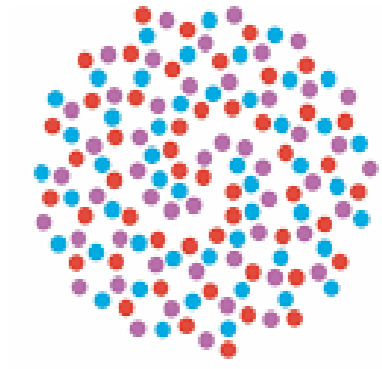


Development of Vaccines against Gonococcal Disease using the PilVax Platform



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Introduction

- Gonorrhoea is a sexually transmitted disease with a high prevalence across the world.
- There is currently no licensed vaccine against gonorrhoea, but vaccine development is a top priority in particular with the rise of antimicrobial resistance (AMR).

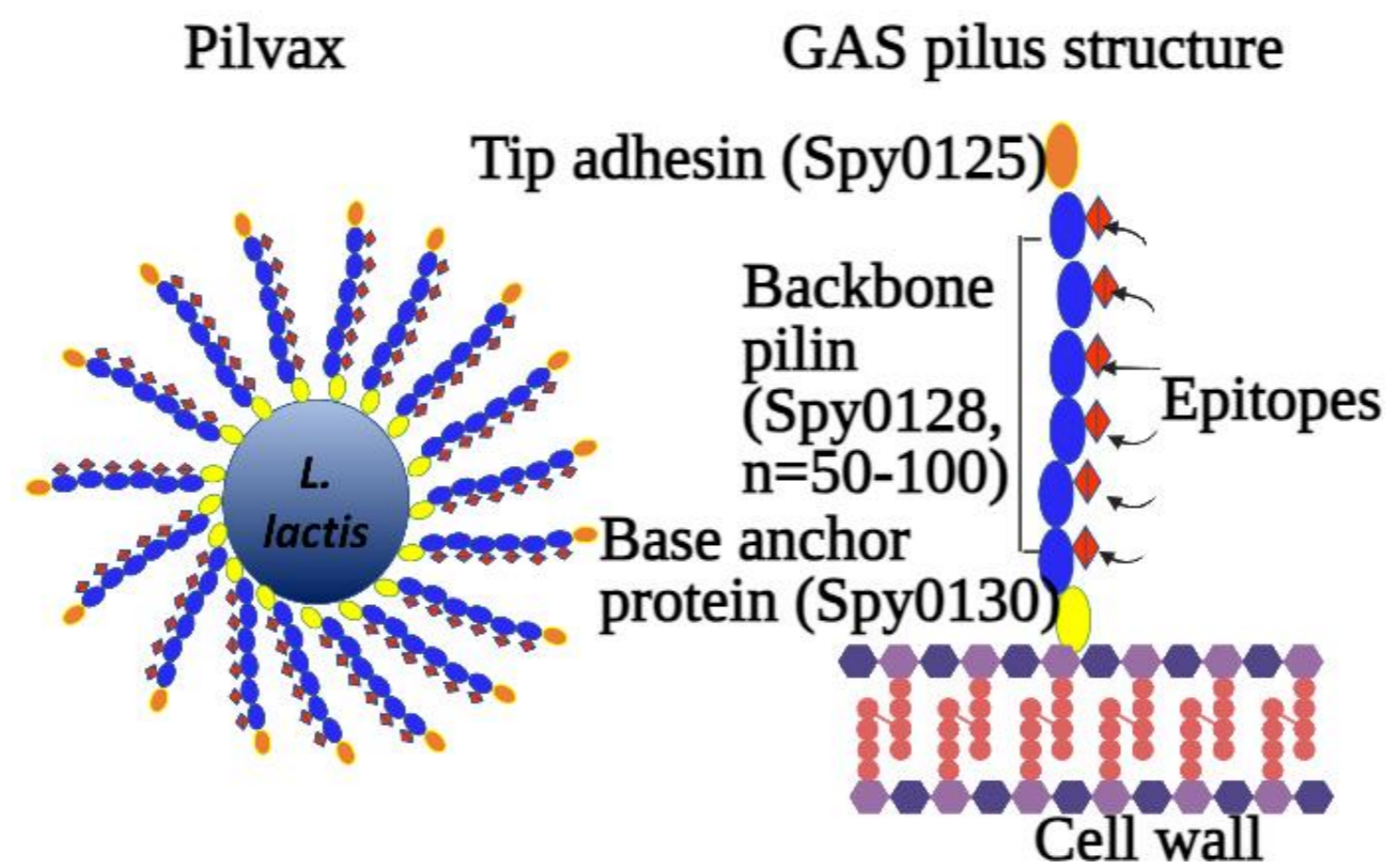


Fig. 1: Schematic representation of PilVax carrying peptide epitopes within the backbone pilus protein.

Pilvax

- Pilvax is a platform where small peptides can be genetically engineered into the identified loops of the pili of *Streptococcus pyogenes* and expressed in *Lactococcus lactis*, a food grade bacteria, intended for intranasal administration (1,2).
- During pilus assembly, the backbone pilin multimerizes into a long fiber containing many copies of the selected peptide on the *L. lactis* cell surface.

