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Aspirin Reorganizes the Lipid Membrane

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The lipid membrane is the most important biological interface, and the fluidity of the membrane is a key property. Cholesterol is a well-known mediator of membrane fluidity. Using X-ray and neutron diffraction we have recently shown that cholesterol at physiological concentrations induces lateral membrane organization. Incorporation of cholesterol into the membrane leads to immiscible cholesterol crystals at high concentration (>37.5mol%), and also creates transient ordered structures, known a rafts, at physiological concentrations of ˜30mol% [1,2]. Non-steroidal anti-inflammatory drugs such as Aspirin or Ibuprofen are amphiphilic molecules, which may interact with the lipid membrane. However, a direct interplay between Aspirin and cholesterol has never been investigated. We present direct experimental evidence for an interaction between Aspirin and cholesterol on the level of the cell membrane. We show that Aspirin partitions in lipid bilayers and increases bilayer fluidity [3]. Most importantly Aspirin was found to dissolve cholesterol plaques [4]. From coherence length dependent neutron diffraction we present evidence that Aspirin changes the molecular structure of lipid rafts induced by physiological concentrations of cholesterol.

[1] MA Barrett, S Zheng, LA Toppozini, RJ Alsop, et al. Soft Matter 9, 9342-9351, 2013.
[2] CL Armstrong et al. PLoS ONE 8, e66162, 2013.
[3] MA Barrett, S Zheng, G Roshankar, RJ Alsop, et al. PLoS ONE 7, e34357, 2012.
[4] RJ Alsop, et al. submitted

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