


## How frequent is SEC found in *Staphylococcus aureus*?

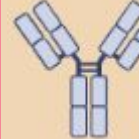
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### Abstract


*Staphylococcus aureus* was isolated from bacteria swabs collected from participants at Concordia University St. Paul for this study. Isolated *Staphylococcus aureus* was then run through genomic prep to gather DNA from each strain. Collected DNA was amplified using PCR with specific primers to the targeted sec gene. Amplified sec gene was then transferred to gel electrophoresis, establishing whether the original strain contained the sec gene.


### Background

 Staphylococcal enterotoxin C (SEC) is characterized by serologically distinct SAGs produced by *Staphylococcus aureus*.

 Characterization of SEC:<sup>1</sup> properties to bind Major Histocompatibility complex (MHC) class II molecules and T-cell receptors on antigen-presenting cells (APC), to stimulate T-cell proliferation. Large amounts of T-cells and macrophages lead to increased cytokine production.



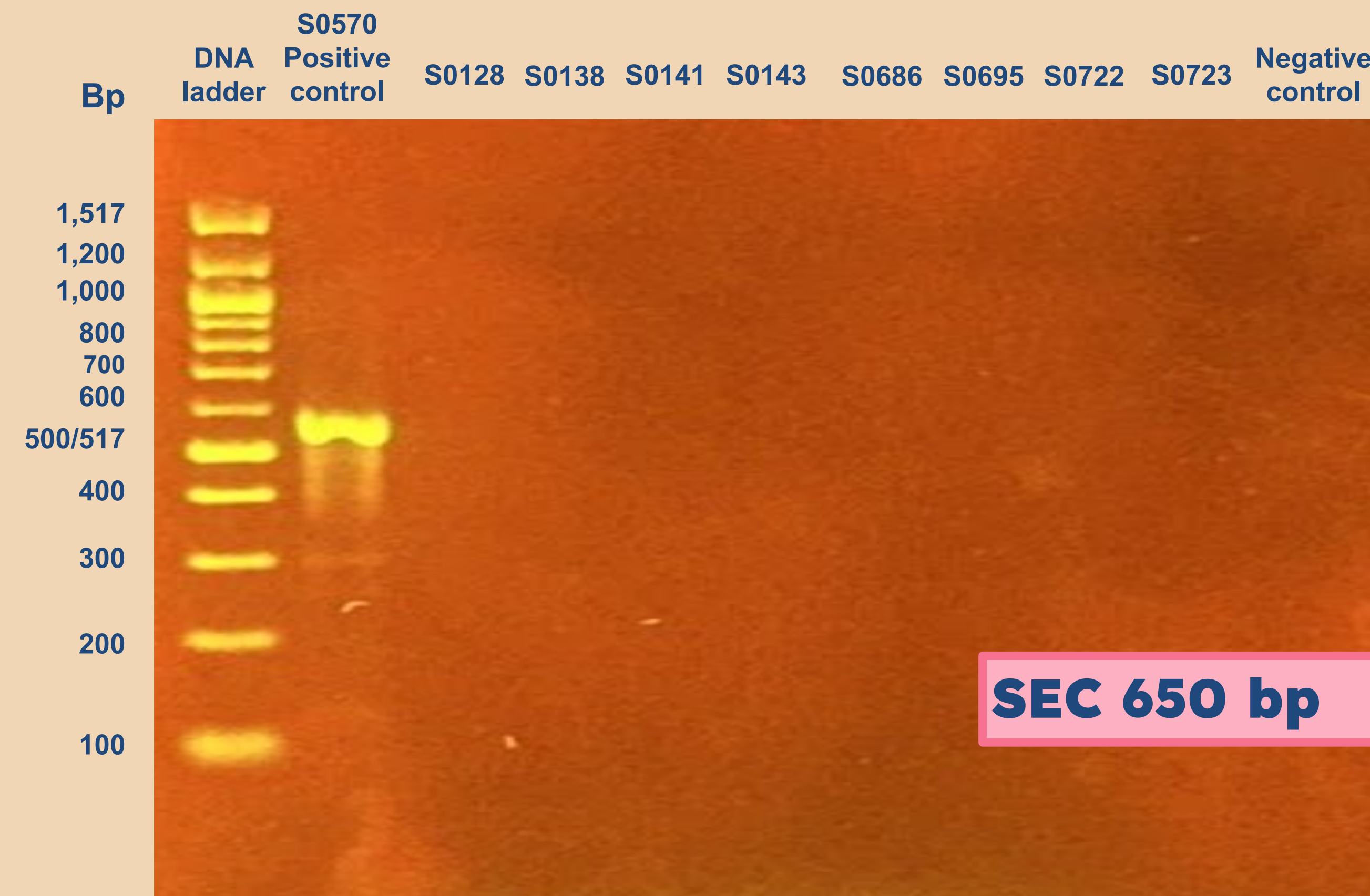
 An enterotoxin is a toxin with the ability to infect the digestive system. *Staphylococcus aureus* causes a large number of human diseases, specifically in the digestive system.

