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2nd International Conference on

BIOCHEMISTRY

September 28-29, 2017 Dubai, UAE

Tau protects Septin 3 from severing by p60-katanin in neurons

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Background & Aim: Cytoskeletal dysfunctions such as reduced microtubule stability have been observed as an underlying mechanism in many neurodegenerative diseases. Neurons are rich in an enzyme called p60-katanin that severs microtubules. Due to microtubule-binding protein Tau's protective activity, microtubules in the axon are more resistant to severing by p60-katanin. Septins are GTP-binding proteins that have been recently recognized as the forth cytoskeletal component. Our study focuses on Septin 3, which is expressed exclusively in brain tissue and nerve terminals. Our aim in this research is to investigate Septin 3-Tau interaction from the point of neuronal processes formation and branching and how this interaction would effects p60-katanin activity on Septin 3 filament formation.

Material & Methods: To analyze Septin 3-Tau interaction, we performed immunocytochemistry and immune-blotting experiments using rat cortical neurons by over-expression and gene silencing using siRNA to better understand the role of Septin 3-Tau-p60-katanin interaction on neuronal branching and differentiation.

Results: Our findings indicated that Septin 3 overexpression causes formation of long and thick bundles in axons. Moreover, Septin 3 overexpression increases dendritic-spine morphology. Upon down regulation of Septin 3, axon extension and dendritic spine branching was impaired. Also, Septin 3 and Tau co-localized predominantly in axons. Septin 3 filaments were severed in axons when p60-katanin was overexpressed and upon Tau over-expression Septin 3 was protected from being severed by p60-katanin.

Conclusions: These preliminary results indicate an important role for Septin 3 in regulating dendritic branching and dendriticspine morphology. Furthermore, Septin 3 and Tau interaction is important for the formation of long and thick axon bundles. More importantly Tau provides stability to Septin 3 and protects Septin 3 from p60-katain serving.

Biography

Didem Baran has completed her Bachelor's degree from Istanbul Kultur University, Molecular Biology and Genetics Department. She is currently pursuing her MSc degree and works at the Molecular Neurobiology Laboratory in Istanbul Technical University, Turkey.

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