Abstract

Ts2631 Endolysin from the Extremophilic Thermus scotoductus Bacteriophage vB_Tsc2631 as an Antimicrobial Agent against Gram-Negative Multidrug-Resistant Bacteria †

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Abstract: Bacteria that thrive in extreme conditions and the bacteriophages that infect them are sources of valuable enzymes that are resistant to denaturation at high temperatures. Many of these heat-stable proteins are useful for biotechnological applications; nevertheless, none have been utilized as antibacterial agents. Here, we demonstrate the bactericidal potential of Ts2631 endolysin from the extremophilic bacteriophage vB_Tsc2631, which infects Thermus scotoductus, against the alarming multidrug-resistant clinical strains of Acinetobacter baumannii, Pseudomonas aeruginosa, and pathogens from the Enterobacteriaceae family. A 2–3.7 log reduction in the bacterial load was observed in antibacterial tests against A. baumannii and P. aeruginosa after 1.5 h. The Ts2631 activity was further enhanced by ethylene diaminetetraacetic acid (EDTA), a metal ion chelator (4.2 log reduction in carbapenem-resistant A. baumannii) and, to a lesser extent, by malic acid and citric acid (2.9 and 3.3 log reductions, respectively). The EDTA/Ts2631 combination reduced all pathogens of the Enterobacteriaceae family, particularly multidrug-resistant Citrobacter braakii, to levels below the detection limit (>6 log); these results indicate that Ts2631 endolysin could be useful to combat Gram-negative pathogens. The investigation of A. baumannii cells treated with Ts2631 endolysin variants under transmission electron and fluorescence microscopy demonstrates that the intrinsic antibacterial activity of Ts2631 endolysin is dependent on the presence of its N-terminal tail.

The whole manuscript can be found at:

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