

# TSST-1 & SEA superantigens are present in the same *Staphylococcus aureus* strains

**Abstract** Isolates were previously classified as *Staphylococcus aureus* from a previous study. In this study *S. aureus* is tested for the presence of MRSA and for the presence of superantigens

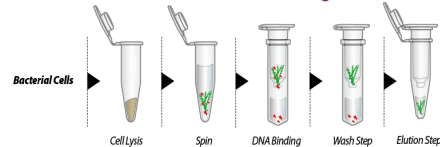
1) Obtain swabs from participants	2) Look for Staph in the swabs and grow it in the lab
3) Is the Staph <b>MRSA?</b>	4) Does the Staph make superantigens?

## Methods

**Kirby Bauer Assay:** To detect antibiotic resistance of 12 strains using Mueller-Hinton plates and oxacillin discs. MSSA (-) and MRSA (+)

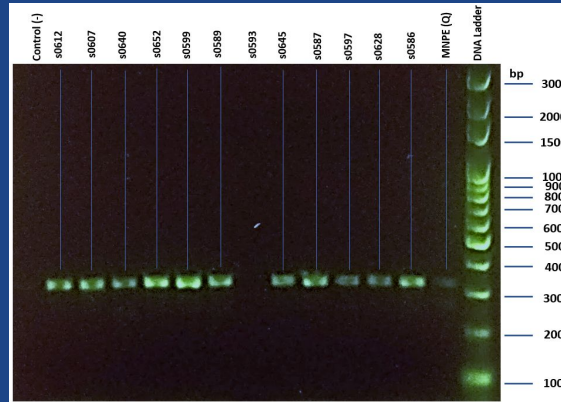
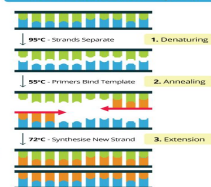


**Genomic Prep Kits:** Compared genomic prep kits, Qiagen's QIAamp DNA Mini Kit and DNAland's Geno Plus Genomic DNA Extraction Miniprep Kit on MNPE.



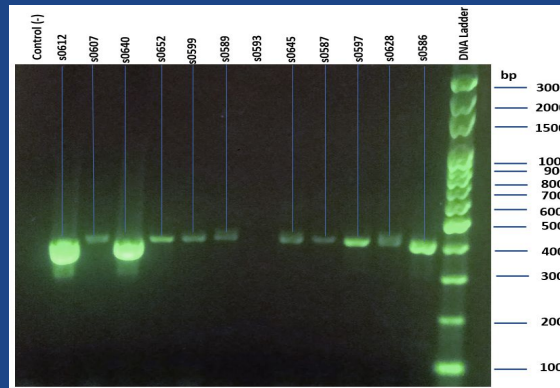
**Polymerase Chain Reaction (PCR):** Genomic preps were used and it's DNA was introduced to specific primers to amplify a specific DNA strain during PCR.

### PCR Process (One Cycle)



TSST-1 expected bp: 325

SEA expected bp: 425

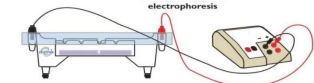


De Boer, M. L., Kum, W. W., Pang, L. T., & Chow, A. W. (1999). Co-production of staphylococcal enterotoxin A with toxic shock syndrome toxin-1 (TSST-1) enhances TSST-1 mediated mortality in a D-galactosamine sensitized mouse model of lethal shock. *Microbial pathogenesis*, 27(2), 61-70. <https://doi.org/10.1006/mpat.1999.0282>

	s0586	s0628	s0597	s0587	s0645	s0593	s0589	s0599	s0652	s0640	s0607	s0612
SEL-X		+	+		+	+		+		+	+	+
SEA	+	+	+	+	+		+	+	+	+	+	+
TSST-1	+	+	+	+	+		+	+	+	+	+	+

**Gel Electrophoresis:** For each run twelve *S. aureus* genomic preps from the Qiagen kit were tested for the presence or absences of superantigens. 2% agarose gel was used for each run.

## Results

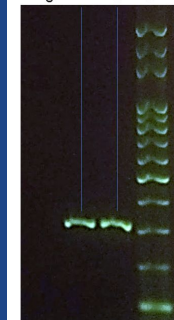


### Kirby Bauer Assay:

Strain	s0586	s0628	s0597	s0587	s0645	s0593	s0589	s0599	s0652	s0640	s0607	s0612
MSSA (-) / MRSA (+)	-	-	-	-	-	-	-	-	-	-	-	+

**Nanodrop:** The Qiagen and DNAland genomic prep kits showed lots of molecules from the wash buffers from each kit at 230nm. Concluded that the Qiagen Kit was better because at A260/A280 it was the closest to 2.

	A260/A280	A260/A230
Qiagen	1.35	0.77
DNALand	0.06	-0.1



- Qiagen:**
- Is a blue chip company (global business).
  - Extra incubation at 95°C was required
  - Two solutions were used to wash the columns out
- DNALand:**
- Smaller business
  - Focuses on creating affordable reagents and kits for research
  - Requires one solution for washing out columns

**Superantigens present in *S. aureus* strains:** 8/12 *S. aureus* strains (s0628, s0597, s0645, s0599, s0652, s0640, s0607, s0612) all contained the SEL-X, SEA, and TSST-1 superantigen.

SEA and TSST-1 are positive within the same *S. aureus* strains, indicating a possible partnership between the two superantigens.

## Conclusion

The expected bp for both TSST-1 and SEA showed 11/12 bands for these superantigen. Indicating that the superantigen is present within a *S. aureus* strain. Within the results the negative control rules out false positive and contamination.

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