According to the flexible surface model (FSM), we hypothesize that changes in membrane curvature influence rhodopsin activation. For the first time, we show that rhodopsin adopts a solvent-swollen state upon light activation. Osmotic stress experiments are conducted on an archetypical GPCR rhodopsin (dim light receptor) in its native lipid membrane as well as in POPC lipid membranes. Here, we investigate how soft matter (lipids and water) regulate GPCR functions, but the changes that these proteins undergo during activation still largely remain a mystery.

**ROLE OF WATER**

- UV-Visible spectroscopy was used to observe the effects of soft matter on rhodopsin activation and binding to the G-protein C-terminal transducin peptide.
- Rhodopsin was reconstituted into 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine (POPC) vesicles to investigate the effects of membrane lipid properties on peptide binding.

**ROLE OF LIPIDS**

- POPC lipids possess a zero intrinsic membrane curvature which favors the inactive Meta-I form of rhodopsin.
- Lipids that possess a negative intrinsic membrane curvature favor the light-activated Meta-II form of rhodopsin.

**CONCLUSIONS**

- Large osmolytes such as PEG 1500 shift the equilibrium to the Meta-I state. These results can be explained by the sponge model. We predict that upon activation water rushes into the rhodopsin core.
- Small osmolytes such as PEG200 have the opposite effect and enter the protein core to stabilize the light-activated solvent-swollen Meta-II state.

**REFERENCES**