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The contribution of cytoskeleton networks to stretch is strain dependent[1] KENECHUKWU DAVID NNETU, TOBIAS KIEßLING, ROLAND STANGE, JOSEF KÄS, University of Leipzig — The interaction between the cytoskeleton filaments in a cell provides it with mechanical stability and enables it to remodel its shape. The rheological response of cells has been characterized either as viscoelastic or soft-glassy which neglects the molecular origin of cell response. In this work, by using a large amount of cells (>10,000 in total) exceeding previous statistics by a decade, we link observed cell response to its molecular origin by showing that actin and microtubule networks maintain the mechanical integrity of cells in a strain dependent manner. While the actin network solely regulated cell deformation at small strain, the microtubule network was responsible for cell relaxation. At large strain, actin and microtubule networks dominated cell response with microtubules having a bipolar effect on cells upon stabilization. This effect could explain the relapse of some cancer after chemotherapy treatment using Taxol thus providing a bridge between soft condense matter physics and systems biology.

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