1153-92-175 **Jun Allard*** (jun.allard@uci.edu), CA. *Transient cell-cell contacts: fluid dynamics at cell-scale and receptor-scale.* Preliminary report.

In many biological settings, two or more cells must come into contact and form bonds between the molecules on their surfaces. In some cases, including T Cells during immune function, the contacts must form in sub-second times for efficient cell-cell communication. Two questions arise: First, the aspect ratio of the cell-cell interface ($\sim$ 10 nm thick and $\sim 10\mu$m in diameter) puts them into the thin-layer limit, or "lubrication limit" of fluid dynamics, raising the question of whether hydrodynamics can impede membrane motion. Second, how do the molecules on the cell surfaces rearrange for contact formation? We present computational fluid dynamics and stochastic rare event simulation using the Weighted Ensemble method. In some cases, the time it takes for an active force to drive local contact may increase if the cells are closer together, leading to an optimal length for cellular protrusions like microvilli. Rare-event simulations of surface molecule motion demonstrate interactions that accelerate changes in surface organization. These simulations point to novel strategies for engineering more efficient T cell function, e.g., in immunotherapies. (Received August 26, 2019)