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Dosimetry of Kodak 9000 Cone-Beam Computed Tomography for Endodontic Purposes

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Background: The purpose of this study was to determine radiation exposure utilizing the Kodak 9000 CBCT machine with a small field of view for endodontic procedures. Previous studies have not been done to measure exposures taken with and without leaded glasses and thyroid shielding during such procedures.

Methods: Anthropomorphic phantoms corresponding to a 30 year old female and a 10-year-old male were used for all exposures. CBCT scans were taken using the Kodak 9000 CB CT at the preset endodontic settings and the field of view for maxillary anterior #6 and maxillary molar #14 regions. The images were performed with and without leaded glasses and a thyroid shield for the female. Dosimetry was performed using optically stimulated luminescent (OSL) dosimeters. The effective radiation dose was calculated for the organs of the head and neck. Organ fractions irradiated were determined using ICRP-89 standards. Overall effective doses were calculated in micro-Sieverts and were based on the ICRP-103 tissue weighting factors.

Results: The effective doses measured with the CBCT for the adult female were 12.3 micro-Sieverts for tooth #6, 10.4 micro-Sieverts for #14 and 13.1 micro-Sieverts for #14 with thyroid collar and leaded glasses. The effective doses measured for the 10 year old pediatric patient were 17.8 micro-Sieverts for tooth #6 and 2.9 micro-Sieverts for tooth #14.

Conclusion: The effective dosages measured, are low enough to be considered an alternative or supplement to traditional 2-D imaging. This study confirms that small field of view CBCT imaging is an effective method to obtain additional useful information following ALARA principles.