NRC·CNRC

MORAXELLA CATARRHALIS

Vaccine to prevent infection – licensing opportunity L-12065

HIGHLIGHTS

Moraxella catarrhalis is a bacterium that can cause painful infection and inflammation of the middle ear, known medically as acute otitis media (AOM). Up to 75% of children will experience an AOM infection before age 5, while roughly 0.25% of adults develop AOM each year. *Moraxella catarrhalis* can also cause bacterial pneumonia and contributes to exacerbating existing chronic obstructive pulmonary disease (COPD).

Infections caused by *Moraxella catarrhalis* are often resistant to antibiotics such as penicillin, ampicillin, and amoxicillin. To prevent the painful infections that *M. catarrhalis* can cause and to address issues surrounding antimicrobial resistance, NRC has engineered a vaccine candidate that can be licensed for further development, or advanced toward clinical trials in collaboration with our vaccine experts.

TECHNOLOGY TRANSFER

- Commercial exploitation licence
- R&D agreement for collaborative development with NRC

MARKET APPLICATIONS

- Prevent acute otitis media (AOM) infections in children: *M. catarrhalis* causes 20% of the 25 million AOM infections in the USA each year, total direct annual cost $750M
- Prevent exacerbations of existing chronic obstructive pulmonary disease (COPD): 6.3% of Americans live with COPD, direct annual cost $4B

HOW IT WORKS

The NRC's vaccine experts identified and isolated a conserved carbohydrate antigen within the lipopolysaccharide (LPS) of *M. catarrhalis* cells, then developed mutant strains to optimise antigen isolation. They mutated two genes of the antigen encoding glycosyltransferases Lgt2 and Lgt4 in order to deliver a conserved and accessible LPS inner core structure that is immunogenic on cells, across all three serotypes of *M. catarrhalis.*

The NRC's experts then prepared glycoconjugates using the LPS inner core structure, and have shown them to be immunogenic in preclinical tests in rabbits. Moreover, following immunization with glycoconjugates, NRC experts also observed that derived sera could facilitate bactericidal killing of all *M. catarrhalis* serotypes at good titers.

Finally, the NRC's experts also raised a monoclonal antibody targeting the LPS core and showed that this antibody recognises all three *M. catarrhalis* serotypes. This antibody is being optimised via cloning and expression to deliver an economical therapeutic approach.

The next steps in the candidate vaccine's development include optimization of the conjugation methodology to develop a cost-effective glycoconjugate; synthetic oligosaccharides are being evaluated to assess if a synthetic route to the vaccine antigen is feasible. The susceptibility of clinical strains will be evaluated, and prophylactic and/or therapeutic approaches will be appraised upon development of a reliable animal model.

BENEFITS

- Conjugates have been prepared that are consistently immunogenic
- Derived conjugate sera facilitates bactericidal killing of all three serotypes
- Conserved epitopes of this LPS-based vaccine are significantly less prone to variation than protein-based vaccines, considerably reducing the likelihood of vaccine escape

PATENTS

NRC file 12065:
Patents issued in Canada, the United States, and Europe.

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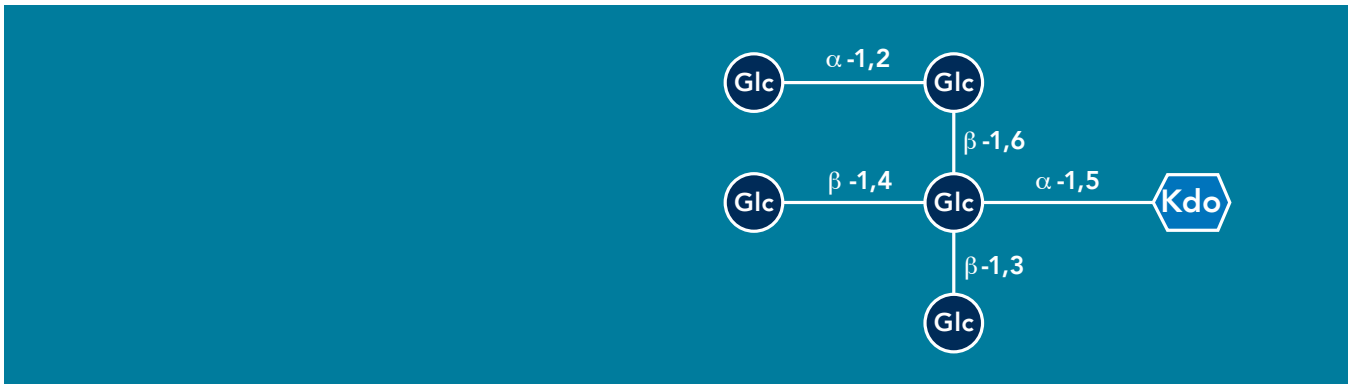

