NTS Ventures
New Technology Services

STUDY TITLE

Determination of the Efficacy of a Heat Cabinet (MRSA-Nator) to Eradicate Pathogenic Microorganisms from Towels

STUDY SPONSOR

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STUDY NUMBER

TBD

DATE

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OBJECTIVE

The objective of this study was to evaluate the ability of the heat oven MRSA-NATOR to reduce the number of microorganisms on towels in athletic facilities. Test organisms included bacteria commonly found in community facilities.

MATERIALS

Test isolates were taken from the culture collection at the Center for Medical Mycology and consisted of 3 strains each of the following:

Methicillin-resistant *Staphylococcus aureus* (MRSA)

Escherichia coli

Organisms were inoculated onto pieces of white toweling samples provided by the sponsor.

METHODS

Substrate Preparation

To evaluate the efficacy of the MRSA-NATOR to kill bacteria commonly found on the skin, white toweling was cut into 2 cm squares, placed in an autoclave pouch, and autoclaved at 121° F for 15 min.

Inoculum Preparation

1. Bacteria was subcultured from frozen stocks onto brain heart infusion (BHI) agar plates and incubated at 37° C for 24 hrs.
2. Bacterial cells were then transferred to sterile water tubes using a sterile inoculating loop and adjusted to a cell concentration of 10^6 CFU/mL using a 0.5 McFarland standard.

Procedure

1. Toweling squares were placed into sterile 6 well microtiter plates and inoculated with 100 µL of bacterial suspension containing 10^5 cells.
2. Plates were placed in the MRSA-NATOR and heated for 15 min, 30 min, 60 min, 90 min, 2 hr, or 4 hr.
3. Upon removal from the oven, 8 mL of BHI broth was added to each well and plates incubated at 37° C for 24 hr.
4. Following incubation, 1 mL from each well was removed and serially diluted. Dilutions were plated on BHI plates, distributed with an L-shaped spreader, and incubated for an additional 24 hr for bacterial growth.
5. Colony forming units (CFU) were determined for each strain at each heated time interval.
6. Unheated inoculated towel squares were included as controls for each test strain.

Results

Ability of the MRSA-Nator to reduce the number of cells from 3 strains of MRSA

Our data showed that exposure to the MRSA-Nator led to complete elimination of MRSA cells of the 3 tested strains in as little as 15 minutes of incubation compared to the untreated control (Figure 1). This inhibition can be seen by visual representations in the appendix.

Ability of the MRSA-Nator to reduce the number of cells from 3 strains of E. coli

The MRSA-Nator demonstrated the ability to eliminate all bacterial cells from 2 strains of *E. coli* (Strain ATCC 8739 and K12) in as little as 15 minutes of incubation compared to the untreated control (Figure 2). The third strain of *E. coli* (isolated from a patient with Crohn's disease) showed notable growth after 15 and 30 minutes of incubation, however, cells were completely

destroyed after 60 minutes of incubation compared to the untreated control (Figure 2-C). This inhibition can be seen by visual representations in the appendix.

Conclusion

In general, our data demonstrate that the MRSA-Nator incubator is effective in eliminating bacterial cells from multiple strains of MRSA and *E. coli* in as little as 15 minutes.

