A new pheromone-guided antimicrobial peptide HP30 for targeted killing of *Streptococcus mutans* in mixed-culture biofilms

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Abstract

Streptococcus mutans is a leading cariogenic pathogen of dental caries worldwide. Clinically, eliminating *S. mutans* from dental biofilms using antibiotics is not practical, because these agents indiscriminately kill other members of the resident microflora, leading to ecological disruption and other negative clinical consequences. To develop target-specific antimicrobials, we evaluated several fusion peptides and identified a new peptide HP30 that showed a high selectivity for targeted killing of *S. mutans*. In the dual-species cultures, 80% of *S. mutans* cells were killed, but only 20% of *S. sanguinis* were killed following exposure to HP30 (5.0 μM) for 15 min. Similarly, 80% of *S. mutans* cells were killed but only 5% of *Actinomyces naeuslundii* were killed following the same exposure. The peptide-guided killing was also confirmed in the dual-species biofilms and the killing increased with increasing concentrations of HP30. However, a combination of low concentrations of HP30 with EDTA well maintained the killing activity against *S. mutans* in the biofilms. A *S. mutans* mutant lacking the ComD receptor only showed 20% of killing, while a ComD overexpression strain showed 90% of killing, suggesting that HP30 predominantly binds to the ComD receptor before triggering the selective killing. New peptide HP30 displays a high selectivity for targeted killing of *S. mutans* due to an improved binding of the peptide to the ComD receptor.

Biography

Xiao-Lin Tian has received her MD from Shanghai Medical University. Since 1993, she worked as a Research Technician in Novopharm Biotech Inc. in Winnepeg for six years. She then worked in the Mount Sinai Hospital Lunenfeld Research Institute, Toronto, for another six years. Since 2006, she has been working as a Researcher at Dalhousie University, with expertise in Moleculr Biology, Bacterial Biofilms and Pathogenesis.

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