GUEST SPEAKER SEMINAR

Molecular Genetics
UNIVERSITY OF TORONTO

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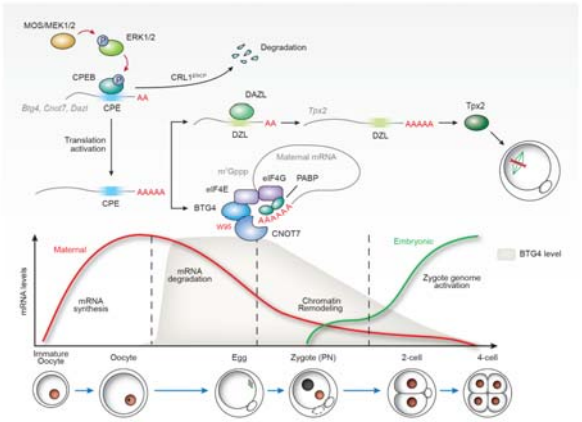
Developmental &
Stem Cell Biology

Regulation of Oocyte mRNA Translation and Decay during the Maternal-to-Zygotic Transition in Mouse



The mRNAs stored in oocytes undergo general decay during maternal-zygotic transition (MZT), and their stability is tightly interconnected with meiotic cell cycle progression. However, the factors that trigger maternal mRNA decay and couple this event to oocyte meiotic maturation remain elusive. Meiotic resumption–coupled hierarchical degradation of maternal transcripts occurs during oocyte maturation in the absence of de novo mRNA transcription. Our recent studies aimed to identify the physiological role and regulation mechanism of this event. We addressed the functional significance of BTG4, the MZT licensing factor, and the CNOT6L nuclease by means of mouse knockout models and oocyte transcriptome analyses. BTG4 bridged CNOT7, a catalytic subunit of CCR4–NOT deadenylase, to eIF4E, a key translation initiation factor, and played a permissive role in maternal mRNA decay. Cnot6l, one of four genes encoding CCR4–NOT catalytic subunits, is preferentially expressed in mouse oocytes. Genetic deletion of Cnot6l impaired deadenylation and degradation of a subset of maternal mRNAs during oocyte maturation. Oocyte intrinsic MAPK cascade triggers translation of Btg4 and Cnot6l mRNAs stored in fully-grown oocytes by targeting its 3'-untranslated region, thereby couples CCR4–NOT deadenylase-mediated maternal mRNA decay with oocyte maturation and fertilization. This study provides the first direct genetic evidence that CCR4–NOT-dependent decay of selective maternal mRNAs is a prerequisite for maternal-to-zygotic transition of mammalian species.

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Host: Dr. Howard Lipshitz

Date: Wednesday November 14, 2018
Time: 3:00 PM
Place: Robert B. Salter Auditorium
Peter Gilgan Centre for Research & Learning
686 Bay St.