Neurological examination in pediatrics

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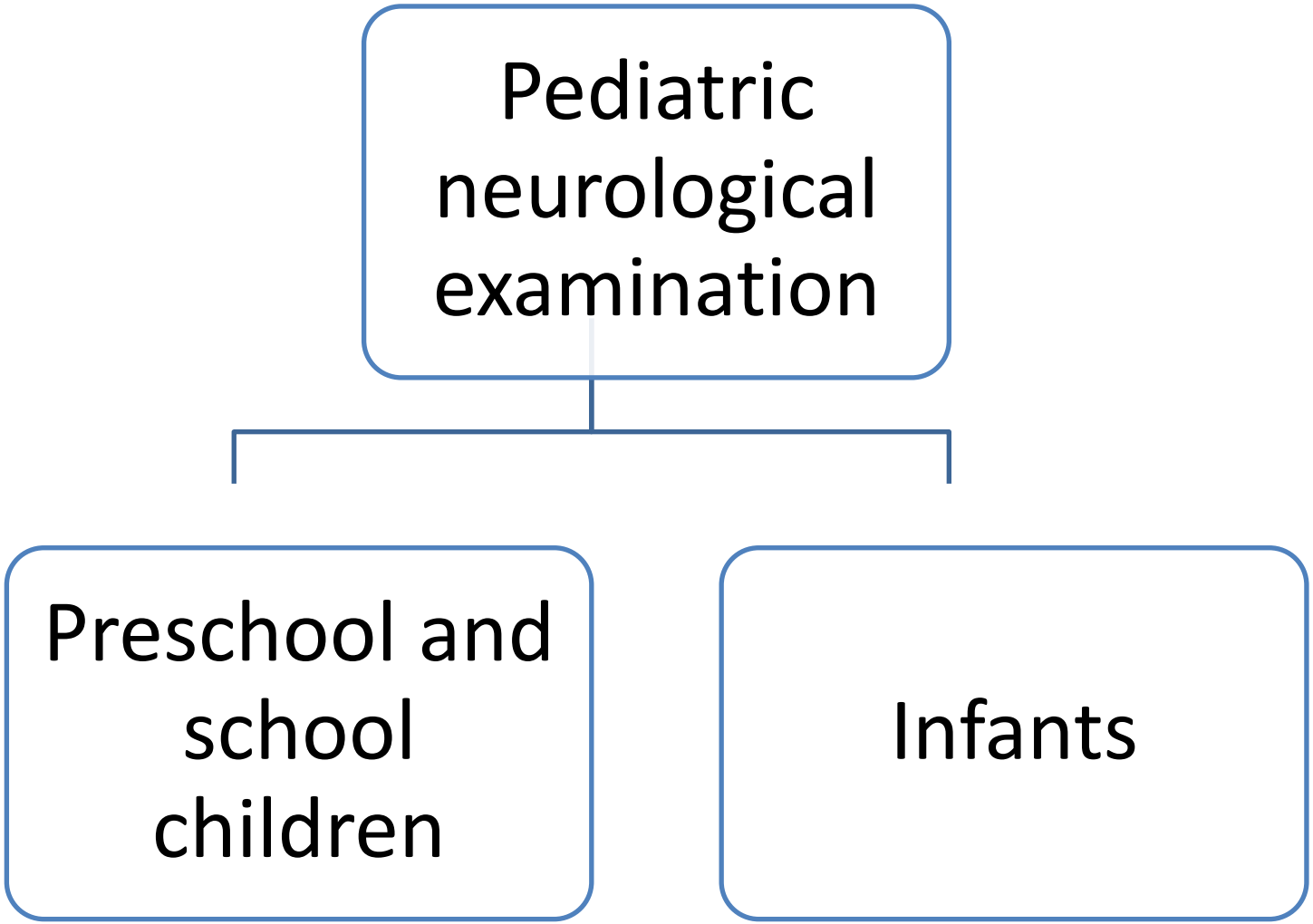
Medical history

1) Family history (metabolic and genetic neurological diseases, alcoholism)
2) The course of pregnancy and delivery (normal or complicated delivery, child's condition after delivery)
3) Development milestones


Pediatric neurological examination
Preschool and school children
Infants

Neurological examination of preschool and school children

Level of consciousness

Alertness	NORMAL- the patient opens his eyes, looks at you, responds fully and appropriately to stimuli.
Lethargy	The patient appears drowsy but opens his eyes and looks at you, responds to questions and then falls asleep.
Obtundation	The patient opens his eyes and looks at you, but responds slowly and is somewhat confused. Alertness and interest in environment are decreased.
Stupor	The patient arouses from sleep only after painful stimuli. Verbal responses are slow or absent. The patient lapses into an unresponsive state when the stimulus ceases. There is minimal awareness of self or the environment.
Coma	The patient remains unarousable with eyes closed. There is no evident response to inner need or external stimuli.

