Spatio-temporal control of cellular mechanics during cell migration

Cell migration is a fundamental process in many biological events, such as development, cancer metastasis and immune responses. To migrate directionally, cells establish integrin-mediated adhesions (focal adhesions) to adhere and sense the extracellular environment. How dynamic turnover of focal adhesions is co-ordinated with the front-to-rear axis during cell migration is one of the challenging problems. Microtubules are thought to physically target and induce adhesion turnover, but its molecular mechanisms have not been fully understood.
We previously identified that KANK (Kidney ANKyrin repeat domain) proteins connect focal adhesions to microtubule ends. This 'capture' of microtubules by KANK traps RhoGEF GEF-H1 on microtubules, which decreases myosin IIA activity and induces disassembly of focal adhesions (Nature materials, 2019). In this seminar, I will propose the mechanism underlying the local control of KANK-to-GEF-H1 axis and discuss its contribution to directed cell migration.

Body shaping by exoskeletal ECM in *Drosophila*

How complex and diverse body shapes are created is a fundamental issue in biology. Studies in diverse animals have revealed cell behaviors that drive body shape changes during development. Less recognized is the fact that cells are not the only building blocks of animal bodies. Postembryonic development proceeds under the protection of rigid ECMs, such as the skeleton, the skin and the shell, which is crucial for survival in harsh environments. Our focus is on how the insect cuticle, the exoskeletal ECM composed of a single polysaccharide called chitin and a large number of cuticular proteins, contributes to body shaping. Here I will talk about how mutations in cuticular protein genes that impact the whole body shape in *Drosophila* have led to our understanding of the cuticle function in body morphogenesis. I would like to present self-organizing capacities of cuticular proteins that affect physical properties of the cuticle, and to discuss potential roles of those proteins in body shape evolution.

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