



BiophysTO Lunchtime Seminar Series

Date

Thursday Nov 14, 2019
12 - 1 pm

Location

McLennan Physical
Laboratories, Rm MP606
60 St. George Street

*Pizza and refreshments will be
provided*

Dr. Thomas Hurd

Department of Molecular Genetics
University of Toronto

Divide and conquer: how deleterious mitochondrial DNA is eliminated in the germline

Unlike nuclear genomes, mitochondrial genomes undergo little recombination, are inherited only maternally, and are subject to a high mutation rate. Consequently, in order to prevent deleterious mutations from accumulating from one generation to the next, special selection mechanisms exist in the female germline. Using an allele-specific fluorescent *in situ* hybridization approach, we have visualized germline mtDNA selection *in situ* for the first time. Here, we show that mtDNA selection first manifests in the early stages of *Drosophila* oogenesis in differentiating germline cysts. We find that just prior, a reduction in the levels of the pro-fusion protein Mitofusin causes mitochondria to undergo a sustained period of fragmentation. This fragmented phase is necessary to isolate mitochondria preventing them from sharing their contents, which in turn reduces product complementation and allows mitochondria harboring mutant genomes to be selected against. Remarkably, not only is prolonged isolation necessary, but it is also sufficient to induce selection in somatic ovarian tissues where it otherwise does not appreciably occur. Our studies posit a generalizable mechanism to select against deleterious mtDNA mutations that may allow the development of strategies for treatment of mtDNA disorders.

Host: Dr. Walid A. Houry



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