Clinical Trials Assessing Imaging Tools in Cancer Management

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NIH NATIONAL CANCER INSTITUTE

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Imaging Tools For Cancer Management

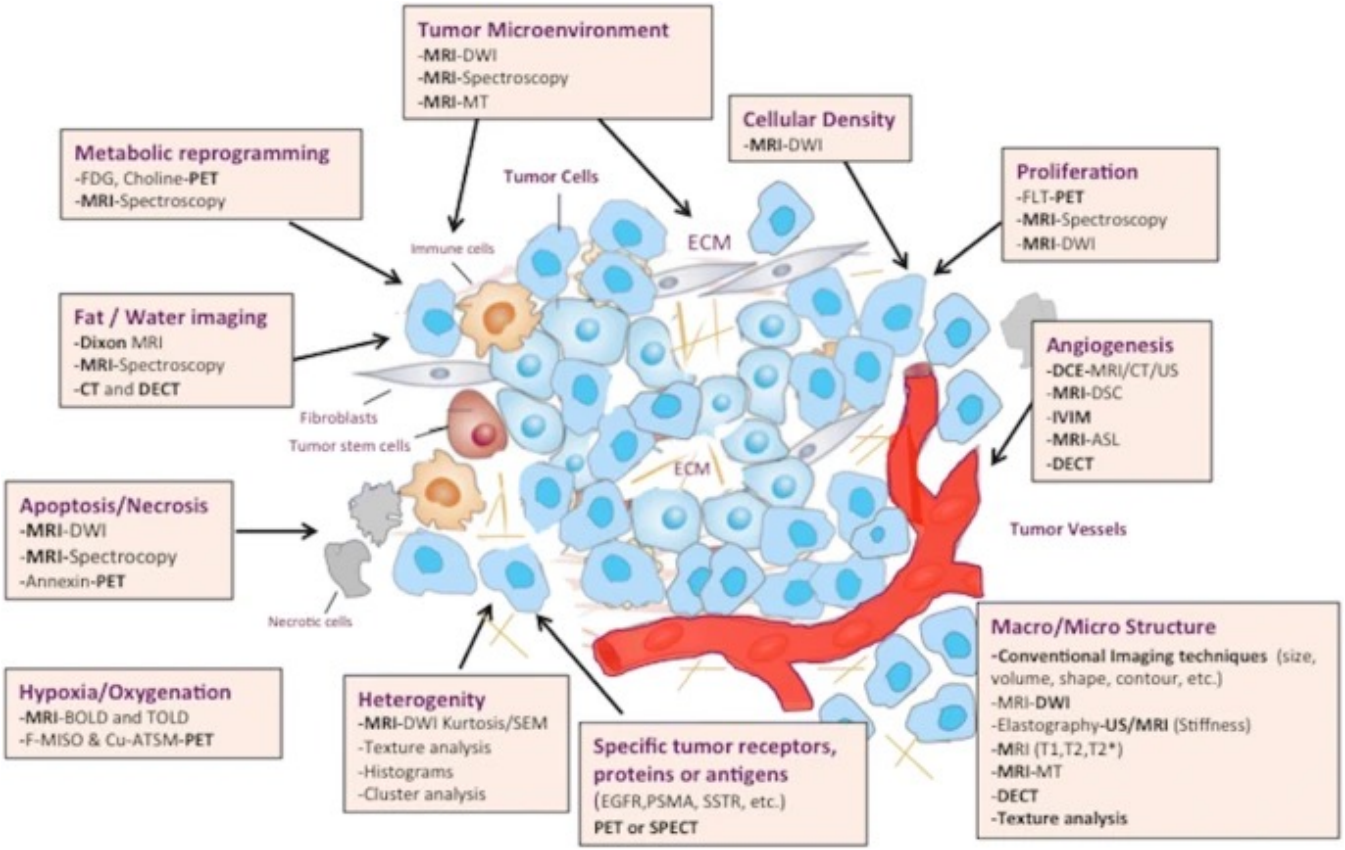
- screening
- diagnosis
- staging
- stratifying patients based on biologic characteristics of the primary tumor and metastases
- guiding therapeutic interventions
- assessing therapeutic response
- surveillance

Imaging Tools For Cancer Management: *Preferred Approach*

Evaluating patients based on biologic characteristics of the primary tumor and metastases for personalized care

- Prognostic Markers
- Predictive Markers
- Assessing therapeutic response
- Focused surveillance/screening

Molecular and Functional Imaging



García-Figueiras, R., Baleato-González, S., Padhani, A.R. *et al.* How clinical imaging can assess cancer biology. *Insights Imaging* **10,** 28 (2019)

Key issues in imaging tool assessment:

- Preliminary efficacy
- Reproducibility
- Tissue correlation

In the context of patient management with standard treatment:

