Seminar/Talk

How to assemble contractile actomyosin bundles in migrating cells?

Jaakko Lehtimäki
University of Helsinki

Host: Carl-Philipp Heisenberg

Cell migration is governed by both protrusive and contractile actin filament arrays, but the relative contributions of these structures differ, depending on the cell-type and extracellular environment. Contractile actomyosin bundles, ventral stress fibers, are the most prominent contractile actomyosin structures in animal non-muscle cells. They are important for cell morphogenesis, adhesion, migration, and mechanosensing. The function of ventral stress fibers depends on periodic, bipolar assemblies of non-muscle myosin II (NMII) filaments along thick actin filament bundles, which are connected to focal adhesions at their both ends. In migrating cells, ventral stress fibers are generated from the pre-existing network of two other types of actin bundles: transverse arcs and dorsal (radial) stress fibers. In addition to thick ventral stress fibers that are typically enriched at the lamellum of motile cells, many cell-types also exhibit thinner stress fibers at their perinuclear region. Whether also these structures are generated from the pre-existing network of transverse arcs and dorsal stress fibers, or through a novel mechanism, was not known. Moreover, the mechanisms underlying the assembly of functional NMII bundles for stress fibers has remained elusive.I will present data demonstrating that UNC-45a protein is critical for efficient folding of NMII molecules, as well as for their assembly into functional bipolar NMII filaments. Hence, the myosin chaperone UNC-45a is critical for the assembly of contractile stress fibers in non-muscle cells (Lehtimki et al., J Cell Biol, 2017). Moreover, I will present new unpublished data demonstrating that thin perinuclear stress fibers are generated through a novel mechanism. I revealed that perinuclear stress fibers assemble de novo, through a NMII pulse-dependent reorganization of the cortical actin meshwork beneath the nucleus. This leads to the formation of a contractile actomyosin bundle, and subsequent enrichment of focal adhesion components at the ends of the bundle. Thus, contractile stress fibers can be assembled by at least two different mechanisms, which are both dependent on the NMII activity.

Friday, January 24, 2020 02:00pm - 03:30pm
Meeting room 2nd floor / Bertalanffy Bldg. (I04.2OG - LAB)

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station. Please find a schedule of the ISTA Shuttle on our webpage: https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.