FASSBERG SEMINAR SERIES

Special Date

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Early differentiation of Human Hematopoietic Stem Cell is regulated by microtubule-dependent nucleus deformation and chromatin reorganization

Hematopoietic Stem Cells (HSCs) are essential to maintain hematopoiesis. HSCs integrate numerous biochemical cues to balance self-renewal and differentiation. But the contribution of physical cues is much less understood. In adherent stem cells, contractile actin bundles turn external adhesion cues into pushing forces, modulating nucleus shape, chromatin organization and gene expression. However, HSCs are poorly adherent. It is not known whether similar or alternative mechano-transduction mechanisms are at play during their differentiation. Here we show that human HSCs differentiation into myeloid progenitors is associated with nucleus growth and significant deformation, chromatin reorganization and microtubules network rearrangement around the nucleus. Using artificial niches we monitored nucleus deformation and chromatin remodelling during long-term culture of individual HSCs and could show they occur concomitantly in a defined time window and depend of microtubule-based forces. Interfering with microtubule-dependent deformation impacts the expression of genes involved in hematopoiesis. Taken together, our data show that human hematopoietic stem cell differentiation into myeloid progenitors involves a novel mechano-transduction mechanism implying microtubules in the deformation of the nucleus and the spatial reorganization of hetero-chromatin.

Host: Melina Schuh

Wednesday / 13.02.2019 / 14:00

Max Planck Institute for Biophysical Chemistry
Large Seminar Room / Administration Building