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Microbial interactions between *Staphylococcus epidermidis* and *Klebsiella pneumoniae*

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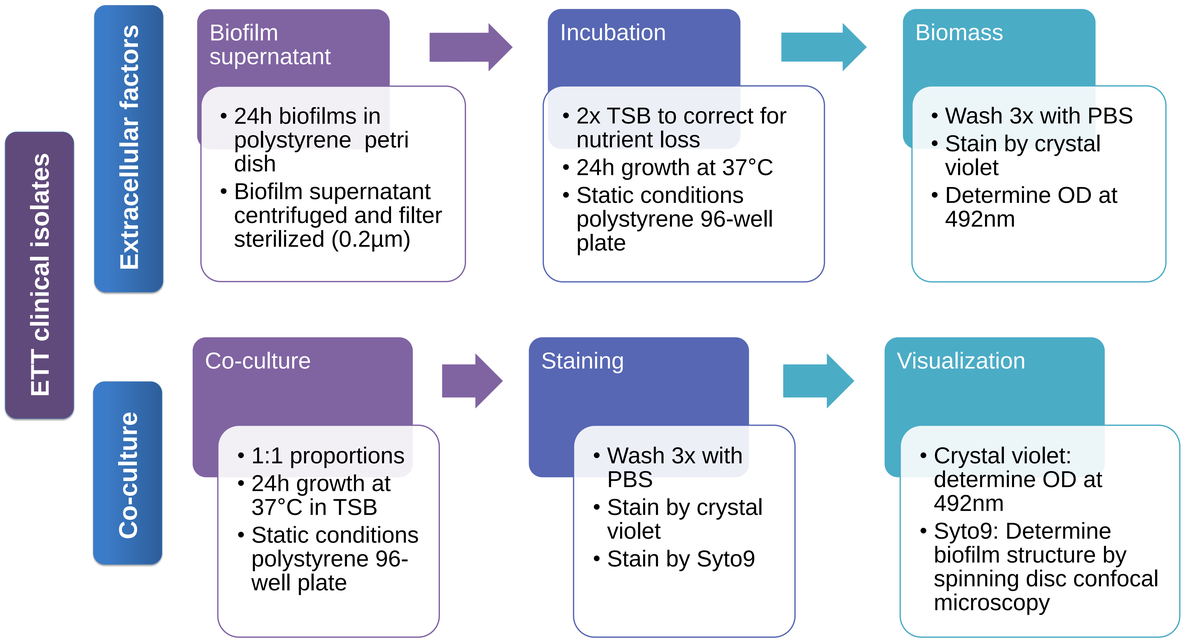
Introduction

Recent research shows that the microbiome and the interactions therein might influence the transition from colonization to infection. *K. pneumoniae* and *S. epidermidis* are frequently co-isolated from respiratory samples and from biofilms formed in endotracheal tubes (ETT) of mechanically ventilated patients in intensive care units. However, the nature of the interaction between these potential pathogens is not yet known. **We aimed to understand the influence of extracellular factors produced by *K. pneumoniae* and *S. epidermidis* during biofilm formation as well as the impact of co-culture on the biomass produced by either organism.**

Materials and Methods



Conclusions

The microbial interactions between *K. pneumoniae* and *S. epidermidis* are strain- situation dependent. *K. pneumoniae* supernatants stimulated biofilm formation in the majority *S. epidermidis* isolates. Nevertheless, during co-culture the biomass of *S. epidermidis* was inhibited and the total biomass was close to *K. pneumoniae* mono-culture. The biomass of the majority of *K. pneumoniae* was reduced by *S. epidermidis* supernatants.

