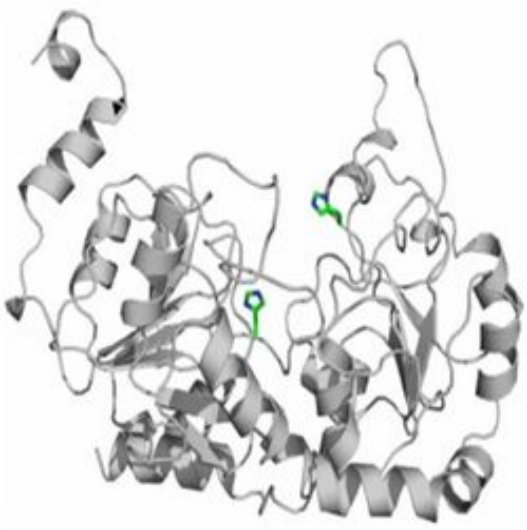
Technology Offer

New Class of Bacterial Capsule Polymerases for Cost-Effective Synthesis of Glycoconjugate Vaccines

Reference Number 15-00527

Challenge
Many bacterial pathogens are surrounded by a thick capsule composed of a network of high-molecular weight polysaccharides. This layer of polymers not only ensures survival by physical means, but represents a crucial virulence factor of different bacterial species. As bacterial capsules directly interact with its host's immune system their components have high immunogenic potential, and are widely used for glycoconjugate vaccine generation. However, availability of vaccines is limited due to high production cost caused by the need of cultivation of pathogens and subsequent isolation of capsular polysaccharides. This not only poses a problem for providing sufficient coverage of vaccination in low-income countries of the developing world, but also for reducing unnecessary use of antibiotics in animal husbandry. Therefore, an *in vitro* method for producing capsular polysaccharides could lower production cost and speed up development of novel vaccines urgently needed.



Homology model of the TagF-like domain

Technology
The present invention provides a novel class of bacterial multidomain enzymes that generate complex phosphate-containing capsule polysaccharides (CPS). The novel polymerases are highly abundant and have been identified in human and animal pathogens as diverse as *Neisseria meningitidis, Actinobacillus pleuropneumoniae, Haemophilus influenzae, Bibersteinia trehalosi, and Escherichia coli*. Although the polymerases share a common TagF-like domain, the assembled CPS sequences vary considerably in a species specific manner. Open reading frames of several candidate polymerases have been cloned to generate recombinant enzymes for further functional testing. NMR and stereochemistry analyses of *in vitro*-synthesized CPS polymers showed identity to capsule polymers harvested from bacterial cultures. Specific truncation experiments of enzymes to enable the tailored synthesis of capsular oligosaccharides of defined length are under way. In summary, the newly identified enzymes allow efficient, economical and fast *in vitro* production of capsule polymers for glycoconjugate vaccine production.

Commercial Opportunity
In-licensing or collaboration for further development is possible.

Development Status
Functional testing of recombinant capsule polymerases has been successfully performed.

Patent Situation
Pending patent applications in Europe and USA (based on PCT application WO2019/020735A1).

Further Reading
Litschko et al. (2018) A New Family of Capsule Polymerases Generates Teichoic Acid-Like Capsule Polymers in Gram-Negative Pathogens. MBio. 2018 May 29;9(3). pii: e00641-18.

Medizinische Hochschule Hannover

Licensing Contact:
Dr Ralf Cordes
Technology Manager
T: +49 511 53289-21
cordes@ascenion.de

Ascenion GmbH
Herzogstraße 64
D-80803 München
T: +49 89 318814-0
info@ascenion.de
www.ascenion.de