

# SEMINAR

## ALL ARE WELCOME

**26 November 2019 (Tuesday), 4pm**  
**The Auditorium (Level 1)**

Hosted by: Dr KOH Tong-Wey

## **Fat-Brain Relay: How fat hormones signal nutrient state to the brain**

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We identified how fly fat communicates with neural circuits to release insulin in response to nutrient state. We also discovered how fat cells secrete the appropriate amount of fat hormones depending on nutrient state. Many health disorders - obesity, diabetes, anorexia- arise from improper hormone secretion and fat-brain communication. Hence, the remarkable molecular and physiological conservation between humans and flies, allows my lab to address complex questions that have the potential to improve human health, while uncovering fundamental biological mechanisms.

Fat cells secrete hormones, which impinge on neural circuits to regulate physiological modalities including hunger, exercise, reproduction and immunity. We investigate how fat hormones relay nutrient status to the brain using a simple model system, the fruit fly. We found that fly fat secretes a hormone Upd2, which is a functional ortholog of human Leptin. This established the conservation between the adipokine signaling mechanisms in humans and flies. Using this system, we discovered how fat hormone signaling alters synaptic plasticity of neural circuits (Brent and Rajan, *in peer-review*). In adipose tissue, we identified a key role for a core autophagy factor Atg8/LC3 in mediating nuclear export and secretion of human Leptin and fly Upd2 from fat cells (Poling et al., *In peer-review*). Thus, we uncover fundamental principles in cell biology and neuroscience and have implications for human health, specifically in developing treatments for eating disorders, diabetes and cardiovascular dysfunctions.

### **Recent Publications:**

1. Brent AE and **Rajan A.** (2019). Adipokines set neural tone by regulating synapse number. bioRxiv. doi: <https://doi.org/10.1101/781526>
2. **Rajan A#**\*, Housden BE, Wirtz-Peitz, Holderbaum L, Perrimon N#. (2017). A mechanism coupling systemic energy sensing to adipokine secretion. *Developmental Cell*, 43(1): 83-98. PMID: PMC5650192. (#corresponding authors; \*Lead author)
3. **Rajan A#** and Perrimon N#. (2012). The Drosophila cytokine Unpaired2 regulates physiological homeostasis by remotely controlling Insulin secretion. *Cell*, 151: 123-137. PMID: PMC3475207 (#corresponding authors)