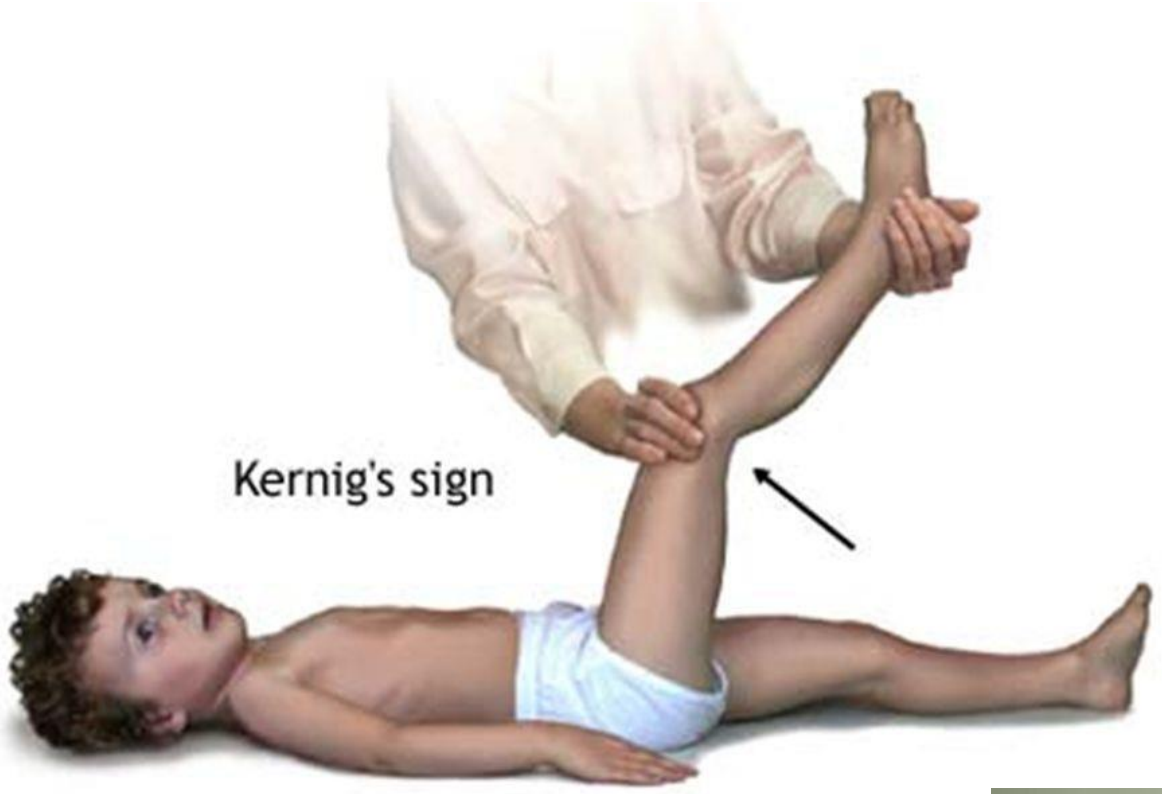
Pediatric Glasgow Coma Scale

		>1 year	<1 year	
Eye opening	4	Spontaneously	Spontaneously	
	3	To verbal command	To shout	
	2	To pain	To pain	
	1	No response	No response	
Best motor response	6	Obeys	Spontaneous movements	
	5	Localizes pain	Localizes pain	
	4	Flexion-withdrawal	Flexion-withdrawal	
	3	Abnormal flexion	Abnormal flexion	
	2	Abnormal extension	Abnormal extension	
	1	No response	No response	
		>5 years	**2–5 years**	**0–23 months**
Best verbal response	5	Oriented and converses	Appropriate words and phrases	Coos and smiles appropriately
	4	Disoriented and converses	Inappropriate words	Cries
	3	Inappropriate words	Cries and/or screams	Inappropriate crying and/or screaming
	2	Incomprehensible sounds	Grunts	Grunts
	1	No response	No response	No response

Meningeal sign

- Headache, photophobia, nausea, vomiting
- Neck stiffness (nuchal rigidity)

  *opistotonus
- Flatau sign
- Brudziński's sign (upper and lower)
- Kernig's sign
- Amos's sign


Kernig's sign

Muscle strength assessment

How to perform the assessment?

1. Active movements against examinator resistance
2. Active movements against gravity

What to assess?

- Impaired strength = weakness= paresis

  vs.

  Absence of strength= paralysis= plegia

- Progressive muscle weakness

- Muscle weakness in one part of the body

  vs.

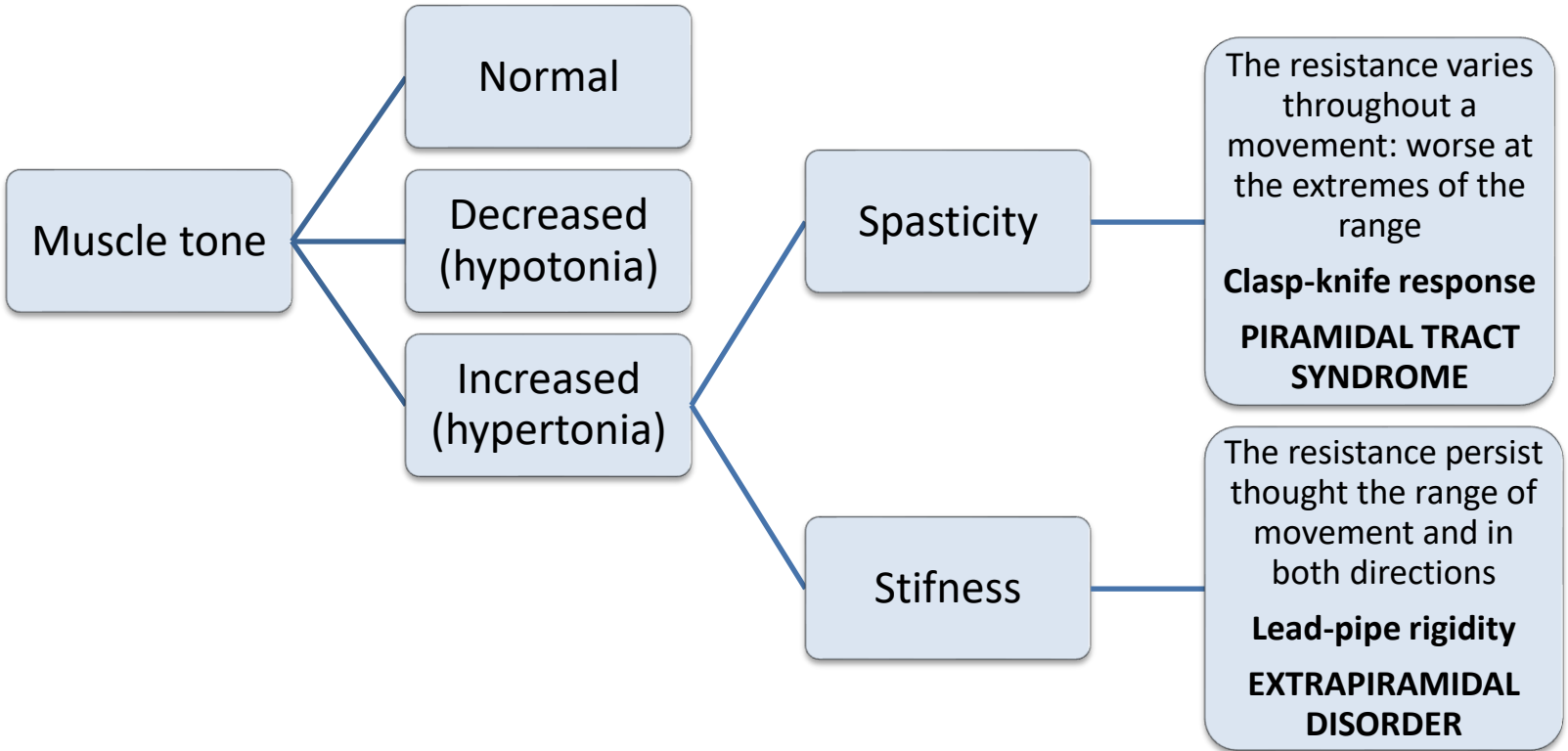
  generalized muscle weakness

Muscle tone assessment

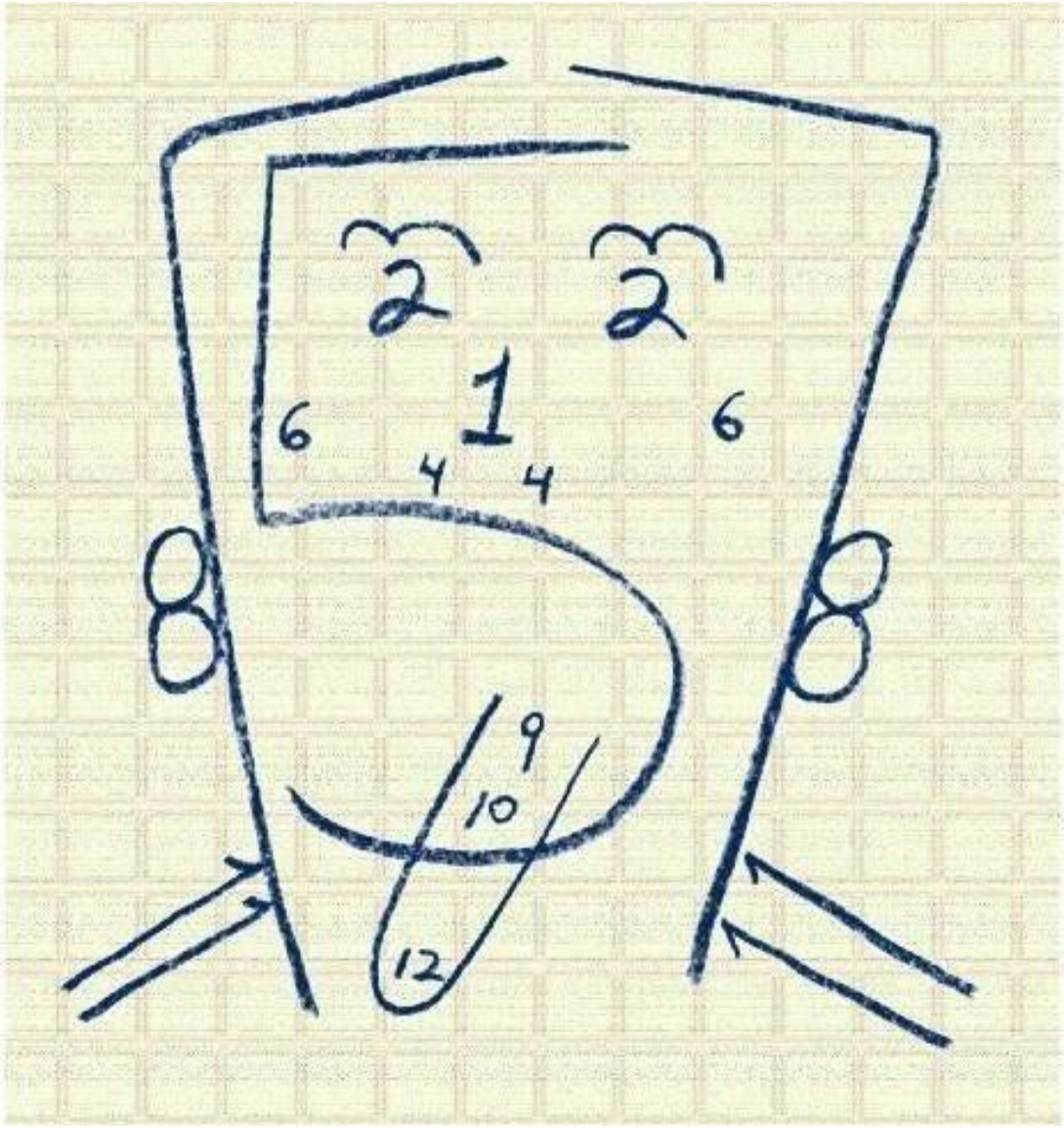
How to perform the assessment?

1. Feeling the muscle's resistance to passive stretch.

What to assess?



