Motivated student needed – join us for M.Sc. study

Translationally regulated mRNAs in cell cycle of lymphoblastoid cell line NcNc (SIS ID: 263785).

LABORATORY OF RNA BIOCHEMISTRY

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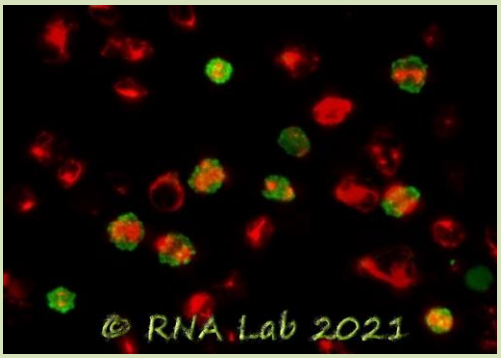
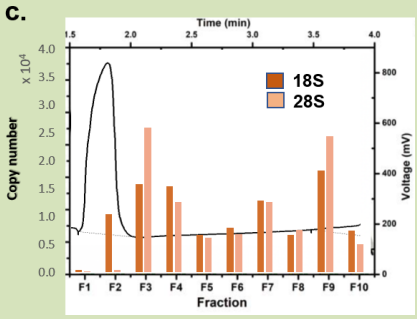
Web pages of the research group:

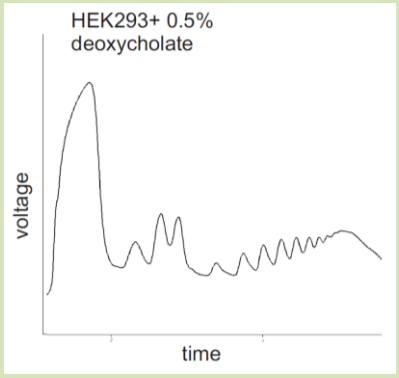
https://www.natur.cuni.cz/biology/genetics/veda-a-vyzkum-1/laborator-biochemie-rna?set_language=en

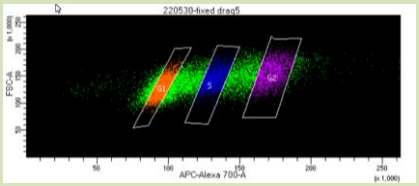




The cell cycle is tightly controlled by precisely timed and coordinated gene expression. The most profound change in mRNA transcription and polyadenylation can be found in mitosis, although progression through G1/S and S/G2 cell cycle phase borders also results in significant change in mRNA composition. Gene expression alteration has been studied on transcriptional level so far; here we aim at changes that occur also at the level of mRNA translation.

Thus, the intended thesis will focus on gene expression analysis of selected mRNAs during G1, S, G2 and M phases of the cell cycle. The candidate mRNAs are selected from published Next Generation Sequencing (NGS) results of the human adherent cell line RPE-1 (derived from retinal epithelium) and from our own sequencing results of the human suspension cell line Nc-Nc (white blood cell precursor). For your thesis, you will be involved in tissue culture propagation including cell cycle synchronization, isolation of total and polysomal RNA, quantitative RT-PCR, protein detection by Western blot, cloning into reporter plasmids, flow cytometry and microscopy. The thesis will optimally conclude with the analysis of RNA binding proteins in order to understand the mechanism of regulation of expression of the studied mRNAs as they pass through the cell cycle.





Relevant publications of the research group:

1. Iyyappan, R., Aleshkina, D., Ming, H., Dvoran, M., Kakavand, K., Jansova, D., Del Llano, E., Gahurova, L., Bruce, A. W., **Masek, T., Pospisek, M.**, Horvat, F., Kubelka, M., Jiang, Z. & Susor, A. **The translational oscillation in oocyte and early embryo development. Nucleic Acids Res (2023)**, doi:10.1093/nar/gkad996.

2. del Llano, E., **Masek, T.,** Gahurova, L., **Pospisek, M.,** Koncicka, M., Jindrova, A., Jansova, D., Iyyappan, R., Roucova, K., Bruce, A. W., Kubelka, M. & Susor, A. **Age-related differences in the translational landscape of mammalian oocytes. Aging Cell 19 (2020)**, doi:10.1111/acel.13231.

3. **Masek, T.,** del Llano, E., Gahurova, L., Kubelka, M., Susor, A., Roucova, K., Lin, C.-J., Bruce, A. W. & **Pospisek, M. Identifying the Translatome of Mouse NEBD-Stage Oocytes via SSP-Profiling; A Novel Polysome Fractionation Method. Int J Mol Sci 21 (2020)**, doi:10.3390/ijms21041254.

4. Mrvova, S., Frydryskova, K., **Pospisek, M.,** Vopalensky, V. & **Masek, T. Major splice variants and multiple polyadenylation site utilization in mRNAs encoding human translation initiation factors eIF4E1 and eIF4E3 regulate the translational regulators? Molecular Genetics and Genomics 293, 167-186 (2018)**, doi:10.1007/s00438-017-1375-4.

5. Frydryskova, K., **Masek, T.,** Borcin, K., Mrvova, S., Venturi, V. & **Pospisek, M. Distinct recruitment of human eIF4E isoforms to processing bodies and stress granules. BMC Molecular Biology 17 (2016)**, doi:10.1186/s12867-016-0072-x.

Current research grants of the group:

OP JAK - Špičkový výzkum, projekt „RNA pro terapii“, registrační číslo CZ.02.01.01/00/22_008/0004575
Next Generation EU (project National Institute of Virology and Bacteriology, Programme EXCELES, ID: LX22NPO5103)
GA ČR 22-27301S (2022-2024) Přechod z meiózy do mitózy - je započetí nového života in vitro rovnocenné in vivo vývoji?
GA UK 321022 (2022-2024) Translation control of G2/M transition through mRNA transcript isoforms in mammalian cell cycle.