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Introduction

Chronic wounds are characterized by a multispecies bioburden which can negatively impact healing when the wounds become critically colonized or infected. Antimicrobial treatment strategies are therefore increasingly utilized in the management of chronic wounds to govern important WHO pathogens such as *S. aureus*, *P. aeruginosa*, *E. faecium*, *E. cloacae* or *A. baumannii*. Here, a bacteria-binding wound dressing* was investigated for antimicrobial activity according to a standard *in vitro* method.

Methods

The determination of antimicrobial activity was performed according to the internationally recognized Japanese industrial standard (JIS L 1902:2015, „Testing method for antibacterial activity of textiles“) against the WHO-relevant pathogens *S. aureus* DSM 11729 (MRSA), *P. aeruginosa* DSM 24599 (ESBL), *E. faecium* DSM 17050 (VRE), *E. cloacae* DSM 26481 (ESBL), and *A. baumannii* DSM 102929. Further, the efficacy of the wound dressing was investigated using a repeated inoculation strategy of *S. aureus* ATCC 6538 and *P. aeruginosa* DSM 1117 over 7 days.

*Sorbact® Bacteria Binding Compress, Abigo Medical

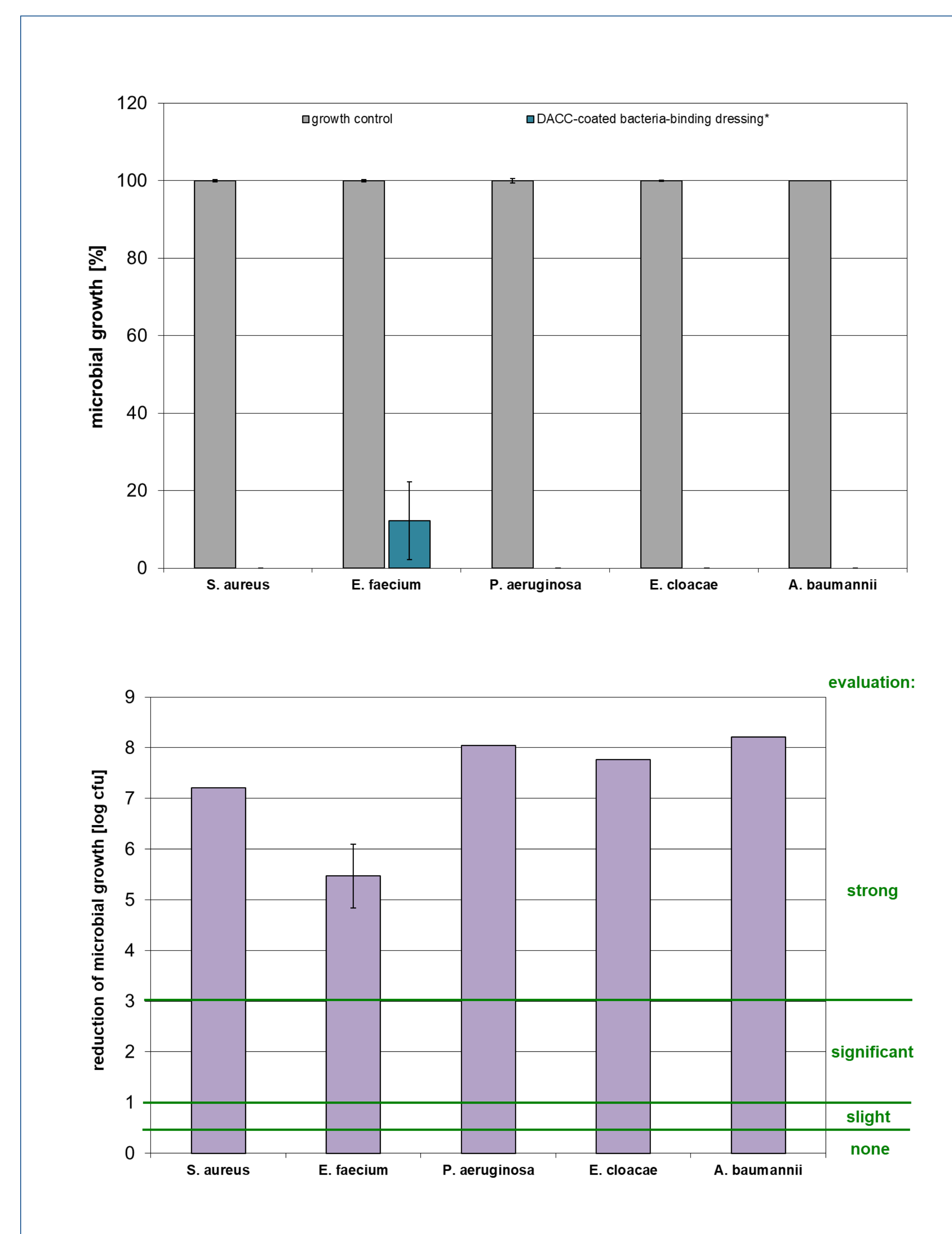


Figure 1: Growth of the WHO microorganisms under the influence of the DACC-coated bacteria binding dressing* over 24 hours (upper panel) and the reduction of microbial growth achieved in [log cfu] according to JIS L 1902 (lower panel).

