7TH GLOBAL FORUM ON TB VACCINES | 8-10 October 2024 Rio de Janeiro, Brazil
Driving innovation from discovery to access

Designing sequences of novel Mtb antigens for mRNA delivering platforms

Nawamin Pinpathomrat[1], Apichai Prachasuphap[2], Sirawit Wet-osot[2], Surakameth Mahasirimongkol[2]

[1] *Faculty of Medicine, Prince of Songkla University, Oxford, Songkhla, UK;* [2]*Department of Medical Science, Ministry of Public Health, Nonthaburi Thailand*

Introduction: Bacillus Calmette–Guérin (BCG) remains the only licensed vaccine for preventing TB. Despite high coverage of BCG vaccination, the slow decline in TB incidence globally highlights the need for a much more effective vaccine. A list of known immunogenic antigens will be used to construct mRNA vaccine.

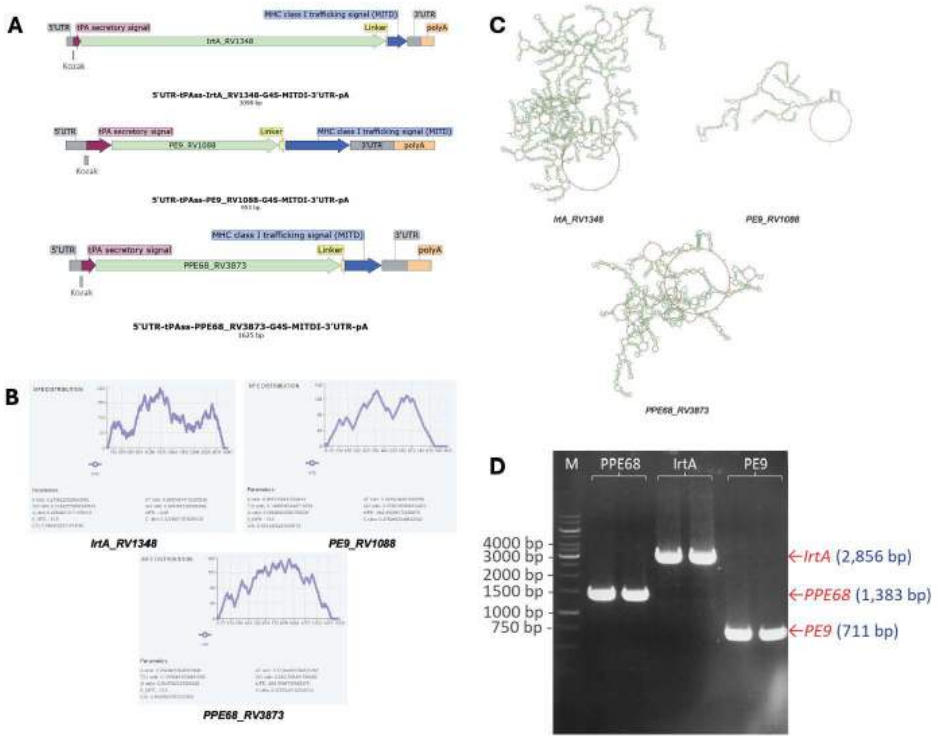
Methods: Here, we show the process of sequencing design to obtain the sequences of IrtA_RV1348, PE9_RV1088 and PPE68_RV3873 were designed and optimized for creating pDNA vectors to be suitable for expression in human cells.

Results: The designed genes had codons frequency distribution in the range of 71-100%, which could increase protein expression higher than before optimization. The secondary structure of mRNA has a negative minimum of free energy (MFE) value indicating the stability of the designed mRNA structure. The designed genes were cloned into the pDNA vector obtaining the consistent size.

Conclusion: The optimized genes of the immunogenic Mtb antigens were stable and well expressed. The synthesized mRNA will be formulated with lipid nanoparticles (LNPs) and tested for immunogenicity and efficacy of the vaccines in murine models with and without a BCG prime.

Funding Sources
National Vaccine Institution (NVI), Thailand

Conflicts of Interest
None



(A) Diagram of the gene fragments used to create a DNA vector (pDNA) for the synthesis of mRNA strands by in vitro transcription. **(B)** The secondary structure of mRNA after optimization with the program mRNAid. **(C)** The minimum of free energy (MFE) of mRNA after optimization with mRNAid. **(D)** PCR products of synthetic genes of Mtb.