BDR SEMINAR via Zoom

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Thursday, May 27, 2021

16:00-17:00

Meeting URL will be announced on the event day by e-mail.
※This seminar is open only to BDR members.

Non-canonical mode of translation in cell identity and fate decision

Summary

We identified a combination of transcription factors, which are sufficient to convert somatic cells to pluripotent stem cells (PSCs), the later so-called induced PSCs (iPSCs). The motivation of my subsequent research was the desire to understand deeply and clearly what happens during reprogramming. We discovered TRA-1-60 and ESRG as good markers of intermediate reprogrammed cells that allowed us to obtain high-quality data and reveal what happens in the cells during reprogramming. Many of our data suggested that post-transcription events such as RNA degradation and translation control are quite important for cell fate change/decision. We have focused on NAT1, which is thought to regulate non-canonical translation, including cap-independent viral gene translation. My experience in the project inspired me to pursue the study of the widespread and fundamental roles of non-canonical translation in cell fate decisions.

The state-of-art ribosome profiling method provided initial evidence that unannotated open reading frames (uaORFs) in untranslated regions of mRNA, non-coding RNA, and circular RNA, can be translated into small bioactive peptides. When the protein expressed in the cell is analyzed by mass spectrometry, the spectrum annotated with the protein sequence information derived from known protein-coding sequence (CDS) is about 40%. Until now, the remaining 50-60% had been ignored because they did not match known proteins, but some of them could be novel proteins encoded by uaORFs. By focusing on such unidentified and unanalyzed uaORFs in this way, far more numbers of novel proteins than previously thought will be identified, and some of them may play a role in executing cell functions.

Based on the unique idea, we will analyze the mechanisms of non-canonical translation by developing our previous research and parallelly take on a new challenge to understand life events such as diseases and aging.

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