- prognostic capabilities
- predictive capabilities
- assessment of treatment response

Standardization

Issues:

- Variability of signal –
  - Within a histology
  - Within a patient on different days (without therapeutic intervention)
  - With different scanners from the same manufacturer
  - With scanners from different manufacturers
  - With different therapeutic interventions

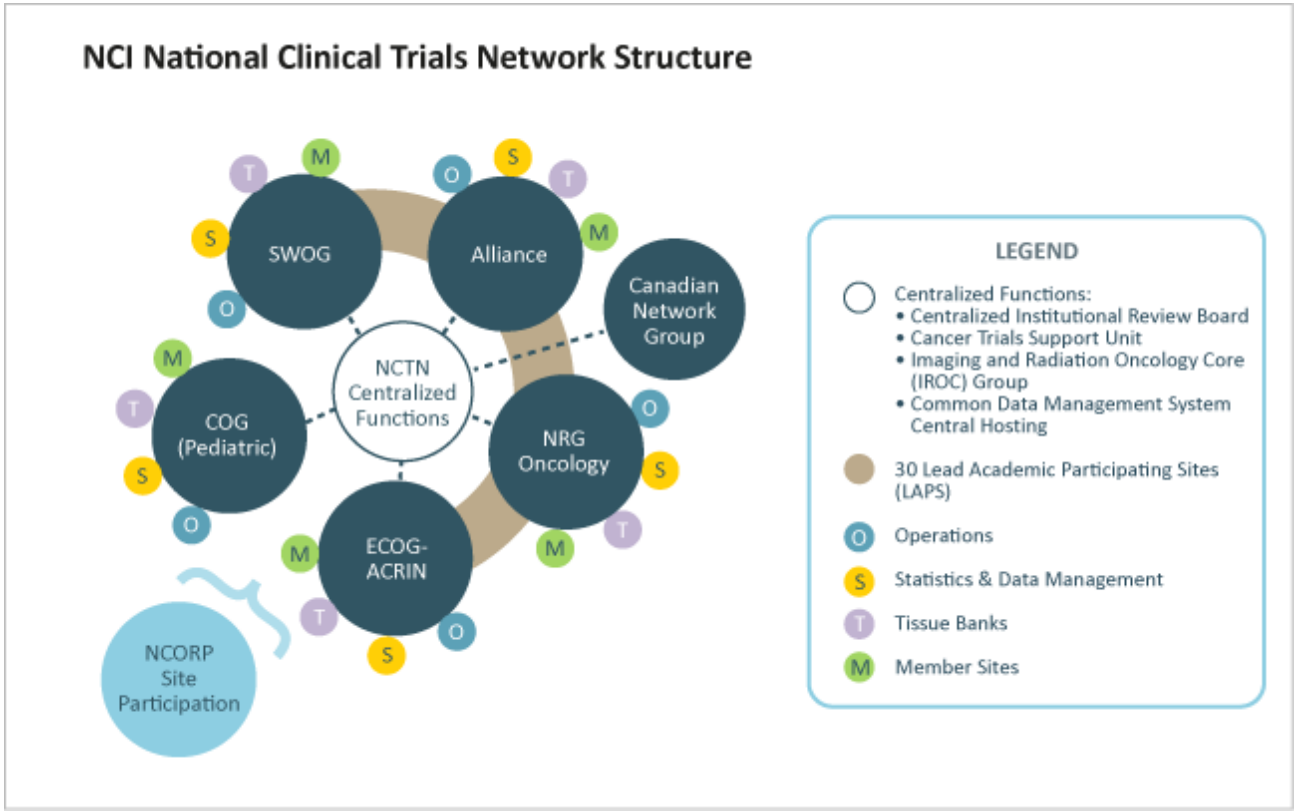
Clinical Trial Networks in the Division of Cancer Treatment and Diagnosis

- Experimental Therapeutics Clinical Trials Network (ETCTN)
- NCI National Clinical Trials Network (NCTN)
- Pediatric Brain Tumor Consortium (PBTC)
- Adult Brain Tumor Consortium (ABTC)
- Pediatric Early Phase Clinical Trials Network (PEP CTN)

ETCTN


ETCTN Sites
BRITISH COLUMBIA
ALBERTA
ONTARIO
Prince George
Kelowna
Vancouver
Abbotsford
Victoria
Toronto
Boston
New Haven
New York
New Brunswick
Philadelphia
Rochester
Madison
Detroit
Cleveland
Pittsburgh
Chicago
Iowa City
Columbus
Baltimore
Washington D.C.
Charlottesville
Davis
San Francisco
Stanford
Aurora (Denver)
St. Louis
Lexington
Durham
Chapel Hill
Duarte
Nashville
Los Angeles
Phoenix
Atlanta
San Diego
Jacksonville
Houston
Tampa

