Diffusion Weighted MRI in NCTN Clinical Trials Meeting Series

Summary and Recommendations

Thomas L. Chenevert, PhD.
Department of Radiology
University of Michigan
# Main Issues in DWI for Breast & Rectal Cancer (Technical)

## Key Challenges for New and Ongoing Phase 2 and 3 Clinical Trials:

### Breast
- **DWI Quality Strong Dependence On:**
  - Patient habitus
  - Scanner platform / options
  - MRI operator skill & experience
- **Lack of Harmonization / Optimization:**
  - DWI acquisition
  - Processing (esp. for advanced models)
  - Lesion segmentation
- **Need Vendor Buy-In/Support:**
  - Multi-shot & GNL correction
  - Image registration (DWI $\leftrightarrow$ DWI & DWI $\leftrightarrow$ T13DGd)

### Rectal
- **DWI Quality Dependence On:**
  - Patient habitus
  - MRI operator training
- **Lack of Harmonization / Optimization:**
  - Field strength
  - Patient prep
  - DWI acquisition (b-values; spatial resolution; scantime)
  - Processing (esp. for advanced models)
  - Lesion segmentation
- **Need Vendor Buy-In / Support:**
  - Reduced FOV DWI
## Recommendations

### Proposed Solutions and Next Steps:

#### Breast

- **Rigorous Site Qualification Process**
  - Scanner capabilities
  - Dedicated MRI operator training
  - Com. Breast DWI phantom QC
- **Consensus → Standardization**
  - Field strength – 3T only
  - Spatial resolution & PE-direction
  - b-values; scantime; TE (SS vs MS-EPI)
  - Centralized ADC generation and lesion segmentation
- **Challenge Vendors to Deliver Protocol That Meet Standards**

#### Rectal

- **Rigorous Site Qualification Process**
  - Scanner capabilities
  - Commercial DWI phantom QC
- **Standardization**
  - Field strength – 3T only
  - Patient prep – enema & anti-antispasmodic
  - b-values (~0-100, 800, 1600)
  - Spatial resolution & scantime 4-5’
  - Centralized ADC generation and lesion segmentation
- **Involve Vendor(s) for sub-par performance systems (phantom tests)**