

High-Throughput Untranslated Region Engineering and Screening

Technology #19123

Applications

This technology is a synthetic 5' UTR sequence that increases recombinant protein expression with applications in research and large-scale enzyme or protein therapeutic production.

Problem Addressed

Recombinant synthesis techniques are used throughout molecular biology to make proteins for research and therapeutic purposes. To make a protein, DNA is first transcribed into an RNA intermediate, then the RNA is translated into protein. There have been many improvements in boosting the efficiency of the first transcription step of protein expression, but there has thus far been little innovation in boosting translation efficiency from RNA into protein. These inventors developed a novel technique for boosting protein expression in human cells by increasing RNA to protein translation.

Technology

This technology uses novel synthetic 5' untranslated regions (UTRs) to increase protein expression. 5' UTRs are present in all genes and are required for ribosomes, the translation machinery that makes protein, to find, bind to, and begin translating RNA sequences. The 'strength' of a gene's 5' UTR dictates how much protein is made from that gene's RNA, and 5' UTRs from highly expressed genes have long been used in molecular biology applications. These inventors performed an unbiased screen of the 5' UTRs on highly expressed genes across many cell types, trained a machine-learning algorithm with this data, then used this computational platform to develop efficient synthetic 5' UTR sequences. The resulting synthetic 5' UTRs drive higher expression than commonly used natural 5' UTR sequences, therefore resulting in higher protein expression per cell.

Advantages

- Increased protein expression in human cells
- Synthetic 5' UTR drives more efficient translation than natural 5' UTR sequences

Categories For This Invention:

[Life Sciences](#)

[Agriculture](#)

[Plant Hormones](#)

[Biotechnology](#)

[Research Tools](#)

[Expression Systems](#)

255 Main Street, room NE 18-501

Cambridge, MA 02142-1601

Phone: 617-253-6966 Fax: 617-258-6790

<http://tlo.mit.edu>

Contact the Technology Manager: tlo-inquiries@mit.edu

Vector & Plasmid
Therapeutics
Peptide
Protein

Intellectual Property:

Synthetic 5' UTR sequences, and high-throughput engineering and screening thereof
US Patent Pending
Synthetic 5' UTR sequences, and high-throughput engineering and screening thereof
PCT
2019-241684

Inventors:

Timothy Lu
Manolis Kellis
Jicong Cao
Eva Maria Novoa Pardo
Zhizhuo Zhang

External Links:

Lu Lab
<http://synbio.mit.edu/2015/12/timothy-lu/>