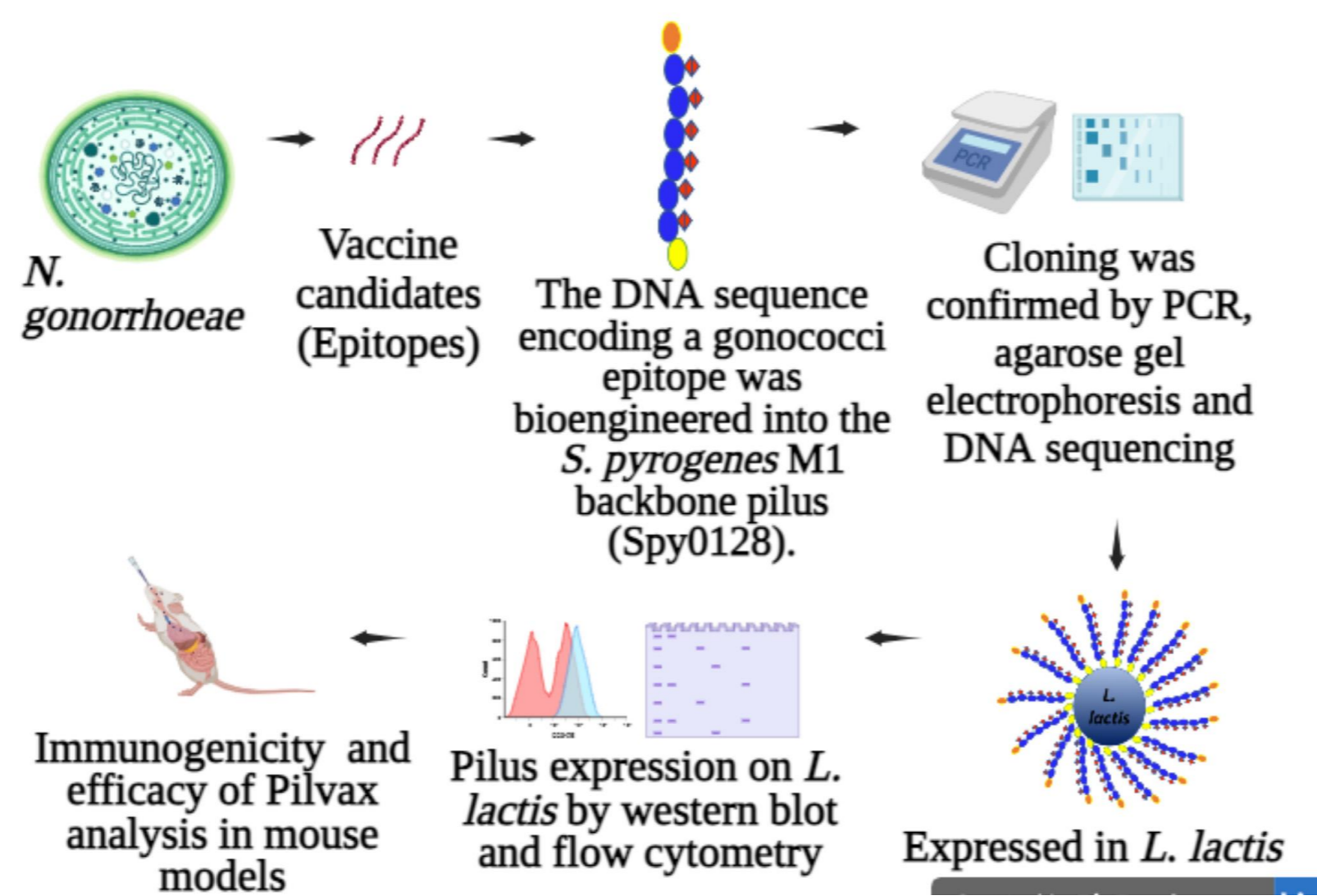
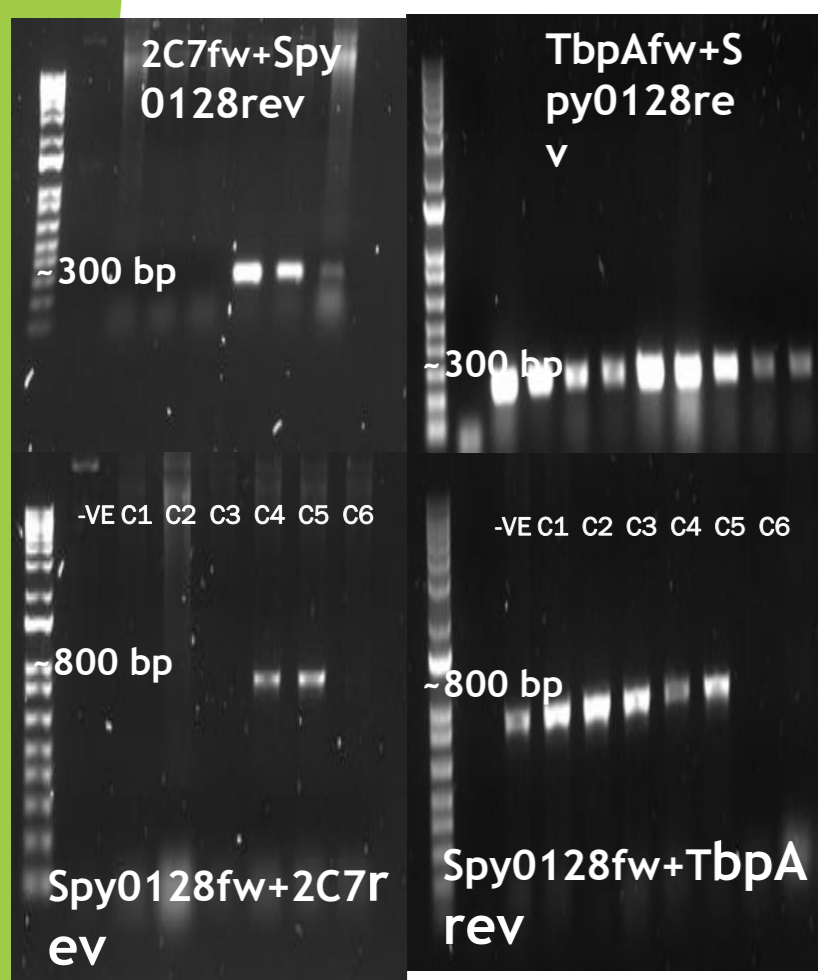


Fig.2. Methodology

Aim

To develop a mucosal vaccine against *Neisseria gonorrhoeae* using the Pilvax platform for presentation of two selected peptides; 2C7 and TbpA loop 10. 2C7 is a peptide mimetic of lipooligosaccharide (LOS) and TbpA is a highly conserved transferrin-binding protein. Both epitopes have shown promising results in previous pre-clinical vaccine studies.

Conclusion

- Gonococcal vaccine candidates were genetically engineered into PilVax and showed stable expression on the *L. lactis* cell surface.
- The overall pilus expression was lower in PilVax containing the peptides compared to native pili.

