Prostate Stereotactic Body Radiation Therapy (SBRT) – Using 18F Prostate Specific Membrane Antigen-1007 (18F PSMA-1007) Positron Emission Tomography (PET) and Multiparametric Magnetic Resonance Imaging (mpMRI) to escalate the dose to Dominant Intraprostatic Lesions (DILs) – ARGOS CLIMBER trial.

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Background

Dose-escalated radiation has been shown to benefit patients in the FLAME trial[1]. PSMA PET and mpMRI can be used to target DILs during radiation treatments. SBRT allows for radiation to be delivered in a few targeted, high-dose treatments.

Methods

ARGOS-CLIMBER[2] is a prospective, phase I/II clinical trial for men with unfavorable intermediate to high-risk prostate cancer.

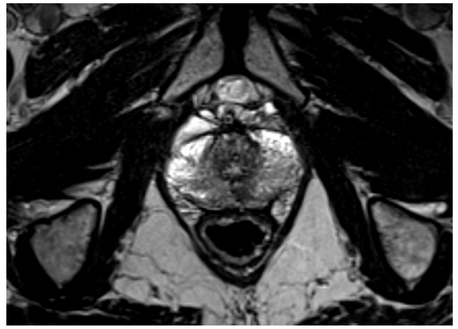
Patients are imaged with baseline 18F PSMA-1007 PET/MRI fused with planning CT simulation for SBRT treatment planning.

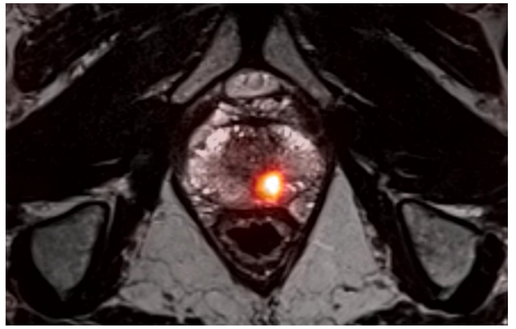
All lesions with a PIRADS v2.1 score of 4 or 5 were delineated as DILs on mpMRI. On 18F-PSMA-1007 PET, suspicious lesions were delineated using a threshold of 20-40% of the maximum SUV in the prostate. The union of these two volumes was used for radiation planning of dose escalation to the DILs.

The following doses are prescribed: 25Gy/5 to the elective pelvic lymph nodes and seminal vesicles; 35Gy/5 to the imaging-detected lymph nodes and to the prostate; 40-50Gy/5 to the imaging defined DILs (dose dependent on respecting OAR constraints).

Treatments are delivered every other day using implanted fiducial markers for image guidance and rigorous bowel and bladder preparation (pre-treatment enema and full bladder)

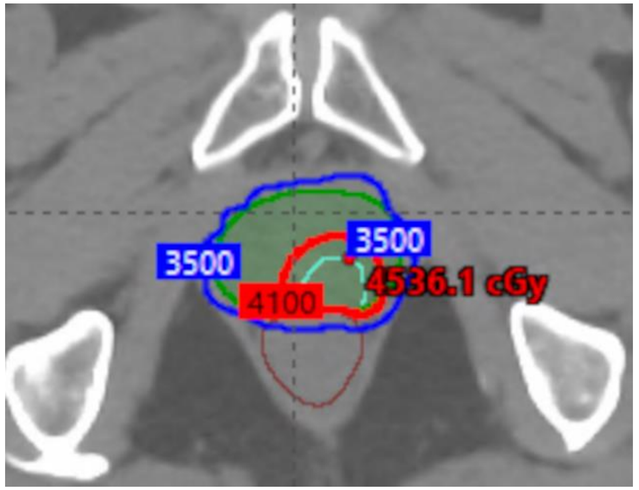
The primary outcome is 6-month toxicity. Secondary endpoints include treatment response on serial PET/MRI and 5-year DFS.





Pre Rx

Rx



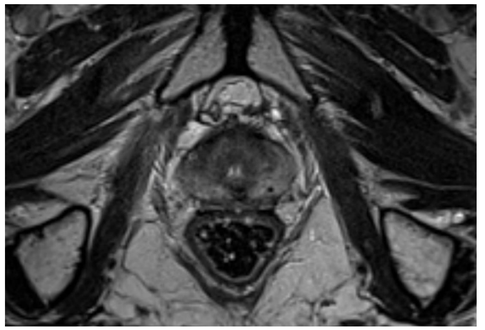
Results

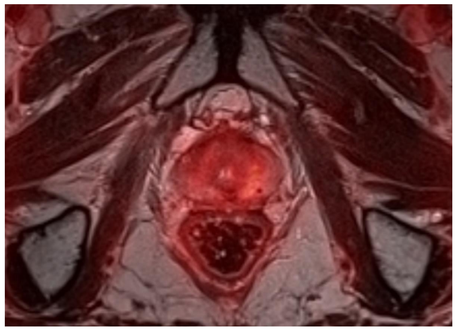
A total of 50 patients have been enrolled and treated. At one institution, the majority were high risk (n = 9) or very high risk (n = 11) by NCCN criteria. On PET/MRI, a median (range) of 2 (0 – 4) MR DILs, and 1 (0 – 4) PET DILs per patient. The median (IQR) size of MR and PET DILs was 14 mm (9 – 20 mm) and 11 mm (9 – 31 mm), respectively. The median (IQR) maximum dose delivered to the DILs 46.9 Gy (45.5 – 48.0 Gy) in 5 fractions. The median (IQR) D99% to the DILs was 42.4 Gy (40.8 – 45.5 Gy) in 5 fractions. Toxicity rates are favorable, with the most common grade 3+ toxicity being grade 3 erectile dysfunction. Two patients have developed metastatic disease, and one patient has died from disease progression, reflecting the high risk patient population.

Conclusions

Dose escalated SBRT based on 18F PSMA-1007 PET/CT and mpMRI has so far been feasible with acceptable acute toxicity. Accrual is complete. Response on PSMA PET/MRI at 6 months and 2 years post treatment will be correlated with biopsy at 2 years to evaluate PET/MRI as an imaging biomarker of treatment response. Long term (5 year) safety and disease-free survival will be evaluated.

6mo Post Rx





References
1. Kerkmeijer, et al. https://ascopubs.org/doi/10.1200/JCO.20.02873
2. Liu, et al. https://10.3389/fonc.2022.863848

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