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PRIMITIVE REFLEXES

Overview of reflexes, signs of retention,
testing procedures, tracking, exercises &
more



WHAT ARE PRIMITIVE REFLEXES

Primitive reflexes are the **starting point for brain development**. They appear in early infancy and within the first year of life. These reflexes are purposed for development and survival. Movements such as crawling, grasping, sucking, swallowing and rolling are activated by primitive reflexes.

Primitive reflexes happen from the brainstem level and begin to integrate after the first year of life as higher level brain areas take over. They are replaced by more mature postural reflexes that serve similar purposes such as balance and postural reflexes to help with coordination, balance and smooth movements.

WHAT ARE RETAINED PRIMITIVE REFLEXES?

Children should lose or 'integrate' primitive reflexes after the first year of life. Primitive reflexes are 'retained' when there is continual presentation of the reflexes after they should be integrated.

Licensed occupational therapists or physical therapists can test for primitive reflexes and/or individuals can be trained to see the reflexes during active movement.

WHAT CAUSES RETAINED PRIMITIVE REFLEXES?

Damage or interruption to higher level brain pathways or the central nervous system may cause retained primitive reflexes. If there is damage or delay to higher centers of the brain it throws the individual into primitive reflex patterns.

Issues in utero, maternal stress, birthing complications, cesarean section, limited movement, developmental delays as an infant, injury, illness, trauma, or stress may cause retained primitive reflexes.

These reflexes can present in adults following traumatic brain injury, high stress and central nervous system issues.

SIGNS & SYMPTOMS OF RETAINED PRIMITIVE REFLEXES

- Developmental delays, lack of coordination, poor balance, poor body and environmental awareness
- Issues reading, sensory integration difficulties, fine motor issues, anxiety
- ADHD, sleep difficulties, bed wetting
- Visual processing and attention difficulties
- Lack of impulse control
- Social and emotional issues

WHAT ARE THE PRIMITIVE REFLEXES?

Moro- The Startle Reflex

The first fight or flight response that our bodies experience. This reflex presents as an infant's arms and neck extend in response to the feeling of falling. The infant will show a startle.

Rooting - The Feeding Reflex

This reflex is a newborn's way of finding a food source while breastfeeding or bottle feeding. When a baby's cheek is stroked he/she will automatically turn toward the stimulus in search of food.

Palmar - The Finger Flexion Reflex

Infants hand will grasp around object. This is an early grasp pattern reflex.

ATNR - Asymmetrical Tonic Neck Reflex

This reflex allows a baby to bring an object into view when looking to the side. This is an early hand eye coordination reflex and is shown when a babies is laying on their back and their head is turned to the side, the hand behind the head will be bent and the hand in front will be extended.

Spinal Galant - The Wiggle Reflex

This reflex helps a baby move through the birthing canal safely and is shown when the back is stroked along the spine eliciting a curving in the back toward the side stroked.

TLR - Tonic Labyrinthine Reflex

This reflex allows for head management, resisting gravity and prepares the infant for gross motor movements such as rolling, creeping, crawling, etc. This is shown when the baby is laying on the stomach, the neck will extend and when laying on the back the neck flexes, the arms and legs will also flex.

STNR - Symmetrical Tonic Neck Reflex

- Sometimes known as the crawling reflex, this helps an infant divide the body into top and bottom to help an infant with crawling and body awareness. When a baby's head flexes (their chin toward their chest), the legs straighten and the arms bend. When a baby's head extends (away from their chest), their legs bend and their arms straighten.

ASYMMETRICAL TONIC NECK REFLEX

Purpose: Early hand eye coordination

Integrated: 6 months

Test:

Active

Place patient in supine with arms out to the side, in quadruped or in standing with arms flexed to shoulder height + palms facing the floor,

Engage patient in visual tracking to left and right to encourage head rotation
hold at each side for 15 seconds

Passive

Place patient in quadruped, passively rotate left and right,
watch for arm bending

Positive sign: Patients arm will bend opposite to the direction the head is facing (see picture below)

Treat: Fatigue reflex with continual L to R visual tracking while blocking arm movement, crawling, cross crawling, lizard exercise

Signs & symptoms of retention: Poor eye-hand coordination, difficulty with handwriting, trouble crossing midline, poor visual tracking, inability to cross eyes, poor balance, right-left confusion, difficulty skipping/marching.



