The Academy Coalition for Imaging and Bioengineering Research
Research Roundtable
Tuesday, September 28, 2021
Sofitel Lafayette Square, Washington DC


Summary

Drs. Hedvig Hricak and Mitchell Schnall welcomed the Roundtable participants, comprising 35 in-person and upwards of 125 virtual attendees, by making their opening remarks. Dr. Hricak introduced Dr. Bruce Tromberg, Director, National Institute for Biomedical Imaging and Bioengineering, as the Roundtable keynote speaker. The title of Dr. Tromberg’s address was *NIBIB and the pandemic response: New opportunities for accelerating innovation from in vitro diagnostics to imaging.*

Dr. Tromberg provided a high-level overview of the history and mission of NIBIB and then focused on the opportunities and accomplishments that have arisen over the past year. Dr. Tromberg’s slides are currently available from the Academy. A large allocation of new funding for NIBIB programs to address the COVID-19 pandemic opened the door to significant technologic advancements in at home and point of care testing, diagnosis, and treatment monitoring. These advancements, in turn, led to multifold increases in capacity, lowered costs, and significantly decreased turnaround times for COVID testing. NIBIB was able to capitalize on its existing and in development capabilities to dramatically accelerate funding awards that have led to vital scientific and engineering breakthroughs. These capabilities included the **Rapid Acceleration of Diagnostics (RADx) Initiative** and the first instantiation of the **Medical Imaging and Data Resource Center (MIDRC)**, a cooperative project supported by NIBIB and implemented by the American Association of Physicists in Medicine (AAPM), the American College of Radiology (ACR), the Radiological Society of North America (RSNA), and the **
University of Chicago. Dr. Tromberg expressed appreciation for the ongoing support for and promotion of the NIBIB by the Academy’s community and optimism for continuing breakthroughs in the sciences of medical imaging and bioengineering.

**Roundtable Discussions**

**Diagnostic Cockpit Initiative (DxCPI) 2.0**

Dr. Schnall opened discussion of the first roundtable topic, the Diagnostic Cockpit Initiative (DxCPI) 2.0. He provided a brief history of the project, which he characterized as a metaphor for integrating multiple data streams to generate diagnostic information that is readily consumable by medical care professionals and provides information relevant to clinical decision-making. Methodologic approaches to data acquisition, aggregation, and analytics are needed to inform clinical guidance. Major barriers to progress that require solutions are the need for clinical and synthetic datasets to support the development and validation of integrated diagnostic algorithms; procedural and dataset standardization; as well as approachable use cases. As the search for a first use case was under way, the first presented itself through the pressing needs of the COVID-19 pandemic. MIDRC has begun to make progress on aggregating x-ray and CT images with accompanying clinical data in a repository that has cases for public access as well as segregated datasets for developing and validating diagnostic algorithms. It is approaching 60,000 cases in various stages of curation and publication. Discussion among participants led to the following observations and considerations:

- There are four major challenges:
  - Alignment of stakeholders
  - Development of a data sharing infrastructure, including universal data standards that support the integration of diagnostic information across source
  - Resources to support research and development
  - Validation of proof-of-concept demonstrations.
- There needs to be an environment for industry cooperation and information-sharing in the pre-proprietary space.
- National guidelines are needed to support data-sharing while still protecting patients.
- Much research that has been done in this domain has not been translated/deployed—each algorithm must be individually applied on an institution-by-institution basis.
- There is very little academic recognition of and support for creating data infrastructure.
- Even partner institutions with a common data platform (e.g., Epic electronic medical records) have different instantiations that make data sharing and integration impossible.
- Where research is done can unintentionally worsen health disparities among disadvantaged populations due to the limited data capabilities of safety net hospitals.

**Point of Care (POC) Technologies**

Dr. Kristen DeStigter opened discussion of the second roundtable topic, Point of Care (POC) Technologies. Rapid advances have been made in POC technologies across many medical disciplines. These bear the promise of more accessible, rapid, and potentially lower cost medical diagnosis and treatment. As an example, Dr. DeStigter provided an overview of wireless and handheld ultrasound devices, which rely on chip-based technology. As these technologies evolve, significant challenges include the need for standardized credentialing of devices and operators, appropriate use criteria that evolve with the technology, quality control parameters, hidden costs, healthcare disparities in access, and common mechanisms for data capture and integration into the medical record.
Roundtable participants made the following observations:

- Concern has been expressed over practitioner loss of control and perceived impact/value
- POC may be a solution to address the volume of routine tests and studies, leaving complex cases to humans
- Standards must be put in place for training, credentialing, and appropriate documentation of results
- Radiologists must bear in mind the potential relevance to POC technologies for image-guided interventions in addition to diagnostics
- Use of POC testing by clinicians may increase referral to radiologists for expert consultation
- POC is patient-friendly—how can we lead vs. resist?

Theranostics

Dr. Woodward opened discussion of the final roundtable topic, presented by Dr. Thomas Hope, Theranostics. The term theranostics refers to use of radiopharmaceuticals, using radioisotopes and radioligands to treat disease processes. It can be said that this rapidly growing field is the vanguard of precision medicine and targeted therapies. The following comments and observations were made:

- Most of the cutting-edge work in this field is being done in Germany and Australia. How can the US become a leader as well?
- What is the appropriate approach to training theranostic practitioners? Should this be a fellowship? Should general radiology residencies include some exposure to the field? How do we encourage more trainees to pursue this emerging discipline?
- Dose tolerance is critical—the dose to the target cells must be maximized while dose to normal tissues must be minimized. There is a need for expertise in personal dosimetry.
- Who should fund theranostic training and research? National Cancer Institute (NCI)? Department of Energy? NIBIB? Is this an appropriate focus for a T32 grant?
- There is a significant gap between the research funding available to support development of theranostic radioisotopes and the funding available to support data collection sufficient for FDA consideration.
- Sourcing existing radioisotopes is already often difficult. Who will supply a broader deployment of theranostic agents?
- Does this field belong in radiology, radiation oncology, or nuclear medicine?
- What kind of support is needed from medical physicists, particular in reference to dosimetry, and what should the qualifications be of physicists performing these functions?
- Perhaps the NCI should convene a meeting to begin to grapple with some of these questions.

The Academy will begin to review the information generated from these discussions and identify its appropriate role and next steps.

Follow up questions or comments from this meeting can be directed to Academy Executive Director, Renee Cruea, rcruea@acudrad.org.
2021 Roundtable Participants
*Includes both in-person and virtual attendees.

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Tina Young Poussaint, MD, FACR  Harvard Medical School, Boston Children's Hospital, ASNR  Chair, Professor of Radiology, ASNR President
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