Cranial nerves examination



Cranial nerves examination

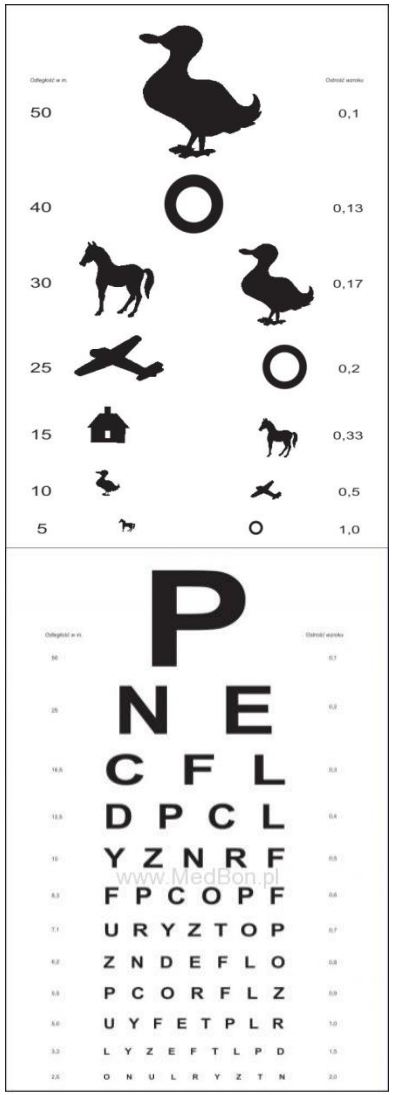
I. Olfactory

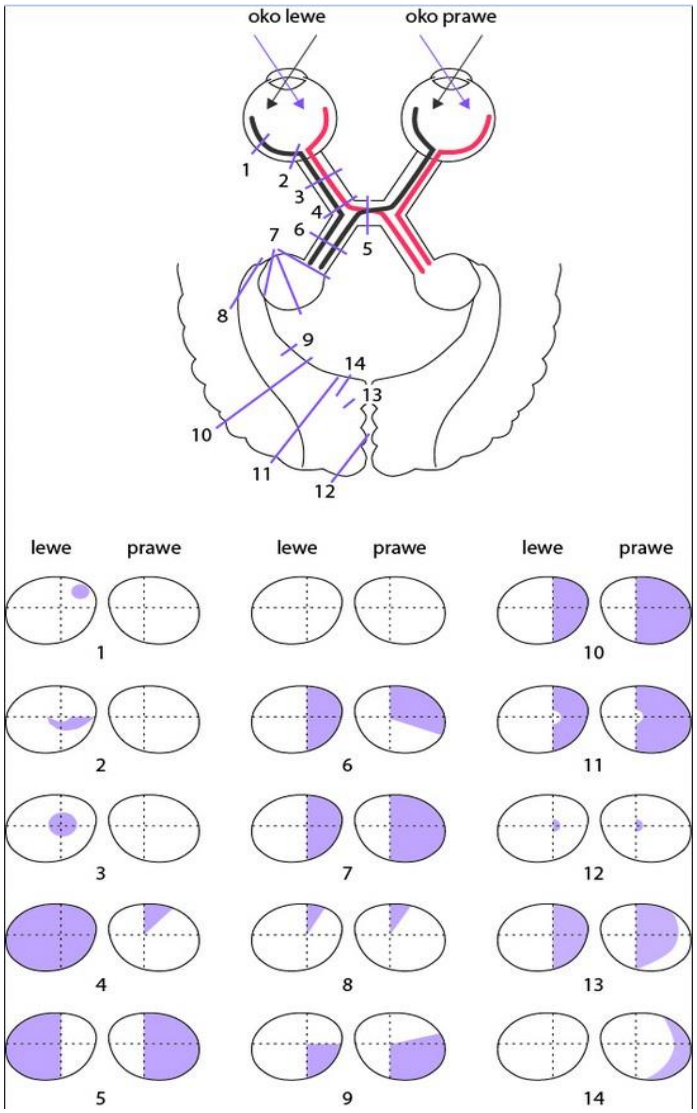
II. Optic

-visual acuity

-visual fields

-opthalmoscopic examination





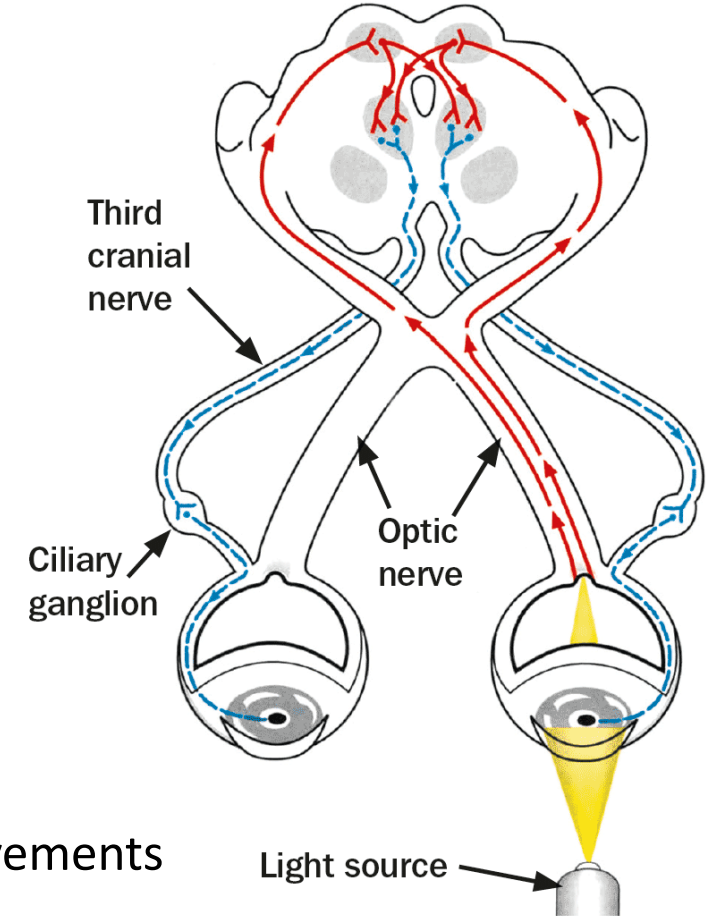
Cranial nerves examination

III. Oculomotor

- size, shape, symmetry of the pupils
- pupillary reaction to light (direct and consensual)
- near reaction
- convergence reaction

IV. Trochlear

VI. Abducens



- Extraocular movements
- Nystagmus
- Stabismus (Hirschberg's test, Cover test)