NCTN


NCI National Clinical Trials Network Structure
SWOG
Alliance
Canadian Network Group
NCTN Centralized Functions
COG (Pediatric)
NRG Oncology
ECOG-ACRIN
NCORP Site Participation
LEGEND
Centralized Functions:
• Centralized Institutional Review Board
• Cancer Trials Support Unit
• Imaging and Radiation Oncology Core (IROC) Group
• Common Data Management System Central Hosting
30 Lead Academic Participating Sites (LAPS)
Operations
Statistics & Data Management
Tissue Banks
Member Sites

Resources for Imaging and RT Activities within the ETCTN and NCTN

For efficient assessment of promising imaging agents and modalities and their role in the development of therapeutic strategies and cancer management:

- Development of a national distribution system for investigational imaging agents
- Biomarker, imaging, and quality of life studies funding program (BIQSFP)
- Imaging and Radiation Therapy Core (IROC) for the NCTN
- Clinical Imaging and Disease Specific Steering Committees
- PAs and PARs

Diagnosis and Staging

Multiparametric prostate MRI

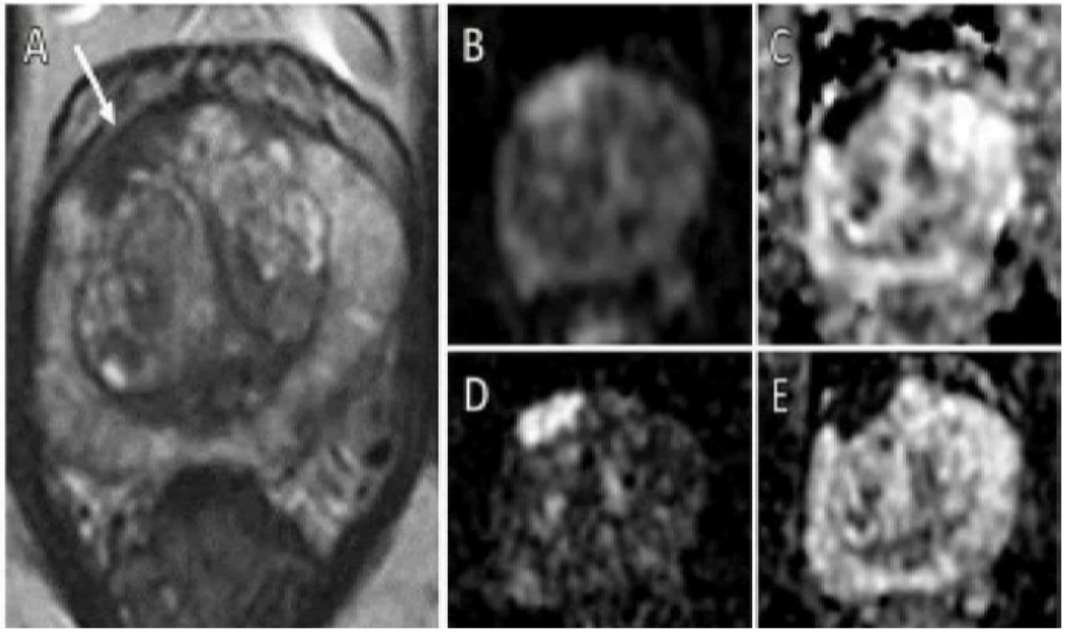


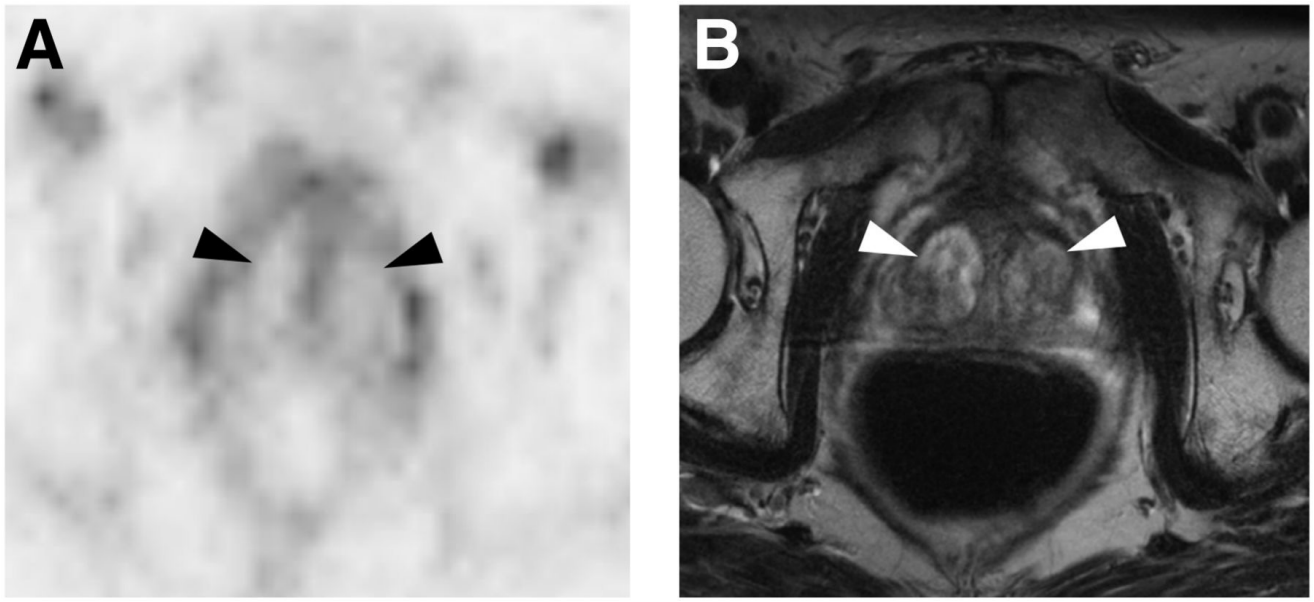
Figure 3. Advantage of small field-of-view (FOV) DWI. 66 year-old patient with PSA 6.1.
351 ng/ml. A: T2WI shows a lesion in the right anterior mid transition zone (arrow). Restricted.
352 diffusion is demonstrated with high signal on the b-1400 DWI (B, D) and corresponding low.
353 signal on the ADC maps (C, E), with small FOV imaging showing improved signal-to-noise
354 ratio and increased lesion conspicuity (D, E), compared to standard DWI (B, C).

T. Barrett; Review Article - Imaging in Medicine (2015) Volume 7, Issue 2

