Docket #: S22-516

Programmable RNA editing and viral recombination platform for mammalian directed evolution

Researchers at Stanford have developed a mammalian-cell-based directed evolution platform that combines programmable RNA editing with viral-mediated recombination to enable iterative diversification and optimization of protein and nucleic acid sequences.

Current directed evolution technologies are primarily performed in microbial systems or rely on approaches that may not fully recapitulate native mammalian cellular environments. As a result, optimization of proteins and nucleic acids whose function depends on mammalian-specific expression, processing, and signaling can be challenging. Existing methods may also offer limited capabilities for targeted diversification, recombination, and iterative evolution in mammalian cells.

This technology enables targeted diversification of sequences of interest through guide RNA-directed RNA editing while leveraging engineered viral systems to facilitate recombination and iterative evolution. The platform supports the generation and selection of functional variants directly in mammalian cells while maintaining genotype-phenotype linkage. The approach is compatible with endogenous targets, synthetic constructs, and membrane-associated proteins, enabling optimization in physiologically relevant cellular environments.

The platform has the potential to accelerate the discovery and optimization of therapeutic proteins, nucleic acid therapeutics, gene-editing systems, and engineered cell therapies.

Stage of Development
Research - in vitro

Applications

- Therapeutic protein engineering
- Cell and gene therapy development
- RNA therapeutic optimization
- Gene-editing tool development
- Synthetic biology and protein design

Advantages

- Mammalian cell-based evolution
- Programmable targeted diversification
- Continuous evolution workflow
- Strong genotype-phenotype linkage
- Minimal genomic off-target effects

Innovators

- Le Cong
- Guangxue Xu

Licensing Contact

Eileen Lee

Email