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Poster Sessions

Social stress induces subcellular degeneration preceding dendritic loss of prefrontal pyramidal neurons in mice

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In rodents, chronic social stress induces dendritic atrophy of pyramidal neurons in the medial prefrontal cortex (mPFC) that underlies emotional and cognitive disturbances. However, the mechanism remains elusive. Here we visualized social defeat stress-induced dendritic atrophy and subcellular alterations of mPFC pyramidal neurons in male C57BL/6 mice at the ultrastructural level, using expansion microscopy and serial electron microscopy. The chronic stress decreased the total length of apical dendrites and the number of their branches but unaffected each branch length, suggesting the loss of a subset of dendritic branches. Dendritic branches with varicosities also increased. We then analyzed subcellular alterations of mPFC pyramidal neurons after the acute stress, thus preceding the loss of dendritic branches. The acute stress induced plasma membrane deformation with morphological changes of mitochondria and microtubule disruption in a subset of dendritic branches, but not adjacent ones. These findings show that stress induces subcellular degeneration in a subset of dendritic branches of mPFC pyramidal neurons preceding their loss with chronic stress.