



PROTEIN EXPRESSION

Codon-Mutant Libraries of Protein-Coding Genes

Brief Description of Technology

Technique that mutates entire genes at the codon level at a controlled rate, compared to existing error-prone PCR methods that achieve this on the nucleotide level.

BUSINESS OPPORTUNITY

Exclusive license
Non-exclusive license
Sponsored research

TECHNOLOGY TYPE

Therapeutic
Research tool

STAGE OF DEVELOPMENT

Preclinical *in vitro*

PATENT INFORMATION

US nonprovisional patent
pending

INVESTIGATOR

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Tech ID: 13-033

Technology Overview

Random mutant libraries of genes are used in a wide variety of molecular biology and bioengineering applications. Current techniques (such as error-prone PCR and its variants) are well suited for introducing mutations at the nucleotide level. PCR with oligonucleotides containing degenerate bases at certain positions are well suited for creating randomized codons at a small number of positions, particularly if these positions are nearly contiguous in primary sequence. However, there are no standard techniques for randomizing codons uniformly throughout a gene at a low rate of mutagenesis. Dr. Bloom has devised an approach to create random codon mutations distributed uniformly across a gene. The Bloom Lab has successfully applied this technique to randomly mutate all codon positions (except the start and stop codons) in the 1.5 kb influenza nucleoprotein gene as proof of concept.

Applications

- Vaccine development
- Directed evolution and protein manufacturing
- Microbiome analysis for cancer therapies

Advantages

- Expands the genetic space that can be searched in mutant libraries
- Introduces mutations at a rate of 2-3 codon mutations per gene
- Decreases rate of insertions and deletions introduced to less than 0.1 indels per gene

Market Overview

The Centers for Disease Control estimate there were 48.8 million illnesses, and 22.7 million medical visits during the 2017-2018 influenza season. Of these, there were a total of 186 pediatric deaths. The vaccines market is estimated to be worth USD 50.42 billion by 2023 with a CAGR of 6.7% compared to 2018, where it was valued at USD 36.45 billion. Although there are several factors attributed with the growth of the market, the two primary drivers include the rising prevalence of diseases, as well as increased government and industry funding of vaccine R&D.