NCI Initiatives in Image-Guided Interventions

Keyvan Farahani, PhD
Image-Guided Interventions Branch
Cancer Imaging Program
National Cancer Institute, NIH

NCIGT
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Presentation Outline

1. NCI Funding Initiatives in IGI

2. Open Science Framework for Assessment of Technologies in IGI
CIP/NCI Initiatives in IGI

- Novel Imaging Technologies (R21/R33)
- Small Business [SBIR / STTR] IGI (R41-R44)
- Early Phase Clinical Trials (R21)
- Academic Industry Partnerships (R01)
- Quantitative Imaging Network (U01)
- Image-Guided Drug Delivery (R01)
Academic-Industrial Partnerships (R01) – [PAR-10-169]

- **Purpose:** Development and Validation of Imaging Systems and Methods
- Requires Partnership between academic and industrial Co-PIs
- Includes investigations of IGI-systems
- Standard R01 Application Receipt Dates
- SEP Review (CSR)
Early Phase Clinical Trials in Imaging & IGI (R21) - [PAR-11-216]

- Quick (2 yr) clinical trials of novel imaging and IGI

- Intended to accelerate the development of imaging and IGI modalities, methodologies, and agents through the early stages of clinical development - such as trials evaluating safety and preliminary efficacy

- Phase I & II studies to establish treatment parameters and early therapeutic efficacy

- SEP Review (CSR)
Quantitative Imaging for Evaluation of Response to Cancer Therapies (U01) – [PAR-11-150]

- Quantitative imaging of response to therapies, including IGI, to facilitate clinical decision making
- Development and implementation of QI methods and tools and their applications to current or pending Phase I/II clinical trials
- Funded teams join the Quantitative Imaging Network (QIN)
Image-Guided Drug Delivery in Cancer (R01) – [PA-09-253]

- Development of integrated platforms for multifunctional and multiplexed oncologic IGDD systems

- Development of quantitative in-vivo imaging methods in IGDD in cancer
  - interrogate tumor/drug interaction
  - imaging studies of biodistribution, PK/PD, Tx response
  - perform imaging studies in non-human primates or large animal models for toxicity screening
Image-Guided Cancer Interventions
PA-10-079 (SBIR); PA-10-080 (STTR)

- Development and optimization of integrated cancer imaging and therapy systems

- Validation of integrated IGI systems through clinical evaluations
  
  Phase I: up to 2 years
  Total costs: $150,000 per year

  Phase II: up to 3 years
  Total Costs: $1,000,000 (clinical studies), $750,000 (otherwise)
Other Initiatives

- **Bioengineering Research Funding Opportunities**
  - Exploratory Bioengineering Research Grants (EBRG) – PA-10-010
  - Bioengineering Research Grants (BRG) – PA-10-009
  - Bioengineering Research Partnerships (BRP) – PAR-10-234

- **Innovations in Biomedical Computational Science & Technology**
  - R21: PAR-09-219
  - R01: PAR-09-218
  - SBIR: PAR-09-220
  - STTR: PAR-09-221
TCIA: The Cancer Imaging Archive

http://cancerimagingarchive.net
TCIA: The Cancer Imaging Archive

Funded by CIP/NCI, is a large archive of clinical images of cancer accessible for download.

TCIA de-identifies, organizes, and catalogs the images for use by the research community.

The archive is already home to high value data sets including a growing collection of cases that have been characterized in the Cancer Genome Atlas (TCGA)

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CIP/NCI Initiatives in IGI

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Translational Research Support

Imaging Translational Research Pipe Line

- Image-Guided Cancer Interventions (SBIR/STTR)
- Image-Guided Drug Delivery (R01)
- Quantitative Imaging Network (U01)
- Academic/Industrial Partnerships (R01)
- Early Phase Trials (R21)
- ACRIN (U01)
Technology Assessment Committee
[Chair: Hendee]

Work Group: Assessment of Technologies in IGI
[Chair: Farahani]

Task Groups (2013)

- 3D C-Arm [Siewerdsen]
- US-Guided Surgery [Vosburgh]
- Robotics-Assisted Interventions [Cleary]
- MR-Guided Focused Ultrasound [Chopra]

Products: TG Reports + Open Tools
Grand Challenges in Image Processing

Goals:

1. To initiate a collaboration between NCI and IP community to expand on the development of open source resources for automated cancer image segmentation.

2. To build on such collaboration in future years in order to provide a more lasting and effective impact for challenge products.
NCI-ISBI Prostate Segmentation Challenge

Segmentation of prostate structures: Central gland (CG) and the peripheral zone (PZ) using NCI TCIA ~60 cases that have 3D prostate feature object mark-ups (as Slicer 3D .nrrd files)

• 40 training cases; 2 x 10 sequestered test cases
• 10 test cases open during ISBI annual meeting (Apr 7-11; San Francisco, CA)
• Open and Closed Source competitions
• Evaluation Metrics: 95% Hausdorff Distance (HD) & Dice Similarity Coefficient against expert mark ups
1. Segmentation of prostate structures: Neurovascular bundle (NV) and seminal vesicles

2. Segmentation of GBM components
Contact Information:

Keyvan Farahani, PhD

farahani@nih.gov
(301) 451 2651

http://imaging.cancer.gov