

## NEUROLOGICAL AND NEUROPSYCHOLOGICAL TESTS

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Neurology is a clinical discipline that covers knowledge about diseases of the nervous system.

Deals with:

- Etiology
- Epidemiology
- Pathophysiology
- Symptomatology
- Diagnostics
- Treatment of diseases of the central and peripheral nervous system

Neurology includes diseases:

- Brain
- Cerebellum
- Spinal cord
- Peripheral nerves
- Autonomous system
- Muscle diseases

Neurological examination is the art of finding symptoms resulting from dysfunction or damage to the nervous system. Like any examination, it consists of an objective and subjective part.

The neurological examination consists of three parts:

1. Interview - an initial observation of the patient is made, not only the symptoms reported by the patient are important, but also the general impression, behavior, way of speaking and contact with the examiner
2. Physical examination: general and neurological
3. Additional tests: laboratory and imaging

**INTERVIEW**-the established order applies:

- Chief complaints

- The beginning of the disease
- Its course
- Treatment
- Tests performed
- Data from family interview
- Comorbidities
- Past injuries and illnesses
- Lifestyle

**The most common ailments in diseases of the nervous system:**

1. Headaches
2. Pain and paresthesia in the limbs
3. Dizziness
4. Consciousness disorders
5. Convulsions
6. Vision disorders
7. Limb paresis
8. Gait disorders
9. Sphincter disorders
10. Sleep disorders

**DETAILED NEUROLOGICAL EXAMINATION**

- General examination: body structure, posture, symmetry, structural defects, behavior
- Head: shape, bone defects
- Cranial nerves: eyelids, eye movements, pupils, facial movements, masseter muscles, tongue
- Motor system: muscles, atrophy, symmetry, fasciculation, tension, strength
- Sensory system
- Reflexes: knee, ankle, abdominal, plantar

- Coordination: finger-nose test, heel-knee test, Romberg test
- Spine: appearance and mobility
- Walk
- Psyche
- Speech

## **Clinical pain testing**

It is difficult to assess in a suffering person because the stimulus causing the pain is most often unknown and its intensity and duration are assessed subjectively on various scales. Clinical pain testing determines:

- Possible cause
- Location
- Duration
- Intensity
- The quality of pain
- Accompanying symptoms

Pain intensity is the most important feature for the patient, but its assessment is very subjective. Many verbal and digital scales are used to examine this trait

- VRS scale
- VAS scale

## **Autonomic nervous system testing**

It is performed only if there is a suspicion of autonomic disorders; the disorders may be local (peripheral) or generalized (central).

## **SPEECH**

1. Aphasia - lack or disorder of the organization of verbal expression or understanding of speech at the central level in brain centers (sensory aphasia - damage to the temporal lobe, motor aphasia - damage to the frontal lobe). Aphasia is often accompanied by agraphia, i.e. the inability to write, and alexia, the inability to read
2. Chanted speech – cerebellar damage

## **CONSCIOUSNESS**

Wakefulness, quantitative disorders. Most frequently used scales:

1. Glasgow Coma Scale - 15 points, which takes into account eyeball and eyelid movements, verbal reactions and motor reactions. Used most often by neurosurgeons

## **AWARENESS**

Maintained full contact with the surroundings and understanding the meaning of words.

## **ORIENTATION**

Time, place and surroundings

The subject of clinical neuropsychology is the analysis of the relationship between human behavior and the structure and functioning of the brain. During the neuropsychological examination, the following is assessed:

1. Cognitive functions
2. Executive functions
3. Patient's affect

Attention is paid during the examination

- Divided attention
- Memory and learning, e.g. short-term, long-term memory
- Linguistic features
- Visuospatial functions
- Thinking and problem solving
- Intelligence

### **Among the tests, the most famous:**

- Beck Depression Scale
- Hamilton Depression Scale
- MMSE scale - assesses disturbances in orientation in time and place, memorization, attention and calculation
- STMS - early symptoms of dementia, not only in Alzheimer's disease
- Clock drawing test - frontal lobe dysfunction
- ADL - Activities of Daily Living scale
- MFIS - Fatigue Scale

- FAS
- Cognitive tests – ACE III

## **Imaging tests in neurology**

### 1. X-ray examinations

- Classic X-ray (skull, spine, lungs)
- Computed tomography (without and with contrast): CT angiography, CT perfusion
- Magnetic resonance imaging; classic, angio, functional

## **Ultrasound examinations in neurology**

Thanks to this method, it was possible to image:

- Flow color coded by speed or energy
- Intracranial structures
- The course of external and intracranial arterial and venous vessels

It is often performed in imaging peripheral nerves, diagnosing carpal tunnel syndrome and muscle pathology

1. Doppler ultrasound
2. TCD – transcranial ultrasound
3. Ultrasound of muscles and peripheral nerves

Thanks to the examination, we can identify:

- Narrowing and occlusion of intracranial arteries - stroke
- Vascular spasm after subarachnoid hemorrhage
- Intracranial hemangiomas
- Aneurysms
- Cerebral circulation arrest using TCD
- Microemboli

## **Electrophysiological studies**

Unlike most imaging tests, they provide insight into the activity of various structures of the nervous system.

1. Electroencephalography - EEG - assessment of spontaneous electrical activity of the brain, mainly the cerebral cortex
2. Evoked potentials - analysis of changes in the electrical activity of the central nervous system in response to visual, auditory and sensory stimuli
3. Electronystagmography – ENG – vestibular system activity
4. Electroneurography - peripheral nerve activity
5. Electromyography - assessment of muscle activity and the neuromuscular junction

### **Non-radiological invasive tests**

Invasive tests involve taking a piece of tissue or a sample of body fluid. Neurology mainly performs:

- Cerebrospinal fluid examination – CSF
- Muscle biopsy
- Peripheral nerve biopsy
- Brain biopsy

### **Cerebrospinal fluid examination**

Indications for examining cerebrospinal fluid include suspicion of:

1. CNS infection
2. Bleeding into the fluid spaces
3. Autoimmune diseases of the CNS
4. Cancer spread in the CSF
5. CNS metabolic disease
6. Neuropathy
7. Seizures of unknown cause

Contraindications:

- Brain tumor in the back of the skull
- Defects in the structure of the spine
- Serious bleeding disorders
- Tissue infection around the puncture area

## Complications

- Puncture team
- Subarachnoid hemorrhage
- Hematoma at the injection site
- Infection

## **Microbiological research in neurology**

They are essential in the diagnosis of infectious and parasitic diseases. The most common diseases of the nervous system caused by microorganisms include:

1. Meningitis
2. Encephalitis
3. Brain abscess
4. Lyme disease