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The Use of Scanning Electron Microscopy for the Analysis of Bacteriophage Binding to *Acinetobacter baumanii*

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Scanning Electron Microscopy (SEM) was used to ascertain the binding of bacteriophage (phage) to clinically relevant *A. baumannii* isolates. The use of phage for successful treatment of pathogenic bacterial infections in conjunction with antibiotics has been documented [1]. The current study examines bacteriophage samples from the US Navy phage library that were previously screened for the ability to inhibit the growth of *A. baumannii*. The phage (AB-Navy1, AB-Navy4, AB-Navy71, and ABNavy97 from the Myoviridae Family, and AbTP3Φ1 from the Podoviridae Family) were examined for their ability to bind to the surface of *A. baumannii*. These phage were used in conjunction with the three clinical isolates of *A. baumannii* TP1, TP2, and TP3 [1, 2]. The clinical isolates were taken at different time points during the infection [1].

The objective of this study was to determine the binding of specific phage to different clinical isolates of *A. baumannii*. Figure 1 (A-C) demonstrates that the size, shape and surface texture of uninfected TP1, TP2 and TP3 were similar in appearance. While the concentration of each phage was similar upon infection, there is a large diversity in the number of phage seen bound to the surface of the bacteria. The binding of AB-Navy1 (D-F) and AB-Navy71 (M-O) is high for TP1, but becomes reduced for TP2 and selective for TP3. The binding levels for AB-Navy4 (G-I), AbTP3Φ1 (J-L) and AB-Navy97 (P-R) remain relatively consistent for TP1, TP2 and TP3. Although the binding remains consistent, previous data demonstrate that TP3 is resistant to lysis by AB-Navy4 and ABNavy97 [1]. The examination of the TP1 column shows that AB-Navy1, AB-Navy4, AB-Navy71, and AB-Navy97 (D, G, M, and P respectively) bound to TP1 with high efficiency. While the binding efficiency of AbTP3Φ1 was significantly lower, this specific phage was previously shown to cause the highest level of growth inhibition of TP1, TP2, and TP3 [2].

References:

[1] Schooley RT *et al*, Antimicrobial Agents and Chemotherapy **61**(10) (2017), p. e00954.
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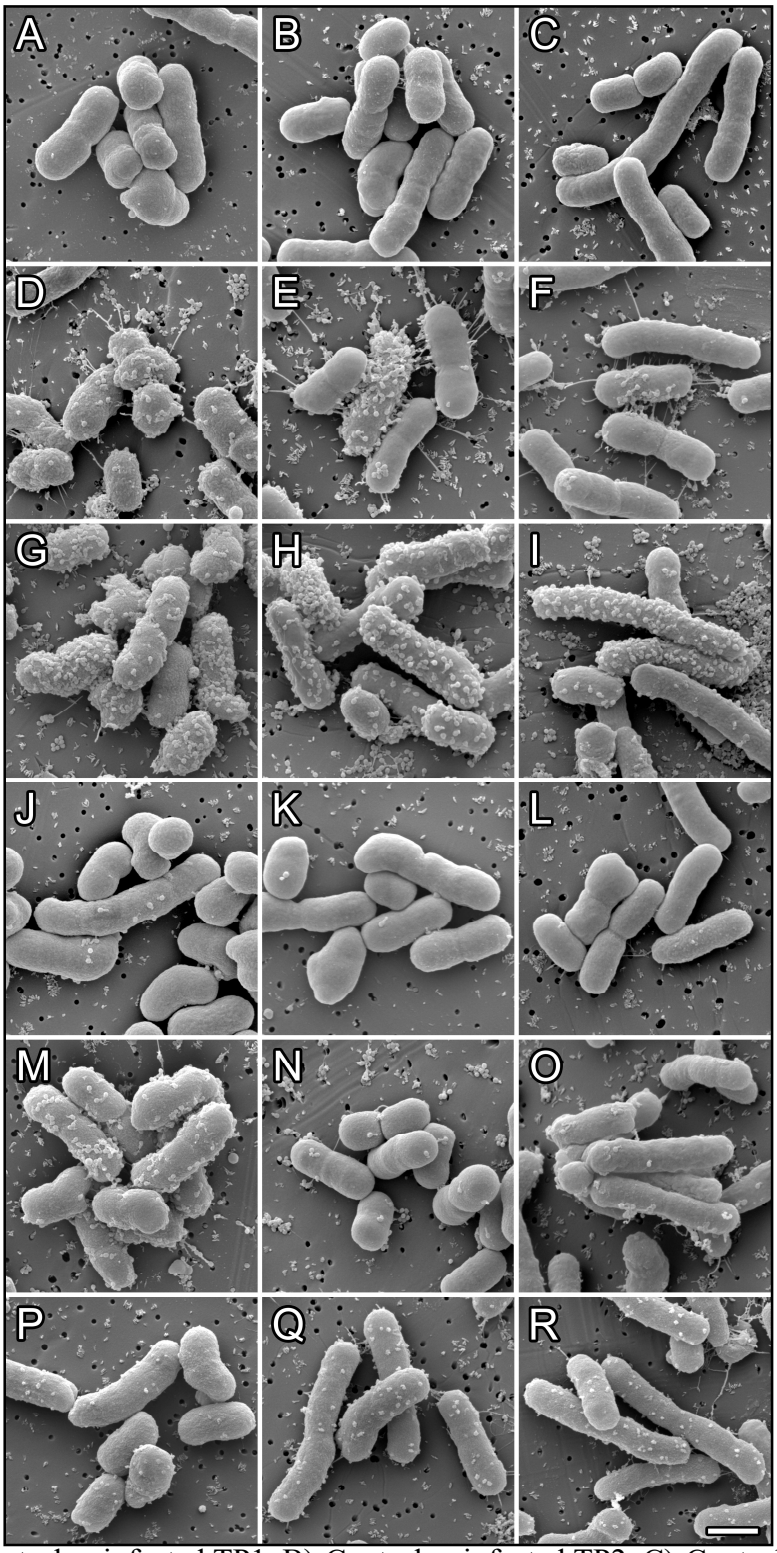

Figure 1. A)-Control uninfected TP1, B)-Control uninfected TP2, C)-Control uninfected TP3, D)-TP1 with AB-Navy1, E)-TP2 with AB-Navy1, F)-TP3 with AB-Navy1, G)-TP1 with AB-Navy4, H)-TP2 with AB-Navy4, I)-TP3 with AB-Navy4, J)-TP1 with AbTP3Φ1, K)-TP2 with AbTP3Φ1, L)-TP3 with AbTP3Φ1, M)-TP1 with AB-Navy71, N)-TP2 with AB-Navy71, O)-TP3 with AB-Navy71, P)-TP1 with AB-Navy97, Q)-TP2 with AB-Navy97, R)-TP3 with AB-Navy97.

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