Jamming transitions of cancer cells during tissue invasion

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Cancer cell migration is a plastic and adaptive process which depends on molecular and physical properties of the microenvironment. When monitored in vivo using intravital multiphoton microscopy, tissue microniches provide invasion-promoting tracks that enable collective migration along tracks of least resistance. In regions of tissue confinement, invading cancer cells undergo a jamming transition towards collective migration and circulate as both individual cells and multicellular clusters for collective organ colonization. Using targeted interference with cadherin adhesion systems, conversion from collective invasion to single-cell dissemination was obtained only in zones of low tissue confinement, whereas at high tissue density multicellular migration was enforced. The data suggest that metastatic cancer cells can undergo physicochemical reprogramming in response to physical determinants of the encountered tissue, and thereby balance cell-intrinsic adhesion and mechanocoupling with encountered cues.