



Stephen COHEN

Ph.D, Princeton University

Executive Director

Temasek Life Sciences Laboratory

1 Research Link, NUS

Singapore 117604

Adjunct Professor, DBS

Phone: 6872 7010

E-mail: steve@tll.org.sg

MAJOR RESEARCH INTERESTS

Work from my lab over the past several years has focused on understanding biological functions of microRNAs. Our approach combines conventional genetic analysis, to understand the biological process affected by the microRNA, with development of computational and biochemical tools to identify the target genes that microRNAs regulate. microRNA genes are numerous and they are involved in diverse biological processes. These include control of tissue growth, cell death, metabolism, cell fate decisions, developmental timing etc. Recent work has shown that many microRNAs are expressed in the brain and we have identified specific microRNA mutants with behavioural and neurodegenerative defects. Understanding the molecular and cellular basis for these defects will be a major focus of research in the next few years. We have also undertaken a long-term project to systematically mutate all fly microRNA genes in the hope of learning more about their functions in the brain.

A second area of research in the lab involves metabolic controls. Nutrient sensing by the Insulin and TOR pathways regulates the balance between growth and metabolism. Perturbations in these pathways are known to be important causes of metabolic diseases, including metabolic syndrome, diabetes, and cancer. We make use of the fly as a genetically tractable model to study regulation of these processes and pathways.

RECENT PUBLICATIONS

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2. Teleanu, A.A., Hietakangas, V., Sayadian, A.C. and Cohen, S.M. (2008) Nutritional control of protein biosynthetic capacity: convergent regulation of Myc by the FOXO and TORC1 branches of the Insulin/TOR pathway. Cell Metabolism, 7, 21-32.
3. Karres, J.S., Hilgers, V. Carrera, I. Treisman, J. and Cohen, S.M. (2007) The conserved microRNA miR-8 tunes Atrophin levels to prevent neurodegeneration in *Drosophila*. Cell 131, 136-145.
4. Varghese, J. & Cohen, S.M. (2007) microRNA miR-14 acts in a feed-forward loop controlling steroid hormone signaling in *Drosophila*. Genes Dev 21, 2277-2282.
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7. Thompson, B.J. & Cohen, S.M. (2006) The Hippo pathway regulates the *bantam* microRNA to control cell proliferation and apoptosis in *Drosophila*. Cell 126, 767-774.
8. Teleanu, A.A., Maitra S. & Cohen S.M. (2006) *Drosophila* lacking microRNA miR-278 are defective in energy homeostasis Genes Dev. 20,417-422.
9. Stark, A., Brennecke, J., Bushati, N. Russell, R.B. & Cohen, S.M. (2005) Animal microRNAs confer robustness to gene expression and have a significant impact on 3'UTR evolution. Cell 123,1133-1146.