

Impact of Cytokines Alone and Primed with Macrophages on Balamuthia mandrillaris Interactions with Human Brain Microvascular Endothelial Cells in vitro

Authors : Abdul Matin, Salik Nawaz, Suk-Yul Jung

Abstract : Balamuthia mandrillaris is well known to cause fatal Balamuthia amoebic encephalitis (BAE). Amoebic transmission into the central nervous system (CNS), haematogenous spread is thought to be the prime step, followed by blood-brain barrier (BBB) dissemination. Macrophages are considered to be the foremost line of defense and present in excessive numbers during amoebic infections. The aim of the present investigation was to evaluate the effects of macrophages alone or primed with cytokines on the biological characteristics of Balamuthia in vitro. Using human brain microvascular endothelial cells (HBMEC), which constitutes the BBB, we have shown that Balamuthia demonstrated > 90% binding and > 70% cytotoxicity to host cells. However, macrophages further increased amoebic binding and Balamuthia-mediated cell cytotoxicity. Furthermore, macrophages exhibited no amoebicidal effect against Balamuthia. Zymography assay demonstrated that macrophages exhibited no inhibitory effect on proteolytic activity of Balamuthia. Overall, to our best knowledge, we have shown for the first time macrophages has no inhibitory effects on the biological properties of Balamuthia in vitro. This also strengthened the concept that how and why Balamuthia can cause infections in both immuno-competent and immuno-compromised individuals.

Keywords : Balamuthia mandrillaris, macrophages, cytokines, human brain microvascular endothelial cells, Balamuthia amoebic encephalitis

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