

The Pelletier lab studies several facets of centrosome biogenesis and function, with a particular emphasis on how their perturbation can lead to devastating developmental diseases and cancer. By organizing PCM, centrosomes orchestrate several fundamental cellular processes including bipolar mitotic spindle assembly/positioning and cell motility. Centrosome also templates the formation of cilia and flagella, key cellular appendages that play important roles during animal development through myriad of signaling cascades. Using functional proteomics, in combination with cutting-edge microscopy and biochemistry, the overarching goal of the lab is to identify and study novel proteins and protein complexes required for these processes, and to illuminate their role in development and diseases.

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### **Abstract**

#### Charting the Human Centrosome-Cilium Landscape

The centrosome is the major microtubule-organizing center (MTOC) in animal cells. Centrosomes control a plethora of cellular processes including the organization of the interphase microtubule network, the assembly of the mitotic spindle and the formation of cilia/flagella. Mitotic cell division relies on the formation of a robust bipolar spindle, which mediates the accurate segregation of genetic material to daughter cells. In mitosis, two centrosomes need to be present, each organizing one of the two spindle poles. Numerical and structural centrosome aberrations can give rise to the formation of abnormal mitotic spindle and genome instability. In vertebrates, cilia fulfill diverse functions critical for embryonic development and the homeostasis of adult tissues. Therefore, defects in cilia biogenesis and function can lead to the onset disease, commonly referred to as ciliopathies including conditions such as blindness, infertility, obesity, mental retardation, situs inversus and polycystic kidney disease. In my presentation I will discuss our work using sub-diffraction imaging coupled with functional proteomics to generate a nanometer functional atlas of the human centrosome-cilium interface and discuss recent progress on our understanding of the molecular mechanism underpinning the assembly and function of these fascinating organelles.