In order to determine how cells squeeze through narrow constrictions, as they would during cancer cell invasion through tissues and barriers such as the basement membrane, we (Olson laboratory) selected MDA MB 231 breast cancer cells on the basis of their ability to pass through cell inserts with 3 μM pores. After 3 rounds of enrichment, selected cells were significantly better at passing through 3 μM pore inserts than parental cells.

The decreased area of selected cells was accompanied by increased MLC phosphorylation, suggesting that actin-myosin contractility contributed to the morphological differences and ability to pass through narrow constrictions.
Three possible questions to be answered:

(i) Do selected cells generate more force during spreading?
(ii) Do they generate more force during the stationary phase?
(iii) Are the selected cells altered for their mechanosensing abilities?

Techniques to be used: magnetic tweezers, traction force microscopy, elastic pillars sensors

References
1. Harada et al. (2014) Nuclear Lamin stiffness is a barrier to 3D migration but softness can limit survival. JCB 204: 669-682