Docket #: S24-259

A Novel Method to Generate DNA-capped RNA Molecules

Stanford scientists have developed DragonRNA, a novel method to produce DNA-capped RNA molecule by RNA polymerases, designed for enhanced stability and utility in RNA-based therapeutic and biotechnological applications.

RNA therapeutics traditionally face significant challenges due to rapid degradation by RNases and exonucleases within cells, severely limiting their stability and duration of effectiveness. Conventional approaches to address this degradation involve chemical modifications such as nucleotide modifications and protective 5'-cap structures. However, these methods can be costly, complex, or only partially effective.

DragonRNA offers a promising alternative: it employs a DNA sequence at its 5' end, serving as a stable primer and template for RNA polymerase-mediated synthesis. This DNA cap can have the potential to protect RNA molecule against enzymatic degradation, and improve persistence and efficacy in biological systems. DragonRNA's hybrid structure could expand opportunities for more durable RNA vaccines, long-lasting protein therapeutics, and advanced gene-regulation tool

Applications

- Improved RNA-based therapeutics
- Next-generation RNA vaccine
- Long-lasting gene expression modulation
- Biomedical research tool

Advantages

- Innovative Platform for RNA Technologies

- Enhanced stability
- Simplified Production Process

Publications

- Emily Greenwald, Drew Galls, Joon Park, Nimit Jain, Stephen B Montgomery, Bijoyita Roy, Y Whitney Yin, Andrew Z Fire. DragonRNA: Generality of DNA-primed RNA-extension activities by DNA-directed RNA polymerases. *Nucleic Acids Research*, Volume 53, Issue 6, 11 April 2025, gkaf236.

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