

Cadherin adhesion in assemblies of lipid droplets

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The regulation of cell-cell adhesion is important in cell motility, tissue growth, and for the mechanical integrity of tissues. Although the role of active cytoskeleton dynamics in regulating cadherin interactions is crucial *in vivo*, here we present a biomimetic emulsion system to characterize the passive E-cadherin-mediated adhesion between droplets. The visualization of a three-dimensional assembly of lipid droplets, functionalized with extracellular E-cadherin domains, reveals a hierarchy of homophilic interactions. First, the high interfacial tension of droplets facilitates *trans* cadherin-cadherin adhesion, which is strong enough to stabilize looser than random close packing configurations. Second, fluorescence enhancement shows that adding clustering agents, such as calcium or chelating ligands, favor the lateral *cis* adhesion of the already bound cadherin pairs over the clustering of monomer cadherin on the surface. Finally, using an E-cadherin mutant that prevents the lateral interactions weakens *trans*-binding and eliminates clustering of thermal droplets. These results suggest that passive clustering, via calcium-induced dimerization or membrane ordering, contribute to the reinforcement of cell-cell contacts.