Model platforms for studying mechanical factors involved in T cell activation

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T cells can be activated via binding of T cell receptors (TCRs) to peptide-major histocompatibility complex (pMHC) molecules displayed on the surface of antigen presenting cells (APCs). The process is accompanied by clustering of TCRs and other co-receptors for the formation of the immunological synapse (IS) [1]. Experimental evidence shows that mechanical forces are involved in this process. However, the possible roles of mechanical force in ligand discrimination, clustering of TCRs or in the final activation or deactivation of T cells remain elusive. We present cushioned-lipid bilayers as models of APCs for studying T cell activation. We use hydrogels with controllable mechanical properties and tunable immobilized ligands for TCR, costimulatory and adhesion molecules, acting as supports for the lipid bilayers. This synthetic surface is used as 'artificial APCs' to study mechanism of T cell activation.

[1] Monks CRF, et al., Nature, 395 (1998)