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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 ethylenediaminetetraacetic 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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