EA8171: Multiparametric MRI (mpMRI) for Preoperative Staging and Treatment Planning for Newly-Diagnosed Prostate Cancer.

Primary Objectives:

- To estimate the diagnostic performance of overall PI-RADS score based on local site imaging review of mpMRI (T2W, DWI and DCE) to detect clinically significant prostate cancer.
- To develop a risk prediction model by incorporating overall PI-RADS, PSA, Gleason score and clinical stage to predict the presence of clinically significant prostate cancer.



18F-DCFBC PET (A) and T2-weighted MR (B) images demonstrating 18F-DCFBC photopenia for representative example of BPH nodules (arrowheads) within central prostate. Steven P. Rowe et al. J Nucl Med 2015;56:1003-1010

JNM The Journal of NUCLEAR MEDICINE

EA8191: Phase III Study of Local or Systemic Therapy INtensification DIrected in Prostate Cancer Patients with Post-ProstaTEctomy Biochemical Recurrence (INDICATE).

Primary Objectives:

- For patients without PET-evidence of extrapelvic metastases, to evaluate whether the addition of enhanced systemic therapy to SOC salvage RT could prolong PFS.
- For patients with PET-evidence of extrapelvic metastases, to evaluate whether the addition of metastasis-directed RT to enhanced systemic therapy and SOC salvage RT could prolong PFS.

Theranostics:

- ^{177}Lu-PSMA radioligand therapy in a 67-year-old man with metastatic castration-resistant prostate cancer.
- **a** Pretherapy. PET image evidenced a difuse metastatic involvement. PSA value 50 ng/ml.
- **b** 4 months following the treatment with ^{177}Lu-PSMA radioligand therapy (8000 MBq), PET showed a complete metabolic response. PSA value 0 ng/ml

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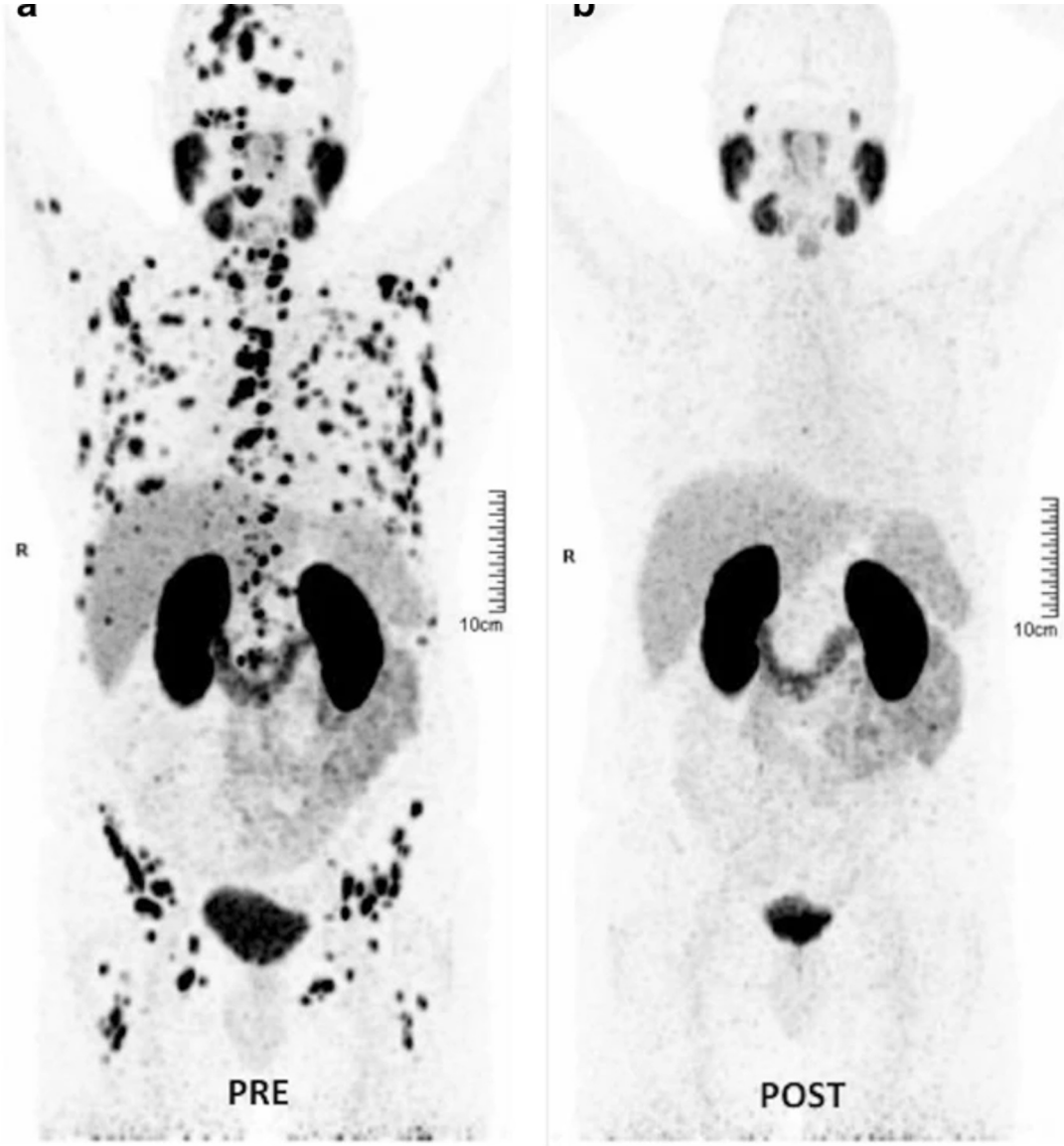
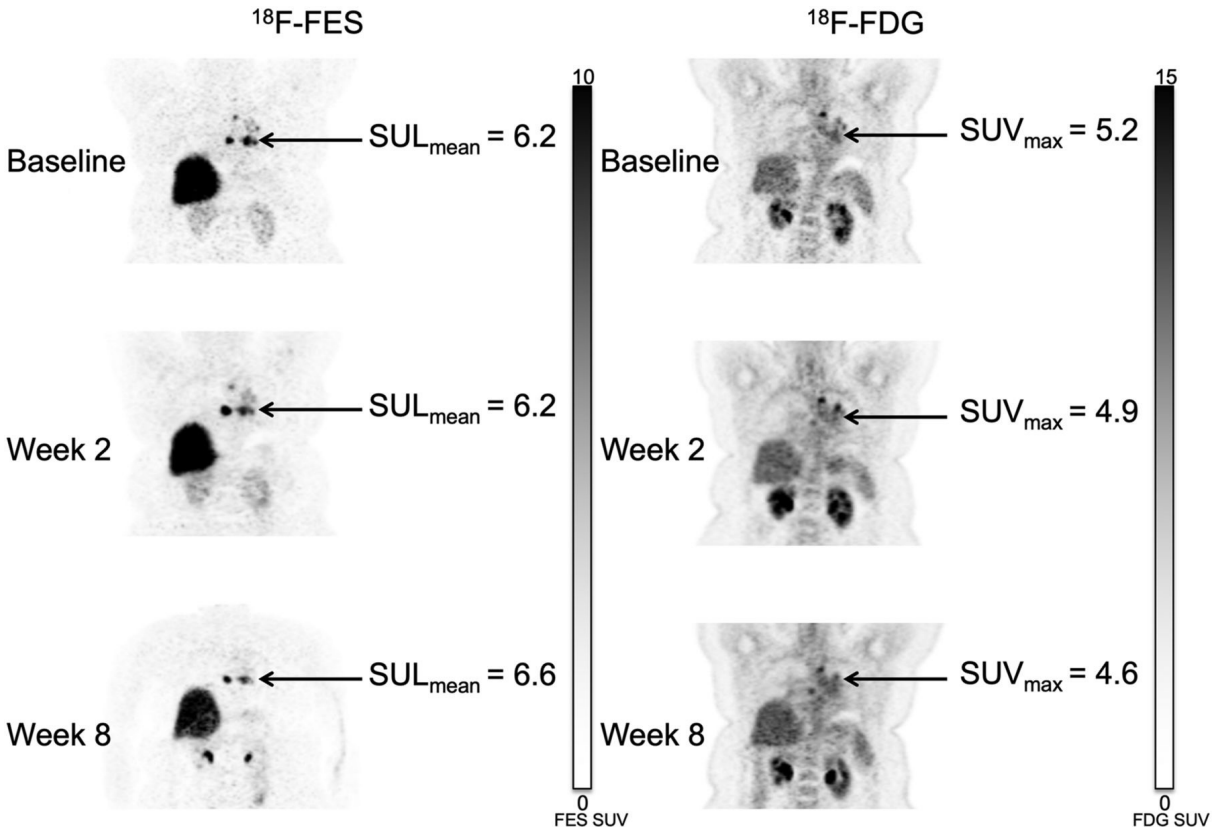


