Cytological examination of cerebrospinal fluid

Cytological examination of cerebrospinal fluid is part of the basic examination of cerebrospinal fluid. It contributes to the diagnosis of neuroinfections, bleeding into CNS, autoimmune diseases, or tumors. It includes:

1. ***quantitative cytology*** - consists in determining the number of cellular elements
2. ***qualitative cytology*** - cell types in cerebrospinal fluid and their number are determined

Method of determination

- Native non-centrifuged cerebrospinal fluid should be used for cytological examination and counting of cells should be initiated within 3 hours of collection (0.1 ml is sufficient). Stained with acid fuchsin.
- Cells are counted in a Fuchs-Rosenthal chamber, which has a volume of approximately 3 $mm^{3.}$ Therefore, the results are expressed as a fraction of n/3.
- Erythrocytes are counted in the unstained specimen, while the other cells are counted in the stained specimen.

Rating

- We find up to 10/3 (3 in 1 ml) cells in the cerebrospinal fluid of a healthy adult, and the the value 11–15/3 is considered borderline high. The normal number of cells is referred to as ***oligocytosis***. When the number of cells is elevated, we speak of ***pleocytosis***.
- In regards to qualitative evaluation, only *lymphocytes* (60-80%) and *monocytes* (20-40%) are present in the normal cerebrospinal fluid, and rarely ependymal cells or choroid plexus cells are present.
- The presence of *erythrocytes* may be due to an injury to the vessel during lumbar puncture or as a result of bleeding into the cerebrospinal fluid.
- The presence of *other elements* (granulocytes, activated lymphocytes, plasma cells, activated monocytes, tumor cells) is a symptom of pathological processes in the CNS.

Some types of pathological cytological findings in cerebrospinal fluid

Pleocytosis

- ***Monocytic***

  Monocyte cells predominate and their activated forms are elevated. They represent a non-specific reaction to previous irritation of the nervous system (e.g., CNS ischemia, terminal phase of inflammation with a clearing reaction, condition after CNS angiography).

- ***Granulocytic***

  A marked increase in neutrophilic granulocytes (thousands to tens of thousands) is typical of purulent (bacterial) inflammation. The predominance of eosinophils occurs in allergic reactions or in some neuroinfections (parasitic, fungal).

- ***Lymphocytic***

  Pleocytosis with a predominance of lymphocytes, including activated forms, is a characteristic finding for non-purulent inflammatory diseases of viral origin, but sometimes in some bacterial neuroinfections.

Pathological oligocytosis

(the total number of elements does not exceed the norm, but the ratios of different cell populations is abnormal)

- ***Monocytic***

  It is characterized by a predominance of monocytes and an increased relative proportion of activated monocytes. This non-specific pattern may be accompanied, for example, by bleeding into the cerebrospinal fluid with erythrocytes phagocytosed by macrophages, or a terminal phase of inflammation.

- ***Granulocytic***

  Granulocyte oligocytosis with a predominance of neutrophils is a common finding in incipient purulent and non-purulent neuroinfections.

- ***Lymphocytic***

  It is characterized by a predominance of lymphocytes with an increased relative proportion of activated forms. The presence of plasma cells indicates intrathecal antibody synthesis. It is typical of chronic neuroinfections

and for multiple sclerosis.

- ***Tumorous pleocytosis or oligocytosis***

  Tumor cells in the cerebrospinal fluid originate in tumors located near the cerebrospinal fluid pathways or in the malignant infiltration of the meninges.

References

Related Articles

- Cerebrospinal fluid
- Biochemical examination of cerebrospinal fluid
- Proteins in cerebrospinal fluid
- Cerebrospinal fluid spectrophotometry
- Cerebrospinal fluid syndromes

External links

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