Proliferation of Natural Killer Cells and the Anti-Inflammatory Cytokine Interleukin-4 in a Model of Infantile Spasms

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Infantile spasms (IS) is a neurological condition that generally initiates development of more severe forms of epilepsy along with developmental disabilities. An investigation of the role played by inflammation in IS elucidated novel findings of the infiltration of natural killer (NK) cells from the periphery to the brain, along with expression of Interleukin-4 (IL-4), which may ultimately lead to insight on the dysregulation of CNS immunity underlying IS. Immunohistochemistry procedures were performed on sagittal brain sections of postnatal day 15 betamethasone-primed N-methyl-D-aspartate (NMDA) administered rats to target the CD16 antigen, a marker expressed predominantly by NK cells, and the IL-4 antigen. Brain sections were scanned using a light microscope, and CD16 and IL-4 expressing cells were quantified in the cerebellum and nuclei of the brainstem respectively. Results revealed a three-fold increased abundance of CD16-expressing cells in the cerebellum from betamethasone-primed NMDA administered tissue than the saline-primed control, with a mean density of 1298.44cells/mm2 compared to 373.4cells/mm2 respectively ($p<.05$). ANOVA and T-test analyses confirmed a significant difference between various treatment groups based on the administration of NMDA and prenatal priming of betamethasone ($p<.05$). However, differences in IL-4 expression in the brainstem did not meet significance ($p>.05$). NK cell infiltration into the cerebellum suggests a role in inflammatory dysregulation, while IL-4 expression does not pose a role in the development of IS. Knowledge of NK cell infiltration into the cerebellum and IL-4 expression increased understanding concerning the development of therapeutic treatments for IS.

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American Statistical Association: Certificate of Honorable Mention