Predictive Marker



Mediastinal lymph node lesions in 53-y-old woman in simultaneous cohort (patient 12). Lanell M. Peterson et al. J Nucl Med 2021;62:184-190

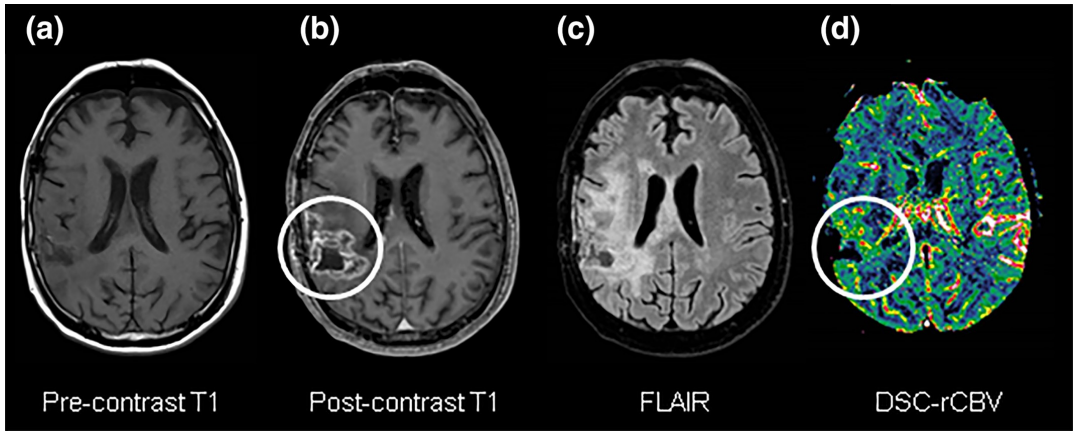
EAI142: [^{18}F] Fluoroestradiol (FES) PET as a Predictive Measure for Endocrine Therapy in Patients with Newly Diagnosed Metastatic Breast Cancer.

Primary Objective:

- To determine the negative predictive value (NPV) of [^{18}F]Fluoroestradiol (FES) uptake for response (clinical benefit) at 6 months in patients with estrogen-receptor positive (ER+) metastatic breast cancer treated with first-line endocrine therapy.

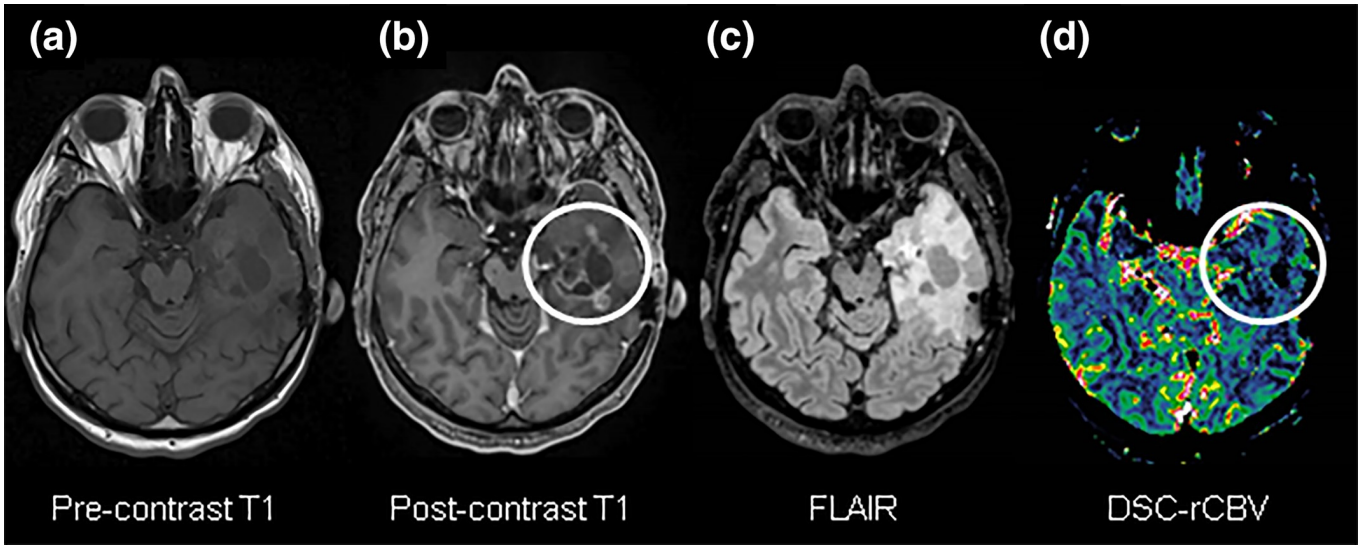
Pharmacodynamic Marker

Perfusion MRI in treatment evaluation of glioblastomas: Tumor progression



Journal of Magnetic Resonance Imaging, Volume: 49, Issue: 1, Pages: 11-22, First published: 18 December 2018, DOI: (10.1002/jmri.26306)

Perfusion MRI in treatment evaluation of glioblastomas: pseudoprogression



Journal of Magnetic Resonance Imaging, Volume: 49, Issue: 1, Pages: 11-22, First published: 18 December 2018, DOI: (10.1002/jmri.26306)

EAF151: Change in Relative Cerebral Blood Volume as a Biomarker for Early Response to Bevacizumab in Patients with Recurrent Glioblastoma.

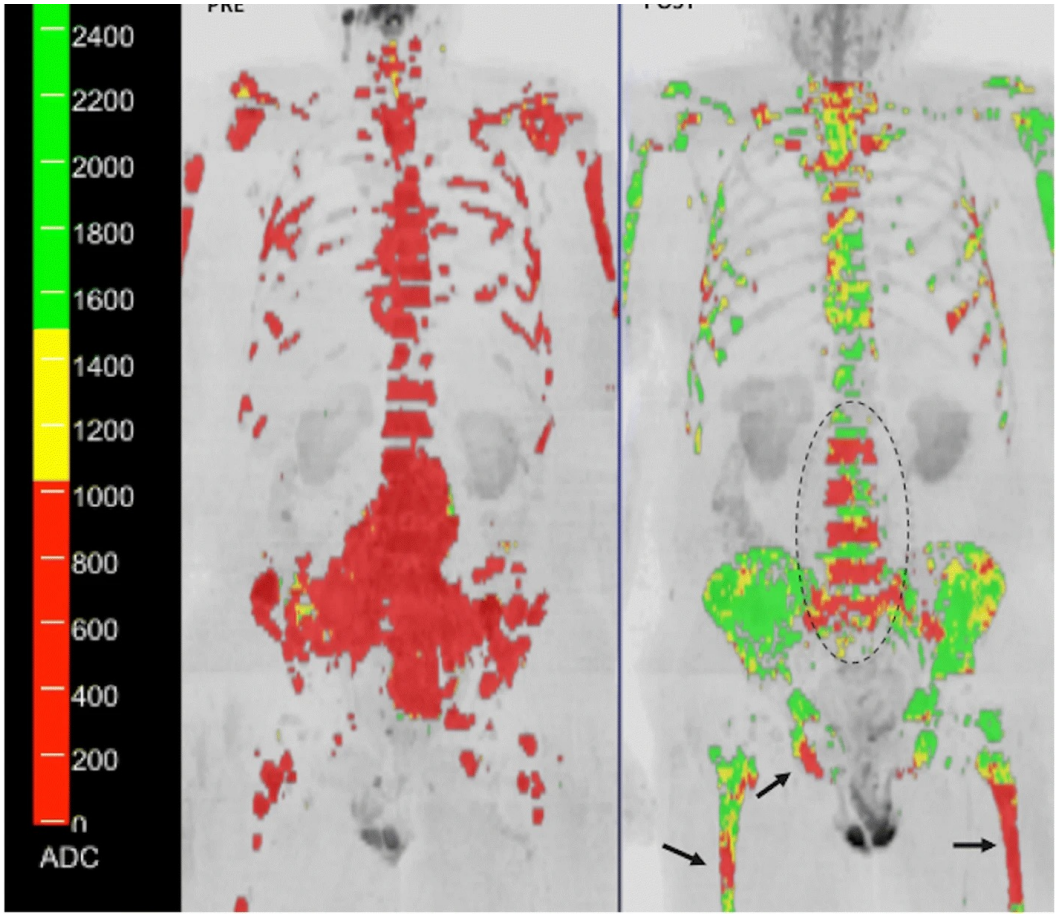
Primary Objective:

