Abstract

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Effect of iodine on mercury concentrations in dental-unit wastewater.

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Author information

Abstract

OBJECTIVE: This study was undertaken to determine whether iodine used to control bacteria in dental unit waterlines could increase mercury concentrations in dental wastewater.

METHODS: The study was conducted in four parts. Part 1. Solutions containing iodine in concentrations ranging from zero (control) to 20 mg/L were mixed with ground and sieved dental amalgam and then allowed to equilibrate by settling. Cold vapor atomic absorption spectrometry was used to determine mercury levels in the settled supernatants at 24 h and at 7 days. Part 2. Deionized water was pumped through an iodine-releasing water-treatment cartridge, collected, and mixed with ground and sieved dental amalgam. Mercury levels in settled supernatants were measured at 24 h and at 7 days. Part 3. Iodine in water from two commercial iodine-releasing cartridges was measured using Inductively Couple Plasma Mass Spectrometry. Part 4. Baseline mercury levels in settled supernatants from wastewater collected from two dental chairs were compared to samples taken from chairs equipped with iodine-releasing cartridges.

RESULTS: Part 1. A linear correlation between iodine and mercury concentration (r^2=0.9167 and 0.9459, respectively, both $P<0.001$) was seen at both 24 h and 7 days. Part 2. Mean mercury levels in 24h samples were 3.0 times higher than the controls (0.2864 mg/L compared with 0.0939mg/L for the 24 h controls). Mean mercury levels in the 7-day samples were 5.9 times higher than the 7-day controls (0.2048 mg/L compared with 0.0348 mg/L for the 7-day controls). Part 3. The effluent from two iodine-releasing cartridges showed iodine concentrations averaging 3.2 mg/L (n=10, SD=0.8, range=2.5-4.6). Part 4. Data from the clinical study showed a statistically significant 2.5-fold increase in mercury levels with iodine-containing samples compared to baseline (0.0853 mg/L, n=18, SD=0.0441 and 0.0345 mg/L, n=18, SD=0.0145, respectively; $P<0.001$).

SIGNIFICANCE: Data suggest that iodine can increase concentrations of dissolved mercury in dental unit wastewater.

Comment in

Re: Stone et al.'s "effect of iodine on mercury concentrations in dental-unit wastewater". [Dent Mater. 2007]

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