

ABSORBED DOSE DISTRIBUTIONS FOR CONE BEAM COMPUTED TOMOGRAPHY EXAMINATIONS OF THE TEMPOROMANDIBULAR JOINT IN PHANTOMS OF AN ADULT AND CHILD

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Introduction

To measure absorbed dose with high spatial resolution we have used Gafchromic film which gives an analog-looking dose distribution image compared to point measurements, e.g. TLDs. CBCT examinations of TMJs will produce dose distributions with very steep dose gradients. Over a distance of 2 mm, the absorbed dose can increase/decrease more than a factor of 10. Point measurements using 3x3 mm TLDs will give dose values with high uncertainty when placed in areas with steep dose gradients.

Aim

The aim was to map the absorbed dose distributions with Gafchromic film, for TMJ investigations using adult and child phantoms. Another aim was to analyze the difference of dose distributions in sensitive organs/tissues between the phantoms.

Material and methods

Gafchromic films were placed between selected layers of the two head phantoms. The number of films was chosen to well cover the height of the CBCT volume used. The films were scanned in a flatbed scanner and the net pixel values were converted to absorbed dose using a calibration curve. Clinically used examination protocols were applied for three different CBCT units. Outlines of organs/tissues considered at risk were superimposed on the dose distributions. Maximum, minimum and mean doses were calculated. Also, the integrated dose in the phantom was calculated to reflect the total radiation load.

Preliminary results and conclusion

For CBCT examinations, dose gradients are steep in many organs/tissues considered at risk. Measuring dose distributions with high spatial resolution will give a solid foundation for calculating mean doses in those organs/tissues both for children and adults and will also facilitate comparisons of different examination protocols and of different CBCT units.