

Social defeat stress increased interfaces between microglia and neurons in the medial prefrontal cortex of mice

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Animal studies using various stress models have shown that excessive environmental stress induces depression-like behaviors with concomitant dendritic atrophy of neurons especially in the medial prefrontal cortex (mPFC) and the hippocampus. Recent progresses have revealed that inflammatory responses in the brain and periphery are critical inducers of dendritic atrophy of the neurons. However, how brain inflammation leads to altered morphology and thereby dysfunction of mPFC neurons remains unknown. Here we aimed to examine the cell-to-cell interaction of microglia and neurons in the mPFC using three-dimensional electron microscopy. 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 block face-scanning electron microscopy. We found that social defeat stress increased microglia-neuron interfaces that are formed between microglial processes and synaptic structures, predominantly presynaptic axon terminals in the mPFC. Our study will pave the way for a better understanding of molecular and cellular mechanisms of brain inflammation for stress-related mental disorders.