ASYMMETRICAL TONIC NECK REFLEX EXERCISES

Asymmetrical Tonic Neck Exercises

Lizard

Have the child lay on their stomach with arms and legs straight and the head to one side. Bend the arms and legs on the same side the face is turned (like creeping but flat on stomach).

Turn the head to the other side, then move the arm, then the leg back to the starting position and wait 5 seconds before repeating the arm and leg flexion and abduction on the other side of the body. This is considered one cycle. Complete 3 full cycles with the goal to relax the body as much as possible

ATNR Exercise Complete slow and controlled



1. Lie on stomach with head turned to left



2. Bring left leg and left arm up



3. Turn head to the right. *Keep left arm and leg up



4. Bring left arm and left leg down.



5. Bring right leg and right arm up



6. Turn head to left. *Keep left arm and left up

ASYMMETRICAL TONIC NECK REFLEX EXERCISES

Asymmetrical Tonic Neck Exercises

- Tummy Reaching:
 - Place child in prone and have him/her reach in various planes for motivating toy
- Zombie March:
 - Child should be in standing position with shoulders flexed to 90° and wrists floppy.
 - Support child at the wrists and have him/her turn head to the right.
 - March in place 20 times maintaining straight arms.
 - Repeat on left side.
 - Arms are focused on remaining straight while head is turning
- One-handed Wall Push Ups:
 - With right hand on wall, turn the rest of the body to face parallel to the wall.
 - Place left hand on hip and complete 10 wall push ups.
 - Turn around and repeat on the other side.
- The Robot (10 reps):
 - Lie on stomach with head turned to the right. Arms by sides and legs extended.
 - Bring right arm and leg up to an “L” shape. Turn head to the left.
 - Bring right arm and leg down.
 - Bring left arm and leg up to an “L” shape. Turn head to the right.
 - Bring left arm and leg down.
 - Similar to lizard
- Crawling with item
 - Have child in quadruped
 - Have child look to one side (chin to shoulder)
 - Place item (toy, ball, towel) between chin and shoulder to hold
 - Crawl forward
 - Repeat on each side
 - Arm is forced to extend though head is turned

SYMMETRICAL TONIC NECK REFLEX

Purpose: Helps with crawling

Integrated: 9-11 months after crawling phase to begin walking

Test:

Active

Place patient in quadruped

Engage patient in visual tracking vertically to encourage head/neck flexion and extension

Hold at each end range for 15 seconds

Passive

Place patient in quadruped, passively flex and extend the neck, watch for arm bending

Positive sign: Patients arms will flex with neck flexion and extend with neck extension, may see opposite movement in lower extremities (flexion with neck extended and extension with neck flexion). Weight may shift back and forth, arms may bend or sway back during movement.

Treat: Fatigue reflex with continual visual tracking vertically while blocking body movements (pt in supine), isolate eye movement without allow body movements, exercises- cross crawling

Signs & symptoms of retention: Poor sitting posture, poor muscle tone, poor eye-hand coordination, inability to sit still/concentrate, toe walking, messy eater, inability to cross eyes, visual tracking difficulty.



SYMMETRICAL TONIC NECK REFLEX EXERCISES

Exercises for integration:

- **Bunny Hop**

- Have child squat from standing position and place both hands on the floor between his/her knees.
- Reach forward with hands and place on floor.
- Coordinate small bunny hop to bring feet to hands. Maintain knees pointing outward.
- Repeat 10 times.

- **Cross Pattern Crawling**

- Begin in tabletop position.
- Have child propel forward using opposing hand and knee (left hand/right knee, right hand/left knee).
- Slightly turn head to visually attend to each hand as it takes the lead.
- Repeat 10 times.

- **The Stretching Cat**

- Begin in tabletop position.
- Sit back on the heels.
- Touch forehead to mat and stretch arms out in front. Hold for 5 seconds.
- Return to tabletop position. Inhale and pause for a few seconds.
- Repeat 10 times.



**Symmetrical Tonic Neck Reflex
(STNR) Exercise**

Cat/Cow

MORO REFLEX

Purpose: Primitive fight or flight

Integrated: 2-4 months

Test:

Active/Passive

Place patient in standing, sitting supported (by tester) or supine with head resting in testers hands

Elicit neck flexion >30 degrees by dropping patient back or visual tracking strategies

Positive sign: Shoulder abduction; elbow, wrist, & finger extension; immediate flexion of extremities.

