Title: Cytoophidia elongation and increased incidence of testicular overgrowth from the overexpression of a singular microRNA within Drosophila melanogaster

Name: Najat Dzaki and Ghows Azzam
School of Biological Sciences, Science University of Malaysia, 11700, Gelugor, Penang, Malaysia

Apart from being largely responsible for the synthesis of CTP nucleotide, CTP Synthase (CTPSyn) is involved in phospholipid and sialyglycoprotein production. The enzyme naturally forms structures called cytoophidia in many organisms. As the patterns, shapes, and length of this proto-organelle are altered in response to internal events, it is proposed as an indicator of disruption to the cellular 'normal'. An extensive overexpression screen involving 103 microRNAs in 195 fly lines was conducted to assess the effects of individual microRNAs on cytoophidia within ovarian cells. One microRNA caused a distinct lengthening of cytoophidia, along with significant reductions in ovariole numbers, ovary sizes, and increased numbers of apoptotic nurse cells. However, quantitative PCR did not detect major changes in CTPSyn levels. Drosophila-Activated-Cdc42-Kinase (dAck), a protein which colocalizes with CTPSyn, was downregulated instead. Dysregulation of the human Ack homolog is conducive to murine prostate cancer. Surely enough, this microRNA is able to induce incidences of gross testes overgrowth in Drosophila. Although decreased dAck levels alter cytoophidia within egg chambers, the effect is in their formation patterns; many more micro-cytoophidia appear, but they remain as separate entities. It is therefore possible that the microRNA directly regulates neither CTPSyn nor Ack, and instead a third component of cytoophidia which inhibits tethering. As the microRNA exerts differing consequences between the sexes, another effectee may include a male-specific product controlling spermatocyte proliferation. Eventually, this study may provide insights into pathogenesis of testicular cancer.

Presenting author details
Full name: Najat Dzaki
Contact number: +60127225712
Twitter account: NA
Linked In account: Najat Dzaki
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