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*Tuning the kinetics of cell-cell adhesion.*

Cadherins are a family of cell-surface proteins that bind cells together in all soft tissue. Cell-cell adhesion is a dynamic process; cadherins tailor their binding in response to changes in the mechanical properties of their surrounding environment. However the kinetics of cadherin interactions in the presence of mechanical stress has not yet been measured. Here we use single molecule force measurements with an Atomic Force Microscope (AFM) and Molecular Dynamics simulations to identify how cadherins tune their unbinding kinetics and withstand mechanical stress. We show that cadherins form three types of adhesive bonds: catch bonds which, counter-intuitively, become longer lived and lock in the presence of tensile force, slip bonds which become shorter lived when pulled and ideal bonds that are insensitive to tugging. Catch, slip and ideal bonds allow cadherins to withstand tensile force and tune the mechanical properties of adhesive junctions. (Received March 04, 2013)