Group Name: Neuroendocrine control of organ growth and sexual maturation
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Title of the MRP: Neuroendocrine control of organ growth and sexual maturation

Summary of the MRP:

In mammals, the process of sexual maturation is orchestrated by the hypothalamic–pituitary–gonadal axis, which operates through interconnected stimulatory feedback loops. These loops are crucial for gonadal maturation, the secretion of steroid and peptide hormones, and the completion of gametogenesis, all of which are vital for reproductive competence. In contrast, the prevailing view in Drosophila is that sexual maturation is primarily driven by autonomous cellular mechanisms, with minimal involvement of neuroendocrine factors.

Our recent findings indicate that disrupting lipid transport from the fat body by knocking down apolipophorin (apolpp), or in the prothoracic gland (PG) by knocking down Fatty acid transport protein 2 (Fatp2), Semaphorin1a (Sema1a), and leptin-like unpaired 2 (upd2), hinders sexual maturation in Drosophila. This disruption results in larvae that remain within the food source, continuing to grow and gain weight until death [70]; these effects are comparable to those seen in leptin/LepR deficiency in patients and mice. Interestingly, despite achieving unusually large body sizes, Sema1ai larvae possess smaller imaginal discs compared to control larvae (Juarez-Carreño et al., 2021). Based on these observations, this TFM proposal seeks to investigate the mechanisms governing the neuroendocrine regulation of sexual maturation in Drosophila, focusing on the neuroendocrine gland and its associated organs.

The TFM will explore the following specific aims:

1) A comprehensive secretome map from Drosophila PGs in the third instar larvae
2) Morphometric analyses of imaginal discs in control and non-pupating animals.

Methods and technology involved in the MRP:

-An ER-localized TurboID (GFP-TurboID-ER) proximity labeling technique (Bosch et al., 2025).
- Immunohistochemistry
-Morphometric analysis of imaginal discs

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