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LABORATORY OF

EPIGENETIC REGULATIONS

RNA degradation, dsRNA, RNAi, lncRNA, retrotransposon

In the picture:

1. Jan Petřížilek | 2. Markéta Černožorská | 3. Radek Malik | 4. Josef Pasulka | 5. Zuzana Loubalová | 6. Jana Kubíková | 7. Sravya Ganesh | 8. Petr Svoboda | 9. Jana Urbanová | 10. Shubhangi Kataruka | 11. Eliška Svobodová | 12. Tomáš Demeter

We study mechanisms governing gene expression during mammalian oocyte-to-embryo transition [OET]. OET is an orchestrated process where a highly specialized cell – the oocyte – is transformed into cells that are able to give rise to a new organism. We work on three OET topics:

Maternal mRNA metabolism

OET relies on extensive post-transcriptional control of maternal mRNAs. Maternal mRNAs that are no longer needed are eliminated, while mRNAs whose products are needed for zygotic genome activation (ZGA) are maintained and translated. We particularly focus on induction of selective mRNA degradation during major developmental transitions: resumption of meiosis, fertilization, and zygotic genome activation.

Role of small RNAs during OET

We study the role of small RNA pathways [microRNA, RNA interference, and piRNA pathways] in the mammalian female germline where these three pathways co-exist. We are particularly interested in [i] variability of this co-existence across mammals, and [ii] in consequences of highly active endogenous RNA interference in somatic cells.

Role of long non-coding RNAs during OET

Long non-coding RNAs [lncRNAs] are a heterogeneous group of genome-encoded RNAs, many of which have important biological functions. In collaboration with the laboratory of Kristian Vlahovicek from the Zagreb University [bioinfo.hr], we annotate and study lncRNAs expressed during OET. This research is supported by a Marie Curie Initial Training network, RNATRIN.

Selected recent papers:

Abe K, Yamamoto R, Franke V, Cao M, Suzuki Y, Suzuki M G, Vlahovicek K, [Svoboda P](#), Schultz R M, Aoki F: [2015] The first murine zygotic transcription is promiscuous and uncoupled from splicing and 3' processing. **EMBO J.** 34(11):1523-37.

Svobodova E, Kubikova J, [Svoboda P](#): [2016] Production of small RNAs by mammalian Dicer. **Pflugers Arch.** 468(6):1089-10.

Karlic R, Ganesh S, Franke V, Svobodova E, Urbanova J, Suzuki Y, Aoki F, Vlahovicek K, [Svoboda P](#): [2017] Long non-coding RNA exchange during oocyte-to-embryo transition in mice. **DNA Research.** [Epub ahead of print] 10.1093/dnares/dsw058.

