Identification of common epitopes between different serotypes of *Streptococcus pneumoniae* group 19

Federica COMPOSTELLA [1], Laura MORELLI [1], Luigi LAY [1], Darielys SANTANA-MEDEROS [2], Yury VALDES-BALBIN [2], Vicente VEREZ BENCOMO [2], Angela VAN DIEPEN [3], Cornelis H. HOKKE [3], Fabrizio CHIODO [3, 4]

[1] University of Milan, Italy, [2] Finlay Vaccine Institute, Havana, Cuba, [3] Leiden University Medical Center, Leiden, The Netherlands, [4] Italian National Research Council (ICB-CNR), Pozzuoli, Italy

federica.compostella@unimi.it

Vaccination with polysaccharide-based conjugate vaccines (PCVs) is recognized as one of the most successful strategy to prevent morbidity and mortality from pneumococcal diseases [1]. PCV vaccines contain capsular polysaccharide fragments from the *Streptococcus pneumoniae* (Sp) serotypes causing the majority of the diseases, covalently linked to a carrier protein. The most relevant limitation of PCV vaccines is caused by the large structural diversity of capsular polysaccharides: the protection offered by vaccination is serotype-specific and serotype prevalence is dynamic. Shifts in worldwide serotype distribution constitute a major challenge for eliminating pneumococcal infections, because commercial vaccines are unable to protect against serotypes not included in the vaccine [2]. This phenomenon is stimulating the search for a new generation of vaccines. Ideal candidates should be protective against a broader range of pneumococcal serotypes, with the possibility of the addition in the vaccine formulation of emerging new clinical isolates. In this framework, to simplify vaccine composition and to elicit a broader protection, we propose the identification of saccharide fragments containing chemical structures shared by different serotypes as cross-reactive and potentially cross-protective common antigens. In particular, we will present recent data on our ongoing work on the identification of common epitopes between different serotypes of Sp group 19 [3]. A small library of saccharides containing chemical structures shared by the 19F and 19A serotypes of S. pneumoniae has been synthesized and tested with a glycan array. The ability of the new compounds to be recognized by antibodies in reference group 19 antisera and factor reference antisera has been evaluated. Our study has shown that a phosphorylated simple disaccharide can be considered as a common carbohydrate epitope shared among different Sp 19 serotypes, setting the stage for exploring new common synthetic epitopes as potential candidates for a new generation of carbohydrate-based vaccines.

COST action CA18103 INNOGLY: INNOvation with GLYcans: new frontiers from synthesis to new biological targets.

Bibliographic references:

[1] B. A. Mungall, B. Hoet, J. Nieto Guevara, L. Soumahoro (2022), Expert Rev. Vaccines (21),201-214.
[2] R. A. Gladstone, J. M. Jefferies, S. N. Faust, S. C. Clarke (2011), J. Med. Microbiol. (60) 1–8.
[3] L. Morelli, L. Lay, D. Santana-Mederos, Y. Valdes-Balbin, V. Verez Bencomo, A. Van Diepen, C. H. Hokke, F. Chiodo, F. Compostella (2021) ACS Chemical Biology (16), 1671-1679.