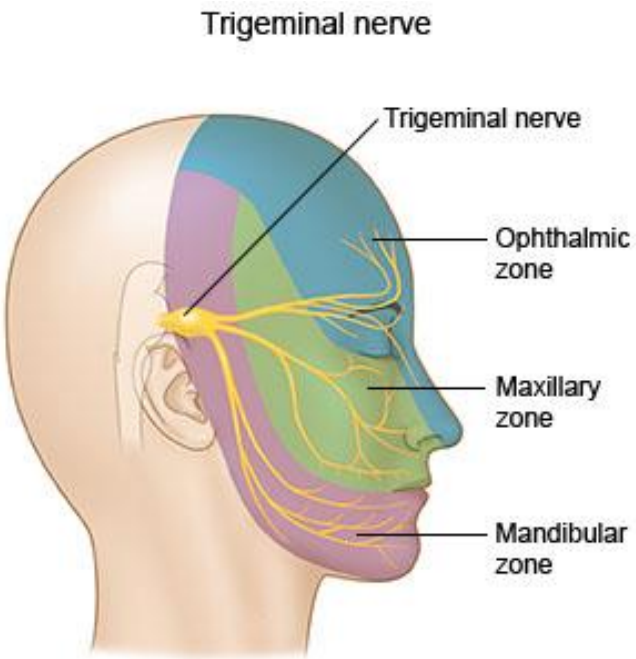
Cranial nerves examination

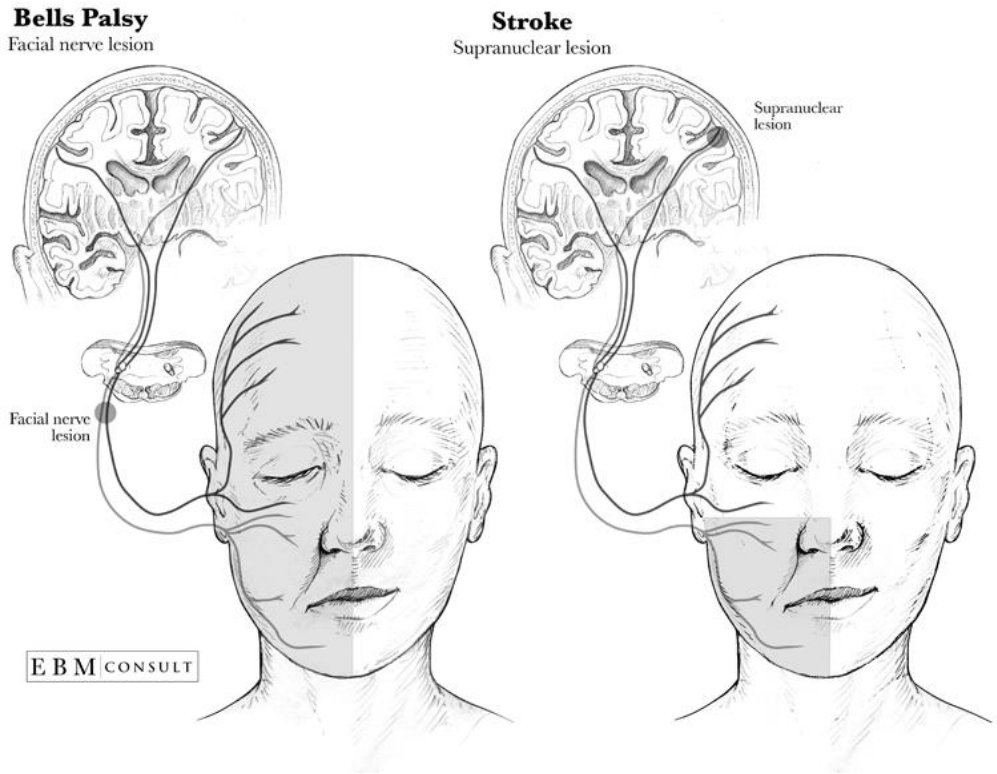
V. Trigeminal

- Motor function
- Sensory function

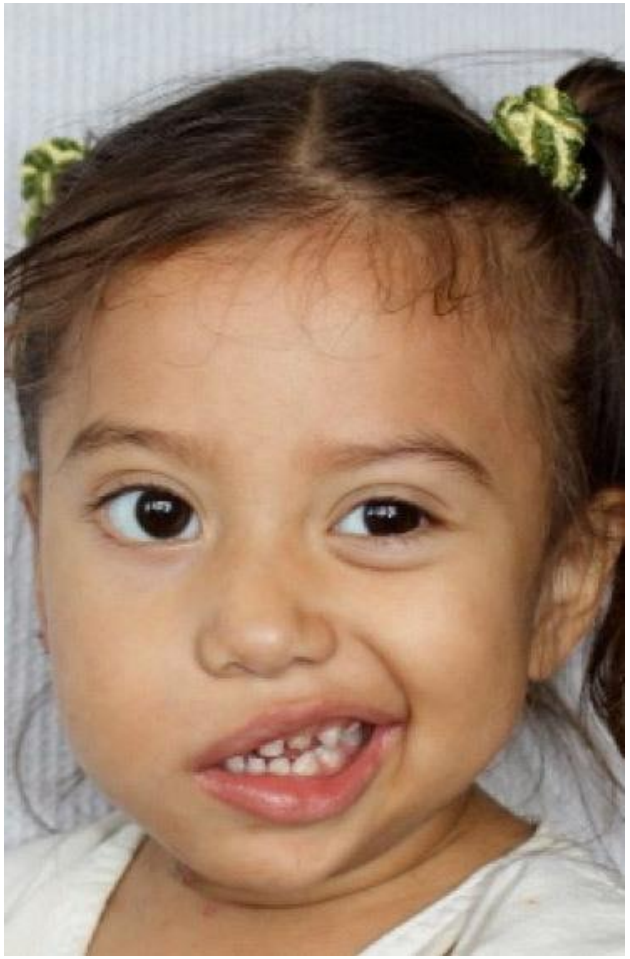
VII. Facial

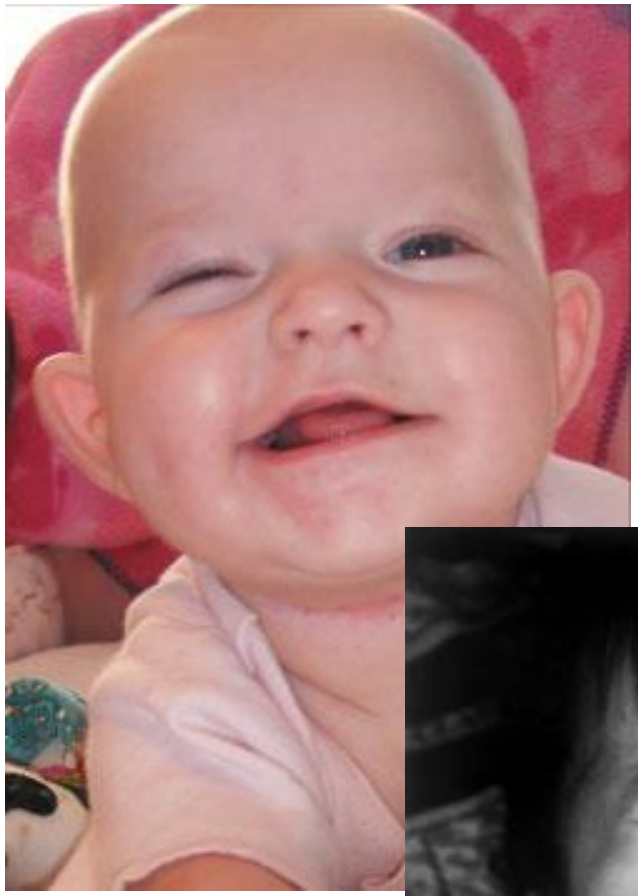
- Face symmetry, mimic movements
- Peripheral/ central injury





Cranial nerves examination





Cranial nerves examination

VIII. Vestibulocochlear

- Cochlear nerve- hearing function (normal- volume voice from 6m, a whisper from 3 m)
- Vestibular nerve- balance, the sensation of dizziness and spinning, nystagmus.