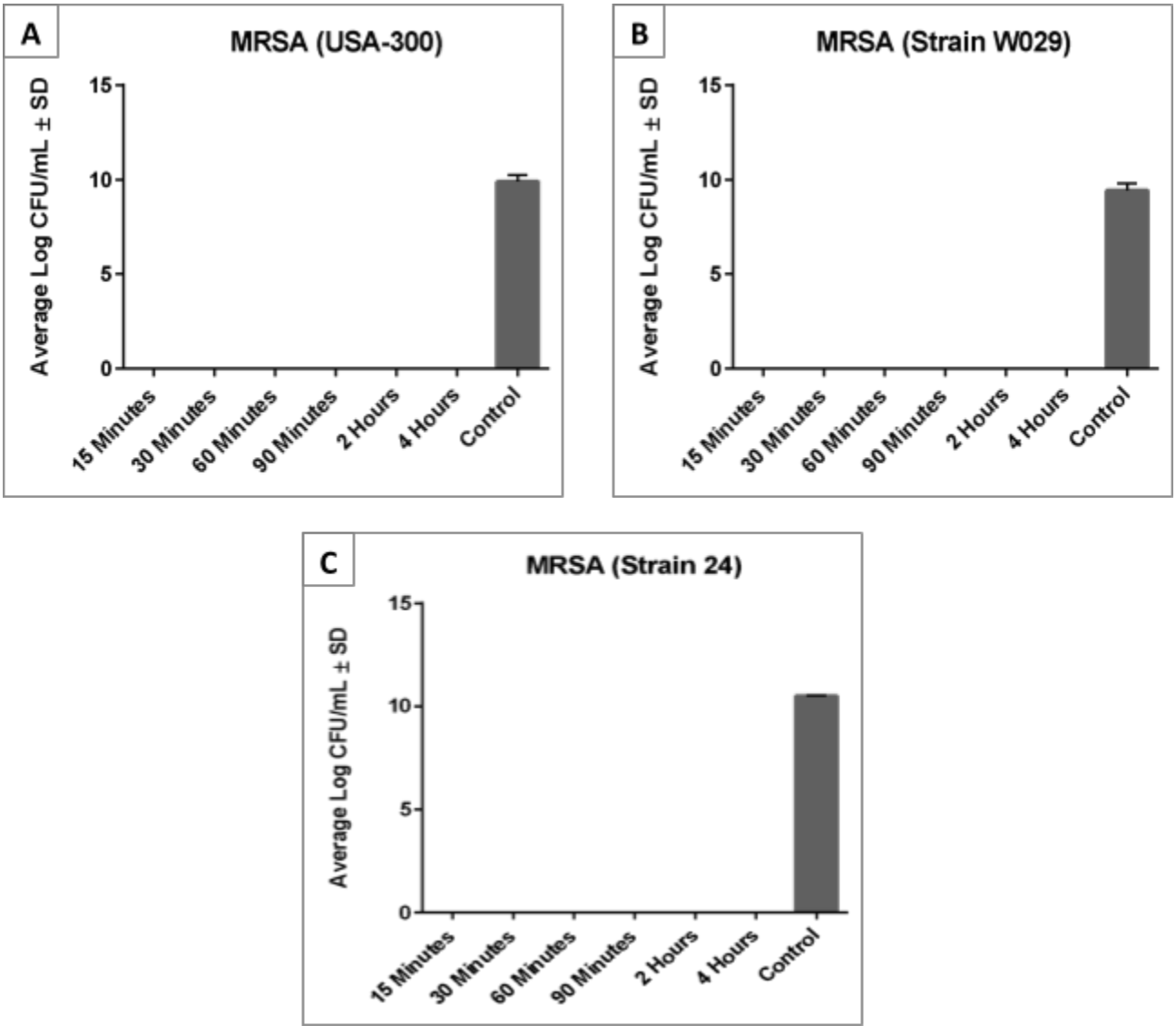


Figure 1. Average log CFU/mL ± SD of bacterial growth for the 3 tested strains of MRSA.

*Indicates statistical significance

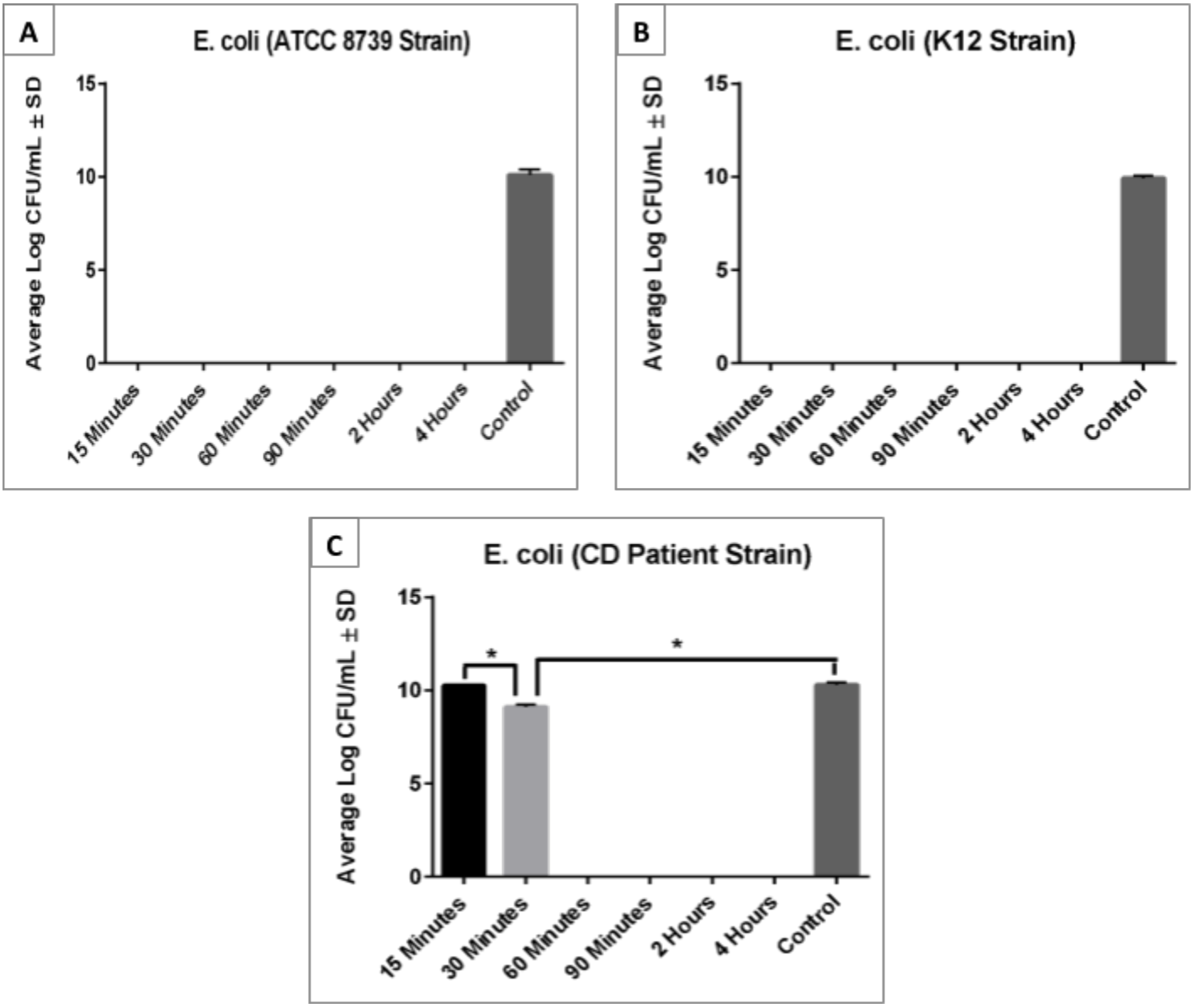
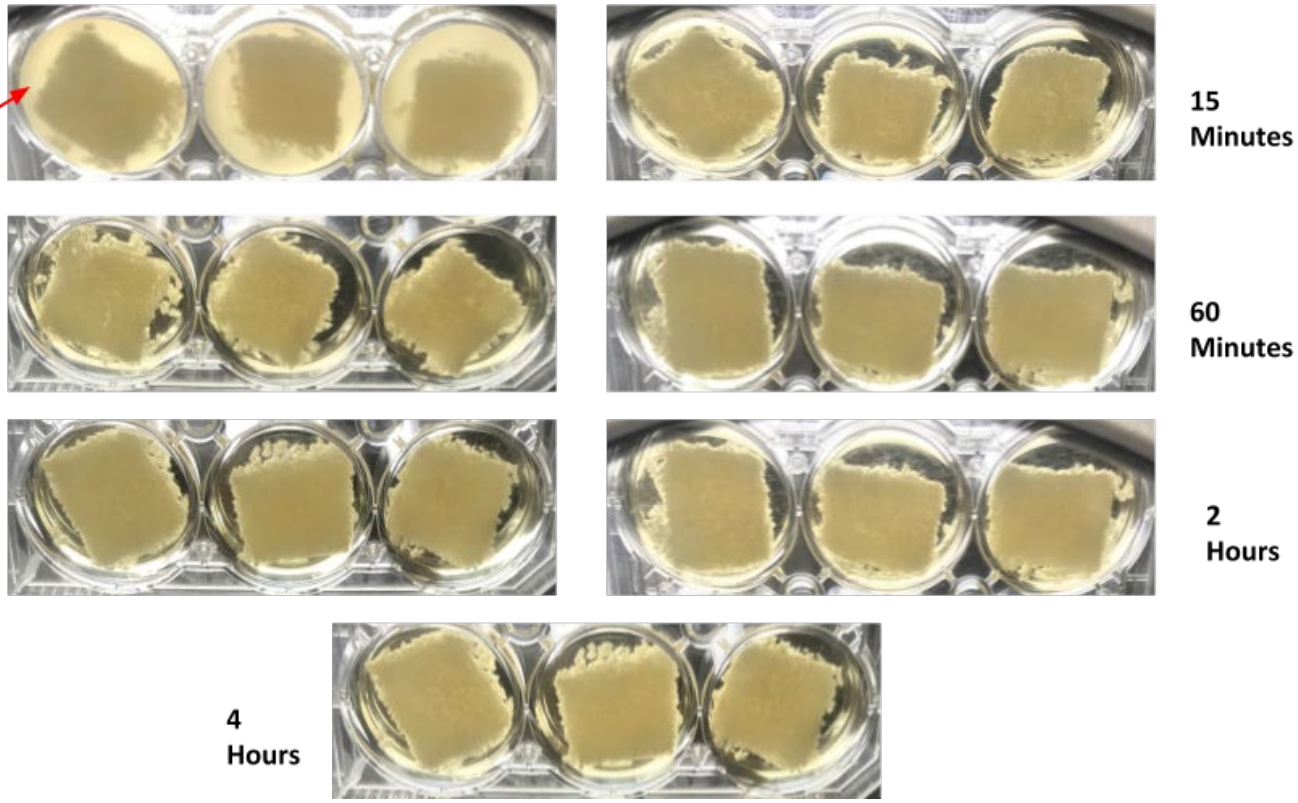