Future directions

- Immunization evaluation in mice
- Vaccine efficacy analysis in mouse vaginal infection model
- Serum bactericidal assay (SBA)

Fig. 3. PCR amplification of Pilvax constructs shows that the DNA sequences that encode 2C7 and the TbpA loop 10 were successfully cloned in the backbone pilus gene.

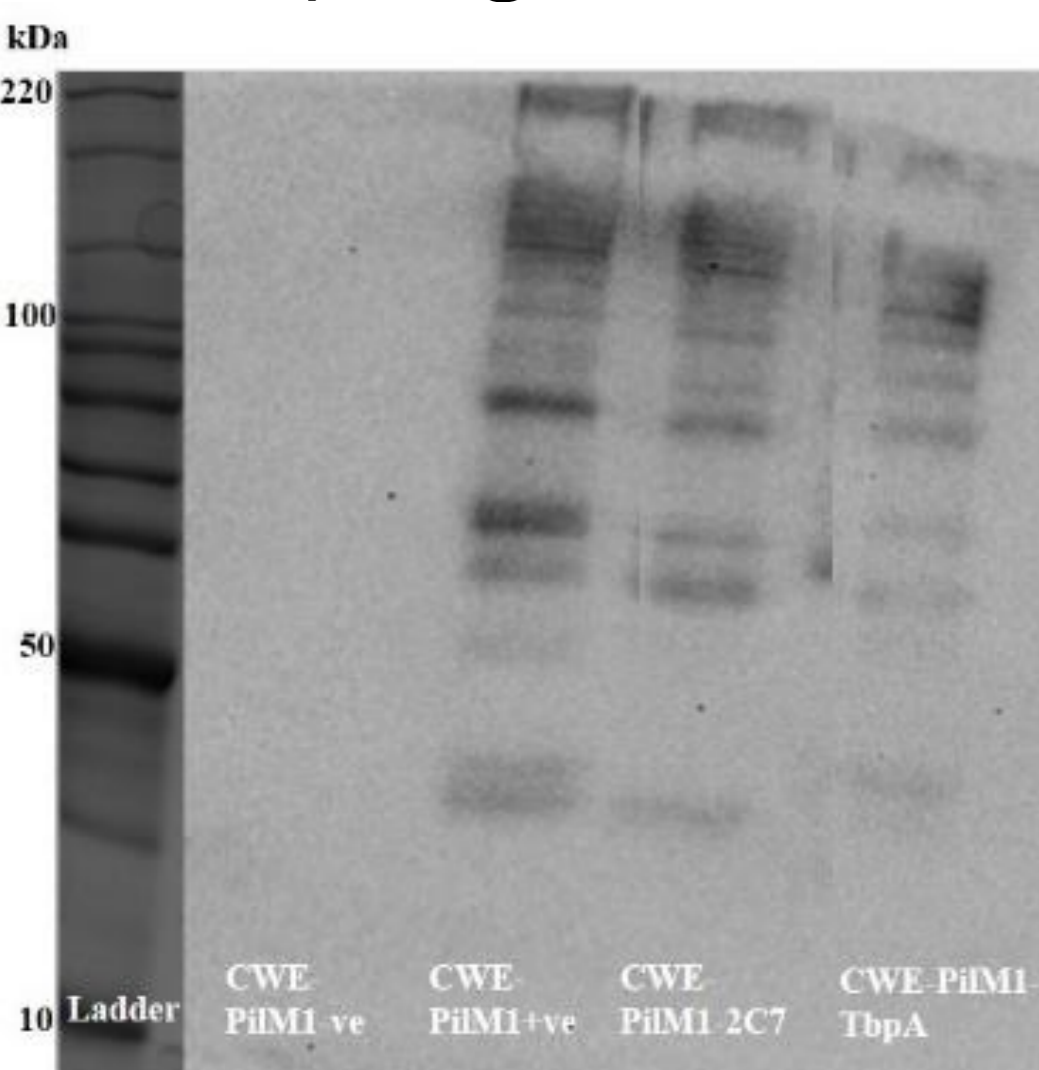


Fig. 4. western blot with antibodies against Spy0128 shows pilus expression of Pilvax constructs

