Leveraging the CTSA Program to Support Imaging Biomarker Development

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(No Relevant COI Disclosures)

Clinical and Translational Science Awards (CTSA)

• Launched in 2006 by NCRR
• 55 sites in 28 states and DC as of 2010
• Strategic Goals
  1. Build national clinical / translational capacity
  2. Training / career development
  3. Enhance consortium-wide collaborations
  4. Improve community and national health status
  5. Advance T1 research (discovery to clinical testing)
• Consortium organizational structure
  – Steering and Strategic Goal Committees
  – 14 Key Function Committees (Translational)
• CTSA facilitated scientific activities
  – Core and training activities
  – Planning and pilot awards (∼$10 – 50K, or more)
Clinical and Translational Science Awards (CTSA)

CTSA Imaging Working Group (CTSA IWG)

- Housed within the Translational KFC
  - Mission: develop infrastructure to facilitate advancements of novel translational research and technologies through the consortium in collaboration with the NIH; bidirectional integration of basic & clinical research to improve care & health
- IWG Chair Daniel Sullivan, MD; Supported by RSNA
- Membership open to CTSA's (awarded and planned) and “interested parties” (industry included)
- Organizational structure
  - Steering Committee
  - 3 Subgroups within the CTSA IWG
    * Cores and Education (Macura and Reynolds)
    * Imaging Informatics (Erickson)
    * Clinical Trials and UPICT (Dorfman)
CTSA IWG Subgroup Activities and CTSA Strategic Goals

- IWG Subgroups: All five strategic goals to some extent
- Cores / Education: Build capacity; Training and career development
  - Inform institutional imaging cores so as to optimize performance
  - Educate clinical and translational scientists and providers (imaging and others) regarding emerging imaging technologies and imaging’s roles and capabilities in translational research
- Imaging Informatics: Build capacity; Enhance collaborations
  - Develop & deploy inter-operable imaging informatics infrastructure enabling optimal sharing of research-related, image-derived data & information

CTSA IWG Subgroup Activities and CTSA Strategic Goals

- Clinical Trials / UPICT: Enhance collaborations; Advance T1 research
  - Trial design including standardized image acquisition; development of relevant imaging endpoints; strategies for handling imaging PHI; and mechanisms for managing image-based response assessments.
  - Development of Uniform Protocols for Imaging in Clinical Trials (UPICT).
UPICT: (Uniform Protocols for Imaging in Clinical Trials)

UPICT facilitates the development and maintenance of consistent imaging protocols for use in clinical trials ...

... so that signal is a consequence of the intervention under investigation rather than to some artifact of the manner in which the imaging is conducted.

As many subjects are enrolled in trials after baseline imaging has been performed, there may be value in UPICT protocols being used in clinical practice.

UPICT Protocols & QIBA Profiles

UPICT Protocols describe how subjects (and potentially patients) should be imaged so as to achieve reproducible qualitative, semi-quantitative, and/or quantitative endpoints (and potentially clinical test results) when those tests are performed utilizing systems that meet specific performance claims. These specific performance claims are inherent in the QIBA Profiles.

QIBA Profiles describe how specific performance claims are achieved when targets (inanimate and/or living) are imaged under specific conditions (including, but not limited to, imaging system requirements and imaging protocols). The imaging protocols used for the living targets are the UPICT Protocols.
Leveraging Current CTSA IWG Activities Towards Imaging Biomarkers

• UPICT
  – Enabling IT infrastructure established
  – Standard Template (v 1.0) – completed, potential improvements based on use
  – Oncologic vCT (Lung) – in progress
  – Oncologic FDG-PET/CT (Whole Body) – in progress
  – Oncologic vCT (Whole Body) – to be implemented, near term
  – AD / MCI MRI (Brain) – committee being organized
  – Airspace Disease CT – committee being organized
  – Suggestions for additional foci and volunteers welcomed
• Discussion during this year’s RSNA regarding linking imaging data (phenotypes) with “omics” repositories
• Individual CTSA site projects (to be catalogued)

Leveraging Potential CTSA IWG Activities Towards Imaging Biomarkers

• Providing tools to CTSA sites to facilitate local activities
  – UPICT protocols, IT, technologies (in c/w industry)
  – Enabling imaging scientists (and collaborators) to compete for local CTSA planning and pilot funds
  – Organizing CTSA sites to develop data necessary (but “missing”) for UPICT protocols / QIBA profiles
• Develop & deploy tools to facilitate linkage between imaging and other data (locally and nationally)
  – “omics” repositories
  – Clinical outcomes data
• Training imaging scientists to travel the path towards imaging biomarker validation / qualification
• Facilitating a national focus on imaging as a biomarker
  – Linkage of standardized image data with existing national repositories
Migration From “Test” to “Biomarker”

- Pre-sampling patient / subject status (characteristics and pre-test management)
- ± provocative maneuvers
- Sample acquisition (fluid, tissue, specimen, cells, data)
- Sample management post-acquisition
- Sample processing (and reconstruction)
- Sample post-processing and analysis
- Interpretation of analytic output (clinical relevance)
- Output archival specifications
- Integration into scientific and/or clinical decision-making

- Requirements (standardization):
  - Stipulated test platform performance (QIBA Profiles)
  - Stipulated SOPs for the use of the test platform (UPICT Protocols)
  - QC and audit for each

- Outcome – Widespread acceptance as biomarker (validation)?