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Lipid Gymnastics: Tethers and Fingers in membrane LOBAT TAYEBI, UCdavis, Applied Science Department, GREGORY MILLER, ATUL PARIKH, UCdavis, Department of Applied Science — A significant body of evidence now links local mesoscopic structure (e.g., shape and composition) of the cell membrane with its function; the mechanisms by which cellular membranes adopt the specific shapes remain poorly understood. Among all the different structures adopted by cellular membranes, the tubular shape is one of the most surprising one. While their formation is typically attributed to the reorganization of membrane cytoskeleton, many exceptions exist. We report the instantaneous formation of tubular membrane mesophases following the hydration under specific thermal conditions. The shapes emerge in a bimodal way where we have two distinct diameter ranges for tubes, $\sim 20\mu$m and $\sim 1\mu$m, namely fat fingers and narrow tethers. We study the roughening of hydrated drops of 3 lipids in 3 different spontaneous curvatures at various temp. and ionic strength to figure out the dominant effect in selection of tethers and fingers. Dynamics of the tubes are of particular interest where we observe four distinct steps of birth, coiling, uncoiling and retraction with different lifetime on different thermal condition. These dynamics appear to reflect interplay between membrane elasticity, surface adhesion, and thermal or hydrodynamic gradient.

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