Towards understanding the role of BAR domain proteins in membrane tension sensing

Ewa Sitarska[1] and Alba Diz-Muñoz[1]

[1]Cell Biology and Biophysics Unit, European Molecular Biology Laboratory, Heidelberg, Germany

Membrane tension has been shown to have a critical role as a physical regulator of cell migration, polarization, and the balance between endocytosis and exocytosis. Despite its importance, it remains unclear how cells sense this mechanical property. We hypothesize that cells sense it by monitoring surface deformations, also referred to as membrane curvature. A group of proteins that is of particular interest in the context of membrane curvature binding is BAR domain family.

Membrane tension affects the landscape of membrane deformations which, in turn, could alter the binding of BAR domain proteins. Following RNAseq we identified BAR domain proteins with upregulated expression in differentiated (migratory) vs undifferentiated (non-migratory) HL-60 cells. Next, we used live TIRF imaging to capture the localization of GFP-tagged BAR domain proteins on the plasma membrane and assessed if their binding is affected by plasma membrane tension. Moreover, we prepared CRISPR/Cas9 knockout cell lines with chosen candidates and performed membrane tension measurements using Atomic Force Microscopy. We observe an increase in membrane tension in some knockout cell lines and are looking into its origin, focusing on structure and polymerization dynamics of actin.