Analysis of Serial 18F-NaF PET Imaging and Paired Tc99 Scans in Metastatic Castration Resistant Prostate Cancer (mCRPC) Treated with Enzalutamide

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ABSTRACT

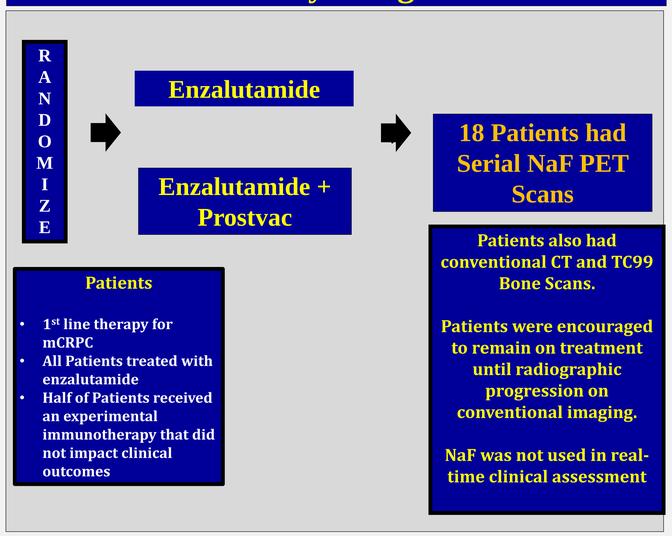
Background: Current and emerging PET platforms will enhance the ability to evaluate metastatic lesions in mCRPC. It remains unclear how the evolution of new lesions on more sensitive scans can improve clinical care as all current therapeutics were developed using CT Scan and Tc99m-MDP (Tc99) bone scans. 18F-Sodium Fluoride (NaF) PET imaging has increased sensitivity for bone lesions relative to Tc99. Here we test a semi-automated method of assessing NaF PET using a novel technology.

Methods: 18 patients (pts) with mCRPC were treated with enzalutamide +/- prostvac on a trial (NCT01867333) with no improvement in combination allowing for collective analysis. Pts had serial CT, Tc99, and NaF PET scans and were treated until radiographic progression (rPD) regardless of PSA. Lesions on NaF were automatically detected and matched across timepoints using TRAQinform IQ technology (AIQ Solutions) as previously published (Kyriakopoulos, JCO, 2020). Lesion response was categorized as completely responding, partially responding, stable, progressive disease, or new lesions (either completely new or return of a resolved lesion).

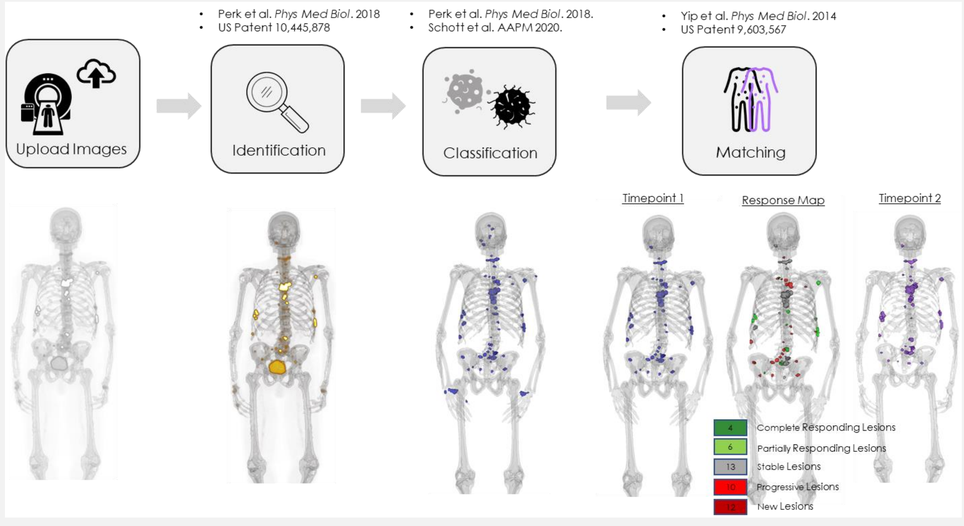
Results: 18 mCRPC pts were evaluated with serial NaF scans (median PSA: 8.2 ng/ml, age: 65 years, time on treatment: 21 months). 14 pts ultimately had rPD on conventional imaging. In total, 67 serial NaF were evaluated. 233 lesions completely resolved after starting treatment; 52 of which (22%) eventually retuned while on therapy. 394 new lesions were seen but 112 (28%) resolved. 14/18 pts (78%) had new lesions that ultimately improved after appearing. In 14 pts who eventually had disease progression, there was an average of 11.7 new lesions vs. baseline on the NaF closest to rPD. In 4 pts who had stable Tc99 throughout there were an average of 9.8 new lesions seen on serial NaF.

Conclusions: These data highlight the dynamic changes seen on PET imaging in mCRPC treated with enzalutamide. The development of new lesions seen on NaF scan may actually resolve in the future and may not predict rPD seen on Tc99. These data highlight that as new PET imaging emerges in mCRPC, more understanding is required as to the clinical significance of new lesions seen on PET imaging in pts with stable disease on Tc99 scans.

