



## Pasteur-Lille University International Doctoral Program 2023

### Project

**Acronym** : Pneumovac

**Title** : Nasal vaccines to reduce asymptomatic carriage and colonization by pneumococcus

### Laboratory /Thesis Director

**Unit /Team**: Center for Infection and Immunity of Lille / Team Bacteria, antibiotics and Immunity

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### Summary of the proposed project

*Streptococcus pneumoniae* or pneumococcus is the most common agent of community-acquired bacterial pneumonia and can cause disseminated invasive infections. Pneumococci naturally colonize the nasopharynx where they can establish asymptotically. The severity of diseases depends on factors related to the host, the early treatment, but it also depends on the bacteria itself and in particular on virulence factors. Pneumococci mainly reach the lungs by aspiration of nasopharyngeal secretions containing *S. pneumoniae*, referred to as aspiration pneumonia. Vaccines based on capsular polysaccharides against pneumococcus are available; however, they have limitations since immune protection is highly serotype-restricted and is mainly directed against invasive pneumococcal disease. In this context, it appears essential to develop new strategies to improve antibacterial vaccines especially against pneumococcal nasopharyngeal colonization.

The bacterial factors required for nasal colonization are not well defined. Therefore, the project aims at characterizing the pneumococcal factors essential for nasopharyngeal colonization. It is innovative and feasible because it is based on (1) innovative high throughput genetic and/or proteomic screening, and (2) colonization models in mice and human epithelium.

The main objectives are to:

- Screen for factors conserved in pneumococci associated with nasopharyngeal colonization
- Characterize their contribution to colonization
- Capitalize on the selected factors to develop nasal vaccination approaches inhibiting nasal colonization and asymptomatic carriage