The 44th Global and Local Infectious Diseases Research Seminar

This Seminar will be held English.

RCGLID OITA UNIVERSITY

February 20,2026 16:30-17:30 Venue: OITA Univ. RCGLID Meeting Room & Zoom

Speaker1: Tanapat Palaga (16:30-17:00)

Department of Microbiology, Faculty of Science and Vaccine Research Center, Chulalongkorn University, Bangkok Thailand

Development of a Multistage Tuberculosis Vaccine Using an mRNA Platform

Tuberculosis (TB) remains one of the most serious public health concerns affecting human populations worldwide. The currently approved vaccine against TB is the live attenuated Bacille Calmette-Guérin (BCG) vaccine, which exhibits high protective efficacy against childhood TB and severe forms of the disease but lacks effectiveness against adult pulmonary TB. Upon infection, *Mycobacterium tuberculosis* (*M. tuberculosis*) exists in both active and latent stages within the host, during which the antigens expressed at each stage differ. This project aimed to design and prepare an mRNA vaccine encoding multi-stage antigens that cover both the active and latent stages of infection and characterize the immunity conferred by such vaccine. The antigens used in this study were Rv0125 (PepA), Rv1196 (PPE18), and Rv2031c (HspX). Codon optimization and subcloning of synthetic DNA fragments for each gene were performed, resulting in three plasmids constructed in the pUC-ccTEV-A101 backbone. An in vitro transcription (IVT) system was used to prepare nucleoside-modified mRNA, which successfully produced proteins corresponding to each gene. After purification, the mRNA was encapsulated into lipid nanoparticles (LNPs) and used to immunize mice. The mice were divided into three groups: a negative control group receiving empty LNPs (eLNPs), a positive control group receiving a single BCG vaccination, and an experimental group receiving mRNA/LNP. The mRNA/LNP group was immunized intramuscularly twice with 5 μg of each mRNA per mouse at a 3-week interval. Immunogenicity was evaluated at week 8 after the first immunization. The mRNA/LNP group exhibited a high antibody response against crude antigens, specifically culture filtrate proteins (CFP). ELISpot assays confirmed that splenocytes and lung cells from the mRNA/LNP group produced significantly higher levels of antigen-specific IFNγ compared to the control groups. Multiplex cytokine assays showed that splenocytes from the mRNA/LNP group responded strongly to stimulation with overlapping peptides (PepA/PPE18) or recombinant HspX by producing IL-2, TNFα, and IFNγ. Finally, a mycobacterial growth inhibition assay (MGIA) was used to evaluate the ability of vaccine-induced immune responses to control BCG growth *in vitro*. The MGIA results showed that lung cells from the mRNA/LNP group were able to control BCG growth, while splenocytes from the BCG-vaccinated group demonstrated superior growth-inhibitory capacity. Taken together, this study provides a foundational framework for a multi-stage mRNA-based TB vaccine combining three antigens that induces balanced immune responses and partially controls mycobacterial growth. Further studies on dose optimization, immunization schedules, and combination strategies with BCG are warranted.

Speaker2: Sita Virakul (17:00-17:30)

Department of Microbiology, Faculty of Science, Chulalongkorn University, Bangkok, Thailand

The Role of Butyrate on Orbital Fibroblast from Graves' Ophthalmopathy Patients

Graves' ophthalmopathy (GO) is an autoimmune-mediated condition characterized by orbital fibroblast activation leading to orbital tissue inflammation and fibrosis. Despite the growing evidence on epigenetic regulation in GO, the effects of butyrate on epigenetic modifications in GO remain unknown. Therefore, this study aimed to investigate the effects of butyrate on orbital fibroblast activation and epigenetic modifications in GO orbital fibroblasts (GOFs). GOFs were treated with butyrate in both 2D and 3D culture models, followed by the assessment of orbital fibroblast activation, epigenetic modifications, and transcriptomic profiles. Our data showed that butyrate significantly suppressed IL-6, hyaluronan, α-SMA, and COL1α1, while promoting H3K9 hyperacetylation and BRD4 expression. Transcriptomic analysis revealed changes in the expression level of methylation-related genes. These findings suggested that butyrate may serve as a potential therapeutic agent to modulate inflammation and fibrosis in GO. To our knowledge, this is the first study demonstrating that butyrate induces H3K9 hyperacetylation and affects methylation-related pathways in GOFs. However, further research on the impact of these epigenetic modifications on GOF activation is required.

FREE REGISTRATION ▶

https://forms.gle/erTcEaeXKX8dz6oB6

Manager Takashi Kobayashi(Professor, Department of infectious disease control,Faculty of Medicine)

Seminar Contact Research Center for Glocal and Local Infectious Diseases (5444)

TEL 097 (586) 5444 E-mail glocal@oita-u.ac.jp