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Research : Mechanisms of biological tube formation in Drosophila tracheal system

Biological tube formation is a developmental process required for the formation of the respiratory, vascular and glandular system of the body. Defects in tube formation result in numerous human diseases including polycystic kidney disease, atherosclerotic heart disease and cancer. The Drosophlia trachea system is a complex interconnected tubular network that delivers oxygen to every cell of the body. It is an excellent model system to study the molecular basis of cell migration, cell recognition, cell adhesion and branch fusion during tube formation. My work is focused on studying the regulation of tracheal gene expression and how tracheal-expressed genes control the complex cellular behaviors that result in the formation of a continuous tubular network. Current projects in my lab focus on 1) using molecular biology techniques to determine minimal regulatory regions of tracheal-expressed genes to identify potential direct regulators, 2) using expression profiling and cell-separation techniques to isolate tracheal cells and examine gene expression changes at different developmental time-points. 3) using genetics to understand the role that tracheal genes play during the development and function of the tracheal system.

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An image of the developing Drosophila trachea illustrating the location of the tracheal fusion cells (magenta) that lead branch migration and fusion. Confocal image of a stage 15 breathless-Gal4 UAS-lacZ embryo with the trachea visualized by anti-ß-galactosidase immunostaining (green), and the fusion cells indicated by anti-Dysfusion.

Publications

Jiang, L., Roger S. and Crews, S.T. (2007) The Drosophila Dead end Arf-like3 GTPase controls vesicle trafficking during tracheal fusion cell morphogenesis. Dev. Bio.15:487-499. (Selected as a Recommended Read by Faculty of 1000)

Jiang, L. and Crews, S.T. (2007) Transcriptional specificity of Drosophila dysfusion and the control of tracheal fusion cell gene expression. J. Bio. Chem. 28: 28659-68. (with cover photo)

Jiang, L. and Crews, S.T. (2006) dysfusion Transcriptional Control of Drosophila Tracheal Migration, Adhesion, and Fusion. Mo. Cell. Biol. 26: 6547-6556.(with cover photo)

Jiang, L. and Crews, S.T. (2003) The Drosophila dysfusion basic helix-loop-helix (bHLH)-PAS gene controls tracheal fusion and levels of the trachealess bHLH-PAS protein. Mol. Cell. Biol. 23: 5625-5637.(with cover photo) (Selected as a recommended read by faculty of 1000)