Revised Structure of the Capsular Polysaccharide from Streptococcus Pneumoniae Serotype 7C

Chenghua DENG [1], Xiuru LI [1], Francesco BERTI [1], Shite SEBASTIAN [1]

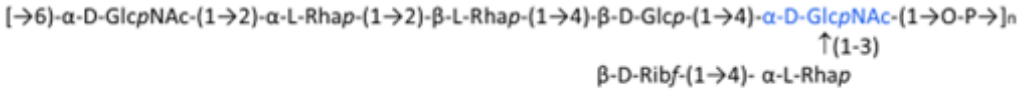
[1] GSK, USA,

chenghua.x.deng@gsk.com

The polysaccharide capsule of Streptococcus *pneumoniae* is recognized as the most important virulence factor of pneumococci and the capsular polysaccharides are widely used as the antigens in pneumococcal vaccines. The structure of the polysaccharide from Streptococcus *pneumoniae* serotype 7C was published in 2018 by Christian Kjeldsen et al based on NMR spectroscopy.

A discrepancy in the composition of this polysaccharide was found from both composition and linkage analysis. No galactosamine was detected by HPAEC-PAD from the hydrolysate of 7C polysaccharide, and an extra glucosamine was found instead. The extra glucosamine residue was determined to be in a 3,4-linkage by GC/MS analysis of the partially methylated alditol acetates. The presence of 3, 4-Glc*p*NAc was further confirmed by NMR analysis. While the ^{1}H NMR and 2D NMR (COSY, HSQC and HMBC) spectra are comparable with the data published, the large ^{3}J coupling constant (~9.6 ppm) between both H-4 and H-3 ($J_{3,4}$) and H-4 and H-5 ($J_{4,5}$) of the 3,4-linked Hex*p*NAc from a selective NOE experiment suggested that the H-4 is in an axial position, and the 3,4-Hex*p*NAc should be 3, 4-Glc*p*NAc instead of 3, 4-Gal*p*NAc in the published structure. The same conclusion is supported by the strong NOE between the H-4 of 3, 4-Glc*p*NAc and the H-1 of the glucose link to 3, 4-Glc*p*NAc through O-4.

In conclusion, the revised structure of the polysaccharide from Streptococcus *pneumoniae* serotype 7C is:



Revised structure of SP 7C

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GSK Vaccines

Bibliographic references:

Christian Kjeldsen, Sofie Slott, Pernille L. Elverdal, Carmen L. Sheppard, Georgia, Kapatai, Norman K. Fry, Ian C. Skovsted, Jens Ø. Duus. Discovery and description of a new serogroup 7 Streptococcus pneumoniae serotype, 7D, and structural analysis of 7C and 7D. Carbohydr. Res. 2018, 463, 24-31. DOI: 10.1016/j.carres.2018.04.011