

# Brainstem reflexes

Brainstem [reflex](#) studies provide important information about the afferent and efferent [pathways](#) and are excellent physiological tools for the assessment of [cranial nerve nuclei](#) and the functional integrity of suprasegmental structures.

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Deep [sedation](#) may hamper the detection of neurological deterioration in [brain injury](#). Impaired [brainstem](#) reflexes within the first 24 h of deep sedation are associated with increased mortality in non-brain-injured patients

## Types

[Blink reflex](#).

Oculo-cephalic Reflex

The vestibulo-ocular reflex (VOR) is a reflex eye movement that stabilizes images on the retina during head movement by producing an eye movement in the direction opposite to head movement, thus preserving the image on the center of the visual field. For example, when the head moves to the right, the eyes move to the left, and vice versa. This reflex can be tested by the Rapid head impulse test or Halmagyi-Curthoys-test, in which the head is rapidly moved to the side with force, and is controlled if the eyes succeed to remain looking in the same direction. When the function of the right balance system is reduced, by a disease or by an accident, quick head movement to the right cannot be sensed properly anymore. As a consequence, no compensatory eye movement is generated, and the patient cannot fixate a point in space during this rapid head movement. In comatose patients, once it has been determined that the cervical spine is intact, a test of the vestibulo-ocular reflex can be performed by turning the head to one side. If the brainstem is intact, the eyes will move conjugately away from the direction of turning (as if still looking at the examiner rather than fixed straight ahead). Negative Doll's eyes would stay fixed midorbit, so having negative "doll's eyes" is a sign that a comatose patient's brainstem is not intact. There is one very important contraindication of this examination - trauma of a cervical spine - because we could seriously injured patient. Sometimes a result can be false-positive thanks to influence of some medication (anesthesia).

Positive oculo-cephalic reflex

Vestibulo-ocular reflex

Also sometimes called caloric reflex, because a stimulation is based on pouring of cold or warm water into the ear. It is better to put patient's head a slight reclining, because we want to influent especially lateral semicircular tubule of an inner ear. A small amount of water flow induces movement of endolymph. Test can be sometimes false-positive if there is any other disease of inner ear. Normally we react just a little bit, because nystagmus in healthy people corrects the eyes movements. There is one special rule for direction of nystagmus: "Cold opposite, warm same (COWS)", which means that cold water pouring into the left ear leads to eye movement to the left and a direction of the nystagmus is on the right (opposite side). It is the same for the second side - pouring of warm water into the left ear leads to eye movement to the right and a direction of the nystagmus is on the left

(same side). Attention! Do not confuse the direction of nystagmus (COWS rule) and the direction of motion of eyes.

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