 SEC contains four antigenically distinct subtypes, each associated with specific human niches.<sup>5</sup> SEC1-SEC4 differ on the nucleotide sequence level to generate diversity between each.

These subtypes vary by 15 amino acids, with a molecular weight ranging between 24 and 28 kDa.<sup>5</sup>



# Low prevalence of SEC detected in various *Staphylococcus aureus* strains.



**Figure:** Through gel electrophoresis, SECs appearance in multiple *S. aureus* strains is visualized. The 8 strains tested S0128-S0723 did not contain the sec gene. Positive control, S0570, shows expected bp of SEC, as this strain contains SEC.

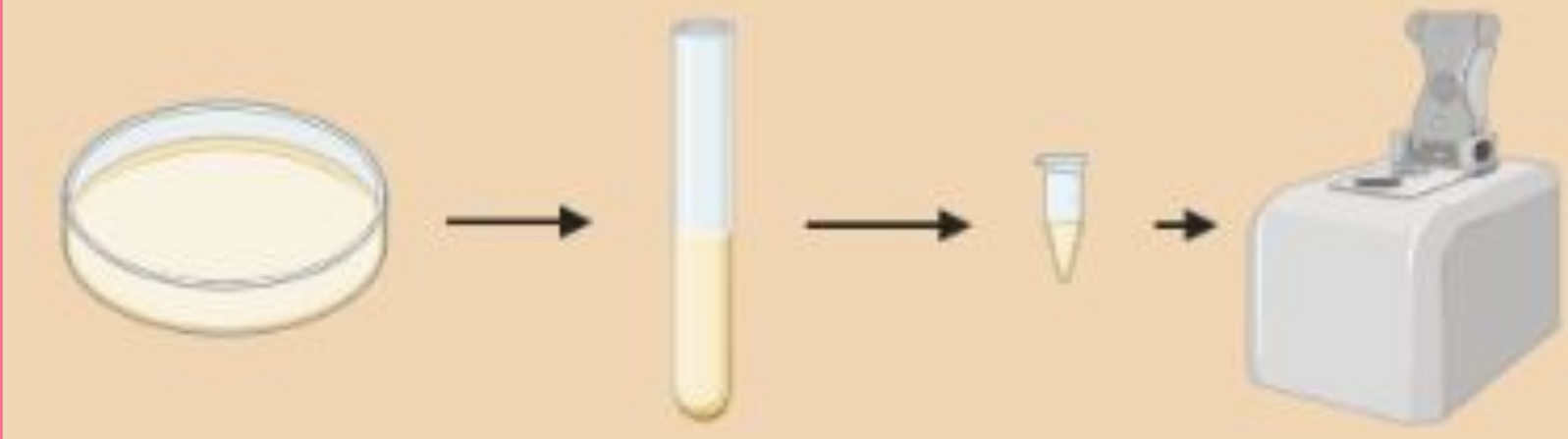
### Results

Research shows,

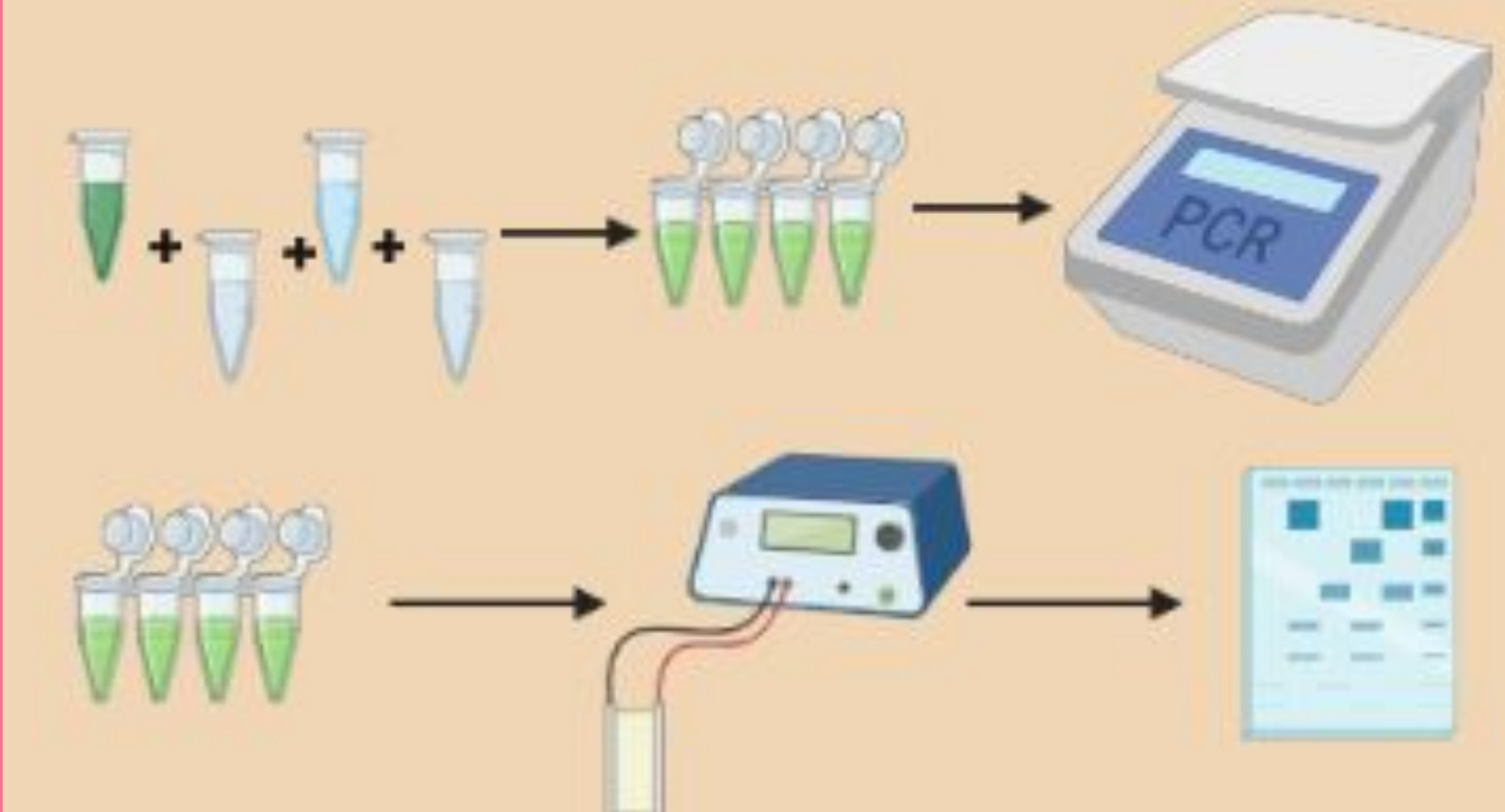
- With new sec subtype sequencing, identical PCR products may be generated, 138 bp. The development of a multiplex PCR system using new primers simultaneously for detection of individual strains is virtually impossible.<sup>3</sup>
- The 4 antigenically distinct SEC subtypes share over 97% homology of nucleotide sequence.<sup>1</sup>
- The earliest publication of sec4 subtype dates to 2020, where genome sequence is not commercially available.

### Methods

DNA Genomic Prep



PCR



### Conclusion

SEC presence in *S. aureus* strains is rare, less than 3%. Upon further research, SEC primer may lack ability to detect the 4 subtypes, leading to nonspecific results.

Isolate strains	Positive with SEC
8 Clinical Strains	0/8
Classmate strains	4/47
Total	4/142

### Acknowledgements

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