IX. Glossopharyngeal

- Symmetry and movements of the soft palate and the pharynx
- The sense of taste in the back 1/3 of tongue

X. Vagus

- Hoarse voice (unilateral injury)
- Aphonia (bilateral injury)

XI. Spinal Accessory

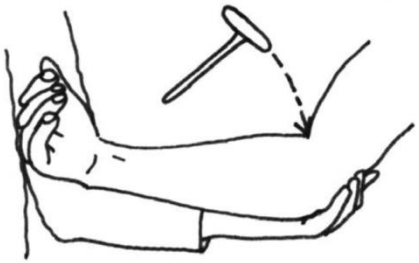
- Strength and tension of the sternoclavicular-mammary muscle, upper trapezius, shoulder blade position (lower on a side of paralysis)

XII. Hypoglossal

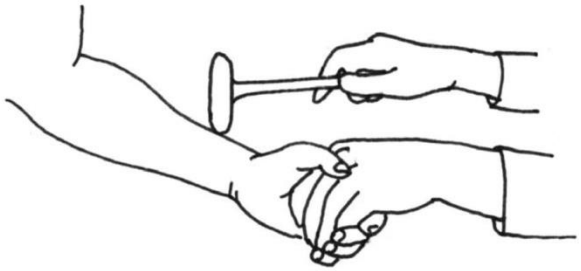
- Symmetry and movement of the tongue

Physiological reflexes

- Superficial
  - Abdominal reflexes (Th8- Th1
  - The plantar response(> 2 r ż)



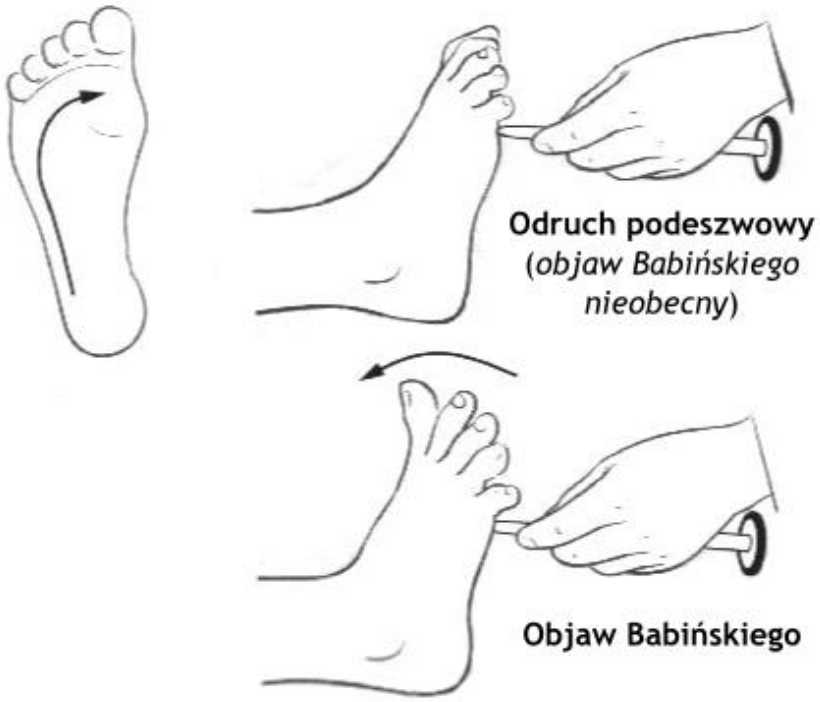
- Deep Tendon Reflexes
  - The Biceps Reflex (C5-C6)
  - The Triceps Reflex (C6-C7)
  - The Brachio- radialis Reflex (C6-C7)
  - The Knee Reflex (L2-L4)
  - The Ankle Reflex (S1-S2)