Figure 1: lgt2 / lgt4 mutant LPS inner core structure

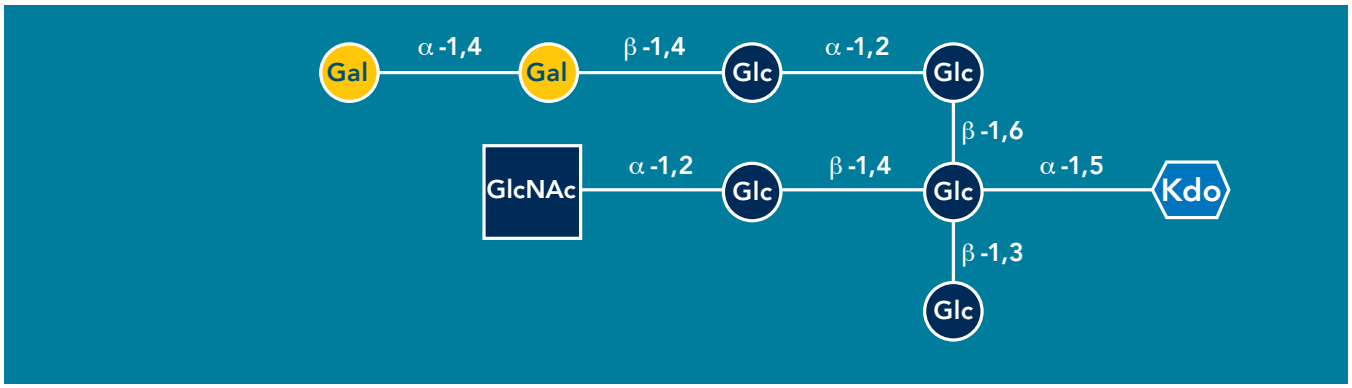

Figure 2: LPS inner core structure for *M. catarrhalis* serotype A

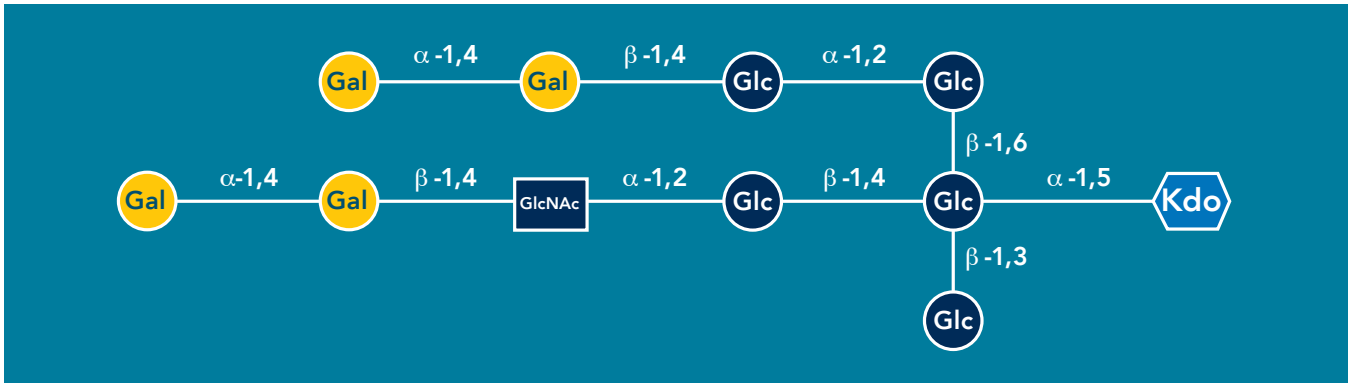

Figure 3: LPS inner core structure for *M. catarrhalis* serotype B

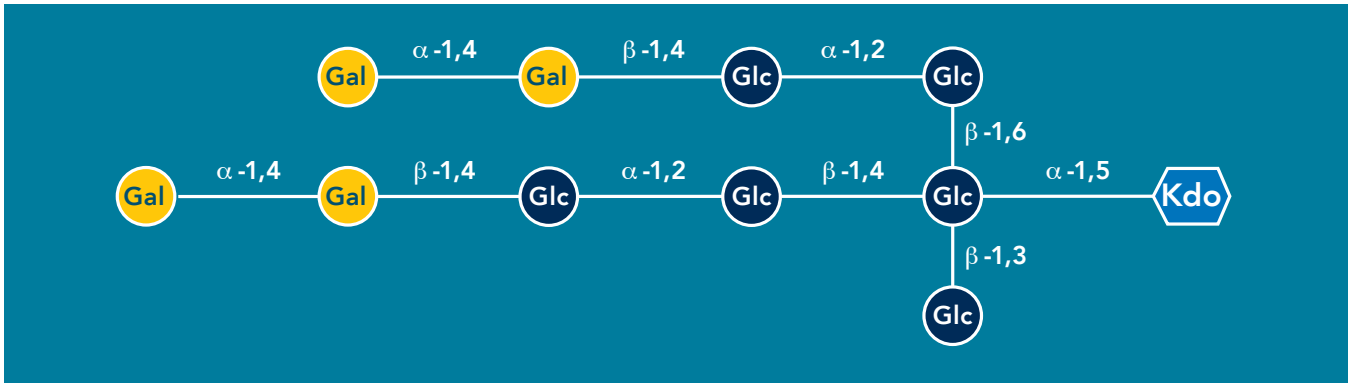

Figure 4: LPS inner core structure for *M. catarrhalis* serotype C