Docket #: S20-175

Optimized Synthesis of RNA-based Therapeutic Candidates

Stanford researchers have developed improved methods for producing mRNAs. Efficient, robust and high fidelity production of mRNAs is critical for obtaining pharmaceutical quality vaccines, viruses and expression constructs, and for eliminating noise due to batch variation. The researchers optimized conditions for efficient RNA synthesis, capping and poly(A)-tailing and identified the best parameters for high quality, uniform mRNA production. This is essential for expression in cells after delivery of RNA into cultured cells. They also created modular mRNA designs that allow testing of rationally and computationally designed 5'UTRs, coding regions, and 3'UTRs for optimal protein expression. In addition, synthetic barcodes that uniquely identify each design enable high-throughput sequencing readouts of tens of thousands of different designs in a single screen for selection of optimal candidate RNAs in downstream mRNA translation and stability assays.

This technology is part of a portfolio of innovations aimed at fighting the COVID-19 pandemic.

Related technologies for optimizing RNA-based therapeutics and vaccine design:

Stanford docket S20-205: Repurposing the SARS-CoV2 5'-UTR for RNA Based Therapeutics
Stanford docket S20-174: Analyzing Translation Efficiency for Design of RNA Therapeutics
Stanford docket S20-176: Software for Rapid Mapping of RNA Structure
Stanford docket S20-135: Translation Enhancer for Gene Regulation
Stanford docket S19-310: Rational Design of Ultratight RNA Aptamers against Protein Targets
Stanford docket S20-174: Primerize: Software for Designing Primers for Rapid RNA

Synthesis

Applications

- Development of RNA based-therapeutics
- Development of mRNA vaccines
- Development of COVID-19 mRNA vaccines

Advantages

- Supports efficient, robust and high fidelity production of mRNA
- Enables large scale RNA-based screens for modularly designed sequence candidates

Patents

- Published Application: WO2022015513
- Published Application: 20220135964
- Issued: 11,739,317 (USA)

Innovators

- Maria Barna
- Kathrin Leppek
- Gun woo Byeon

Licensing Contact

Sam Rubin

Licensing Associate, Life Science

Email