**REFLEXES**

**The stretch reflex**

Physiological stretch reflex are present in a healthy individual.

The evocation of reflex: by tapping of neurological hammer on the respective tendon

The tapping: only one reasonably strong, painless, fast, accurate

The muscle groups, that are investigated: relaxed

The position and the grip: the best one position and one grip for the examination of all reflexes on the limb

Reinforcement maneuvers to improve the evoking:

* Placing the therapist's fingers on the tendon (stretching) and tapping on the fingers
* Jendrassik's maneuver - clinch the hands together and try to break away or the patient to clench their teeth or the isometric contraction on the opposite limb = on the basis of the phenomenon of irradiation
* A distraction: eg. calculation: from 100 gradually subtract 7
* Change positions: in lying supine the response is the lowest, in sitting or standing the excitability of the central nervous system increases and the responses are higher

Response:

**Normoreflexia** = the muscle contraction with an adequate motion

**Hyperreflexia** = increased response, muscle contraction with significantly large movement

 = response even with slight tapping of hammer

 = the reflex zone (area of inducing) is extended beyond the tendon

 = in central paresis, in disorders of the extrapyramidal system, in cerebellar lesions with pendulum movements

**Hyporeflexia** = the decreased response (only contraction happens but not to move), necessary sharper tap and reinforcement maneuver

**Areflexia** = no response
                 = in peripheral paresis

|  |  |
| --- | --- |
|  | **Rate the reflex with the following scale:** |
| 5+ | Sustained clonus |
| 4+ | Very brisk, hyperreflexive, with clonus |
| 3+ | Brisker or more reflexive than normally. |
| 2+ | Normal |
| 1+ | Low normal, diminished |
| 0.5+ | A reflex that is only elicited with reinforcement |
| 0 | No response |

Checking: the quality of response and a comparison of both sides

**The upper extremities stretch reflexes**

**Finger flexor reflex** (spinal segment C8)
The position: the forearm in supination, the fingers in semiflexion, therapist holds the patient's fingers from the the palmar side
The tapping: on the finger flexor tendons in the middle of the palm or on the therapist’s fingers
The response: gentle flexion of finger, when the response is inadequate, it is possible fingers flexion against the resistance of the therapist’s fingers

**Pronator teres reflex** (spinal segment C6-7)

The position: the elbow in semiflexion, the forearm in supination
The tapping: on the tendon m. pronator teres - on the process styloidus radii from the inside
Response: the forearm pronation

**Brachioradialis reflex** (spinal segment C6):

The position: the elbow in semiflexion, the forearm in middle position

The tapping: on the tendon m. brachioradialis on the distal radius
The response: dorsal flexion of the wrist
To enhance the response: therapist's finger on the lower end of the radius and tapping of the fingers

**The phenomenon of the upper forearm**

The position: the elbow in semiflexion, forearm in the middle position
The tapping: on the muscle belly of m. brachioradialis
The response: dorsal flexion of the wrist – physiological, elbow flexion – pathologic

**Biceps reflex** (spinal segments C4-5)

The position: elbow in semiflexion, the forearm in supination
The tapping: on the tendon m. biceps brachii
The response: flexion of the forearm
For the increased response: the therapist’s thumb tendon on the tendon of the biceps – elongation, the tapping on the therapist’s thumb

**Triceps reflex** (spinal segments C5-7)
The position: the arm in flexion, forearm is bent toward the opposite shoulder, therapist fixates the arm
The tapping: on the tendon m. triceps brachii just above the olecranon
The response: extension of the forearm

**The lower extremities stretch reflexes**

**Patellar tendon reflex** (spinal segment L2-4):

The position: supine – lower limb should be flexed in all joints, but also semiflexion with underlay knee is good

The tapping: on the ligamentum patellae, between the patella and the tendon on the tibia

The response: extension in the knee

**Medial hamstring reflex** (sinal segment L5)

The position: semiflexion v exteranal rotation in the hip joint

The tapping: on the tendon of medial hamstrings (m. semitendinosus, m. semimembranosus)

The response: flexion in the knee

For reinforcement: tapping on the therapist’s fingers

**Achilles tendon reflex** (spinal segment L5-S2):

The position: supine flexion in all joints, foot passively put into the middle position – the best in dorsal flexion ; prone lying, kneeling – the feet over the edge of bed

Modified position:



The tapping: on the Achilles tendon

The response: plantar flexion

**Medioplantar reflex**

The position: supine flexion in all joints, foot passively put into the middle position – the best in dorsal flexion ; prone lying, kneeling – the feet over the edge of bed

The tapping: in the middle of the foot

The response: plantar flexion

**Signs in damage upper motor neuron – the cortispinal pathways**

**Juster sign**

The evoking: rubbing with a blunt instrument on the lateral side of the palm from the wrist to the metacarpal pads

The response: adduction and opposition of the thumb

**Trömmer sign**

The evoking: therapist grasps the 3rd finger from lateral sides and flincks into the 3rd fingertip

The response: flexion of the thumb or all fingers

**Hoffmann sign**

The evoking: therapist grasps the wrist and flincks through the 3rd nail

The response: flexion of the thumb or all fingers

**Babinski sign**

The evoking: rubbing with a blunt instrument on the lateral side of the foot from the heel to the metatarsal pads

The response: flexor: the toes curve down and inwards, and the foot [everts](https://en.wikipedia.org/wiki/Eversion_%28kinesiology%29); this is the response seen in healthy adults.

 indifferent: there is no response.

 extensor: the hallux dorsiflexes, and the other toes fan out; this is Babinski's sign, which indicates damage to the central nervous system.

**Brissaud phenomena**

The evoking: like Babinski sign

The response: clonus m. tensor fasciae latae

**Chaddock sign**

The evoking: around the lateral malleolus

The response: extension of the big toe

**Oppenheim sign**

The evoking: applying pressure along the medial side of the tibia

The response: dorsal flexion in ankle joint

**Strümpel sign**

The evoking: flexion in the hip and knee against the large resistence

The response: dorsal flexion of thumb and in ankle joint

**Medel-Bechterev sign**

The evoking: percussion on the os cuboideum on the dorsum of the foot

The response: flexion of the toes

**Rossolimo sign**

The evoking: percussion on the tips of the toes

The response: flexion of the toes

**Žukovski – Kornilov sign**

The evoking: percussion in the middle of the foot

The response: flexion of the toes

**Reeducation of movement on the basis of inducing reflexes**

Using: patient does not move with the limb or the part thereof and the reflex in this region can be induced

**Methodical procedure**

* I tell and show patient what I want him to do
* Stimulation of the skin exteroceptors above the working muscle groups: rubbing, scratching, pinching
* Stimulation of the muscle sprindle with rapid passive movement
* Voice stimulation: I tell patient “Do flextion, extension…”
* The evoking of reflex or sign
* Performance of the movement: passive, active with help, active