Biodegradable tooth-binding micelles inhibit Streptococcus mutans biofilm growth

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Today, during the 89th General Session & Exhibition of the International Association for Dental Research, held in conjunction with the 40th Annual Meeting of the American Association for Dental Research and the 35th Annual Meeting of the Canadian Association for Dental Research, lead researcher F. Cheni will hold an oral presentation on a research study titled "Biodegradable Tooth-binding Micelles Inhibit *Streptococcus mutans* (*S. mutans*) Biofilm Growth."

This research was performed under the objective to develop tooth-binding micelles (TBM) using peptide based biodegradable tooth-binding moieties that can effectively bind to the tooth surface to provide prolonged drug retention in the oral cavity, but can also safely detach from the tooth by gradual degradation of the peptide. Di-phosphoserine, tetra-phosphoserine and hexa-phosphoserine peptides were synthesized using a standard solid phase peptide synthesis method. These oligopeptides were conjugated to Pluronic P123 copolymer using a click reaction.

The tooth-binding micelle was prepared by self-assembly of the modified Pluronics with the antimicrobial agent triclosan. The binding kinetics of TBMs on hydroxyapatite (HA) particles was evaluated using a UV spectrophotometer. For in vitro biofilm prevention studies, HA discs were pretreated with different TBM formulations prior to inoculation with S. mutans UA159, and subsequent biofilm formation was assessed. Biofilm growth was measured by calculating the colony forming units (CFU) recovered per disc. Specific differences between

the log-CFU/biofilm of each experimental group were analyzed using the Student t-test. A p-value of

The binding kinetics of TBMs on HA particles were found to be fast (< 1 min). higher binding capacity was achieved using tetra- and hexa-phosphoserine as binding moieties. in biofilm prevention study, the tbm treated groups all showed significantly lower cfu (2 to 4-log reduction, p