



CFAO GRADUATE STUDENT POSTERBOARD ABSTRACTS

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LEACHING OF BISPHENOL-A FROM INTRA-ORAL AND ORTHODONTIC MATERIALS

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OBJECTIVE: To simulate intense mechanical and thermal conditions that may occur intra-orally in order to investigate whether these conditions could cause bisphenol-A (BPA) to leach from routinely employed orthodontic and intra-oral materials.

MATERIALS AND METHODS: Samples of intra-oral materials including pacifiers, mouth guards, elastomeric ligatures, and polycarbonate brackets were subjected to simulated abrasion, immersion in artificial saliva, thermal shock via temperature cycling, and simulated intraoral exposure. Sample aliquots were collected for up to 2 weeks after artificial saliva immersion, derivatized, then analyzed for BPA by gas chromatography/mass spectroscopy. BPA concentrations were quantified by calculating the relative response factors based on the area of the internal standard diacetylated BPA-d₁₄ or by using a standard calibration curve created by a serial dilution of a BPA water solution. BPA leaching data was analyzed by descriptive statistics.

RESULTS: Quantifiable amounts of leached BPA were observed from 3 of 25 materials tested: a Gerber silicone baby bottle nipple (20 µg), a Bioacryl thermoformed retainer (30-38 µg depending on the mass of the retainer) and Transbond XT orthodontic adhesive (2 µg). BPA leaching was only observed after 3 days of artificial saliva immersion with no additional leaching thereafter.

CONCLUSIONS: Although many parts of the world have banned the use of BPA in baby bottles, BPA content may still be present in some silicone baby bottle nipples. While the leached BPA from this investigation was below the United States Environmental Protection Agency reference dose, it was greater than the tolerable daily intake established by the European Food Safety Authority for the Gerber nipple and the thermoformed Bioacryl retainer. Due to the existing high level of BPA exposure in children, and its potential association with adverse health effects, BPA exposure should ideally be minimized. Whenever possible, BPA-free baby bottles and nipples are recommended. Methods to reduce BPA leaching from the orthodontic products investigated may include: soaking retainers in hot water prior to delivery, ensuring that the adhesive is fully cured, having the patient rinse after bonding, and/or using an orthodontic adhesive that does not contain a BPA derivative.