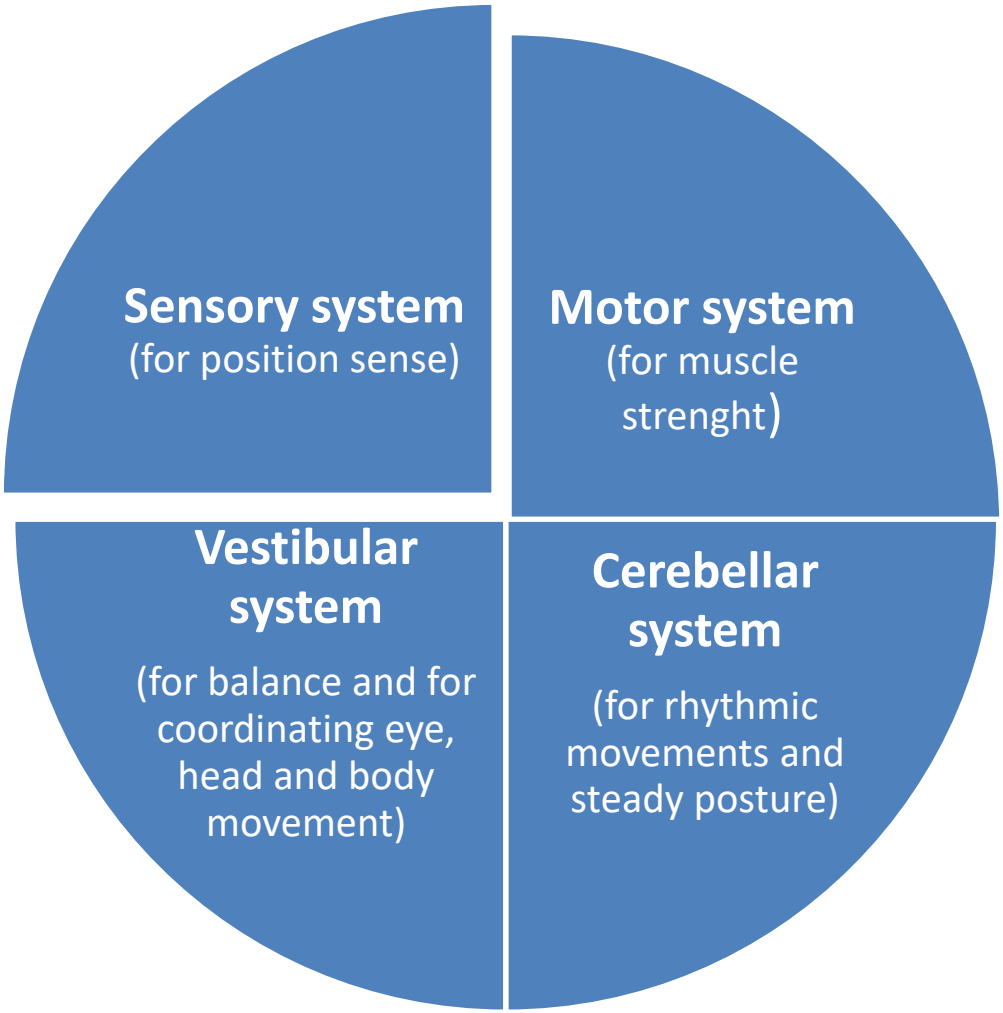
*Jendrassik's method

Pathological reflexes

- Babiński's sign
- Rossolimo's sign
- Oppenheim's sign



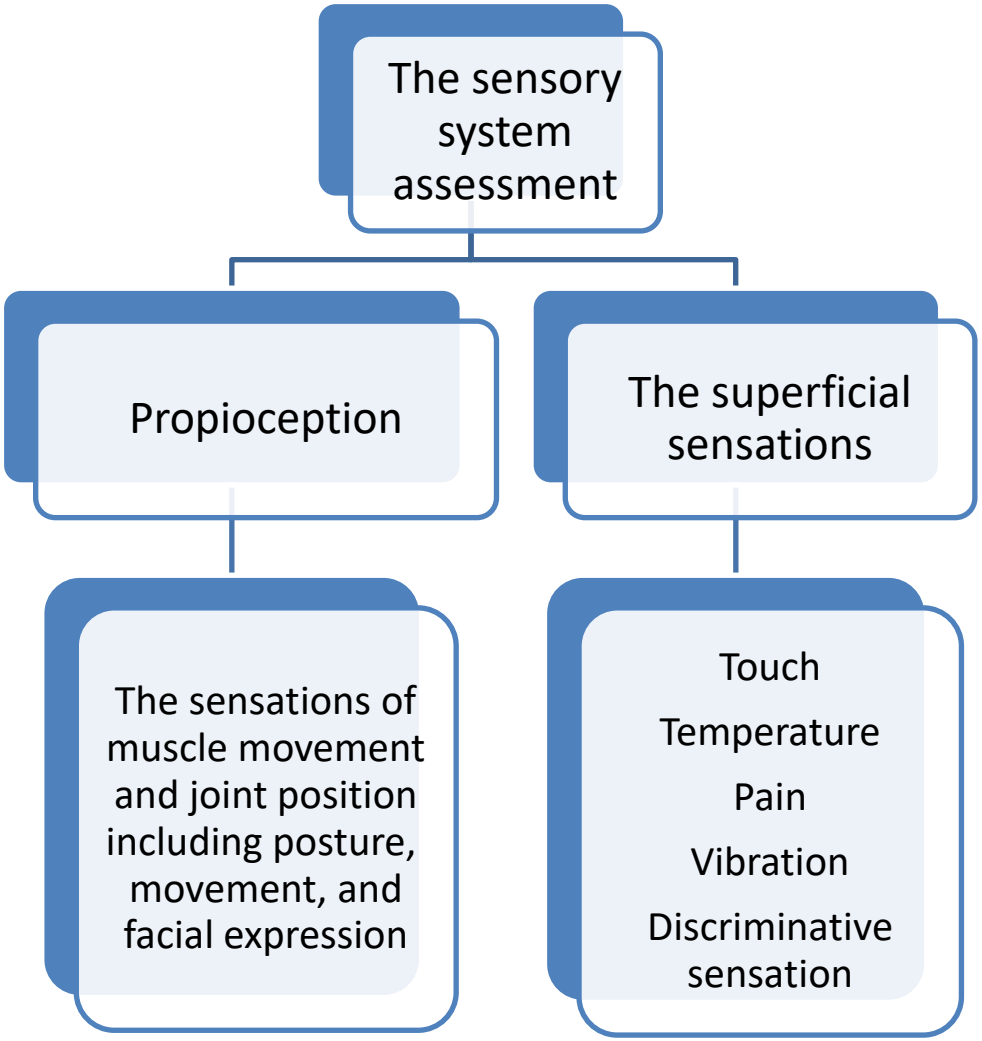
Coordination



Coordination

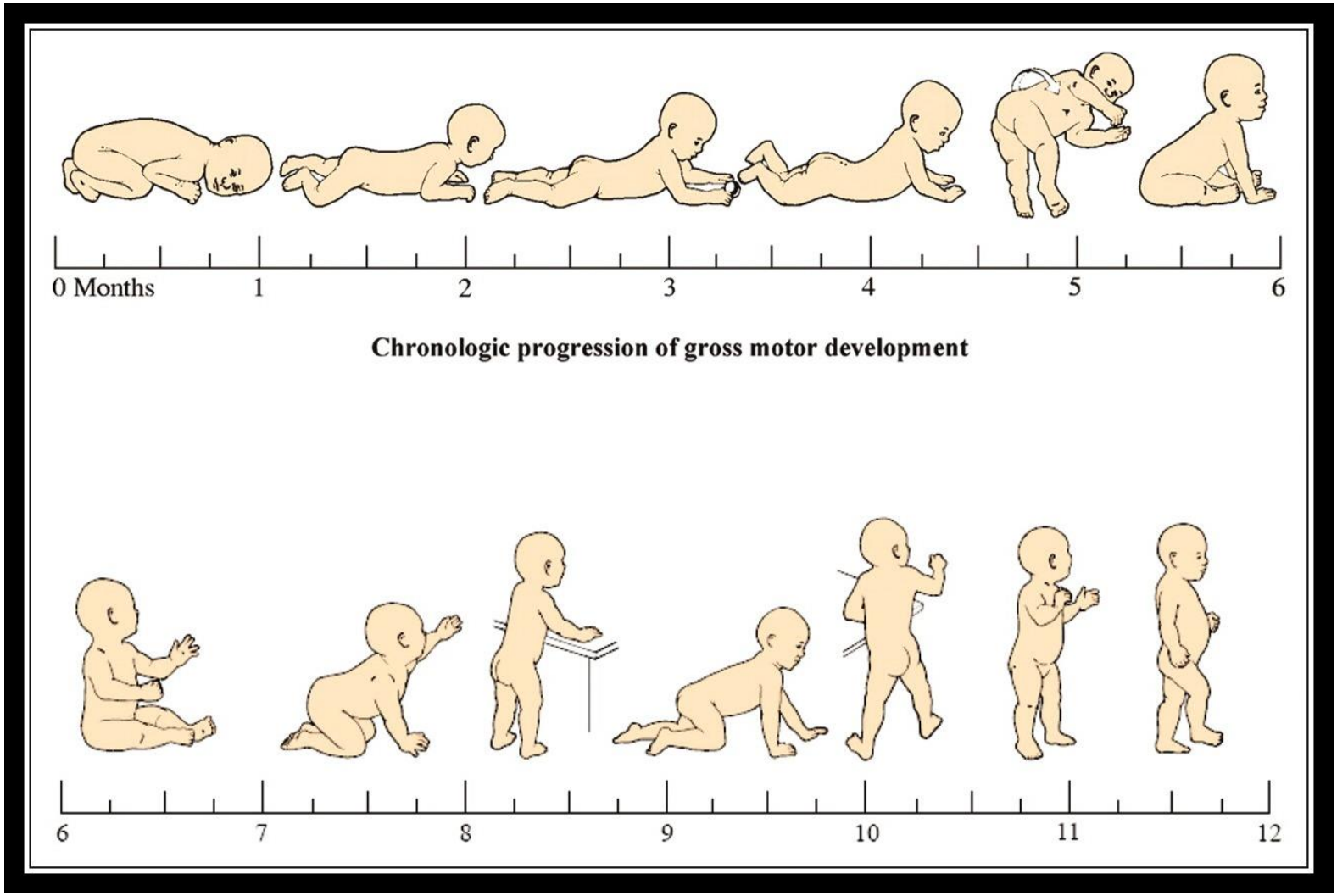
1. Rapid alternating movements (diadochokinesis)
2. Point- to- point movements (dismetria, intention tremor)
3. Gait (normal walk, heal-to-toe walk, walk on toes)
4. Romberg’s test

