

Jeffrey Fredberg's title and abstract

“A hard day in the life of a soft cell”

With every beat of the heart, inflation of the lung, or peristalsis of the gut, cell types of diverse function are subjected to substantial stretch. New data show that cell responses to a transient stretch exhibit remarkable physical similarities to fluidization observed in jammed inert matter, including colloids, pastes, emulsions, and foams, and thus implicate mechanisms mediated not only by specific signaling intermediates, as is usually presumed, but also by nonspecific actions of a slowly evolving network of physical forces. These results support the idea that the cell interior is at once a crowded chemical space and a fragile soft material in which the effects of biochemistry, molecular crowding, and physical forces are complex and inseparable, yet conspire nonetheless to yield remarkably simple phenomenological laws. These laws appear to be universal and thus comprise a striking point of contact between the worlds of cell signaling biology and soft matter physics.