**Conclusion:** Intramuscular triamcinolone is an effective second-line hormonal agent in CRPC. Its side-effect profile is different from other steroids and has the advantage of supervised administration.

### Varying Atlas Numbers and Imaging Modality for Auto-contouring in Prostate Radiotherapy

A. Pathmanathan [*], J. Kieselmann [*], D. Brand [*], J. Christodouleas [†], S. Nill [*], R. Huddart [*]
[*] *Institute of Cancer Research/The Royal Marsden NHS Foundation Trust, London, UK*
[†] *Elekta Inc./Hospital of the University of Pennsylvania, Philadelphia, PA, USA*

**Purpose:** Auto-contouring reduces clinician delineation time and improves interobserver variability [1], particularly relevant in adaptive radiotherapy (RT) [2]. Here we assess the impact of atlas number and imaging modality on the quality and speed of a machine learning-based prostate auto-contouring research tool (ADMIRE, v2.0, Elekta AB, Stockholm, Sweden).
**Methods:** Ten patients had computed tomography (CT), T2-weighted (T2W) and T2*-weighted (T2*W) magnetic resonance imaging (MRI) acquired. Three clinicians manually delineated the prostate for each imaging modality. Using the clinician contours, a simultaneous truth and performance level estimate (STAPLE) 'gold standard' atlas was created for each imaging modality.
Using the leave one out cross-validation method, ADMIRE was used to create prostate auto-contours with three, six and nine atlases, respectively. To minimise bias, atlases were chosen consecutively using scan date. Auto-contour accuracy by comparison to the gold standard was assessed with Dice similarity coefficient (DSC), Cohen's kappa, Hausdorff distance (HD) and mean distance between contours. Non-parametric Friedman testing was performed with Dunn's test for multiple comparisons.
**Results:** Using three atlases, median values for CT, T2W and T2*W, respectively, were; DSC 0.85, 0.85, 0.87; Cohen's kappa 0.77, 0.78, 0.80; HD 11.6, 8.8, 10.2 mm; mean distance 2.1, 2.1, 1.9 mm; auto-contouring time 100, 24, 43 s. There is a significant difference between imaging modalities in auto-contouring time, although slice thickness was 1.5 mm for CT and 2.5 mm for MRI. There is no significant difference in accuracy between imaging types. There is a significant difference when increasing atlas numbers from three to nine for T2W (DSC, Cohen's, mean distance) and T2*W (DSC, mean distance).
**Conclusion:** Auto-contours showed good agreement with clinician gold standard. Both increasing atlas numbers and differing modality impact auto-contouring time, with some evidence that increasing atlas numbers improves accuracy. Future research needs to assess clinical significance of such differences and identify ways to improve accuracy without time penalty.
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### The National Radium-223 Dichloride Audit Group: Data from Patients in 17 UK Oncology Centres with Metastatic Castrate-resistant Prostate Cancer Treated with Radium-223 Dichloride

M. Randhawa [*], R. Jones [*], I. Stratton [†], A. Bahl [‡], D. Bottomley [§], H. Carruthers [||]
[*] *The Beatson West of Scotland Cancer Centre, Glasgow, UK*
[†] *Gloucestershire Hospitals NHS Foundation Trust, Gloucester, UK*
[‡] *University Hospitals Bristol NHS Foundation Trust, Bristol, UK*
[§] *The Leeds Teaching Hospitals NHS Trust, Leeds, UK*
[||] *University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK*

**Purpose:** The National Radium-223 Dichloride Audit Group comprises clinicians from 17 oncology centres across the UK whose aim is to collect high-quality data from patients with metastatic castrate-resistant prostate cancer (mCRPC) treated with radium-223 dichloride (Xofigo®).
**Methods:** Patients with mCRPC treated with radium-223 dichloride were identified and consented from September 2017 onwards. Demographics, clinical parameters such as primary treatment, date of diagnosis, ECOG performance status, weight, analgesic requirements, number of cycles completed, adverse events and Functional Assessment of Cancer Therapy-Prostate (FACT-P) questionnaires were obtained, in addition to biochemical parameters, including full blood count, alkaline phosphatase, lactate dehydrogenase and prostate-specific antigen (PSA). These were recorded at baseline and follow-up visits prior to each treatment cycle.
**Results:** As of June 2018, data from 150 patients in 8 centres were available [presented as mean (standard deviation)]. Age at first treatment was 73 (8) years and weight was 85 (16) kg. Haemoglobin count was 125 (14) g/l, platelet count was 255 (75) $\times$ $10^9$/l and alkaline phosphatase level was 272 (316) U/l. PSA values [median (centiles)] were highly skewed, 86 (25th: 25; 75th: 177; 90th: 1070) μg/l. Preliminary follow-up data demonstrated that broad trends could be observed, such as increases in the prevalence of anaemia from 12% at baseline to 47% after completion of 6 cycles and in documented rates of fatigue from 53% to 84%.
**Conclusion:** The ongoing National Radium-223 Dichloride Audit is recording data from mCRPC patients treated across the UK in routine clinical care and to our knowledge is the first prospective analysis of such patients assessing quality of life outcomes in addition to standard biochemical and clinical parameters.

### Validation and Reproducibility of Changes in Magnetic Resonance Imaging Radiomic Features in Response to Androgen Deprivation Therapy in Patients with High-risk Prostate Cancer

H. Tharmalingam [*,†], W. Beasley [†], R. Alonzi [*], A. McWilliam [†], P. Hoskin [*,†], A. Choudhury [†]
[*] *Mount Vernon Cancer Centre, Middlesex, UK*
[†] *The Christie NHS Foundation Trust, Manchester, UK*

**Purpose:** Biochemical response to neoadjuvant androgen deprivation therapy (nADT) predicts recurrence-free and overall survival for prostate cancer (PCa). However, PSA levels often become undetectable following nADT and may not reflect the true extent of tumour cell kill. Our previous work on magnetic resonance imaging (MRI) of high-risk patients showed significant changes in textural radiomic features in response to nADT demonstrating their potential as surrogate biomarkers [1]. We aimed to validate these changes and evaluate their reproducibility using test–retest MRI scans before and after nADT.
**Methods:** 20 patients with high-risk PCa were examined with 4 MRI scans, 2 before nADT and 2 after 3 months of therapy. Median time between the first 2 scans was 2 days and between the last 2 was 1.5 days. T2-weighted sequences were used to define tumour regions-of-interest (ROI). These were subtracted from the prostate outline to form the benign prostate ROI. Pyradiomics, an open-source radiomics package, was used to extract textural features of homogeneity and energy from both ROI. A paired Student's *t*-test compared values before and after nADT. An inter-class correlation coefficient (ICC) calculated using mean feature values from consecutive MRI scans assessed reproducibility; an ICC value $\geq 0.85$ considered high reproducibility.
**Results:** Baseline homogeneity and energy values differed between benign and malignant tissue ($P < 0.0001$). In response to nADT, homogeneity and energy significantly increased in benign prostate (0.315–0.436, $P = 0.0003$; 0.108–0.241, $P < 0.0001$, respectively) whilst decreasing in tumour (0.632–0.472, $P = 0.0013$; 0.378–0.221, $P = 0.0003$). Both features exhibited high reproducibility in benign and cancerous tissue before and after nADT; all ICC values $\geq 0.89$.
**Conclusion:** Consistent with previous results, textural features of energy and homogeneity in benign and malignant prostate showed significant reciprocal changes in response to nADT. Validation of these feature changes and demonstration of their high reproducibility confirms their potential as prognostic biomarkers in high-risk PCa.
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