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Monolayer Circles to Stripes via Cholesterol and Curvature

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Lung surfactants lower the surface tension at the alveolar air-water interface to minimize the work of breathing. This talk will examine morphological transitions in multicomponent lung surfactant monolayers induced by cholesterol or interfacial curvature. The role of cholesterol in lung surfactant is still open to debate as the clinical lung surfactant replacements Curosurf and Survanta have all cholesterol removed, while Infasurf contains 5-6 mol% cholesterol. We have found a novel semi-circle to uniform width stripe transition in model lung surfactant monolayers on addition of cholesterol. This transition is the result of epitaxial growth of a cholesterol rich phase on existing phospholipid crystalline domains. Theoretical predictions show that domain shapes are set by a balance of line tension, γ , and the dipole density difference, Δp . Once the domains reach a critical area,