Setsunan University

Applied Biosciences

Biosynthesis of Circular RNA (circRNA)

Rei Yoshimoto, Lecturer

Division of Applied Biosciences

E-mail rei.yoshimoto@setsunan.ac.jp

Key words Pre-mRNA splicing, non-coding RNA, circular RNA

Summary

Backgrounds

- High-throughput sequencing of full transcriptomes has identified thousands of circRNAs in eukaryotes, and these are now considered common by-products of many protein-coding genes.
- ciRS-7 is apparently a key component in a gene-regulatory network in the brain, but understanding the biosynthesis and transport of this particular circRNA remains an important challenge.

Purpose

- I delineate the biosynthetic pathway of ciRS-7. The back-splicing events that form circRNAs are often facilitated by flanking inverted repeats of the primate-specific Alu elements.

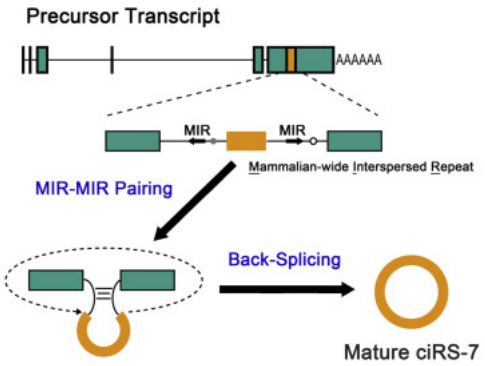
Major achievements

- The circular RNA, ciRS-7 (CDR1as), functions as a regulator of miR-7
- ciRS-7 is generated by back-splicing, not via intra-lariat splicing
- Back-splicing of ciRS-7 is promoted by the flanking inverted MIR elements
- The biosynthesis of a subset of mammalian circRNAs could be mediated by MIRs
- Technically, I can do very simple bioinformatics analysis using a crappy cheap laptop PC. Papers involved include: RNA.23,47-57(2017), iScience.23,101345(2020), Nat Commun.12,4910(2021), Cell Chem Biol.28,1356-1365(2021) and Genes Cells.26,18-30(2021).

Prospects of collaboration

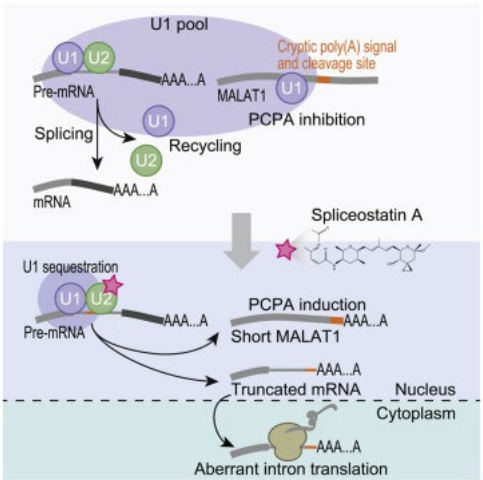
【Collaboration with agriculture and food industries】 Search for small molecule compounds that regulate circRNA metabolism.

【Collaboration with Medicine, Pharmacology, Nursing, and Engineering】 I will try to provide easy-to-understand explanations to get people interested in molecular biology from familiar topics.



A Subset of Mammalian circRNAs Are Biosynthesized by MIR-Mediated Back-Splicing

Schematic illustration of circular RNA biogenesis. See iScience.23,101345 for more information.



SSA generates a prematurely polyadenylated short isoform of MALAT1. See Cell Chem Biol.28,1356-1365 for more information.

Selling point

I demonstrate the biosynthetic pathway of the functionally important circRNA, ciRS-7 (CDR1as).