Conclusions

The DACC-coated wound dressing* was found to possess antibacterial properties including against WHO relevant wound pathogens, which was found to be achieved by binding and obstructing the microorganisms' progeny.

Results

The DACC-coated bacteria-binding wound dressing* was able to inhibit the growth of all important WHO pathogens tested (Figure 1). According to JIS L 1902:2015 the antimicrobial activity could be rated as strong against *S. aureus* (MRSA) (log-reduction = 7.21), *E. faecium* (VRE) (log-reduction = 5.47), *P. aeruginosa* (ESBL) (log-reduction = 8.04), *E. cloacae* (ESBL) (log-reduction = 7.76), and *A. baumannii* (log-reduction = 8.21). Furthermore, it was found that the dressing* was able to inhibit the growth of *S. aureus* (Figure 2) and *P. aeruginosa* (Figure 3) over the examined time period of 7 days with repeated re-inoculation of the test specimen. The dressing was found to exert its antibacterial effect by binding the microorganisms to the fibres and inhibiting their growth (Figure 4).

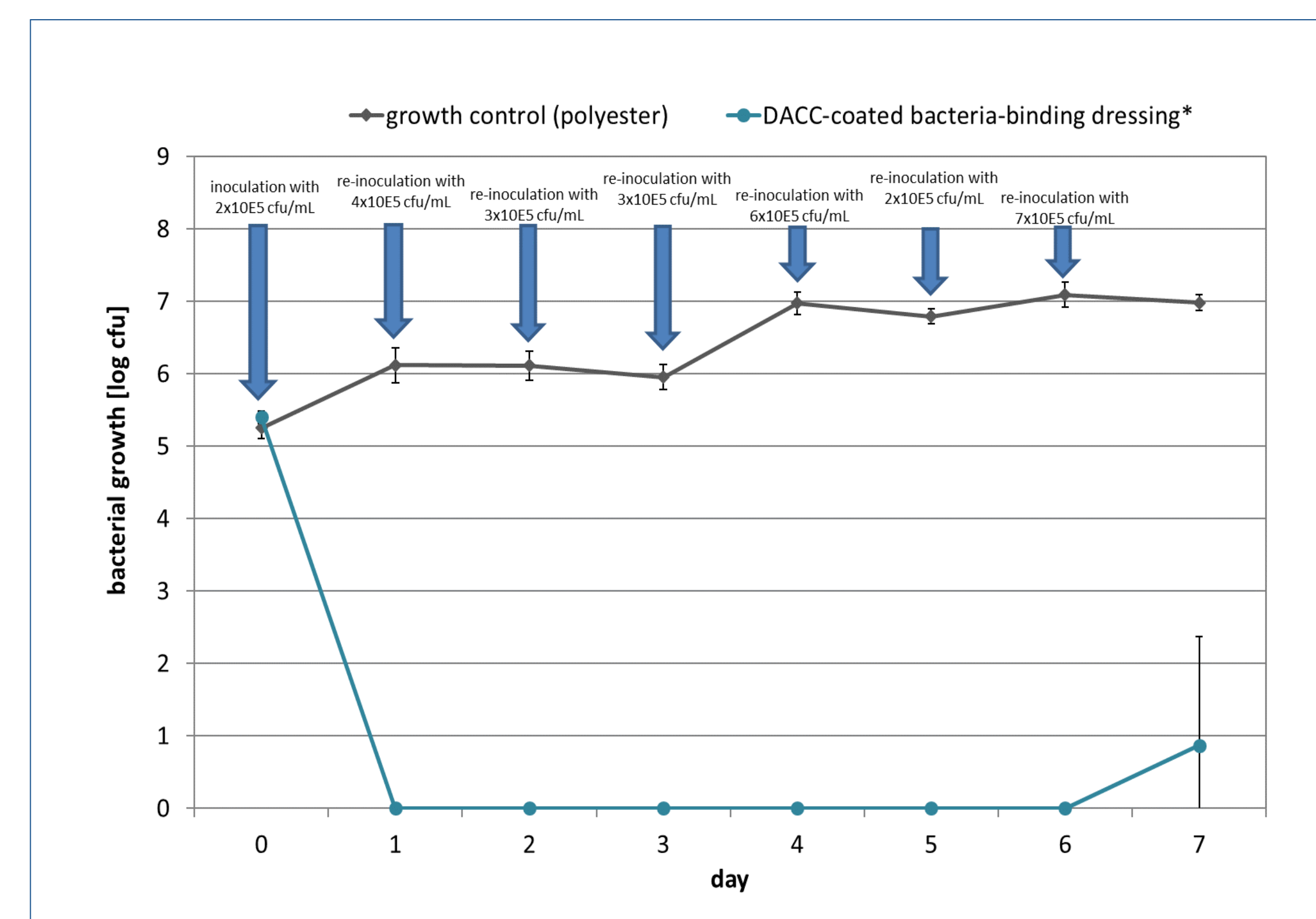


Figure 2: Growth of *S. aureus* under the influence of the wound dressing over 7 days and the estimation of the reduction of bacterial growth by evaluation of [log cfu] according to JIS L 1902. The re-inoculation protocol is depicted as arrows at the respective time points.

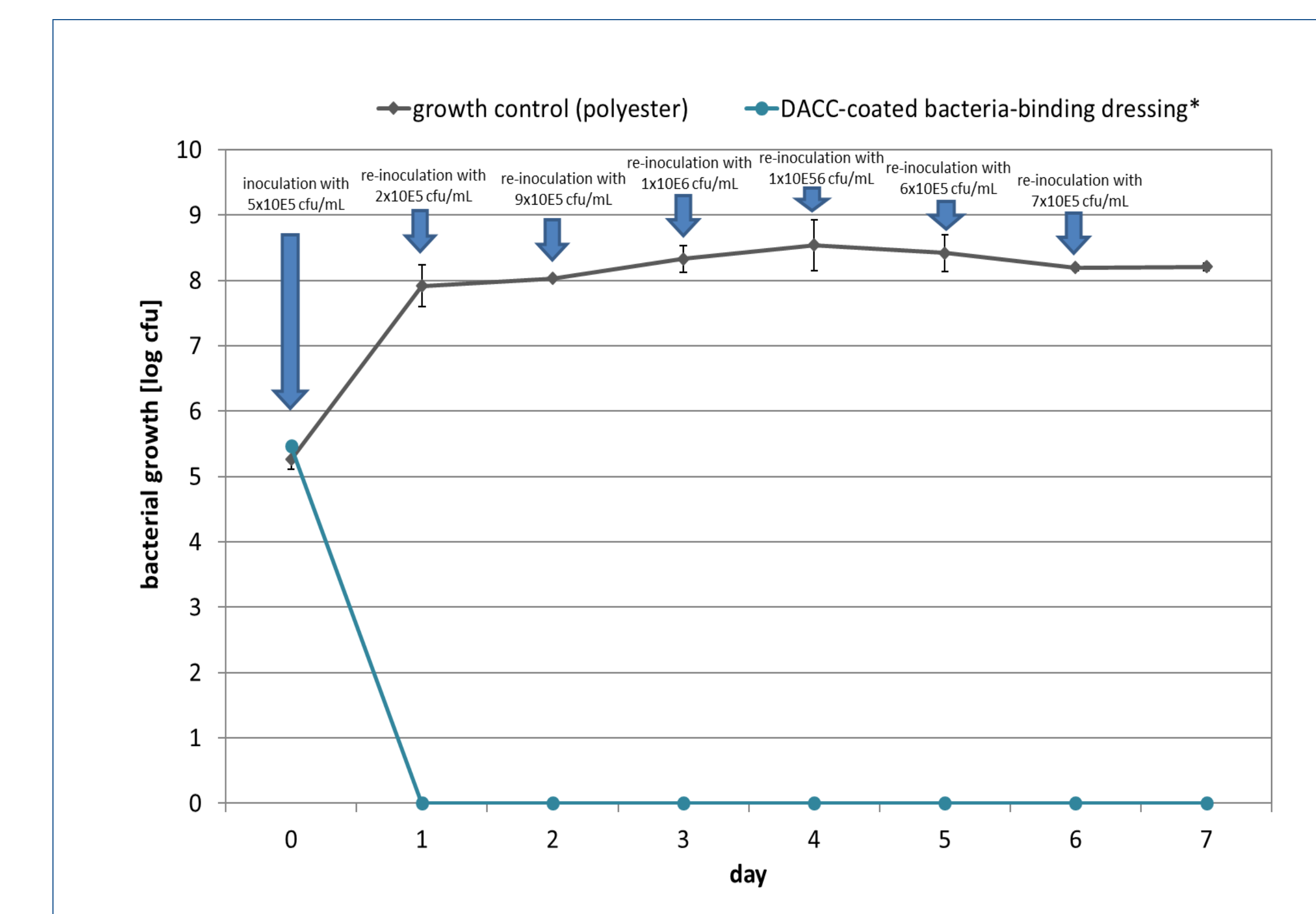


Figure 3: Growth of *P. aeruginosa* under the influence of the wound dressing over 7 days and the estimation of the reduction of bacterial growth by evaluation of [log cfu] according to JIS L 1902. The re-inoculation protocol is depicted as arrows at the respective time points.

