

# ABSTRACT SUBMISSION FORM

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## PRESENTATION TITLE

Absorbed dose calculation based on CBCT data for head and neck cancer patients.

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## ABSTRACT

Please type in your abstract up to a MAXIMUM of 500 words. Figures may be included.

### Absorbed dose calculation based on CBCT data for head and neck cancer patients.

**Purpose:** In a radiotherapy magnetic resonance imaging (MRI) only workflow, a synthetic CT (sCT) data set is generated from the MRI data as a substitute to the computed tomography (CT) data. Since no CT scan will be acquired, no such data is available for quality control (QC) of the sCT. It has, however, been suggested to use kV-cone beam CT (CBCT) data for QC in the head region [1]. The aim of this study is to evaluate the possibility to use CBCT scans for QC of the sCT data for head and neck (H&N) cancer by comparing H&N treatment plans calculated using the CT and CBCT data, respectively.

**Materials & Methods:** Five patients with one CT and two CBCT data sets each, were evaluated. The CBCT data sets were acquired early in the treatment period. All CBCT data sets were deformably registered to the CT data, remediating errors originating from repositioning and/or anatomical changes between the imaging sessions. The CBCT and CT data were adjusted to have the same field of view (FOV) in the longitudinal direction. A volumetric modulated arc therapy (VMAT) treatment plan was created based on the CT data for each patient. Treatment volumes, organs-at-risk (OAR) and treatment plan were copied from the CT to the deformable registered CBCT data. The treatment plan was then recalculated, with the standard CT Hounsfield unit to relative electron density (HU-

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RED) conversion curve. Dosimetric differences between the dose distributions for the treatment plans were calculated and evaluated by comparing dose-volume metric constrains.

**Results:** Local dose difference in percent for dose-volume metric constrains when comparing the CT and CBCT based dose distributions for each patient can be seen in Fig 1. The mean local difference for the mean absorbed dose to the clinical target volume (CTV) was 0.41% with a maximum and minimum value of 1.37% and 0.15% respectively. The CTV D<sub>98%</sub> criteria had a difference of 0.19% and CTV D<sub>2%</sub> criteria a difference of 0.38%. The planning OAR volume (PRV) of the spinal cord had a difference of 0.39% and the parotid right and left a difference of 0.36% and 0.08%, respectively.

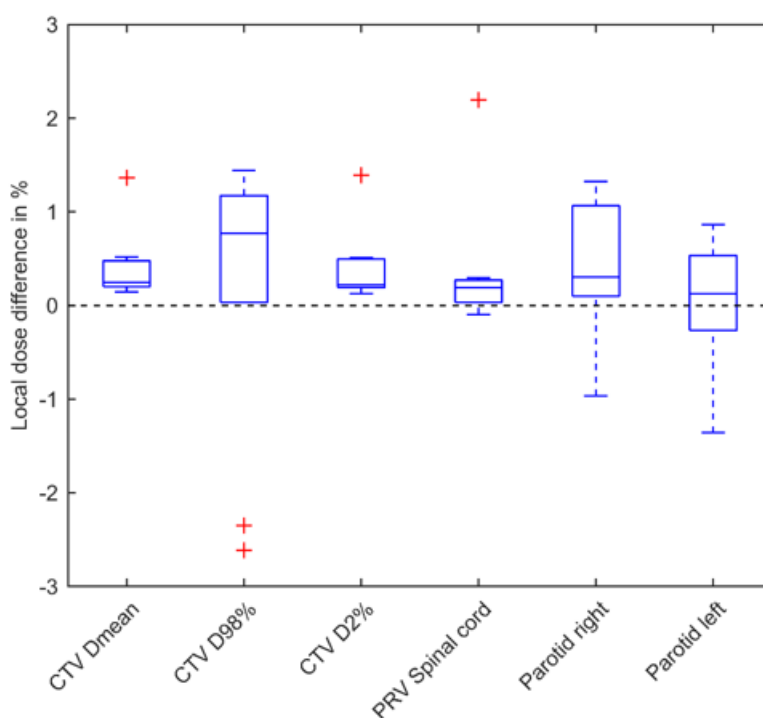


Fig 1. Difference in percentage between dose distributions calculated on CT and CBCT data sets. The dose-volume metric constrains evaluated were for CTV, PRV Spinal cord and Parotid right and left.

**Conclusions:** The dosimetric difference between the dose distributions for treatment plans calculated based on CT and CBCT data were minor. This indicates that CBCT data could be a good candidate for QC of sCT data in an MRI only workflow for H&N cancer patients.

[1] J. M. Edmund *et al.* *Acta Oncol.* 54(9) 1496–1500 2015