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PRESENTATION TITLE

Head And Neck Synthetic MR OnLy PrOtocol (HAN-SOLO)
Feasibility of MR based radiotherapy planning for cancers of the oropharynx

AUTHOR(S)

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ABSTRACT

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

Purpose:

With encouraging results from our methods from previous studies into Magnetic Resonance Imaging (MRI) only prostate radiation therapy planning, this study is a feasibility study of applying our method of creating synthetic Computed Tomography (CT) scans from standard T1 weighted stitched MRI scans for the purpose of MRI only head and neck radiation therapy planning.

MRI is beneficial for head and neck planning and is currently routinely used in combination with CT for radiation therapy planning. MRI has superior soft tissue contrast, allowing for improved tumour and organ at risk delineation, while CT scans contain the electron density information require by the planning system for plan calculations. Usually the MRI scan is fused to the CT scan for planning purposes, however, this fusion can introduce some inaccuracies in the planning process. In order to be able to plan off MRI scans, the electron density information needs to be generated from the MRI scan, a process which has been termed synthetic CT (sCT).

Materials & Methods:

This is a single arm, single centre study to be performed at the Calvary Mater Newcastle requiring a 10 patient cohort with histologically confirmed oropharyngeal cancer.

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Participants had stitched T1 VIBE DIXON and PETRA (Pointwise Encoding Time Reduction with Radial Acquisition) sequences added to their routine radiotherapy planning MRI imaging to aid in synthetic CT creation. The PETRA and VIBE DIXON scans were de-identified and sent to CSIRO E-Health Centre, Brisbane for sCT generation. The radiotherapy plan will be generated on the simulation CT scan and then transferred to the sCT for comparison of the corresponding dosimetry. The difference in Hounsfield Units will be measured on both the patient's planning CT and the MRI generated sCT. The dosimetry of the plan will also be tested on both the planning CT and sCT to determine if the plans are affected by the sCT creation

Results:

10/10 Participants have been recruited and it is anticipated that preliminary results will be ready by the time of the meeting.

The results will respond to the end points as specified in the study protocol;

1. To determine the feasibility of applying our method to create pseudo-CT scans from MRI for Head and Neck Cancer treatment planning.
2. Investigate PETRA imaging which provides improved bone and air contrast.
3. Develop pseudo-CT scans for the head and neck region.
4. Compare doses calculated on the pseudo-CT scans to doses calculated on the patient CT scans
5. Incorporate new PETRA sequence and determine if this sequence improves the pseudo-CT estimation.

Conclusions:

The outcomes of this study are technical in nature. The primary endpoint of this study is to demonstrate the dosimetric agreement between conventional CT and MRI-generated synthetic CT scans for radiotherapy planning for the head and neck region. We will report the Housfield Unit comparison between the conventional CT scan and the synthetic CT scan as well as the image guidance comparison.

It is anticipated that the outcomes of this study would benefit this patient cohort by reducing the number of scans required as well as eliminating the errors introduced the MRI-CT image fusion process.