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The NO-Age and NO-AD Seminar Series 018

'Mitochondrial genome mosaicism and resistance to damage'

by

Dr. Steven Zuryn
Queensland Brain Institute, The University of Queensland, Australia

at

14:00-15:00 (CET), Monday, 07th June 2021

Register in advance for this webinar:
https://uio.zoom.us/webinar/register/WN_3XpmDWP_SIe3hG0VtXgN8g

Organizers:
Evandro F. Fang (UiO), Jon Storm-Mathisen (UiO), Menno P. Witter (NTNU),
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Previous recorded talks are available here: https://noad100.com/videos-previous-events/

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Photo: provided by the speaker

Speaker: Steven Zuryn

Title: Mitochondrial genome mosaicism and resistance to damage

Abstract:
Mitochondria contain multiple copies of their own genome (mtDNAs) that encode proteins important for energy generation. Mutations in mtDNAs cause severe metabolic diseases that are heritable. These mutations can also accumulate as we age. We have studied the distribution of mtDNAs in *C. elegans* cells, finding that mutations evolve in stereotyped mosaic patterns between different tissues. This distribution is determined by the activity of a quality control pathway called mitochondrial autophagy (mitophagy), driven by the PINK1-parkin signalling axis. PINK1 and parkin genes are mutated in early-onset Parkinson's disease implying links between mtDNA mutations and neurodegeneration. Indeed, we find that mutations in PINK1/parkin enhance mtDNA mutation levels in neurons and that proteotoxic species associated with Alzheimer's and Huntington's diseases can inhibit mitophagy resulting in increased mtDNA mutation levels in the nervous system. Counteracting the effect of mtDNA mutations, we discovered a new role for the conserved factor ATFS-1/Atf5, which when localised to mitochondria, promotes the repair of mtDNAs and shields cellular function from targeted and age-associated mtDNA damage.

Biography:
Steven Zuryn obtained his PhD at the University of Queensland, studying mitochondrial physiology. He then pursued postdoctoral research at the Institut Génétique Biologie Moléculaire Cellulaire (IGBMC) in Strasbourg, France, where he worked on epigenetic mechanisms that ensure the robustness of changes in cell identity. In late 2015, Steven opened his own laboratory at the Queensland Brain Institute, University of Queensland. His lab works on mitochondrial biology and epigenetics to uncover fundamental genetic principles of the mitochondrial genome (mtDNA). Throughout his research career, Steven has capitalised on the powerful genetic model system of *C. elegans* to address complex biological questions. His group now uses this elegant organism to probe deep underlying principles of mtDNA quality control, mosaicism, and inheritance.