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Pulse Dynamics in Endocytic Protein Patches[1] ANDERS CARLSSON, XINXIN WANG, Washington University in St Louis — During the process of endocytosis in yeast, submicron-sized protein patches assemble, exert forces on the membrane to bend it, and finally disassemble. The patches contain an initial coat that establishes the endocytic site and binds cargo, polymers of the protein actin, "nucleation-promoting factors" (NPFs) that catalyze actin polymerization, and curvature-generating proteins. We model the dynamics of protein patches in yeast using a variant of the activator-inhibitor "Fitzhugh-Nagumo" model. We treat NPFs as the activator, and polymerized actin as the inhibitor, on the basis of findings that the lifetime of NPF patches is extended when actin polymerization is inhibited. Using this model, we find that as the polymerization rate is reduced, there is a discontinuous transition from protein pulses to persistent patches. We also find, surprisingly, that in some parameter regimes reducing the polymerization rate can increase the polymerized-actin content of the patch. We present data for NPF dynamics budding yeast, which confirm some of the predictions of the model.

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