



*Division of Biology Presents:*

## **Cardiomyocyte Adhesion Complexes and their Linkages to the Cytoskeleton**

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With every heartbeat, the junctional complexes that couple cardiomyocytes must transmit the mechanical forces of contraction while maintaining adhesive homeostasis. Cardiomyocytes are linked end-to-end by the intercalated disc (ICD), a specialized junction that coordinates signaling, electrical and mechanical operations. The ICD comprises adherens junctions (AJs) and desmosomes that connect the actin and intermediate filament cytoskeletons, respectively, of neighboring cells. ICD function requires multiple adhesion and cytoskeletal proteins and mutations in these proteins are linked to cardiomyopathies. Yet little is known about how adhesion complexes are regulated to establish and maintain heart tissue integrity.

The long-term goal of the Kwiatkowski lab is to gain a deep, mechanistic understanding of cardiomyocyte adhesion and cytoskeletal organization at the ICD. Our current research focuses on the role of  $\alpha$ -catenin, the primary mechanoresponsive link between the cadherin-catenin complex and actin. Our approach is to define how mechanical and molecular inputs are transduced through  $\alpha$ E(Epithelial)-catenin and  $\alpha$ T(Testes)-catenin to regulate cardiomyocyte adhesion and cytoskeletal organization. We hypothesize that  $\alpha$ -catenins function as central regulators of junctional complex assembly and actin integration at the intercalated disc to control cardiomyocyte adhesion and organization. We are using a combination of computational tools, proteomics, protein biochemistry, cell biology, super resolution and electron microscopy to study  $\alpha$ -catenin and associated ligands function in cardiomyocytes. Our rationale is that defining the individual and collective roles of  $\alpha$ -catenin and its ligands at the cardiomyocyte AJs will provide fundamental insight into how cardiomyocyte AJs balance mechanical and signaling functions.

If you would like to visit with Dr. Adam Kwiatkowski, please contact Luke Messer at [clukemesser@ksu.edu](mailto:clukemesser@ksu.edu).

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