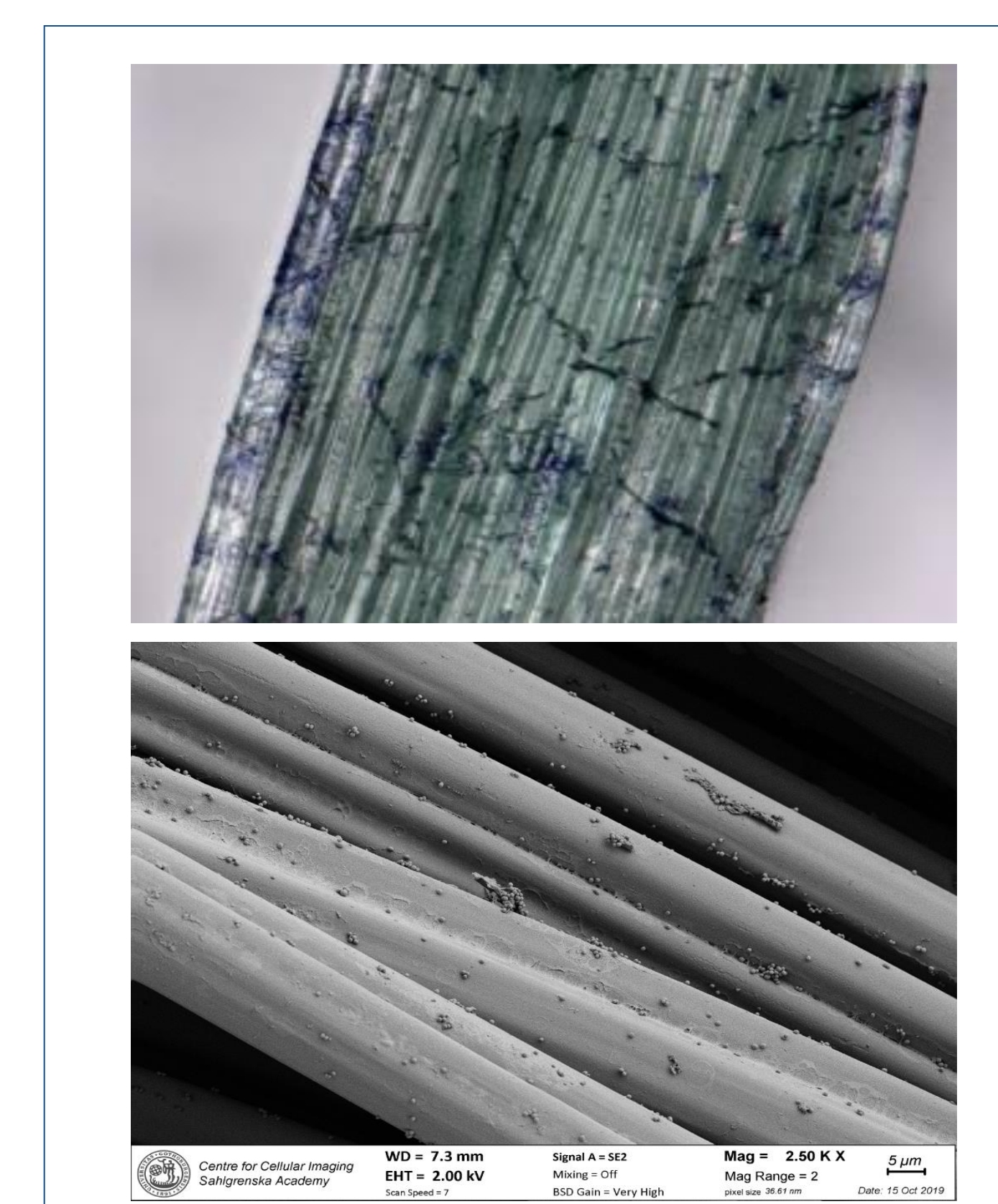


Figure 3: *S. aureus* binding on a DACC-coated dressing fiber stained with MTT and photographed at 100-magnification using the digital Keyence microscope (upper panel) and SEM imaging (lower panel).