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Driving innovation from discovery to access

BAXERNA: Developing a next-generation mRNA vaccine against TB

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Introduction: Diversifying the tuberculosis vaccine development pipeline is recognized as an important strategy to find an effective vaccine and curb the tuberculosis crisis. Two components of this strategy are the identification of novel Mycobacterium tuberculosis (MTB) antigens and improved vaccine formulations. BAXERNA (www.baxerna.eu) is an EU-funded project that combines both of these components in a next-generation bacterial mRNA vaccine development pipeline that aims to bring a new tuberculosis vaccine to phase I.

Methods/Results: BAXERNA's pipeline brings two key innovations to the process of bacterial vaccine development: 1) a state-of-the-art immunopeptidomics workflow that allows highly sensitive, empirical discovery of the bacterial epitopes presented by infected cells using mass spectrometry, and 2) the Galsome platform, an mRNA vaccine formulation that incorporates the adjuvant alpha-galactosylceramide and elicits strong innate and adaptive immune responses. We have applied our immunopeptidomics workflow to identify highly presented antigens from three virulent pathogens, including MTB. Using this approach, we identified over 100 bacterial proteins presented on cells infected with MTB, of which multiple were identified by two or more distinct immunopeptides. Next, we will encode the bacterial proteins with the largest numbers of distinct immunopeptides in our Galsome formulation and evaluate the immunogenic and protective potential of these vaccines in preclinical models. Finally, for MTB, we will perform a preclinical toxicology assessment of the lead vaccine candidate and evaluate it in a phase I clinical trial.

ConclusionL Our novel approach to antigen discovery and our next-generation vaccine platform promises to bring a new, effective, and affordable tuberculosis vaccine into the clinical pipeline.
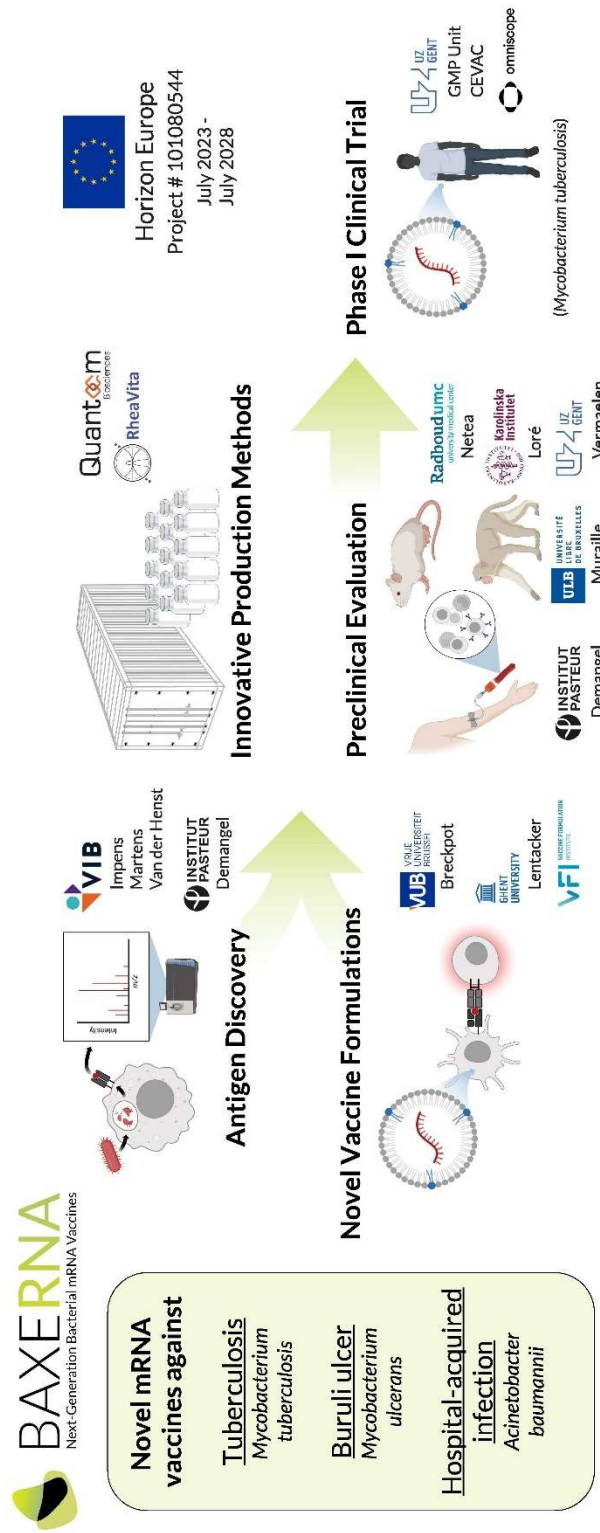
Conflicts of Interest
None

Overview of the BAXERNA vaccine development pipeline, including project partners