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Nutritional strategy against Japanese encephalitis-associated neuro-inflammation

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Statement of the Problem: Neuroinflammation has a central role in common pathologies of brain diseases. Japanese encephalitis, which is caused by infection with mosquito-transmitted Japanese encephalitis virus (JEV), is an example of an immunopathological disease closely associated with pathological disruption of the BBB and severe neuroinflammation. Those immunopathological changes correlate well with the onset and disease progression of Japanese encephalitis and represent promising targets for therapeutic control. With a view to gaining a better understanding of the pathogenic process and developing therapeutic options for Japanese encephalitis, further investigations of the underlying neuroinflammatory mechanisms during the course of JEV infection are needed. DHA possesses nutritional and pharmaceutical properties with a broad range of applications, including anti-inflammation. Since dietary and nutraceutical supplements of DHA are increasingly becoming acceptable options for health promotion and/or therapeutic treatments, the purpose of this study was to investigate the effect of DHA on Japanese encephalitis-associated neuroinflammation.

Methodology & Theoretical Orientation: Cultured neuron/glia containing 40% neurons, 40% astrocytes, and 20% microglia were prepared from cerebral cortices of Sprague-Dawley rats. JEV NT113, a JEV strain isolated from mosquito, was propagated in C6/36 cells and used to infect cultured neuron/glia.

Findings: Infection of cultured neuron/glia with JEV caused a profound reduction of neuron viability and the neurotoxicity was attenuated by DHA. The neuroprotective action of DHA was accompanied by inhibition of NO, TNF- α , and IL-1 β production. Mechanistic studies revealed that JEV infection elicited an elevation of toll-like receptor 7 (TLR7)/MyD88 signaling axis leading to activation of NF κ B and AP-1 as well as expression of cytokines. We further identified that HMGB1 released from JEV-infected neuron/glia had neurotoxic effect and proinflammatory effect. In conclusion, current results indicate that DHA can attenuate JEV infection-induced neurotoxicity involving resolution of neuroinflammation.

Biography

Chun-Jung Chen has devoted his effort in the study of viral encephalitis and neurological degeneration. By culturing primary neural cells and establishing diseased models from rodents, pathological mechanisms and therapeutic strategies are his interests. He has built many types of primary neural cells and diseased animal models of central and peripheral nervous system after years of experience in research, evaluation, teaching and administration both in hospital and university.

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