Name (First, last) | Kristen Zakian
---|---
Mailing address (including province/state, country, postal/zip code) | Department of Medical Physics, 1275 York Avenue, New York, New York 10065
Institution/organization | Memorial Sloan-Kettering Cancer Center
Position | Associate Attending Physicist
Telephone (including country prefix) | 1 646 888 3465
Email | zakiank@mskcc.org

The submission is to be considered in the following category
- [ ] Oral presentation preferred
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Trainee status
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**PRESENTATION TITLE**

Changes in MRI-derived Prostate Cancer Diffusion Parameters during and after Hypofractionated SBRT

**AUTHOR(S)**

K L Zakian1, N Tyagi1, H V Alvarez1, A Wibmer1, M Varghese1, E Sala1, M Kollmeier1, B Mychalczak1, M Hunt1, M Zelefsky1

1Memorial Sloan-Kettering Cancer Center

**ABSTRACT**

**Purpose:** To study the change in prostate cancer diffusion parameters by MRI during and after hypofractionated SBRT.

**Materials & Methods:** 10 patients with biopsy-proven prostate adenocarcinoma underwent DW-MRI prior to hypofractionated SBRT (5x800cGy), within one hour after fractions 1 and 4, and 3, 6, 12, 18, and 24 months after HFSBRT. Data for FRX1, FRX4, and 3 months are presented here. Inclusion criteria were MR-visible tumor ≥ 0.5 cm and localized disease. MR imaging was performed on a 3.0 Tesla Philips MR. Subjects underwent multi-b-value DWI (single-shot EPI, 16 b-values between 0 and 1000 s/mm²), voxel size 1.1 x 1.1 x 4.5 mm³). Tumor ROIs were identified by GU expert radiologists. Apparent diffusion coefficient (ADC) was calculated by fitting all b value data to a single exponential. True diffusion coefficient and microperfusion-related parameters were calculated using separate fits for b values < 200 s/mm² and > 200 s/mm². Based on phantom reproducibility studies performed at our institution and others, a 20% change in a DWI-derived parameter was considered to exceed inter-examination variability. Data from 7 patients were available for analysis.

**Results:** The figure below shows the most notable changes in DWI-derived parameters (columns 1-3 represent ADC, microperfusion-related diffusion coefficient (Dₚ) and DWI-derived microperfusion fraction (Fₚ), respectively). Rows represent time points. Immediately after fraction 1, no parameter demonstrated a consistent pattern of change. After fraction 4, 3 of 7 patients had increased ADC (>20%), 6 of 7 patients had increased Dₚ (>20%) and 5 of 7 patients had increased Fₚ (>20%). After 3 months, Dₚ increased by > 20% in 5 patients and decreased by >20% in 2 patients suggesting inter-patient heterogeneity in microperfusion response. ADC increased in 4 of 7 patients by >20% at 3 months and was unchanged in 3 patients. The true diffusion coefficient (Dₚ, not shown), tended to follow the trends demonstrated by the ADC. Only 5 Fₚ measurements were available at 3 months and 4 of these showed >20% increase in Fₚ while one showed >20% decrease.

**Conclusions:** These data suggest that MRI can detect microperfusion-related diffusion changes during hypofractionated SBRT. Additional studies in 20 patients are planned to confirm these results.
and determine whether changes during SBRT correlate with eventual parameter changes and/or long-term outcome.

Figure. Individual diffusion parameter changes in 7 patients who underwent hypofractionated SBRT (5 x 800cGy). DW-MRI was performed within one hour after fraction 1 (data in row 1), one hour after fraction 4 (row 2), and 3 months post-treatment (row 3). Column 1: ADC; Column 2: microperfusion-related diffusion coefficient (D_p); Column 3: microperfusion fraction (F_p).