

Analysis of ultrastructural alterations in the mouse medial prefrontal cortex toward the understanding of pathophysiology of social stress-induced depressive-like behaviors

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Animal studies using various stress models have shown that excessive environmental stress induces depressive-like behaviors with concomitant atrophic changes of neurons especially in the medial prefrontal cortex (mPFC) and in the hippocampus. Despite the accumulating evidences showing that multiple cellular and molecular events including persistent increase of the corticosteroid hormone and brain inflammation are inducers of this neuronal atrophy, its underlying molecular mechanisms particularly inside the neurons are still elusive. In the present study, we aimed to examine the ultrastructural events inside neurons in the mPFC during the course of chronic social stress in mice. We subjected male C57BL/6 mice to either single or repeated social defeat stress and analyzed the brains from those stressed mice or from control mice which did not receive defeat stress by serial electron microscopy. We found that social stress induced disruptions of plasma membranes of neuronal dendrites in the mPFC with concomitant morphological alterations of subcellular organelle and cytoskeletons. We will discuss the potential biological insights and mechanisms of these ultrastructural events.