Antibacterial Orthodontic Cement Containing a Quaternary Ammonium Monomer Dimethylaminododecyl Methacrylate

Alexandria, Va., USA – 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 < 0.05). Biofilm total microorganisms were reduced by up to 88%, total streptococci by 96%, and mutans streptococci by 98% (p < 0.05).

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.

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.

About the American Association for Dental Research
The American Association for Dental Research (AADR), headquartered in Alexandria, Va., is a nonprofit organization with more than 3,600 members in the United States. Its mission is: (1) to advance research and increase knowledge for the improvement of oral health; (2) to support and represent the oral health research community; and (3) to facilitate the communication and application of research findings. AADR is the largest Division of the International Association for Dental Research (IADR). To learn more about the AADR, visit www.aadr.org.

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