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Influence of E-cadherin on Epithelial Cell Mechanics and Adhesion

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The mechanical and physiological cohesion of multicellular organisms' tissues is of particular importance for the function of these tissues. Cell-cell and cell-matrix adhesions are crucial for the formation, composition, architecture and function of tissues. Transmembrane proteins are required for cell-cell connections and cell-matrix adhesions, which interact with corresponding structures on the surface of the opposite cell. The present study aims to investigate the influence of transmembrane proteins on the mechanics of a cell monolayer by utilising E-cadherin knockout and E-/K-Cadherin double knockout MDCKII cells. The cadherins are calcium-dependent transmembrane proteins that mediate homophilic cell-cell adhesion and interact with the cortical actin scaffold. This is of particular interest given that many carcinogenic mutations have been found to lack cadherins, resulting in ineffective binding among tumour cells, making them easier to detach and carry to other parts of the body.

The behaviour of these knockout cells is then compared to that of wild-type MDCKII cells containing cadherins using collective cell migration velocity measurements and cell-cell adhesions measurements using atomic force microscope (AFM), specifically single cell force spectroscopy (SCFS) as well as electric cell-substrate impedance sensing (ECIS).