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The cytoskeleton significantly impacts invasive behavior of biological cells ANATOL FRITSCH, JOSEF KÄS, KRISTIN SELTMAN, THOMAS MAGIN, University of Leipzig — Cell migration is a key determinant of cancer metastasis and nerve regeneration. The role of the cytoskeleton for the epithelial-meschenymal transition (EMT), i.e, for invasive behavior of cells, is only partially understood. Here, we address this issue in cells lacking all keratins upon genome engineering. In contrast to prediction, keratin-free cells show a 60% higher deformability compared to less pronounced softening effects for actin depolymerization. To relate these findings with functional consequences, we use invasion and three-dimensional growth assays. These reveal higher invasiveness of keratin-free cells. This study supports the view that downregulation of keratins observed during EMT directly contributes to the migratory and invasive behavior of tumor cells. Cancer cells that effectively move through tissues are softer and more contractile than cells that stay local in tissues. Soft and contractile avoids jamming. Naturally, softness has to have its limits. So neuronal growth cones are too soft to carry large loads to move efficiently through scar tissue, which is required for nerve regeneration. In synopsis, the physical bounds that the functional modules of a moving cell experience in tissues may provide an overarching motif for novel approaches in diagnosis and therapy.

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