Researchers develop a novel antibacterial orthodontic bracket cement

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Today, at the 43rd Annual Meeting & Exhibition of the American Association for Dental Research (AADR), held in conjunction with the 38th Annual Meeting of the Canadian Association for Dental Research, Mary Anne Sampaio de Melo, from the University of Maryland, Baltimore, will present a research study titled "Antibacterial Orthodontic Cement Containing a Quaternary Ammonium Monomer Dimethylaminododecyl Methacrylate."

Demineralized lesions in enamel around orthodontic brackets are caused by acids from biofilm accumulation. The objectives of this study were to develop a novel antibacterial orthodontic bracket cement by incorporating a quaternary ammonium monomer dimethylaminododecyl methacrylate (DMADDM), and to investigate the effects on dental plaque microcosm biofilm response and enamel bond strength.

DMADDM with an alkyl chain length of 12 was synthesized and incorporated into the cement at mass fractions of 0%, 1.5% and 3%. Orthodontic cement Transbond XT served as control. Shear bond strength of metal brackets to human enamel was measured. Cement remnant index scores were determined after bracket failure. A plaque microcosm biofilm model with human saliva as inoculum was used to measure metabolic activity, lactic acid production, and colony-forming units (CFU) for biofilms on orthodontic cements.

Incorporating DMADDM into orthodontic cement did not affect the shear bond strength (13.1 to 14.6 MPa; $p = 0.09$). Dental plaque

microcosm biofilm viability was substantially inhibited when in contact with cement disks containing DMADDM. The new orthodontic adhesive reduced biofilm metabolic activity by up to 66% and lactic acid by 78% (p streptococci by 96%, and mutans *streptococci* by 98% (p

Increasing DMADDM mass fraction increased the antibacterial potency. Orthodontic cement containing 3% DMADDM was the most strongly antibacterial. These results show that the DMADDM-containing orthodontic cement inhibited biofilms and lactic acid without compromising the enamel bond strength, and hence may be promising to reduce or eliminate demineralization in enamel around orthodontic brackets.

More information: This is a summary of abstract #1327, "Antibacterial Orthodontic Cement Containing a Quaternary Ammonium Monomer Dimethylaminododecyl Methacrylate," to be presented by Mary Anne Sampaio de Melo, Saturday, March 22, 2014, from 8 a.m. – 9:30 a.m. at the Charlotte Convention Center, room 213BC.

Provided by International & American Associations for Dental Research