



CDB SEMINAR

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Friday, April 21

16:00~17:30 C1F CDB Auditorium

Assembly of an RNP Complex for Intracellular mRNA Transport and Translational Control

Summary

The coupling of mRNA localization to translational control is a conserved strategy that allows precise spatial and temporal control of protein expression within cells [1]. The *Drosophila* oocyte is an ideal model for studying the mechanism of RNA localization-dependent translational control [2]. *oskar* mRNA, which encodes the posterior determinant of the fly, is localized to the posterior of the oocyte during oogenesis and is translationally repressed prior to localization at the posterior pole. Assembly of a functional *oskar* mRNA localization complex begins in the nucleus with the splicing-dependent deposition Exon Junction Complex proteins at the first exon-exon junction in the mRNA [3]. The *oskar* 3'UTR is necessary (but not sufficient) for mRNA localization to the posterior pole, and mediates co-assembly of *oskar* mRNA into transport complexes. *oskar* translational repression, which is coupled to mRNA transport, is mediated by Bruno protein. It has been shown that Bruno repressor binds to specific sequences in the *oskar* 3'UTR and to Cup, an eIF4E-binding protein with which Bruno interacts, suggesting a model for *oskar* translational repression at initiation [4]. In vitro analysis has recently revealed that, in addition to the proposed mechanism, a second, novel repression mechanism cooperates to ensure tight control of *oskar* mRNA translation [5]. The molecular mechanisms underlying *oskar* mRNP complex assembly, localization and translational control will be discussed.

1. St Johnston, D., *Moving messages: the intracellular localization of mRNAs*. Nat Rev Mol Cell Biol, 2005. **6**(5): p. 363-75.
2. Riechmann, V. and A. Ephrussi, *Axis formation during Drosophila oogenesis*. Curr Opin Genet Dev, 2001. **11**(4): p. 374-83.
3. Hachet, O. and A. Ephrussi, *Splicing of oskar RNA in the nucleus is coupled to its cytoplasmic localization*. Nature, 2004. **428**(6986): p. 959-63.
4. Nakamura, A., K. Sato, and K. Hanyu-Nakamura, *Drosophila cup is an eIF4E binding protein that associates with Bruno and regulates oskar mRNA translation in oogenesis*. Dev Cell, 2004. **6**(1): p. 69-78.
5. Chekulaeva, M., M.W. Hentze, and A. Ephrussi, *Bruno acts as a dual repressor of oskar translation, promoting mRNA oligomerization and formation of silencing particles*. Cell, 2006. **124**(3): p. 521-33.

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