AMERICAN ASSOCIATION of PHYSICISTS IN MEDICINE

ARPA-H Listening Session #9, 11 August, 2021

Stakeholder: American Association of Physicists in Medicine (AAPM)
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Disclosure: Dr. Bourland has sub-contract and grant funding from BARDA and NIAID in the area of radiation countermeasures and recently served on a NASA panel on pre-clinical research relevant to space travel.

Thank you for the invitation to join today's discussion on ARPA-H. I am delighted to present as an NIBIB stakeholder on behalf of the AAPM (www.aapm.org), a 9,000-member association of physicists who work in medicine. We provide tangible solutions for challenging problems in medical imaging and treatment.

ARPA-H has great potential for human health for high-reward, tech-based projects that are brand new, inspired, curated and steered from inception to safe and effective implementation. Driven by important medical problems, ARPA-H can be the incubator where the right scientific ingredients and enabling technologies are both created and brought together to provide biomedical devices and platforms for diagnosis and cure.

Opportunities and Gaps:

- Accelerate the development of robust Big Data + Artificial Intelligence (AI) platforms. Big Data in the Learning Healthcare environment is even Bigger than we've thought – we need Data + Models + Tools for AI – These are "very smart" knowledge-based solutions.
- Catalyze the development of nanomedicine and theranostics, including novel tracers and small molecules, for truly personalized medicine.
- Leverage the immense NIH archive of biological information, sensor technologies, imaging radiomics, and expertise. The bell curve for human biology is wide and diverse - like **Big Data** it is **Big Biology** – NIH holds the biology and biotech to leverage – the breadth of biology needs to be processed, sorted and quantitatively analyzed using advanced imaging and AI.
- Reduce health disparities by delivering cheaper, faster, smaller and portable diagnostic and therapeutic high-tech solutions – lowering, not raising, the cost of providing high quality care for those in resource limited regions.
- Game-changing technologies like Single-Cell Clinical Imaging. Imagine, seeing easily from outside the body with high accuracy, a small number of cells that are deep within, showing presence or absence of any disease at a certain location. When there is a signal from a particular disease, let's find it.

- Address regulatory aspects such as agency MOUs, facilitated industry-academic partnerships, data privacy and governance, managed COI risk, facilitated GLP for quality research, and streamlined FDA approval for new categories that go beyond devices and drugs.
- There is no shortage of good ideas or smart people, but rather a lack of funding for important ideas that may be too risky or too practical for traditional NIH funding.

Challenges for Commercialization:

- Modeled like DARPA or BARDA, ARPA-H can help bridge the so-called Valley of Death, facilitating the great benefit of basic research by lowering the translational hurdles leading to commercialization.

Partnership Strategies:

- This is all about multi-institutional partnerships and diverse skillsets and participants for consortium R&D – academia, industry, community practices, regulators, advocates, others.
- The Medical Imaging and Data Resource Center (MIDRC.org) led by AAPM and two other medical imaging organizations, with contract funding straight from NIBIB for rapid start-up in 1 year, is an example of a successful, multi-institutional consortium, using AI in medical imaging at a large-scale level.

In Closing:

- Leadership and Project Managers are key, to find game-changing projects, recruit Subject Matter Expertise and drive projects to their success. Medical physicists can contribute as PMs, SMEs and process experts.
- Use three doors for projects: 1) Research funneled by NIH, 2) Strategic health priorities conceived within, and 3) Independent pitches from outside.
- Take advantage of the NIH and NIBIB portfolios in Big Biology, sensors, imaging and radiomics – take the fundamental research of NIH and maximize its transformation to meaningful applications in health.

Thank you for the opportunity to contribute to the character of ARPA-H. We are readily available to further assist for its remarkable impending benefit for human health.