Characterization of the membrane-regulated dynamics of Mga2 from baker's yeast

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Biological membranes define the boundaries of living organisms and organelles. Their physicochemical properties are determined by the lipid and protein composition. An important parameter is the degree of lipid saturation which determines lipid packing, water permeability, and membrane fluidity. Key for maintaining such physicochemical properties are sensor proteins that examine and regulate lipid compositions. However, so far little is known about the mechanisms that sense and control the different membranes properties. An excellent model to study the regulation of the lipid acyl chain composition is the OLE pathway that controls the production of unsaturated fatty acids in *Saccharomyces cerevisiae*. Within the OLE pathway the ER-resident transcription factor Mga2 gets ubiquitylated by the E3-ligase Rsp5 when the cell requires the production of unsaturated fatty acids and gets processing by the proteasomes which releases an active form that induces the expression of the Δ9-fatty acid desaturase OLE1.
Our aim was to investigate the sensing mechanism and the signal transmission from Mga2’s transmembrane region to its ubiquitin site. The data from our Förster Resonance Energy Transfer (FRET) experiments indicates that the juxtamembrane region with its structural dynamics could serve as an amplifier or lever for the fluctuating signal from the sensory TMH.