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Roles of Stretch-Activated Cation Channels in Neuromuscular Diseases

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Summary

Stretch-activated channels are known to be involved in various cellular processes including share stress responses. Previous literatures have shown that However, it is still unclear how SACs are activated in response to changes in the membrane status, and how SACs regulate downstream pathways. In this study, we have carried out the following projects: (1) Elucidation of the role of SACs in maintenance of the membrane structure in skeletal muscle and (2) Identification of phospholipid translocases that regulate differentiation of myoblast cells into myotubes. In the first project, we have focused on several SACs including TRP (Transient Receptor Potential) channels that are expressed in mouse skeletal muscle and mouse myoblast cell line C2C12. Our studies along with previous literatures showed that several TRP channels are predominantly expressed in muscle tissue and cells. We hypothesized that SACs in muscle cells could be involved in muscle differentiation; however, gene knockdown of one of SACs rather promoted myotube formation, implying that the SACs could act as a regulator for myotube formation. In the second project, we have focused on phospholipid translocases that possess the ability to translocate phospholipids between inner and outer leaflets of the plasma membrane. We conducted siRNA-mediated gene knockdown studies based on our gene expression profiles, and showed that several phospholipid translocases play important roles in myotube formation. Thus our results shed light on the importance of phospholipids' distribution in skeletal muscle.