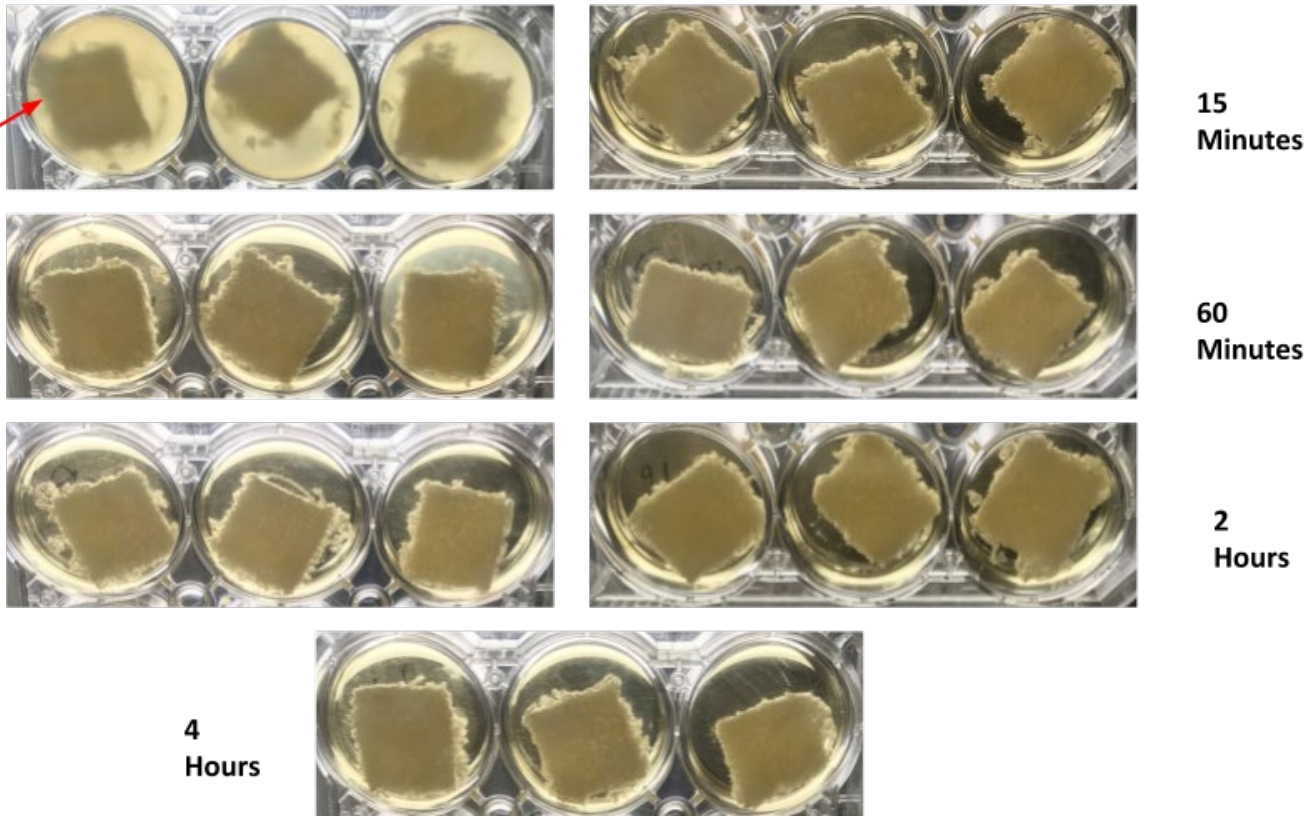
Figure 2. Average log CFU/mL ± SD of bacterial growth for the 3 tested strains of *E. coli*.