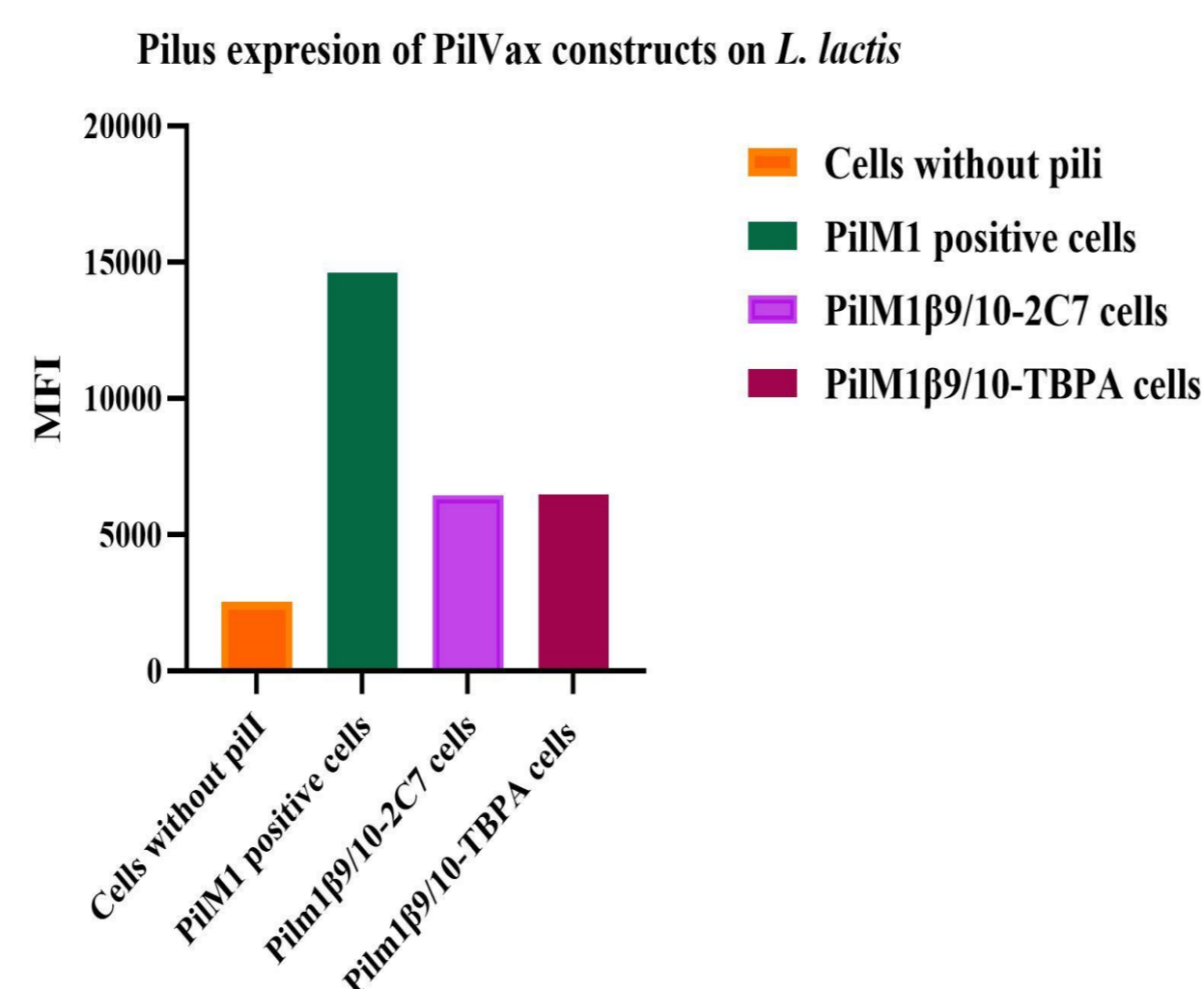


Fig. 5. Pili with inserted peptides are assembled on the surface of *L. lactis*. Modified *L. lactis* strains were grown in culture, washed and used for flow cytometry analysis with specific polyclonal antibodies against the Spy0128 backbone pilin.