BIOCHEMISTRY 640

(Biomembranes Discussion Group)

Wednesday, April 4, 2018

Room 4-70 Medical Sciences Building

4:00 PM

Swai Mon Khaing

MSc Student, Touret Lab

"Novel model for plasma membrane organization"

Control of the lateral diffusion of immune receptors supports pathogen induced activation via their clustering. The encounter is often brief, thus receptors oligomerization and activation must be rapid. Arguably, the uninterrupted diffusion of these receptors is beneficial, however, most membrane proteins exhibit confined behavior. *Kusumi* et al., proposed a "fence and picket" membrane model in which transmembrane proteins, the "pickets" are transiently immobilized by interacting with the cortical cytoskeleton.

Here, CD44, an abundant single pass transmembrane protein in macrophages, is shown to function as a picket. Not only CD44 is bound to the cortical actin cytoskeleton, but also to the pericellular coat via multiple hyaluronan (an abundant extracellular matrix protein) binding sites. Through these interactions, CD44 limit the diffusion of phagocytic receptors. Remodeling of the cortical actin fence acts indirectly to support clustering and activation of receptors to initiate pathogen phagocytosis.

This work provides novel insights on the organization of cell membrane and how it controls receptor activation.

Kusumi, A., Fujiwara, T. K., Chadda, R., Xie, M., Tsunoyama, T. A., Kalay, Z., ... & Suzuki, K. G. (2012). Dynamic organizing principles of the plasma membrane that regulate signal transduction: commemorating the fortieth anniversary of Singer and Nicolson's fluid-mosaic model. *Annual review of cell and developmental biology*, *28*, 215-250.

Freeman, S. A., Vega, A., Riedl, M., Collins, R. F., Ostrowski, P. P., Woods, E. C., ... & Mayor, S. (2018). Transmembrane Pickets Connect Cyto-and Pericellular Skeletons Forming Barriers to Receptor Engagement. *Cell*, *172*(1), 305-317.