

Actin based epithelial projections in zebrafish: regulation of their formation, patterns and function

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Epithelial cells exhibit various kinds of F-actin based projections, which facilitate their functioning. For example, microvilli increase the absorptive surface of enterocytes whereas stereocilia of hair cells are essential for mechanosensation. In contrast to these tall, finger-like projections, microridges are horizontally long apical projections seen on squamous epithelial cells, including epidermal cells. Their proposed functions include mucus retention, abrasion resistance and actin as well as membrane storage. Although conserved in vertebrate lineage, the regulation of microridge formation has remained poorly understood. I will present the evidence that microridges are formed of branched actin network and their function is essential for the retention of mucus. By combining genetics with imaging in zebrafish, we have unravelled how cell polarity regulators control formation and maintenance of microridges in epidermal cells. We show that the aPKC function is essential to regulate the formation of microridges. Mechanistically, aPKC controls levels of apical Lgl, which along with non-muscle Myosin-II, functions as a prolongation factor for microridges in the epidermis. I will further discuss how function of an actin based molecular motor, Myosin Vb, is essential for the maintenance of microridges in the epidermal cells and microvilli in the enterocytes. In the end, I will emphasise the utility of microridges as an important model to unravel mechanisms that regulate formation of horizontally long actin-based projections and their patterns.

