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How social stresses can alter microtubular proteins structure, dynamicity and kinetics

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Abstract

Social stresses are considered as one of the major components of our modern lives. Stressful life events are generally considered as having precipitating effects on the development of human psychopathologies such as anxiety and depression. Previous works and experiments have shown that neuronal plasticity - which is defined as structural adaptation of neurons to functional requirements- can be affected by chronic and acute stress conditions. These structural changes can be characterized by retraction of apical dendrites, reduction in axonogenesis and decreased neurogenesis. The close relationship between cytoskeleton and neuroplasticity controlling system suggests the possibility cytoskeletal proteins such as Microtubular (MT) proteins alterations in high stressful conditions. It's been observed that structural modifications to tubulin monomers and MAPs occur during stressful conditions. Acute stress results in increased hippocampal expression of acetyl-Tub (a marker of stable MT) and decreased expression of Tyr-Tub (a marker of dynamic MT). However, there has been no report about the effect of stress on MT kinetics and dynamicity. In our work, we have studied the effect of social instability (as a well-known model of social stress) on the kinetic and dynamicity of male rat brains MTs. Activity of microtubules was tested in two conditions: semi-purified (without adding exogenous GTP) and purified. MT kinetics of the stress-treated and control group shows difference. Our initial results indicate that in semi-

purified conditions, MTs of the stress-treated groups reach steady state quicker than the control group, but maximum polymerization of the two groups shows no difference. Significant dynamicity differences have not yet been observed. More work on structural and protein stability differences are to be done as well.

Keywords

Social stress, Social instability model, Microtubular proteins, microtubule polymerization dynamicity, microtubule polymerization kinetics

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