Structural analysis of the actin cortex and its correlation to cell mechanics in adhered and suspended states

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The cellular cortex plays an important role in biological processes such as cell migration and division. This 200nm thick network beneath the cell membrane is mainly composed of actin filaments, associated with motor proteins and linkers. Its mechanical properties act as the main contributor to the mechanics of cells and their shape. During cell adhesion the cortex is expected to be altered [1]. In order to test how such alterations influence the cellular mechanics during adhesion, we compared the mechanical properties of RPE1 cells in adhered and suspended states by AFM. The results were correlated to the local structure of the actin network using scanning electron microscopy. We found differences in the cell mechanics and structures depending on the state of adhesion. Altering the activity of the motor protein myosinII allowed us to further asses the contribution of this protein to the mechanical properties of the cells in both states. Structural changes were analyzed using a home-made vectorial tracing software.

Hence, we describe here a quantitative correlation between the structure of the actin cortex and the mechanical properties of cells both in the frame of adhesion state and by chemical alteration. These results are promising in understanding the mechanical plasticity of cells in processes like e.g. cell differentiation or metastasis.

[1] Chugh, P. and E.K. Paluch, *The actin cortex at a glance.* J Cell Sci, 2018. **131**(14).