(SD2021-427) Upregulation of cellular proteins using coronavirus-derived protein/peptides fused to RNA-targeting effectors

Tech ID: 33332 / UC Case 2021-Z08-1

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ABSTRACT

Researchers from UC San Diego developed an invention that enables protein expression to be upregulated using specific proteins and/or peptide sequences derived from SARS-CoV-2 proteins that are engineered to recognize specific mRNA transcripts by fusion to RNA-targeting modules such as CRISPR/Cas systems. They anticipate that these proteins can be fused or tethered to any engineered RNA-targeting moiety/module such as PUF/Pum, and pentatricopeptide proteins.

TECHNOLOGY DESCRIPTION

RNA RECOGNITION COMPLEX AND USES THEREOF

(https://patents.google.com/patent/WO2022256414A1)

This approach provides a means to reversibly activate protein expression in a temporal manner, unlike traditional gene editing technologies which rely on permanently altering DNA sequence. In one embodiment of this invention, the research team fused a nuclease-dead version of Streptococcus pyogenes Cas9 (dCas9) recombinant proteins derived from SARS-CoV-2 proteins, and show that they are capable of significantly enhancing target gene translation when bound to mRNA. These data show that fusions of SARS-CoV-2 proteins to any system capable of binding mRNA (such as CRISPR/Cas) can be used to enhance translation.

OTHER INFORMATION

CATEGORIZED AS

- **Biotechnology**
  - Genomics
- **Medical**
  - Therapeutics
  - Vaccines

RELATED CASES

2021-Z08-1

APPLICATIONS

Researchers from UC San Diego developed an invention that enables protein expression to be upregulated using specific proteins and/or peptide sequences derived from SARS-CoV-2 proteins that are engineered to recognize specific mRNA transcripts by fusion to RNA-targeting modules such as CRISPR/Cas systems. They anticipate that these proteins can be fused or tethered to any engineered RNA-targeting moiety/module such as PUF/Pum, and pentatricopeptide proteins.

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enhancing target gene translation when bound to mRNA. These data show that fusions of SARS-CoV-2 proteins to any system capable of binding mRNA (such as CRISPR/Cas) can be used to enhance translation.

Research tool. Characterize the effects and dynamics of single and multiplex translational activation.

Therapeutic for diseases. Viral (AAV) or other delivery approaches to treat diseases with reduced gene expression.

ADVANTAGES

STATE OF DEVELOPMENT

INTELLECTUAL PROPERTY INFO

UC San Diego is looking for companies interested in commercializing this patent-pending technology in the United States.

RELATED MATERIALS

▶ Yeo G, Xiang J, Mueller J, Luo EC, Yee B, Schafer D, Schmok J, Tan F, Rothamel K, McVicar R, Kwong E, Croker B, Jones K, Her HL, Chen CY, Vu A, Jin W, Park S, Le P, Brennan K, Kofman E, Li Y, Tankka A, Dong K, Song Y, Clark A, Carlin A, Nostrand EV, Leibel S. Discovery and functional interrogation of SARS-CoV-2 protein-RNA interactions. Res Sq [Preprint]. 2022 Mar 17:rs.3.rs-1394331. doi: 10.21203/rs.3.rs-1394331/v1. - 03/17/2022

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