- To determine whether the binary change (increase vs. decrease) in normalized rCBV within enhancing tumor from the baseline scan (S0) to the post-dose 1 treatment scan (S1) is associated with overall survival (OS) in recurrent GBM patients receiving bevacizumab or its biosimilars for the first time

Response Assessment

Diffusion Weighted MRI

- Metastatic prostate cancer pre and post systemic therapy



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EA2174: A Phase II/III Study of Peri-operative Nivolumab and Ipilimumab in Patients with Locoregional Esophageal and Gastroesophageal Junction Adenocarcinoma.

Primary Objectives:

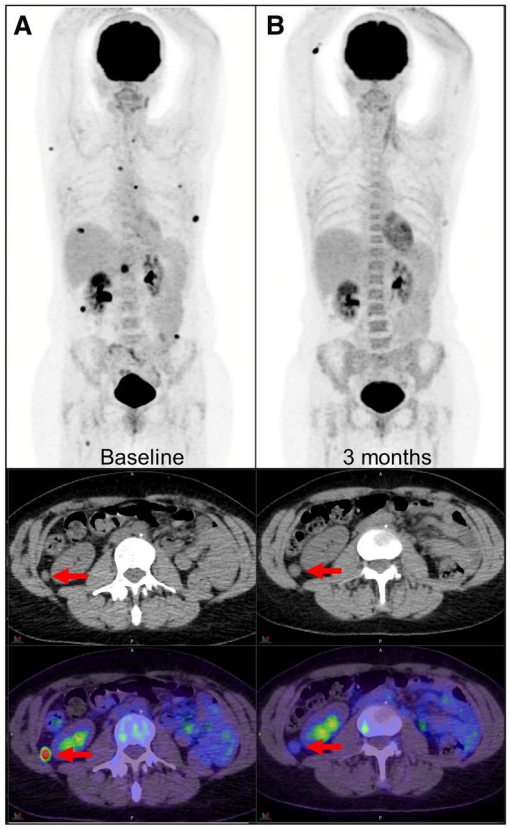
- To assess the pathCR rate following administration of neoadjuvant carboplatin, paclitaxel and radiation therapy versus neoadjuvant carboplatin, paclitaxel, radiation therapy and nivolumab in patients with a resected locoregionally advanced esophageal or gastroesophageal junction adenocarcinoma.
- To assess the disease-free survival (DFS) following administration of adjuvant nivolumab and ipilimumab versus adjuvant nivolumab in patients with a resected locoregionally advanced esophageal or gastroesophageal junction adenocarcinoma who received neoadjuvant treatment with carboplatin, paclitaxel and radiation therapy with or without nivolumab.

NRG-GI002: A Phase II Clinical Trial Platform of Sensitization Utilizing Total Neoadjuvant Therapy (TNT) in Rectal Cancer.

Primary Objective:

- To demonstrate an absolute improvement in Neoadjuvant Rectal Cancer (NAR) score for the experimental regimen as compared to concurrently randomized control patients.

FDG PET CT



Metabolic response with residual morphologic lesion (arrows) as seen on PET (top), CT (middle), and PET/CT (bottom) images. Amir Iravani, and Rodney J. Hicks J Nucl Med 2020;61:943-950

EA1183: FDG PET to Assess Therapeutic Response in Patients with Bone-dominant Metastatic Breast Cancer, FEATURE.

Primary Objective:

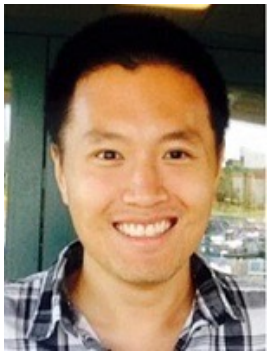
- To evaluate the performance of FDG-PET/CT response criteria (modified PERCIST complete, partial and stable metabolic disease versus progressive metabolic disease) as a binary predictor of PFS in patients with BD MBC treated with systemic therapy.

Collaborations for Assessment of Imaging Tools

- NCI-FDA (Tracer development pathways)
- NCI-CMS
- NCI-EORTC
- Response Assessment – collaboration with EORTC and Pharma
  - RECIST 1.1
  - FDG – ongoing evaluation
- QIBA
- Biomarkers Consortia

Clinical Trials Branch Staff

Dr. Brian Rodgers



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