CXCL13 concentrations in CSF of Lyme neuroborreliosis and other neuroinflammatory patients

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Introduction;

Laboratory diagnosis of Lyme neuroborreliosis (LNB) is partly based on the detection of intrathecal *Borrelia burgdorferi* –specific antibody production (increased antibody index (AI)). However, AI can be negative in patients with early LNB and, on the other hand, can remain elevated for months after antibiotic treatment. Recent studies have suggested that the chemokine CXCL13 in the cerebrospinal fluid (CSF) is a biomarker for active LNB. The aim of the present study was to evaluate the value of CXCL13 as a biomarker of LNB disease activity and in monitoring the response to therapy.

Materials and Methods

CXCL13 concentrations were analysed in CSF samples of 366 retrospectively identified individuals (Figure 1.) using a CXCL13 kit (Quantikine, R&D Systems). The samples represented pre-treatment LNB (38 patients), tick borne encephalitis, central nervous system (CNS) varicella zoster infection, CNS herpes simplex infection, CNS HHV6 infection, CNS enterovirus infection, and untreated neurosyphilis. The panel included also samples from patients with multiple sclerosis, and other neuroinflammatory conditions. Of the LNB patients, 24 post treatment CSF samples were available for CXCL13 analysis.

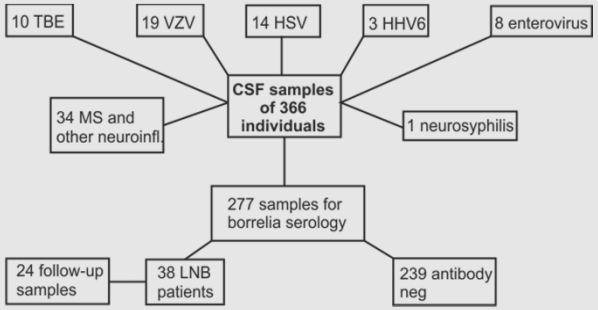

Figure 1. The distribution of CSF samples in which CXCL13 concentrations were analyzed in the study.

References

Mygland et al: EFNS guidelines on the diagnosis and management of European Lyme neuroborreliosis. *Eur J Neurol* 2010, 17:8-16, e11-14.

Schmidt et al: A prospective study on the role of CXCL13 in Lyme neuroborreliosis. *Neurology* 2011, 76:1051-1058

Results

The CXCL13 concentrations in CSF samples of untreated LNB patients were significantly higher (median 6480 pg/ml) than the concentrations in the non-LNB group (median <7.8 pg/ml), viral CNS infection samples (median <7.8 pg/ml), or samples from patients with non-infectious neuroinflammatory conditions (median <7.8 pg/ml) (Figure 2.). The use of cut-off 415 pg/ml led to sensitivity of 100% and specificity of 99.7% for the diagnosis of LNB in these samples. CSF CXCL13 median concentrations declined significantly from 16770 pg/ml before to 109 pg/ml after the treatment (Figure 3.).

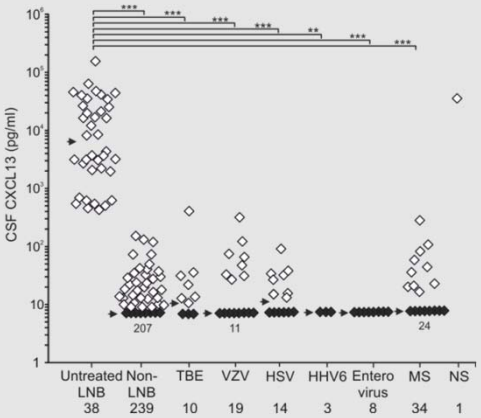

Figure 2. CXCL13 concentrations in the LNB and control CSF samples. Black diamonds indicate CSF samples with concentration below the lowest standard. The figure below the black diamonds indicates the number of such samples. The arrow indicates the median concentration. ** $p < 0.01$; *** $p < 0.001$.

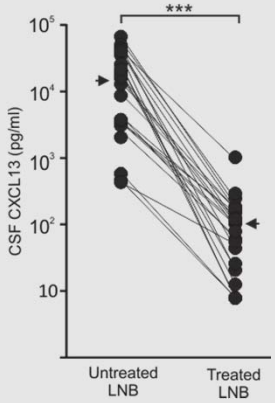

Figure 3. CXCL13 (left) and neopterin (right) concentrations in CSF samples of LNB patients before and after antibiotic treatment. *** $p < 0.001$.

Conclusions

CSF CXCL13 appears to be an excellent biomarker in differentiating LNB from viral CNS infections and from other neuroinflammatory conditions. It is also a useful tool for follow-up of LNB patients after antibiotic treatment.