CELL MECHANICS ACROSS SCALES AND GENE EXPRESSION

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In multicellular organisms, cells generate and undergo mechanical forces that propagate through tissues. Using genetically encoded molecular tension sensors, we seek to understand how mechanical forces propagate through scales and the molecular mechanisms by which they activate genetic programs.

We show that in adherent migrating cells, various proteins of adhesion complexes and the nuclear envelope can undergo tension changes that exhibit non-trivial relationships between each other and with cell scale forces. Moreover, these tension changes associate with changes in enzymatic activities and post-translational modifications of specific proteins, and ultimately gene expression.

These results provide insight into the complexity of the cell composite mechanics and its connection with major signaling networks involved in development and disease.