Funding

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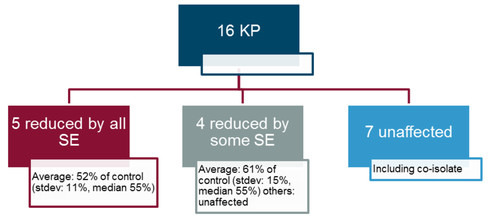
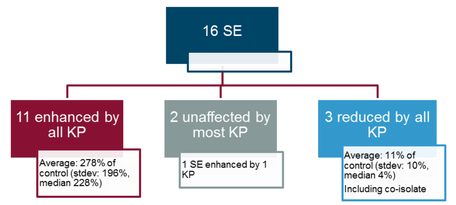
Results

Impact of extracellular factors on biofilm formation





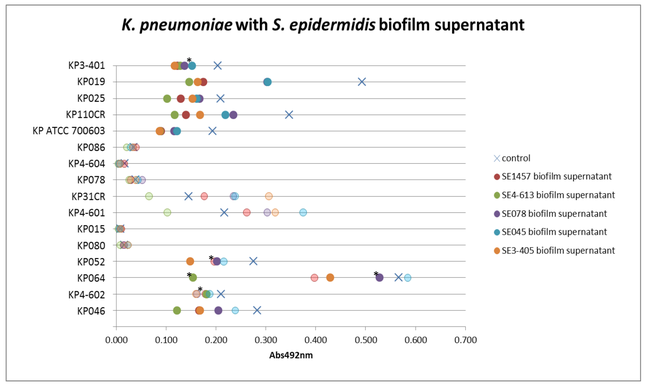


Fig 1: Impact of *S. epidermidis* biofilm supernatant on *K. pneumoniae* biofilm formation. P<0.001 is all cases. Transparent values are not significant. All values with * p<0.05. KP078 is co-isolated with SE078.

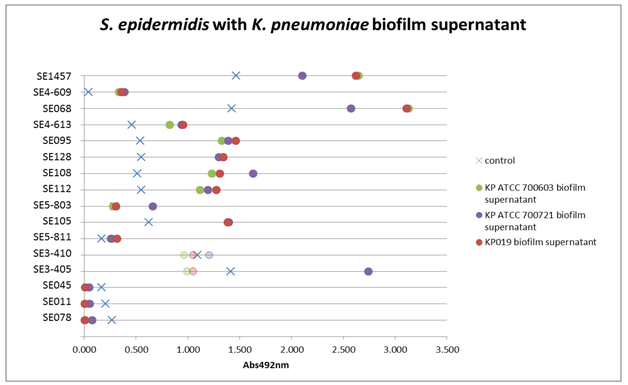


Fig 2: Impact of *K. pneumoniae* biofilm supernatant on *S. epidermidis* biofilm formation. P<0.001 in all cases.; Transparent values are not significant.

Impact of co-culture on biofilm formation

During co-culture, the total biomass was close to the biomass of *K. pneumoniae* mono-culture (data not shown).
Microscopy showed that *S. epidermidis* formed a thick, confluent and structured layer (fig 3A) whereas only a few K. *pneumoniae* cells were attached (fig 3B, white arrows). During co-culture, *S. epidermidis* biofilm formation was inhibited as only small microcolonies consisting of *S. epidermidis* were visible (fig 3C)

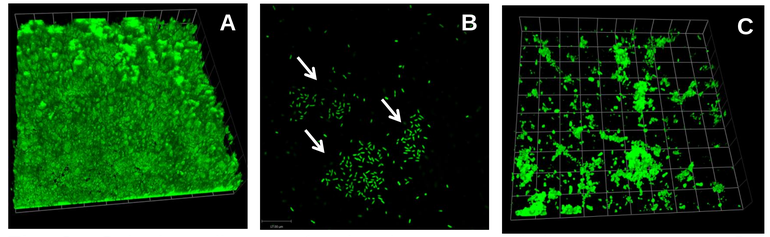


Fig 3: Spinning disc confocal microscopy of live biofilms of *S. epidermidis* (A), *K. pneumoniae* (B) and co-culture (C). All cells were stained by Syto9.

References

Lambotte (2002), Chest, 122, 1389-99; Sanduimenge (2012), Curr Opin Pulm Med, 18, 187-93

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