Appendix

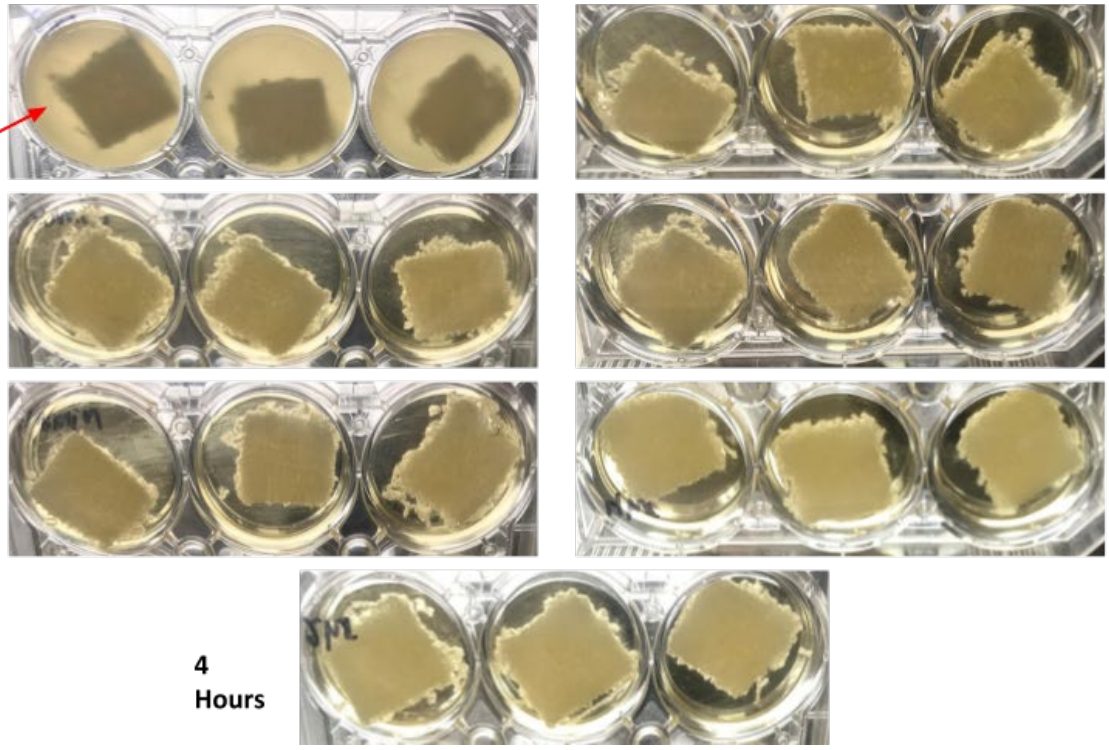
MRSA (Strain USA-300)



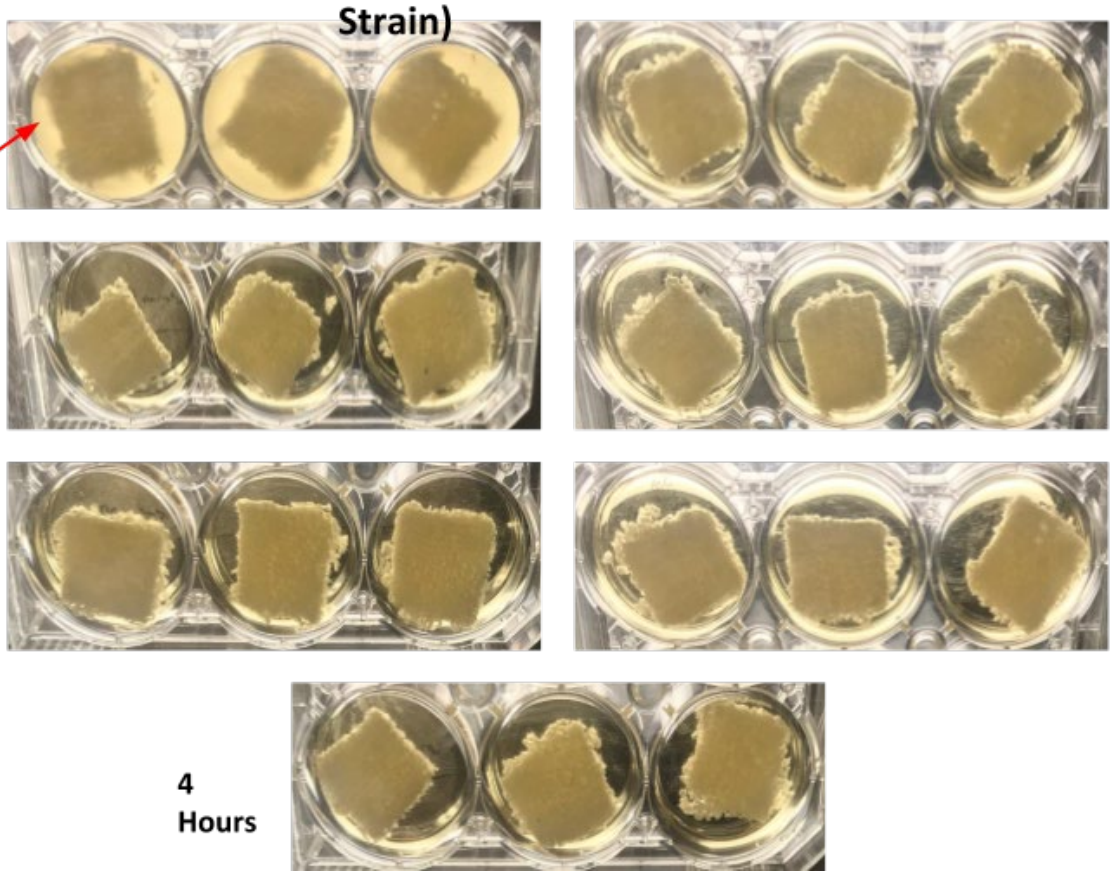
MRSA (Strain W029)



