CDB SEMINAR

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King's College London, UK

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16:00~17:00 A7F Seminar Room

Roles of Myosin II and Myosin III in regulation of hair cell apical morphology

Summary

The sophisticated micromechanics underlying normal hearing and balance rely on the unique morphologies, distinct mechanical properties, precise dynamics, and extraordinary patterning of hair cells in the inner ear. The number of roles for myosins, molecular motors that drive actin-based cargo transport and contractility, in contributing to each of these essential characteristics, is ever-increasing. Because the fragility and scarcity of hair cells precludes classical biochemical and structural biology approaches, high resolution and ultrastructural imaging has been fundamental in investigating the localization and dynamics of these myosins and their associated molecular assemblies, to gain important insights into their hair-cell specific functions.

In this presentation I will discuss the roles of two myosins in hair cell function. Myosin III was implicated in regulating the precisely graded lengths of stereocilia, essential for accurate and robust mechanotransduction, via its actin-regulatory cargo, Espn 1. Preliminary data on novel myosin cargos now suggest that the differential regulation of stereocilia length is in fact the result of more sophisticated coordinated/competing interactions between different myosin isoforms and their associated proteins. Non-muscle myosin II interlaces with actin at the perijunctional actin belt that circumscribes individual hair cells, to form mini-sarcomeres. The contraction and relaxation of these sarcomeres drives changes in epithelial geometry and tensional homeostasis. This growing body of data suggests that it is also likely myosins that transport elements of the mechanotransduction, and other key molecular machinery, along the stereocilia actin core. A comprehensive understanding of the molecular mechanisms of auditory function, and changes that occur during development, aging and deafness, thus requires the continued elucidation of the distinct and integrated myosin-associated macromolecular complexes and their dynamics in hair cells

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