**Smart lipid balloons: Stimuli-responsive natural lipid droplets for selective lipid trafficking**

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Natural lipid droplets (LDs or oleosomes) play a crucial role in the biological function of cells, due to their ability to traffic lipids through their triacylglycerol core. By combining experimental techniques with molecular dynamics simulations, we show the role of the LD phospholipid monolayer on the trafficking of lipids (absorption or release). Lipids can permeate the LD monolayer due to hydrophobic forces, and rest in their core, leading to an LD volume expansion and decrease of the monolayer density. Similarly, when LDs are in contact with a hydrophobic surface, lipids are fueled outside LDs through a phospholipid channel, leading to LD deflation. The ability of the LDs to expand in volume or shrink is assigned to the weak lateral molecular interactions in the phospholipid monolayer which sits on the liquid triacylglycerol core, permitting a reversible dilation. The mechanistic understanding of lipid trafficking by LDs is ameliorating the understanding of the LD functions, which can lead to delicate and targeted carrying and delivery of therapeutics for disease treatments.

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