Direct Evolution of Antibody Fragments Targeting CD32a for Application in Immunotherapy to Eradicate HIV Latency

Ngo, Long (School: Oregon Episcopal School)

The challenge of finding the HIV cure lies in latent HIV-infected cells, which are inert to current HIV treatment. Since CD32a has been identified as a potential biomarker of latent HIV-infected cells, genetically modified T cell therapy targeting CD32a-expressing cells is a possible strategy to eradicate HIV. Single-chain variable fragment (scFv), a type of antibody fragment, can help genetically modified T cells recognize CD32a-expressing cells. This project aims to create scFv antibody fragments that bind CD32a using a technology called yeast surface display. The 10^10 Saccharomyces cerevisiae library, in which every yeast cell expressed a variation of scFv, went through multiple rounds of selection of CD32a-binding yeast cells using CD32a-coated magnetic beads and depletion of yeast cells that bind to unwanted molecules. The enrichment of yeasts was analyzed using flow cytometry to determine proportion of CD32a binders and non-CD32a binders. The result of flow cytometry satisfied the project's aim and showed the existence of CD32a binders. The result was also comparable to previous studies. Further methods such as affinity maturation and advance flow cytometry can enhance the affinity and specificity of selected scFv that bind to CD32a. In the long term, this project opens a promising, unconventional path toward the cure for HIV using immunotherapy.

Awards Won:
Third Award of $1,000