# AbstractID: 4924 Title: The effect of dental restorations and fixed prosthodontics on radiation therapy dose distribution: A Monte Carlo study.

**Purpose:** To investigate the effect of dental restorations, fixed prosthodontics, and implants on dose distributions in head and neck radiation therapy using Monte Carlo simulations. Specifically, we seek to understand how to prevent localized mucositis caused by backscatter dose.

**Method and Materials:** Simplified models of a range of dental restorations, fixed prosthodontics, and implants were constructed using a representative sample of materials and configurations. These models were irradiated with a simulated 6MV lateral beam. The resulting dose distributions were compared against dose distributions on models without dental work.

**Results:** Exposed dental alloy (Au-Pd) caused the most significant amount of backscatter, and corresponding hot spots in the dose distribution. Dental alloy which was surrounded by porcelain also caused backscatter hot spots, although lower compared to exposed metal. These backscatter effects do not appear in pencil beam dose calculations. This work showed that backscatter from dental work caused a dose enhancement of up to 40% at a distance of 1mm in the upstream direction for exposed metal surfaces. The dose enhancement from porcelain-veneered materials was up to 20% 1mm from the surface. The smaller enhancement was attributed to absorbtion within the ceramic veneer. Isodose lines for the backscatter formed a contour roughly conforming to the shape of the dental work. Beyond 3mm from the surface of the prosthodontic device, the dose enhancement had completely decayed.

**Conclusion:** The metal content of dental restorations and fixed prosthodontics create significant enhanced dose to adjacent soft tissue. This is a major cause of morbidity. Since we have shown that the enhancement decays at a distance of about 3mm in tissue-equivalent material, we may reduce the likelihood and intensity of mucositis by displacing the soft tissue from the teeth with 3mm of tissue-equivalent material.