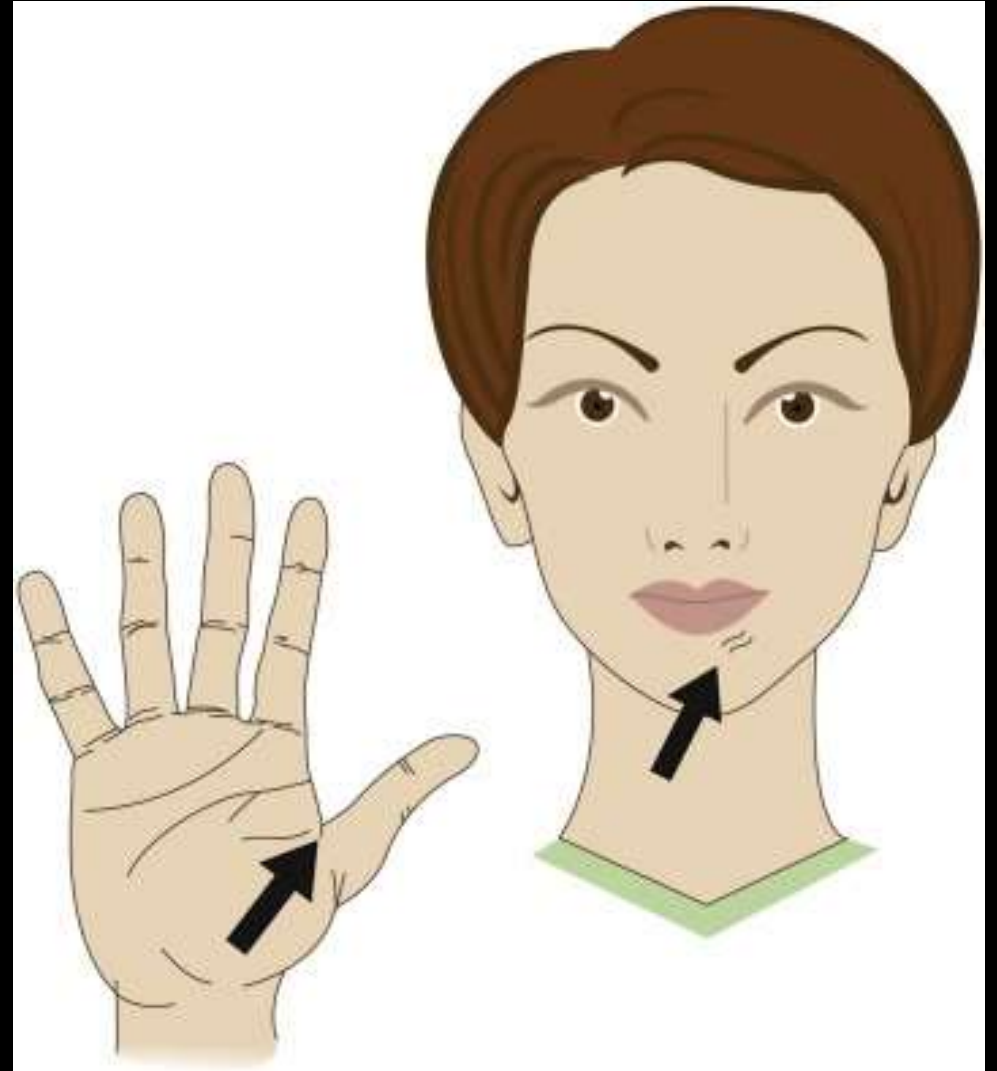
Significance: Polysynaptic path between hand and face released due to diffuse frontal lobe damage or senescence.

Glabellar reflex



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MASS REFLEX OF RIDDOCH

Elicitation & Loop

Protocol: Triggered in spinal cord injury patients by minor, non-noxious sensory stimulus below the injury (e.g., skin scratch, bladder overfilling).

Polysynaptic Hyper-Response: Afferent sensory streams cascade unchecked through the isolated spinal segments, causing a massive, uninhibited sympathetic and motor reflex outflow.

Catastrophic Response

Clinical Signs: Flexor muscle spasms of both legs, involuntary evacuation of bowel and bladder, profuse sweating, and severe hypertension.

Anatomy: Localizes to complete spinal cord transection above T6 segment.

Autonomic Dysreflexia: Strongly related; constitutes a true medical emergency.

THANK

YOU