

Mediators and biomarkers of inflammation in meningitis: Cytokine and peptidome profiling of cerebrospinal fluid

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Abstract

© 2016, Pleiades Publishing, Ltd. Differential diagnosis of bacterial and viral meningitis is an urgent problem of the modern clinical medicine. Early and accurate detection of meningitis etiology largely determines the strategy of its treatment and significantly increases the likelihood of a favorable outcome for the patient. In the present work, we analyzed the peptidome and cytokine profiles of cerebrospinal fluid (CSF) of 17 patients with meningitis of bacterial and viral etiology and of 20 neurologically healthy controls. In addition to the identified peptides (potential biomarkers), we found significant differences in the cytokine status of the CSF of the patients. We found that cut-off of 100 pg/ml of IL-1 β , TNF, and GM-CSF levels discriminates bacterial and viral meningitis with 100% specificity and selectivity. We demonstrated for the first time the reduction in the level of two cytokines, IL-13 and GM-CSF, in the CSF of patients with viral meningitis in comparison with the controls. The decrease in GM-CSF level in the CSF of patients with viral meningitis can be explained by a disproportionate increase in the levels of cytokines IL-10, IFN- γ , and IL-4, which inhibit the GM-CSF expression, whereas IL-1, IL-6, and TNF activate it. These observations suggest an additional approach for differential diagnosis of bacterial and viral meningitis based on the normalized ratio IL-10/IL-1 β and IL-10/TNF > 1, as well as on the ratio IFN- γ /IL-1 β and IFN- γ /TNF < 0.1. Our findings extend the panel of promising clinical and diagnostic biomarkers of viral and bacterial meningitis and reveal opposite changes in the cytokine expression in meningitis due to compensatory action of proand antiinflammatory factors.

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Keywords

biomarkers, cerebrospinal fluid, cytokines, inflammation, meningitis, peptidome