

## Versatility of the CoPoP platform for antigen discovery and tuberculosis vaccine testing

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**Introduction:** Tuberculosis (TB) continues to plague humankind. The Covid-19 pandemic erased years of progress in our fight against TB, highlighting the need to innovate in every facet of this disease: diagnosis, treatment, and vaccine development. Specifically, the century-old BCG—a live attenuated *M. bovis* strain—remains the only licensed vaccine, despite its limited protection against pulmonary TB. Recent studies show subunit proteins can be used as prime vaccines or to boost BCG protection. Herein, we used Cobalt Porphyrin Phospholipid (CoPoP) liposome platform developed by Lovell, for antigen discovery and TB vaccine testing using recombinant *Mtb* his-tagged proteins and/or synthetic peptides.

**Methods:** Synthetic his-tagged peptides and recombinant *Mtb* proteins were obtained commercially or in-house (Lovell lab and CSU's protein core). Peptide sequences were obtained from literature search or bioinformatic analysis of TB proteins via NetMHCII. Vaccines were generated by co-incubating his-tagged proteins/peptides + CoPoP in optimized conditions. Female mice were prime vaccinated IM with CoPoP or subQ BCG Pasteur, followed by CoPoP boosting 3 weeks later. Bacterial burden enumeration and histopathological analysis was performed in lungs and spleens 1 or 3 months after aerosol infection with *Mtb* H37Rv.

**Results.** More than 50 antigens (peptides/recombinant proteins) have been screened in 2 years. Several individual antigens induced protection (lower CFUs and pathology) at 1 month, potentially synergizing when multiplexed. Ongoing studies are evaluating long-term protection by multiplexed vaccines and/or as BCG boost.

**Discussion.** CoPoP represent a versatile vaccine platform for TB antigen discovery and vaccine testing. Versatility is reflected in multiple ways: ease to manufacture/store; compatibility with single/fusion/multiplexed antigens, in-house prepped or commercially available his-tagged proteins, and synthetic peptides from difficult to express *Mtb* proteins.

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### Conflicts of Interest

None