The Sensory System



Neurological examination of infants

DEVELOPMENT MILESTONES



Physical examination in 4 positions:

I. The baby lying on his back (supine position)

II. Vertical position

III. The baby lying on his stomach (prone position)

IV. Horizontal suspension

The examination of the baby lying on his back (supine position)

A baby’s position at rest

- Symmetry!
- Spontaneous motor activity
- Until 6 months of age flexor muscles predominance

A baby's position at rest

Signs of sever neurologic disease:

- Persistent extension of extremities
- Persistent asymmetry of posture
- Frog- leg position (hypotonia)
- Marked extension of head, neck and extermities (opistotonus)

Muscle tone assessment

I. Observe the baby's neutral position and spontaneous motor activity
II. Test the baby's resistance to passive movements
III. Move the baby's major joint through its range of motions, noting any spasticity of flaccidity

SYMMETRY!!!

Muscle strengh- Be creative ☺ ☺

Meningeal signs in newborns and infants

- Protuberance and excessive pulsation of the fontanelle
- Widening of the cranial sutures
- Opistotonus
- Excessive Irritation

Classic meningeal signs may not be present in infants!!!

Upper Brudziński's reflex may be present in heathly infant until 6th month of age

Cranial nerves

I. Olfactory- difficult to test

II.

- Up to 6th week of life: optic blink reflex (blinking in response to light)
- After 6th week of life: the baby regards your face, keeps the eye contact, responds to your facial expressions
- 2 months old baby follow the subject with his eyes

III. Papillary reflex

IV.

VI.

Extraocular movements:
From the 2nd month of life the baby is tracking an interesting subject or your face with his eyes.

Cranial nerves

V. The rooting and sucking reflexes. Look at the baby sucking a breast or a bottle.

VII. Observe baby crying and smiling, note symmetry of face and forehead.

VIII.

- Until 3 month old the child has acoustic blink reflex (od Moro reflex in response to acoustic stimuli)
- Since 4th month of life: tracking in response to sound.

IX. Observe coordination during swallowing. Palatal arches symmetry. Test for gag reflex.

XI. Observe symmetry of shoulders.

XII. Observe coordination of swallowing, sucking and tongue thrusting.

Primitive reflexes

Both failure to elicit expected primitive reflexes, their late persistence as well as re-emergence of the ones that have already vanished are indicators of central nervous system disease during infancy.

Primitive reflexes

- ☑ Palmar grasp reflex (Birth to 3- 4 months)
- ☑ Plantar grasp relfex (Birth to 10- 12 months)
- ☑ Rooting Reflex (Birth to 3- 4 months)
- ☑ Moro reflex (Birth to 6 motnhs)
- ☑ Asymmteric tonic neck reflex (Birth to 6 months)


LITTLE
MAN


B.Y.O.B.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Pyramidal reflexes

- Rossolimo's reflex– my be present in healthy baby until 6th month
- Babiński's reflex- may be present in healthy baby until 2 years ols

The examination of the baby in vertical position

Traction test

During the traction test:

- 1st month: the head slims backwards
- 4th month: the head follows the axis of the body
- > 5th month: the head is ahead of the trunk

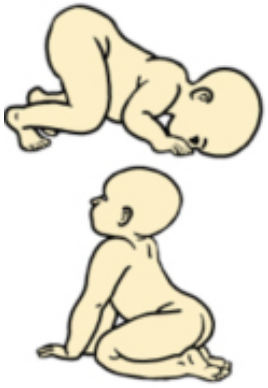
Primitive reflexes in vertical position

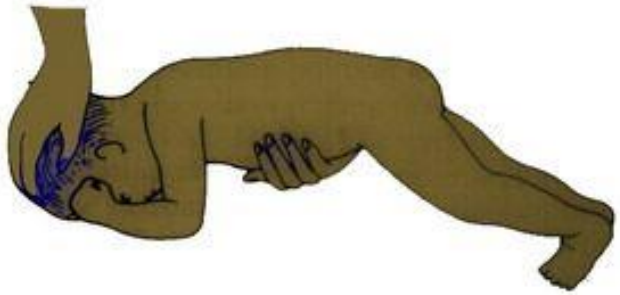
- ☑ Placing and Stepping Reflex (Birth to 4- 6 months)

The examination of the baby lying on his stomach (prone position)

Primitive reflexes in prone position

- ☑ Symmetrical tonic neck reflex (until 6 -9 months)
- ☑ Galant's reflex (until 6 months)
- ☑ Automatic crawling





The examination of a baby in horizontal suspension

Primitive reflexes in horizontal suspention

- ☑ The head position in horizontal suspension

< 2nd month: falls below the body axis

2nd- 4th month: in the body axis

> 4th month: above the body axis

- ☑ Landau reflex (until 6- 7 months)
- ☑ Parachute reflex (since 6th month)


Thank you!