Mapping the Hyaluronan-Rich Pericellular Coat of Living Cells

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A coat of hyaluronan (HA) and GAGs envelops many mammalian cells. This pericellular coat (PCC) plays a vital role in biological processes such as adhesion, proliferation, motility and embryogenesis. Due to its invisibility to most microscopy techniques, novel methods for its static and dynamic characterization, as well as alterations due to GAGs, is needed. Therefore we employ a toolbox of different biophysical techniques, including confocal microscopy, particle tracking micro-rheology and adhesive nanostructured surfaces. Thus we were able to obtain a micromechanical map of the PCC, which could be correlated to its hyaluronan distribution profile [1] and are able to study the dynamic modulation of the PCC in response to different extracellular signals.

Based on the obtained micromechanical map of the PCC and the corresponding HA distribution profile, we were able to elucidate the structure of the PCC on living chondrocytic cells: HA is not forming a multi-layered coat, but instead and adhesive carpet, where each HA chain is attached to the cell membrane. The architecture of the PCC will furthermore be influenced by the molecular interaction of HA with different HA binding proteins; we are therefore studying their effect on the mesoscopic structure of the PCC and its micromechanical properties are changed in the presence of different hyaladherins.

[1] H. Boehm, T. A. Mundinger, C. H. J. Boehm, V. Hagel, U. Rauch, J. P. Spatz, J. E. Curtis, *Soft-Matter,* DOI: 10.1039/B905574F, *2009*, vol. 5 (21) pp. 4331-4337