

BIOLOGICAL SCIENCES SEMINAR SERIES

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“The eukaryotic cell membrane: an integrator of mechanical and chemical inputs”

The surface of a eukaryotic cell interfaces with the external milieu constantly, decoding signals in the form of chemical and mechanical inputs. These cues are interpreted primarily by membrane receptors which are embedded in the plasma membrane, a fluid lipid bilayer templated by an active cortical actin meshwork. One such membrane receptor, the integrin receptor binds to the extracellular matrix, and receives mechanical signals from the external environment. Chemical cues activate Rho A-dependent signaling cascades in the cell, whereas mechanical inputs activate mechano-transducers via the Talin-Vinculin axis. Remarkably, integrin receptor activation downstream of these two pathways leaves an imprint on this fluid membrane in the form of spatially localized mesoscale liquid-ordered (lo) membrane domains resembling *active emulsions*. These membrane domains encode information about both the chemical and mechanical nature of the substrate. This is necessary for integrin receptor function, namely cell spreading and migration in complex environments. The active actin-membrane composite thus behaves as a mechano-responsive medium, integrating chemical and physical cues for the regulation of cell physiology.