Collaborative Cancer Imaging Effort Launched; caBIG Conference Identifies Far-Reaching Goals

A unique cooperative effort, bringing together participants from across the spectrum of the medical imaging community, has been launched as part of a larger National Cancer Institute (NCI) initiative to build on the collaborative strengths and goals of researchers at cancer centers throughout the United States. The Cancer Biomedical Informatics Grid (caBIG™) In Vivo Imaging Workspace was formally launched in teleconferences in November and held its initial planning meeting on December 15 and 16 in Philadelphia, PA. According to organizers, the group will focus on identifying the ways in which the wealth of information provided by medical imaging can be shared, optimized, and most effectively integrated into the ongoing effort to understand, prevent, diagnose, and treat cancer.

"Through this initiative we hope to work together to define and address the biggest challenges and most promising rewards of the growing role of imaging in cancer research, treatment, and care," said Eliot L. Siegel, MD, NCI Imaging Workspace lead, a professor of diagnostic radiology at the University of Maryland School of Medicine, and chief of imaging services for the Maryland Veterans Affairs Health Care System. "We have received indications of great interest and enthusiasm for the possibilities offered by this unique effort in diagnostic imaging. The very real rewards that can be achieved through our cooperative work on issues at the cutting edge of medical research and patient care could have far-reaching effects for the ways in which clinical imaging—across all modalities—will be practiced in the future."

caBIG: A Work Already in Progress

The Imaging Workspace, initiated by NCI's Cancer Imaging Program, joins other caBIG efforts that have been underway for almost 2 years. caBIG was envisioned as a voluntary network or grid connecting individuals and institutions to enable sharing of data and tools, creating a World Wide Web of cancer research. The goal is to speed the delivery of innovative approaches for the prevention and treatment of cancer.

caBIG is being developed under the leadership of NCI's Center for Bioinformatics, with more than 500 individuals from NCI-designated cancer centers and other organizations working collaboratively on a wide range of projects in a 3-year pilot program. caBIG is already delivering tools and applications, all freely available to the scientific community and other interested stakeholders. Many participants believe that the infrastructure and tools created by caBIG also will have broad utility outside the cancer community.

caBIG™ cancer Biomedical Informatics Grid™

Other currently active caBIG workspaces include those focusing on:

- Clinical Trial Management Systems: working to deploy and develop caBIG-compliant tools to support data capture/analysis in the management of clinical trials.
- Integrative Cancer Research: assembling data, tools, and infrastructure to facilitate the cross-silo use of cancer biology information to support integrated cancer research.
- Tissue Banks and Pathology Tools: developing a set of tools to track, mine, and visualize tissue samples and related information from a geographically dispersed repository.

These workspaces are supported by cross-cutting workspaces, including:

- Architecture: extending architecture/infrastructure frameworks and standards to support caBIG tools and data access.
- Vocabularies and Common Data Elements: creating and maintaining software systems for content development and content delivery, as well as assessment of and recommendations on vocabularies and common data elements.

The caBIG development process, like its tools and other products, is open and entirely driven by participants. In addition to representation from cancer centers and other organizations, patient advocates regularly participate in meetings to bring patients' points of view to strategic planning and the selection of targeted projects.

A Broad Range of Participants

The first meeting of the caBIG Imaging Workspace, held on the University of Pennsylvania campus in

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Philadelphia, attracted more than 75 participants from cancer centers, other medical institutions, academia, and industry. "We're encouraging the widest possible representation in the workspace," said Siegel. "Industry involvement, for example, is essential as we address the need for new standards and innovative approaches that will require all of us—imaging specialists, researchers, vendors, and even our referring physician communities—to rethink many of the current 'rules' that govern imaging practice."

In part, the stimulus for creating the Imaging Workspace came from the widespread recognition that the power of medical imaging was largely untapped as a resource for continuing and accretive cancer research. Although medical imaging, including nuclear medicine studies, has played an essential role in diagnosis, monitoring of therapeutic progress, and designation of clinical trial endpoints, imaging data from clinical trials has not been aggregated in central databases or archived in such a way that meaningful comparisons can be made among studies or over time.

The challenges to leveraging the power of medical imaging to the next level in cancer research include standardization and harmonization of acquisition and display parameters, developing common imaging vocabularies and reporting tools, and devising reliable methods to both anonymize records and still track change within the same patients and/or populations. Productive work on these and associated tasks will require breakthroughs in the ways in which industry, researchers, and practitioners collaborate and share data. Among the topics that Siegel and a core group of participants from 15 cancer centers and allied organizations have identified as potential areas for initial efforts are:

- Image annotation and mark-up standards;
- Common, standards-based imaging vocabularies;
- Natural language processing tools for radiology reports and associated information within the electronic medical record;
- Tools for automated change assessment in pixel data;
- Imaging standards for small animal studies;
- Validated, freely available image reference datasets for research, software development, and algorithm validation;
- Improved tools to facilitate de-identification of patient information;
- Grid infrastructure to facilitate multisite imaging research and image processing; and
- Standards to normalize data from devices manufactured by different vendors—including efforts to enable effective viewing of different modalities from the same workstation.

"We anticipate that these initial approaches will be refined, with new projects added as we begin to explore the ways in which imaging results can be mined for research and development," said Siegel. "Although a number of projects have attempted to address individual elements in streamlining communication and utility of imaging data across multiple sites, this is the first effort to bring all interested participants under one metaphorical roof to work together for comprehensive and beneficial long-term solutions. Along with my colleagues at NCI, I look forward to this extraordinary opportunity."

For more information on caBIG, see https://cabig.nci.nih.gov. For information on the In Vivo Imaging Workspace, see: https://cabig.nci.nih.gov/workspaces/Imaging. To join the workspace listserv, see https://list.nih.gov/archives/cabig_image-l.html.