Biology Seminar

12:30 - 1:30 pm
Friday, October 30, 2026
BGS 0165



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Regulation of membrane trafficking by phosphatidylinositol 4-kinases and phosphatidylinositol 4-phosphate

PIPs are low-abundance membrane phospholipids with crucial roles in cell physiology, including regulation of membrane trafficking. Eukaryotes have three different types of phosphatidylinositol 4-kinases (PI4Ks) that synthesize phosphatidylinositol 4-phosphate (PI4P). PI4P serves as a precursor to $PI(4,5)P_2$ and $PI(3,4,5)P_2$ at the plasma membrane and binds and recruits proteins needed for post-Golgi membrane trafficking. Mammals have two type II (PI4K2A, PI4K2B) and two type III (PI4KA, PI4KB) PI4Ks, whereas flies and budding yeast each have a single type II PI4K and two type III PI4Ks. PI4KA is essential in every organism where it has been investigated (budding yeast, flies, mice). In contrast, budding yeast PI4KB localizes to the Golgi and is essential for intracellular trafficking, whereas PI4K2 is non-essential and plays a role in endosome motility.
We previously showed that Drosophila PI4KB (also called Four wheel drive [Fwd]) and PI4KII are non-essential, which was surprising given the genetic results in budding yeast. We discovered that Fwd is needed for spermatocyte cytokinesis, whereas PI4KII is required in salivary glands for growth of regulated secretory granules. These observations led us to uncover overlapping essential roles of these enzymes in intracellular trafficking. Moreover, we recently identified upstream regulators of Fwd and PI4KII that are essential for these PI4Ks to carry out their functions in Drosophila development.