# Assessing Bacterial Adhesion to Metallic Coating on Silicone for Peritoneal Dialysis Catheters

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## Introduction

- The project goal is to test the effectiveness of a coating on silicone tubing of peritoneal catheter extensions to reduce biofilm formation.
- Peritoneal dialysis (PD) is a treatment option that filters blood using the peritoneum [1].
- Dialysate enters the body through a peritoneal catheter-extension. Excess fluid and chemical waste diffuse across the peritoneum and into the PD fluid which is then removed from the body [2].
- Peritonitis is the inflammation of the peritoneum usually from bacterial or fungal infection. Minimizing infections is important for PD patients to improve quality of life [3].

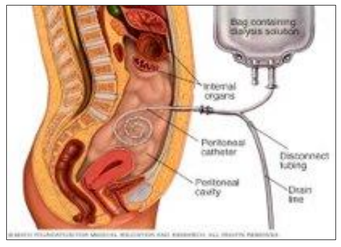



**Figure 1.** Diagram of peritoneal dialysis setup.

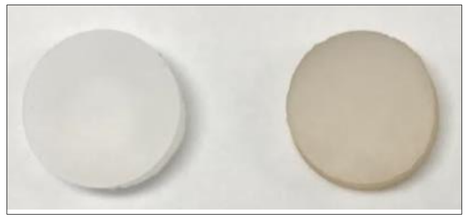
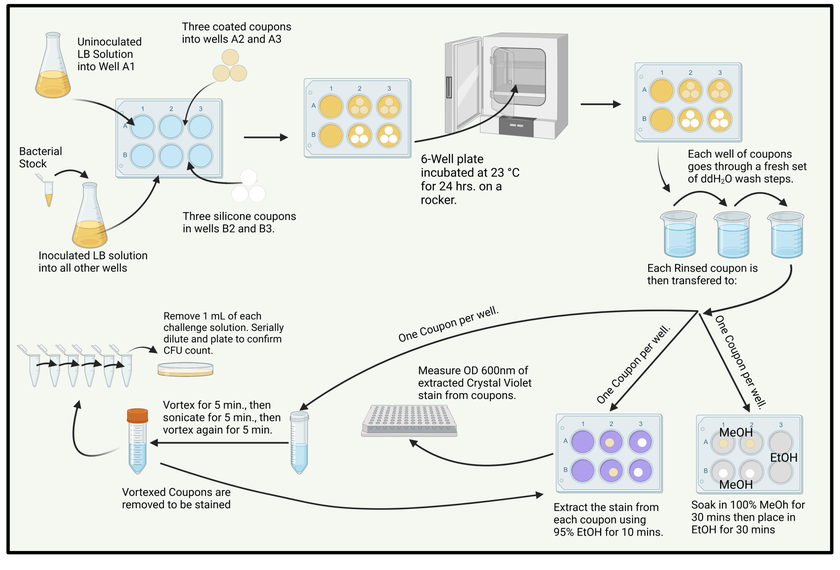
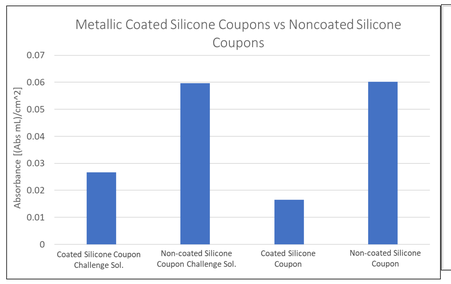
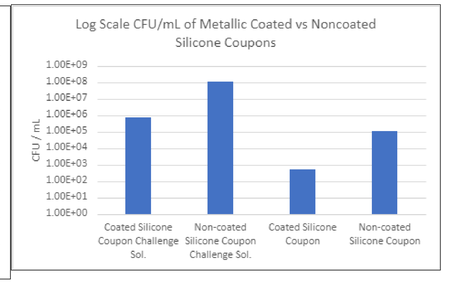


**Figure 2.** Images of bare non-coated (left) silicone coupon, and the metallic coated silicone coupon (right).

## Method



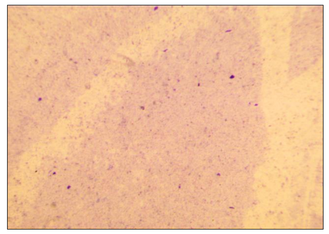



**Figure 3.** (Left) Metallic coated coupon after crystal violet staining at obj. 10x.

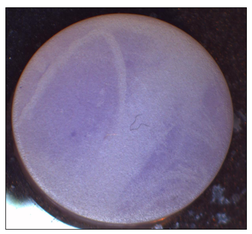


**Figure 4.** (Right) Metallic coated coupon after crystal violet staining.

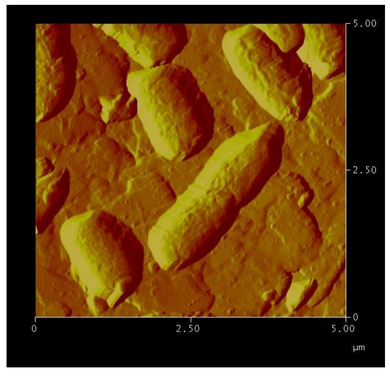



**Figure 5.** Atomic force microscopy image of non-coated silicone coupon.

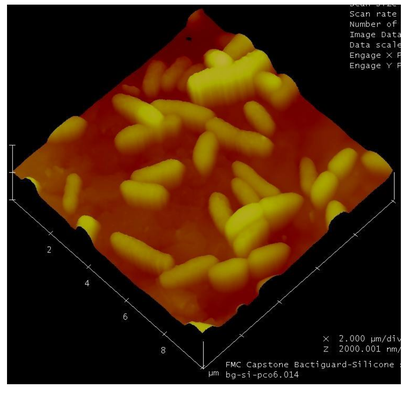



**Figure 6.** Atomic force microscopy 3D image of metallic coated silicone coupon.

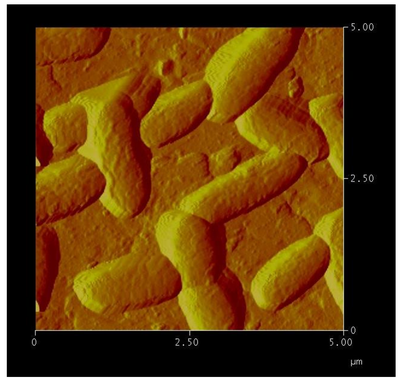



**Figure 7.** Atomic force microscopy image of metallic coated coupon.

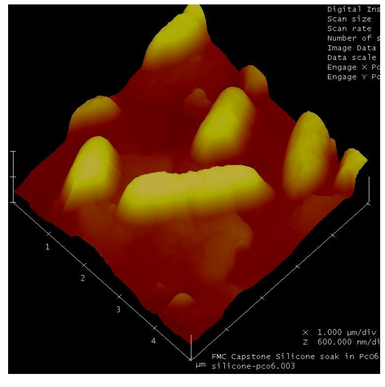



**Figure 8.** Atomic force microscopy image 3D of non-coated silicone coupon.

## Results and Discussion

- Crystal violet staining has shown a 55.42% reduction between the metallic coated and non-coated silicone coupons. The challenge solution has shown a 72.63% reduction in bacterial growth.
- Colony forming units per mL data has shown a 2-log reduction between the metallic coated and non-coated silicone coupons. The challenge solution has also shown a 2 log reduction between the metallic coated and non-coated silicone coupons.
- Visual confirmation of crystal violet staining the biofilm attached to the coupons has been shown in Figures 3 & 4.
- As shown in the AFM images healthy bacteria can be seen growing on both the metallic coated and non-coated silicone coupons. These images are shown in Figures 5-7.

## Future Work

- Perform more replicates of the experiment.
- Use of *S. aureus* and *P. Aeruginosa* in place of PcO6.
- Analyze the results with atomic force microscopy and scanning electron microscopy.
- Analyze results using live dead staining techniques.
- Replicate results to ensure reliability.

## Acknowledgements

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## *References*

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