"Efficacy of Synthetic Antimicrobial Peptides Against Oral Biofilms"

Kentucky Science and Engineering Foundation; Kentucky Science and Technology Corporation

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Abstract:

With the increasing development of antimicrobial resistance to traditional antibiotics, new technologies are needed to combat infections that cause human disease. Oral infections are rarely life threatening but have a significant impact on quality of life, economics, and oral and systemic health. The use of systemic antibiotics for the management of oral infections, especially in cases of the biofilm-associated diseases dental caries and periodontal disease, has not received considerable support because of the implications for the emergence of antibiotic resistance in medically important pathogens. However, the use of topical chemotherapeutic agents is gaining considerable support but the development of such agents is lagging behind the potential applications.

This proposal brings together experienced investigators from the fields of molecular virology, molecular microbiology, and engineering in an attempt to develop a new approach to controlling oral infections. The use of antimicrobial peptides for oral infection has been considered previously, especially the use of host-derived peptides. However, this proposal introduces a new group of antimicrobial peptides of viral origin that utilize the lytic domains of membrane active viruses. Referred to as the lentiviral lytic peptide (LLP), this 28-residue peptide is similar in character to the magainins and human cathelicidins. Engineered LLP derivatives (eLLPs) have been developed that are highly effective for in vitro killing of bacterial pathogens.

We hypothesize that topical application of eLLPs may represent an exciting new approach to the treatment of oral infections. This proposal outlines in vitro studies that are necessary prior to evaluating the eLLPs in animal models of oral disease. Being a new area of research, this proposal is "high risk" since no previous in vivo data exists to support this approach. However, based on our preliminary in vitro studies, this approach may have tremendous applications in the control of oral infections and may be of "high impact" if proven effective in a test model.