

Investigation of cerebellum

Cerebellum plays a key role in the control of movement, in regulation of muscle tone, in keeping upright posture and in coordination of movement.

Functionally, cerebellum may be divided to:

1. *vestibulocerebellum*, which thanks connections to vestibular system regulates the balance and eye-movements,
2. *spinocerebellum*, which having information from proprioceptors and brain cortex compares the planned movement with its realization and coordinates it; and
3. *cerebrocerebellum*, which has connections to motoric and premotoric cortex and participates in programming the movements.

Deterioration of cerebellar function results in various **disorders of movement** of the patient, but usually not seen in rest conditions. Symptoms similar to the cerebellar damage may be observed also in healthy individuals after intake of sufficient dose of alcohol.

As a result of damage of the cerebellar vermis, **paleocerebellar syndrome** with a *disorder of posture and walk* may be found. The patient wobbles in standing position (titubation) to all directions, direction of the eventual fall is not dependent on the position of the head (contrary to vestibular disorders).

To investigate the function of cerebellar vermis we can do:

1. investigation of posture: Romberg I, II and III:

Romberg I: posture in slightly widened base with arms stretched forward and opened eyes

Romberg II: posture in normal base with arms stretched forward and opened eyes

Romberg III: posture in normal base with arms stretched forward and closed eyes

2. investigation of walk: walk I (opened eyes), walk II (closed eyes): investigated person walks stright down the line firstly with opened, then with closed eyes

As a result of damage of cerebellar hemisphere, **neocerebellar syndrome** with *ataxia* (i.e. deterioration to hit the target in the space), *hypermetria* (i.e. overshooting the movement), *adiadochokinesia* (i.e. dysability to alternate fastly the activation of antagonistic muscle groups), *intention tremor* (amplified especially at the end of movement), *muscle hypotonia* (increased pasivity, event. higher excursability in the joints), *dysartria* (i.e. deterioration of articulation) etc. may be observed.

To investigate the function of cerebellar hemispheres we can do:

1. **investigation of taxia on upper extremities (UE):** investigated person stretches the arms forward, then investigator asks him to touch the nose with the indicator (firstly with, then without the eye control); in cerebellar ataxia excluding the eye control doesn't worsen the result
2. **investigation of taxia on lower extremities (LE):** investigated person in lying position is asked to put the heel on the knee of the oposite LE
3. **investigation of diadochokinesia on UE:** investigated person stretches the arms forward and alternates fastly the pronation and supination of both UE
4. **investigation of diadochokinesia on LE:** investigated person lying face down fastly alternates the flexion of right and left LE in the knee joint