Title:	Understanding the role of actomyosin complex in the developing lymph gland of Drosophila melanogaster
Authors:	Sharma, Shiv Kumar
Keywords:	Actomyosin complex Drosophila Melanogaster
Issue Date:	28-Jul-2021
Publisher:	IISERM
Abstract:	The mechanical property of a cell is indicated by the actomyosin activity, which regulates several cellular processes, including cell adhesion, apoptosis, proliferation, differentiation, and collective cell migration in Drosophila, C.elegans, and mammalian system. Despite the recent surge in studies related to actomyosin in tissue morphogenesis and cell fate specification in a different organism, the blood type-specific role of actomyosin components are not very well worked out. Since the last decade, Drosophila hematopoiesis has helped us understand the basic cellular and molecular mechanisms underlying the production and function of blood cells in health and disease. Using the Drosophila larval hematopoietic system (lymph gland), I have tried to understand the requirement of actomyosin in blood cell development. Through genetics and molecular approaches, the current work reveals that the maintenance of blood progenitor cells depends on the actomyosin activity. Actomyosin complex in the larval blood progenitors regulates the transcriptional activator of Hh signaling: Cubitus interruptus (Ci). Interestingly, the enrichment of cortical actomyosin in the progenitor cells is regulated through DE-cadherin and angiotensin- converting enzyme (Drosophila ANCE, a homolog of ACE). These studies also revealed another exciting mechanism where angiotensin-converting enzyme can perform RAAS independent function in the hematopoietic system. In the second part of my work, I have demonstrated that the blood progenitors' proliferation is regulated by Ance-DE-Cadherin-Actomyosin activity. Our detailed analysis reveals that the actomyosin activity regulates the G2/M transition in the otherwise proliferative progenitor cells. Therefore, Ance-shg-actomyosin plays a dual role in Drosophila progenitors of the lymph gland. In the last part of my work, I tried to understand actomyosin's role in the hematopoietic niche. My effort has yielded a novel interaction between the hematopoietic niche and cardioblast, which is essential for LG homeostasis. Overall, the work done provides a significant enhancement of our current understanding of the role of mechanical regulation on blood cell development. Given the resounding similarity between the Drosophila and the vertebrate hematopoietic system, the outcome of this work will contribute significantly towards our understanding of developmental hematopoiesis.
URI:	http://hdl.handle.net/123456789/3715
Appears in Collections:	PhD-2012

Files in This Item:

File	Description	Size	Format	
Shivkumar (PH12101) .pdf		52.5 MB	Adobe PDF	View/Open

Show full item record

Admin Tools

Edit...
Export Item
Export (migrate) Item
Export metadata