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Presentation Title:

Dynamics of specific vesicle-substrate adhesion: From local events to global dynamics

Presentation abstract:

A standard approach used in the study of cell adhesion is to spread cells on flat, functionalized substrates. However, data on the dynamics of the early stages of adhesion are sparse. It is in this regime that membrane-related interaction should play an important role. These effects have been studied with passive cell-model systems, such as giant vesicles, which carry mobile ligands that can bind specifically to receptors immobilized on a flat substrate. It has been previously shown that adhesion in such systems is associated with the formation of radially growing adhesion domains. While the adhesion dynamics at low densities of ligands is well understood, in other regimes, a variety of scaling modes have been suggested and measured. Thus, even in the relatively simple vesicle-substrate system, the dynamics of adhesion is poorly understood.

Novel results from experiments on adhesion dynamics, carried out with binding pairs of intrinsically low binding affinity, will be presented. In this system, the adhesion is still mediated by adhesion domains but large deviations from the radial growth are observed, exposing the statistical nature of the adhesion process. Excellent agreement with the results of dynamic simulations of a specifically adhering membrane are obtained. Together, these results allow for the development of a more holistic view of the dynamics of the adhesion process, which will be elucidated.