Additional testing positions and positive signs

Pigeon toe walking forward & backwards- will see awkward arm position and arms raising up as walking forward = retained reflex

Cross over test- standing cross legs, bring arms up, then down to touch toes... if patient falls over or loses balance= retained reflex

Treat: Increase eye tracking activities, complete eye tracking while doing tongue movements, complete activities where patient is looking down and lifting arms up, reflex specific exercises

Signs & symptoms of retention: Hypersensitivity, hyper-reactivity, poor impulse control, sensory overload, social/emotional immaturity, decreased eye contact, car sickness, poor stamina/balance/coordination, anxiety, mood swings.



MORO REFLEX EXERCISES

Starfish

- This can be done lying on the back on the floor or seated in a chair. The child should have the arms and legs spread out in a loose, relaxed position with the head slightly extended. The arms and legs move or should be moved all together towards each other into a fetal position with arms and legs drawn into the chest.
- Move the head so the chin touches the chest. Hold the position for two seconds then slowly move the arms and legs back to the Starfish position. Remain in the Starfish for two seconds.
- The movement should be continuous and relaxed. In the crunched position the **left leg and left arm cross over the right leg and right arm**, when the movement is repeated, cross the right leg and right arm over the left leg and arm. This completes one repetition.
- It is very important to move the head and neck all at the same time. If the child has difficulty remembering which arm and leg to cross over, it may be helpful to place a visual cue, such as a sticker on their left arm and leg (then move it to right arm and leg) as needed. Also try tapping their arm and leg to give them a tactile cue for each repetition.

Moro: Starfish Exercise

1. Lay flat on back with arms and legs open like a starfish



2. Crunch up into a ball crossing left arm over right arm & left leg over right leg at the same time. Tuck chin & hold.



3. Release crunch back into start position.



4. Crunch up into a ball crossing right arm over left arm & right leg over left leg. Tuck chin & hold. Complete crossing arms & legs at the same time.

PALMAR REFLEX

Purpose: Grasp patterns

Integrated: 5-6 months

Test:

Active

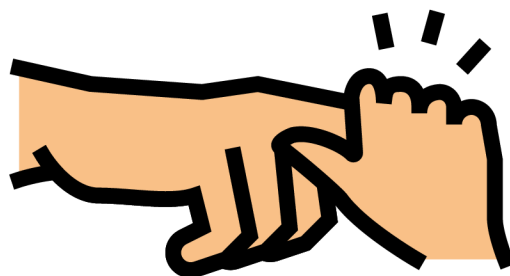
For infant, place your finger in the palm of their hand approaching from the small finger/ulnar side

For older individual, stroke the palm of the hand from small finger to thumb

Positive sign: Finger movements after palm stimulation; thumbs, fingers or elbow may flex

Treat: Increase sensory stimulation and play to the palms (various textures, vibration, cold/warm), exercises

Signs & symptoms of retention: Poor handwriting, poor manual dexterity, lack of pincer grip, speech and articulation issues, hypersensitive palm, mouth movements when writing or drawing.



PALMAR REFLEX EXERCISES

Exercises for integration:

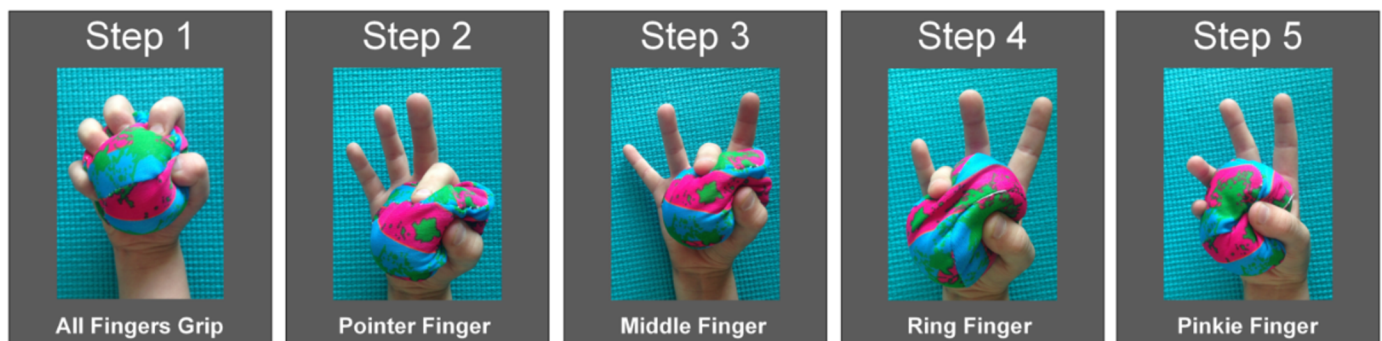
Ball Squeeze - Full Hand

Use entire hand to squeeze foam ball or stress ball 30 times.
Complete exercises with both hands.
Could also use putty or Play-Doh.

Ball Squeeze - Individual Fingers

Squeeze ball with the thumb and each individual finger, one at a time.
Start with index finger and work to pinky.
Repeat on pinky and complete squeezes in reverse order.
Complete exercises on both hands, 30 times.

Palmer Reflex Exercise



SPINAL GALANT REFLEX

Purpose: Navigating birth canal, hip movement, crawling and walking

Integrated: 3-9 months

Test:

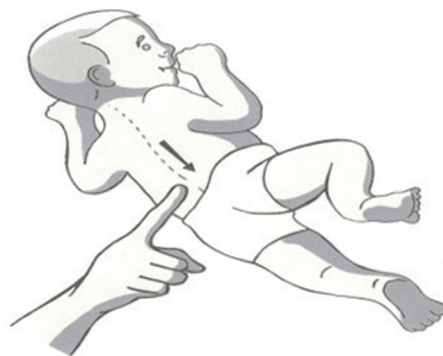
Active

Place patient in prone or quadruped, stroke alongside spine

Positive sign: Curving of the back towards the side that was stroked

Treat: Rolling, increase stimulation on back (brushing protocol/rubbing), exercises (snow angels), tight shirts/rash guards,

Signs & symptoms of retention: Postural issues, fidgeting and trouble sitting still, bedwetting and bladder control, poor concentration/attention, poor short term memory, poor organization, hypersensitivity, auditory processing difficulties, trouble reading.



SPINAL GALANT EXERCISES

Exercises for integration:

Snow ('slow') Angels

1. Have the child lay on their back with both feet together, legs straight, and arms down to the sides of the body. **Very slowly** move the arms and legs out like a jumping jack or making a snow angel, keeping legs and arms on the floor, making contact with the mat or surface they are laying on. The hands should touch as the legs reach their widest point then **slowly** return to the starting position. Each angel in the snow should last at least 20 seconds. **Do three angels to complete the exercise.**
2. This exercise is best done without a shirt on so that the back is in contact with the floor/surface

Heel Taps

1. Have child lay on their back, place stickers on each foot (optional)
2. Have child reach and tap each heel making sure the back stays in contact with the floor



TONIC LABRYNTHINE REFLEX

Purpose: Upright posture, position in space, related to head and neck position, balance, linked to vestibular system

Integrated: 4 months

Test:

Active

Infants:

Place patient prone and see extension of head, neck and extremities

place patient in supine and see flexion of head, neck, and extremities

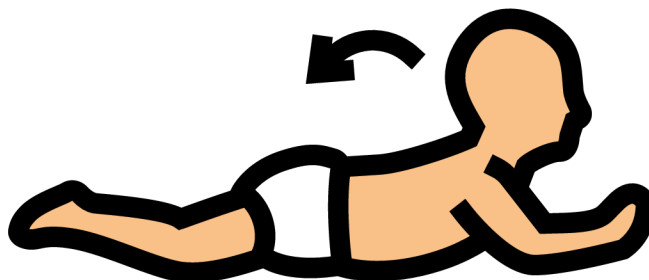
Older individuals:

Have patient in prone position and attempt to lift arms & legs off the floor
Have the patient stand with feet together, hands at sides, and eyes closed. Tilt head toward the ceiling, then toward the floor and hold for 10 seconds each.

Positive sign: In supine demonstrates increased flexor tone, prone demonstrates increased extensor tone, child in superman position will not be able to keep legs extended, if standing patient may lose balance or demonstrate increased tone

Treat: Tummy time, crunches, fatigue reflex and combine sensory experiences, visual tracking, numb flexor tone in supine,

Signs & symptoms of retention: Poor posture and balance, weakness, diminished spatial awareness, poor sequencing and sense of time, inability to cross eyes.



