automatic segmentation is performed relative to inter-observer variability in manually-derived contours.

Results

For the whole heart, 4 chambers and large vessels the automatic delineation performs well when compared to the inter-observer variability (see Table 1). However, for smaller structures such as coronary arteries, accurate delineation may not be feasible due to large segmentation uncertainties.

	Manual Contours		Automatic Segmentation	
Structure	DSC	MASD	DSC	MASD
Whole heart	0.939±0.015	1.558±0.457	0.935±0.014	1.745±±0.444
Ascending Aorta	0.737±0.106	3.871±2.431	0.734±0.087	2.503±0.952
Descending Aorta	0.821±0.067	2.718±1.791	0.806±0.068	1.821±0.845
L. Atrium	0.801±0.057	2.214±0.785	0.792±0.033	2.606±0.567
L. Ventricle	0.875±0.025	1.740±0.505	0.835±0.039	2.765±0.768
R. Atrium	0.813±0.060	2.238±1.288	0.767±0.053	3.060±0.971
R. Ventricle	0.808±0.043	2.248±0.786	0.755±0.056	3.608±1.023
L. Coronary Artery	0.201±0.202	4.727±4.456	0.027±0.004	4.870±0.548
L. Circumflex Artery	0.101±0.115	3.425±1.358	0.023±0.000	8.401±0.000

Conclusion

The results show promise that larger structures can be accurately segmented automatically, however for smaller structures a model-based approach may be more feasible.

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EP-2128 Investigating a new MR sequence for prostate delineation for radiotherapy

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Purpose or Objective

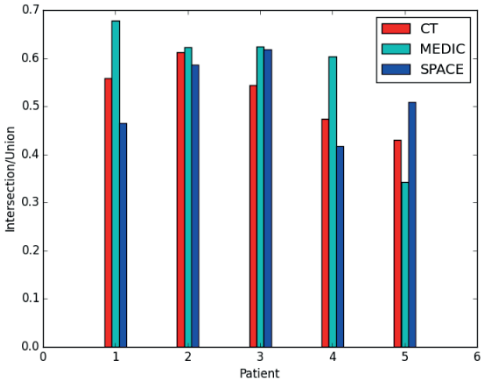
MR is increasingly being used for prostate delineation in radiotherapy due to its superior soft-tissue contrast. However acquisition sequences affect the image contrast and the literature is scarce regarding the optimal sequence for prostate definition. A 3D T2-weighted turbo spin echo sequence (SPACE) is commonly used but in our institution a 2D T2-weighted combined multiple gradient echo sequence (MEDIC) is preferred for prostate radiotherapy. This study aimed to compare the variability and efficiency of prostate delineation using the MEDIC sequence to a SPACE sequence and CT.

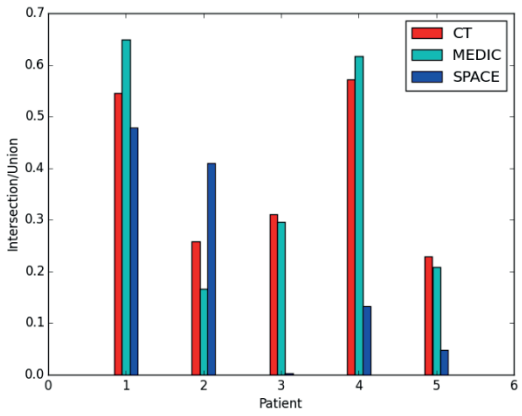
Material and Methods

CT and MRI scans for radiotherapy planning were acquired in the treatment planning position in five patients. Two MR sequences were acquired in the same scanning session, the 3D SPACE and the 2D MEDIC. Four consultant oncologists from two institutions delineated the prostate and seminal vesicles on each image set independently, using the same treatment planning system and recording the time taken.A similarity measure of the intersection volume divided by the union volume of all four delineations was calculated for each image and patient. The mean volume of the delineations for each image and patient were calculated. The ratio of the MEDIC mean volume to the CT mean volume for each patient and the equivalent ratio of the SPACE to the CT was determined.

Results

The prostate delineations using the MEDIC sequence had the highest similarity measures for four out of five patients (see figure 1). Patient 5 appears to be anomalous for the MEDIC sequence, which may be due to significant motion artefact present on the MEDIC images for that patient. There was a wide range of variability in the definition of seminal vesicles, with the MEDIC and CT performing similarly (see figure 2). Both MR prostate volumes were consistently smaller than the CT. The SPACE-CT volume ratio was the smallest, 0.74 ± 0.04 (mean ± s.e.m.) compared to 0.82 ± 0.05 for the MEDIC-CT ratio. Similarly for the seminal vesicles, the SPACE-CT ratio was 0.79 ± 0.05 and the MEDIC-CT ratio 0.88 ± 0.06.The MEDIC sequence was preferred by all delineators and was the quickest to delineate, taking 10 ± 1 minutes (mean ± s.e.m.). The CT took 13 ± 1 minutes and the SPACE 14 ± 1 minutes.





Conclusion

The MEDIC sequence appears the most efficient for prostate delineation and is preferred by all oncologists in this study. It also appears to have the least variability in prostate delineations and is no worse than the SPACE sequence and CT in delineating the seminal vesicles. Volumes delineated on MR are consistently smaller than those delineated on CT, with the SPACE volumes being smaller than the MEDIC. The MEDIC sequence appears a more efficient option for routine prostate delineation.

EP-2129 The impact of b-values on radiomic features of diffusion-weighted imaging in hepatic cirrhosis

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