Chariot Innovations

+44 (0)20 7927 2678
info@chariotinnovations.co.uk
chariotinnovations.co.uk

London School of Hygiene
& Tropical Medicine
Keppel Street
London WC1E 7HT

Low-cost conjugated pneumococcal vaccine

Summary

A novel, versatile protein-glycan coupling technology (PGCT) generating a safe and effective low-cost *Streptococcus pneumoniae* vaccine, countering the threat of mortality from the pathogen on the human population.

Efficacious vaccines are a critical for protecting the human population from diseases. ***S. pneumoniae*** **is** responsible for a considerable burden of morbidity and mortality worldwide. Current existing vaccines for *S. pneumoniae* have major drawbacks in that they are fixed and only target certain serotypes. We have developed a vaccine by applying transformative glycoconjugate vaccine technology. This technology allows a rapid, flexible and low-cost method of producing vaccines for *S. pneumoniae* and for other pathogens.

Applications

- **A vaccine for general population applications including pneumococcal disease and meningitis.**

Benefits

- Low-cost production of vaccine.
- Simple and fast purification of PCV.
- High yield production.
- Proven efficacy and safety in mice.
- Versatility-vaccine can be adjusted quickly against other serotypes as well as other pathogens.

Background

S. pneumoniae is the causative pathogen for pneumococcal infections that include pneumonia, septicemia, and meningitis, with a mortality rate of up to 35% for the more serious infections. Over 90 serotypes of *S. pneumoniae* exist, with the dominant disease-causing serotypes varying geographically and by age. To combat the pathogen, glyconjugate vaccines have been developed and are a preferred form of vaccine due to their long-lasting immunity and fewer side effect compared to other vaccine types such as live attenuated vaccines. Although these pneumococcal conjugate vaccines (PCV) are effective at preventing *S. pneumoniae* infections, they have important drawbacks:

1) Existing PCV's are not readily altered to counteract variations in the dominant serotypes causing infections in different geographical populations and in different types of infection.
2) Currently available PCV targets only 13 of the 90+ *S. pneumoniae* capsular serotypes, and its efficacy has been impaired by the major expansion of non-vaccine serotypes.
3) Existing PCV vaccines are produced by a multi-step chemical conjugation approach that involves hundreds of quality assurance steps which are expensive, restricting PCV use in low- and middle-income countries where the burden of disease is heaviest, and preventing the vaccine from being cost effective.

Overall, there is a high necessity to produce a low-cost *S. pneumoniae* PCV, which is flexible in antigen content to rapidly adjust for population change in different serotypes of *S. pneumoniae*.

Technology and its advantages

Scientists at the London School of Hygiene and Tropical Medicine and University College London have developed PGCT to produce a highly effective *S. pneumoniae* glycoconjugate vaccine.

Company No: 8281188
VAT No: GB158543389

A wholly-owned subsidiary of:

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

+44 (0)20 7927 2678
info@chariotinnovations.co.uk
chariotinnovations.co.uk

London School of Hygiene
& Tropical Medicine
Keppel Street
London WC1E 7HT

The technology uses *E. coli* as a host expression system for the production of a glycoconjugate vaccine which can be purified in a single affinity purification step. This allows for a rapid, low-cost method for the production of a glyconjugate vaccine with reproducible yields. Moreover, the technology is flexible in allowing antigen content to be adjusted for different serotypes. The PCV is double-hit approach (immunogenic protein and glycan) and has been shown to provide significant protection in murine *S. pneumoniae* infection model through a combination of anti-capsular and anti-protein antigen immunity, and with a similar efficacy to the commercially available PCV Prevnar-13.

Market Opportunity

According to FierceBiotech, Prevnar-13 generated sales of $5.8 billion for Pfizer in 2019. Markets and Markets Ltd. estimate the global vaccines market to projected to $58.4 billion by 2024 from $41.7 billion in 2019, at a CAGR of 7.0% by 2024.

Team

Prof. Brendan Wren: Research interests predominantly involve determining the genetic basis by which bacterial pathogens cause disease. His research group studies bacterial glycostructures and the generation of low cost glycoconjugate vaccines. He has published over 360 scientific publications and has 18 patents.

Dr. Jon Cuccui: Research interests revolve around the biological characterization and subsequent exploitation of bacterial glycosylation systems. He was the first Royal Society of Edinburgh / BBSRC Enterprise Fellow to emanate from the LSHTM.

Prof. Jeremy Brown: A clinician scientist with research expertise in molecular pathogenesis of lung infection, specifically pneumonia due to *S. pneumoniae*. He has published around 140 research articles, editorials, reviews and case reports in scientific or medical journals, and authored three books including a textbook on the *S. pneumoniae*. His clinical specialty is respiratory infection, and he is a member of the Joint Committee on Vaccination and Immunisation, advising the UK government on vaccine policy including for *S. pneumoniae*.

Intellectual Property

The technology is protected by a family of patents WO2019211386

Contact

Monika Kraszewska-Hamilton PhD
Head of Technology Transfer, Consultancy and Intellectual Property
London School of Hygiene & Tropical Medicine
Keppel Street
London WC1E 7HT
Tel: +44 (0)20 7927 2678
Email: monika.hamilton@lshtm.ac.uk
Web: www.chariotinnovations.co.uk