While much is known about the genetic and cellular defects that cause cancer, comparatively little is known about the progress of the disease in individual cells. This talk will focus on microfluidic approaches for measuring physical properties of single cells with particular focus on high precision measurement of cell mass, growth, density, and stiffness. Ultimately, the ability to combine multi-parameter physical with molecular measurements at the single-cell level could not only be used to further understanding of important cellular processes such as malignant transformation but may also be used to increase the predictive power of clinical diagnostics.