Quorum sensing autoinducer peptides as biomarkers for the diagnosis of *Staphylococcus aureus* infections

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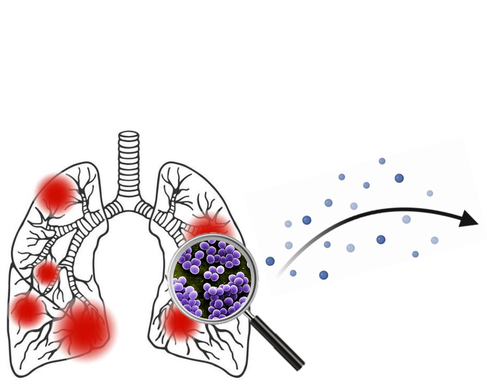
1 Introduction

Staphylococcus aureus is one of the leading causes both of healthcare-associated and community-acquired infections[1]. Up to now, there is still a need of reliable **diagnostic tools** able to early detect and monitor these infections.

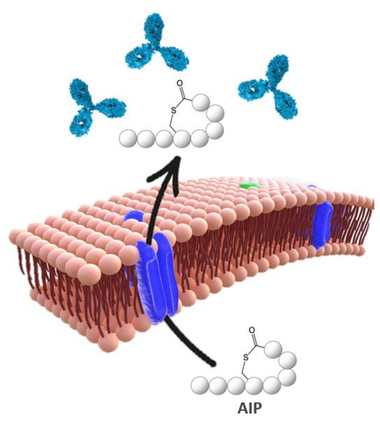
Quorum-sensing (QS) is a cell-to-cell communication process based on the release and sensing of low molecular weight chemical signals, called autoinducers (AIs)[2]. In *S. aureus*, these molecules correspond to cyclic thiolactone **autoinducing peptides** (AIPs I-IV), whose production is regulated by the accessory gene regulator (agr) system during an infection process[3]. AIPs control its own biosynthesis and modulate the genetic expression of virulence factors and survival mechanisms[4].



S. aureus infection

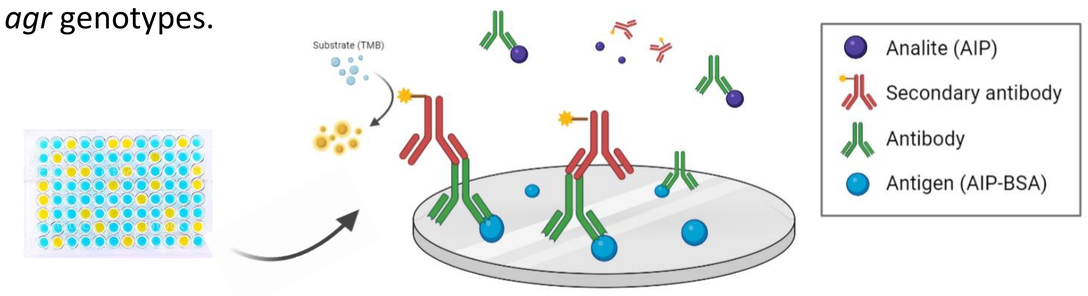
2 Strategy presented: AIP detection

Production of specific **antibodies** for the **detection** of **AIPs**, which could be implemented on bio-sensing technologies, to **speed up** the **diagnosis** of infections caused by *S. aureus* in clinical settings.



3 Immunochemical assay development

Development of **competitive indirect microplate-based ELISA assays** for the detection of AIPs in **clinical *S. aureus* isolates** belonging to different *agr* genotypes.



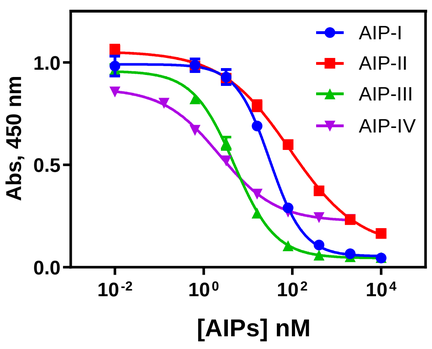
Indirect competitive ELISA

4 Results: analysis of bacterial isolates

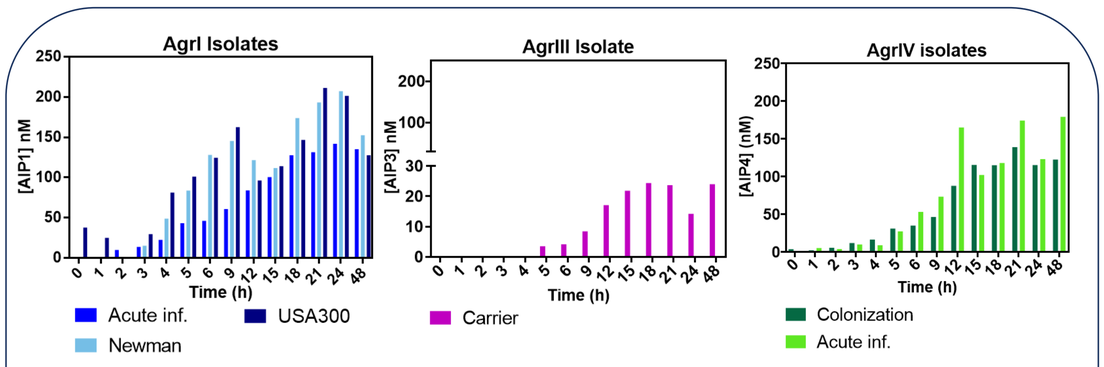
Main features of the ELISAs developed:

- Robust and reproducible
- High sensitivity (low nM range)
- High specificity to each of the AIPs

Implementation in ½ culture broth



	AIP-I	AIP-II	AIP-III	AIP-IV
IC_{50} (nM)	28,16 ± 8.097	87.426 ± 4.07	6.68 ± 3.38	3.18 ± 0.95
Slope	-1.02 ± 0.04	-0.56 ± 0.02	-0.86 ± 0.11	-0.8 ± 0.12
LOD (nM)	2.90 ± 1.04	1.53 ± 0.33	0.51 ± 0.32	0.24 ± 0.12
R^2	0.998 ± 0.001	0.99 ± 0.001	0.996 ± 0.003	0.990 ± 0.011



AIPs have been quantified with **high accuracy** in **½ culture broth** samples where clinical isolates have been grown after a **short incubation** period.

5 Conclusion

The results shown bring to light the potential of the immunochemical technique developed to **early diagnose *S. aureus* infections**. **AIPs I-IV** can be **easily detected** from complex culture media with simple previous treatment (½ dilution). Likewise, the specificity profile towards the different AIPs gives possibility of using this method in **genotyping studies**.

6 Future work

- ✓ Validation of the diagnosis and genotyping capability, by testing samples of all agr types.
- ✓ High throughput screening of several cinical isolates.
- ✓ Detection of AIPs directly from clinical respiratory samples.

CONTACT

Literature
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Aknowledgments
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