TONIC LABRYNTHINE EXERCISES

Exercises for integration:

Meatball/Knee to chin exercises

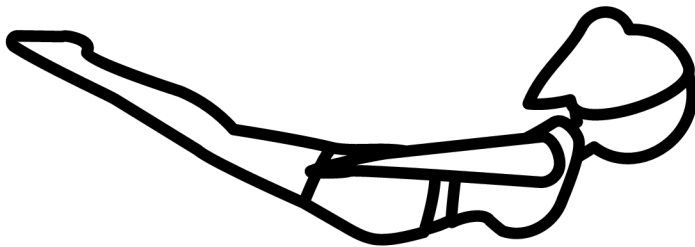
1. Lay the child on their back with knees bent, feet flat on floor. Cross arms and legs (no particular order). Have the child bring head to knees (feet off the floor) and hold for 5 seconds. Then drop head back into extension; toward to floor but continue to hold knees up and bent. This exercise stimulates the inner ear.

Complete 2 sets.

Superman

Have the child lay on their stomach with arms above head. Lift arms and legs off mat and “fly for 15 seconds. **Complete 2 sets.** May also add thumb tracking during activity if instructed by your therapist.

Make sure the child has straight arms & legs.



CENTRAL NERVOUS SYSTEM

Before testing and treating each individual reflex it is important to note that primitive reflexes are integrated most effectively when central nervous system is primed and ready. This can be done using neuro-plasticity and CNS treatment strategies. The following are tips and strategies that are imperative to know for primitive reflex integration.

The central nervous system takes in information and learns through sensation. Sensation and sensory stimulation must be done with primitive reflex integration to help increase/decrease muscle tone, connect the brain to body and target multiple areas of the brain.

Sensory/tactile stimulation can be completed through rubbing, brushing, or vibration. Starting at the head work top to bottom and provide tactile input to each upper limb, trunk and lower limbs/feet. Refer to brushing protocol for order.

A neuroplasticity order for primitive reflex integration is

- Visual tracking
- Sensory/tactile stimulation
- Exercises/movements

PRIMITIVE REFLEXES ARE BEST ELICITED WHEN TESTING ACTIVELY. THOUGH THEY CAN BE ELICITED PASSIVELY, BEST PRACTICE TESTING IS ACTIVE TESTING.

CENTRAL NERVOUS SYSTEM

Including various early childhood developmental movements and positions to assist with primitive reflex integration. Incorporate movements such as rocking, rolling, swinging, tummy time, quadruped, and crawling etc. Pair moments with other sensory experiences for increased neuro-rewiring.

Visual activities (tracking) is a primary way the brain integrates reflexes. The visual system connects to 80% of the CNS. Always incorporate visual tracking when doing primitive reflex integration.

Pair sensory strategies/systems to hit activate multiple areas of the brain for rewiring

- Visual tracking + sound
- Smell + vision
- Vestibular + hearing/auditory input

Children with low tone may not shown strong primitive reflex presentation. Test actively and feel for muscular contractions and treat as if PR are present.

ADDITIONAL REFLEXES AND STRATEGIES

There are many more reflexes than the ones presented in this resource. The following may be helpful.

Plantar reflex:

Toe walking may be indicative of plantar grasp activation

Test- stimulate bottom of the foot, under metatarsals

Positive sign- toes will flex and extend

Treatment- sensory stimulation to the bottom of the foot often

Palmar Mandibular Reflex:

Mouth movements with fine motor tasks

Test- engage in fine motor task such as cutting or
apply pressure to both of the palms of the hands

Positive sign- mouth will open/close, head may extend
& tongue may protrude

Treatment- increase sensory experiences to hands,
work with head & neck extension during fine motor tasks

Rooting Reflex:

The feeding reflex; helps infant find source of food

Test- stroke side of cheek

Positive sign- head turns toward side stroked, mouth opens

Treatment- increase sensory stimulation to face, mouth, jaw
include vibration, cold, tactile and massage

TEST & TRACK

NAME:	DATE TESTED:	
Reflex	Retained	Exercises
ATNR		
STNR		
MORO		
PALMAR		
SPINAL GALANT		
TLR		

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