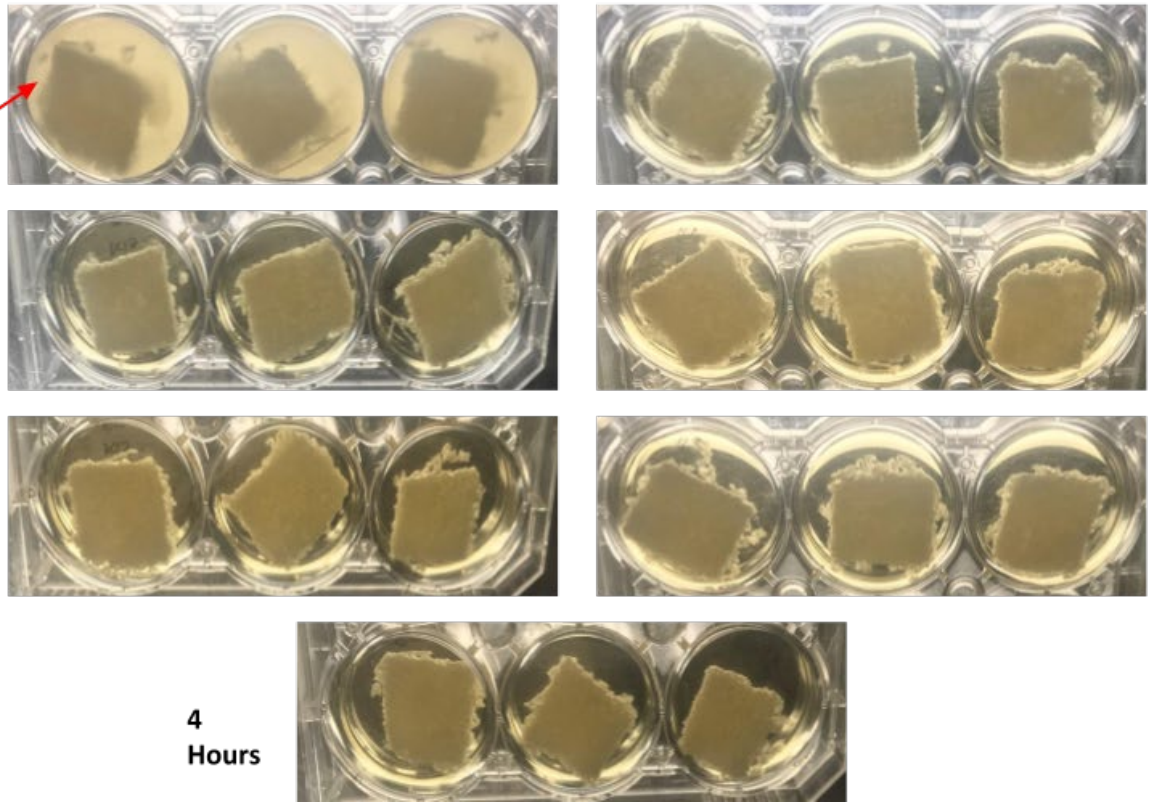
MRSA (Strain 24)



E. coli (ATCC 8739 Strain)



E. coli (K12 Strain)



E. coli (CD Patient Strain)