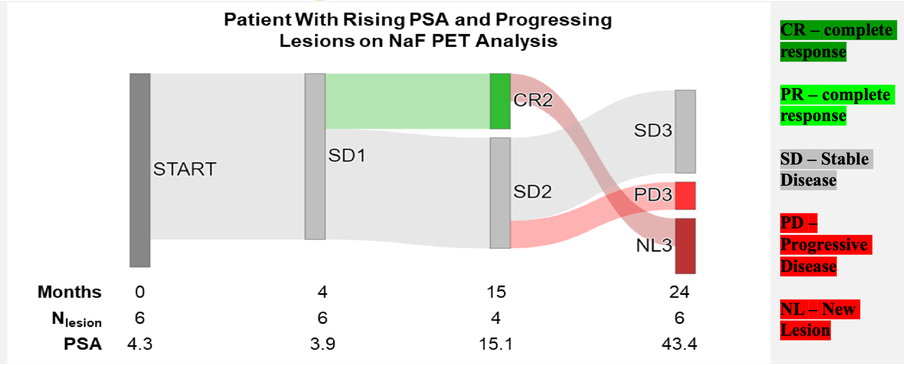
Study Design



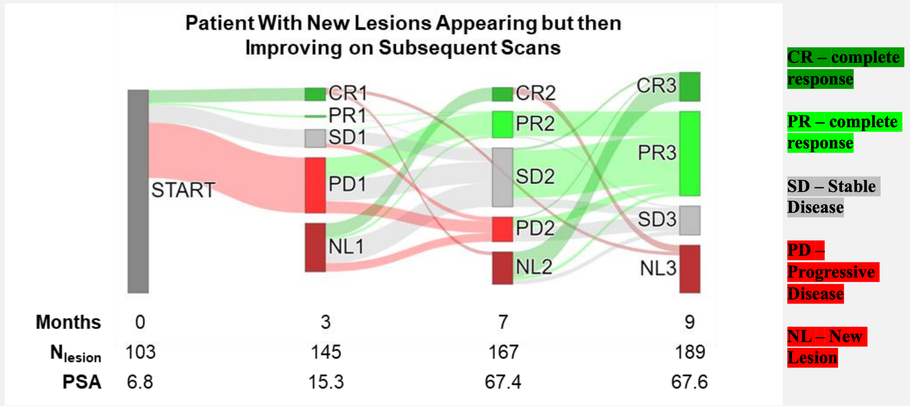
Analysis of Lesions on Serial NaF PET Images in mCRPC Patients Treated with Enzalutamide and had Stable Disease on Tc99 Bone Scan



Example of a Patient Where There Was a Predictable Linear Progression of Lesions

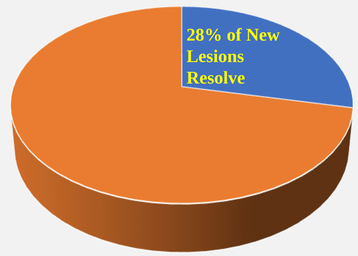


For Many Patients, New Lesions on NaF Resolve Over Time and are Likely not Clinically Significant

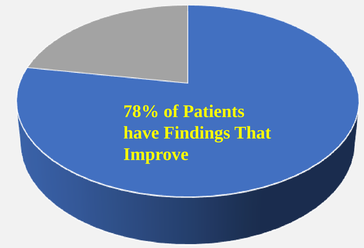


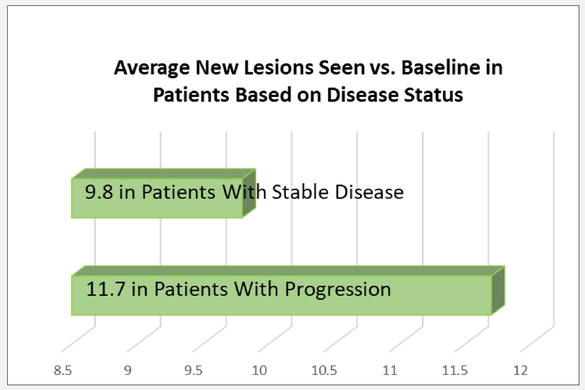
New Lesions Seen on NaF PET Scan May not Signify Treatment Failure Over Time

394 New Lesions Seen on NaF Pet in 18 Patients



14 of 18 Patients Had "New" Findings on NaF PET that then Improved





Preliminary Conclusions

- These data highlight the dynamic changes seen on PET imaging in mCRPC treated with enzalutamide.
- The development of new lesions seen on NaF scan may actually resolve in the future and may not predict rPD seen on Tc99.
- As new PET imaging emerges in mCRPC, more understanding is required as to the clinical significance of new lesions seen on PET imaging in pts with stable disease on Tc99 scans.
- The findings on these NaF may speak to the underlying intrapatient tumor heterogeneity that suggests lesions may behave differently in response to therapy.

Ravi A. Madan has no relevant conflict of interest email: madanr@mail.nih.gov