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Neuroinflammation, glial activation, oxidative stress and behavioral deficit in the hippocampus following short-term adrenalectomy

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Adrenalectomy (ADX) has been shown to damage the hippocampal neurons and however, the effects of short-term ADX are not studied. Therefore, we aimed to investigate the effects of short-term ADX on the levels of pro-inflammatory cytokines, response of microglia, astrocytes, neuronal cell death and oxidative stress markers over the course of time (4 h, 24 h, 3 days, 1 week and 2 weeks) in the hippocampus. Our results showed a transient significant elevation of pro-inflammatory cytokines IL-1β and IL-6 from 4 h to 3 days in the ADX compared to sham. TNF-α levels were significantly elevated at 4 h only in ADX compared to sham. Time dependent increase in degenerated neurons in the dorsal blade of the dentate gyrus is from 3 days to 2 weeks after ADX. Quantitative analysis showed significant increase in the number of microglia (3, 7 and 14 days) and astrocytes (7 and 14 days) of ADX compared to sham. A progression of microglia and astroglia activation all over the dentate gyrus and their appearance for the first time in CA3 of adrenalectomized hippocampi compared to sham was seen after 2 weeks. A significant decrease of GSH levels and SOD activity and increase in MDA levels were found after 2 weeks of ADX compared to sham. In order to investigate the effect of adrenalectomy on the behavior of the animals we used a passive avoidance test at 3, 7 and 14 days after adrenalectomy. Our results showed a significant reduction in the latency time in the adrenalectomized compared to the sham 3, 7 and 14days after adrenalectomy. Our study showed an early increase in the pro-inflammatory cytokines followed by neurodegeneration and activation of glial cells as well as oxidative stress. Hence, early inflammatory components might contribute to the initiation of the biological cascade responsible for subsequent neuronal death.

Biography

Naserddine Hamadi is working in the College of Medicine and Health Sciences, United Arab Emirates. He has a Bachelor's degree in Biochemistry from University of Batna, Algeria after which he moved to University of Constantine-1 where he obtained his Master's degree in Molecular and Cellular Biology, as part of his Master's degree he travelled to Ain Shams University, Cairo, Egypt to do his experimental part of the thesis which ended up published in impacted journal. He joined the same university for his PhD program in which he is at the final stage to obtain his degree. As a part of the PhD program he joined the College of Medicine and Health Sciences, UAE University, in the Laboratory of Prof. Abdu Adem. He worked under his supervision in collaboration with his Algerian supervisor Khelifi Touhami Fatima. Currently, he is planning to move to Karolinska Institute, Sweden to do his Post Doc.

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Notes: