Really Getting to the Heart of the Matter

In the University of Minnesota’s Visible Heart® Laboratory (supported by the University and Medtronic), the unseen becomes the seen. By becoming accessible, though, the functional anatomy of the human heart is visibly astonishing. The technology developed here on campus has illuminated mysteries, educated medical practitioners, informed product development, and very likely saved lives—still, it seems no one remains more awed by the experience than Dr. Paul Iaizzo, the Visible Heart® Lab and Lillehei Heart Institute’s director. In his new technical review paper with Dr. Michael G. Bateman, Iaizzo’s passion and knowledge come pulsing through as he explores the applications of Visible Heart® imaging to date and their consequences for researchers and patients.

Inside the labs at the Medical School’s Department of Surgery, Iaizzo and his team have worked to reanimate mammalian hearts—often pig but also human hearts, those deemed non-viable for transplant but certainly viable for scientific advancement—and to capture video and still images. Together, the resulting visualizations make up an invaluable free access website or medical library of imagery that is available to surgeons, student, teachers, and biomedical engineers or anyone who goes online (http://www.vhlab.umn.edu/atlas) courtesy of the Lab and another of its partners, LifeSource. To summarize that breadth of experience and data would seem an insurmountable task—yet to capture video and still images. Together, the resulting visualizations make up an invaluable free access website or medical library of imagery that is available to surgeons, student, teachers, and biomedical engineers or anyone who goes online (http://www.vhlab.umn.edu/atlas) courtesy of the Lab and another of its partners, LifeSource. To summarize that breadth of experience and data would seem an insurmountable task, even for researchers who spend their days (and nights) navigating vital organs. But Iaizzo and Bateman accomplish this with brevity and clarity in the journal Cardiovascular Diagnosis and Therapy.

“The study of reanimated large mammalian hearts... has enhanced the design, development, and testing of novel cardiac therapies,” Iaizzo and Bateman write—an understatement, but an important point. “Pivotal to these advances has been significant improvements in cardiac imaging.” That is, when it comes to creating better see the live images coming from inside the beating organ. “It is like a ‘Fantastic Voyage’ every time,” Iaizzo enthuses, “and it’s a different voyage in every heart.” The reporter says excitedly, “Seeing the heart like this makes me appreciate what it is we’re trying to mend. These inner workings are like no piece of engineering I’ve ever seen.” These days, the sentiment still rings true. But the view? That’s available, courtesy the Visible Heart® Lab.

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In Really Getting to the Heart of the Matter, a glimpse into Dr. Paul Iaizzo’s Visible Heart® Lab demonstrates some of the possibilities of advanced cardiac imaging in improving treatment of persons with heart disease. However, to level set, all medical technologies, including those that identify and treat heart disease, must achieve the Triple Aim of better health, better care (including a better patient experience), and lower cost. How well does advanced cardiac imaging achieve the Triple Aim?

Coronary CT angiography (CCTA) was introduced several years ago with the promise that it might replace more invasive procedures, obviate the need for additional testing, make it easier to discern cardiac chest pain from non-cardiac pain, make the management of chest pain in Emergency Departments more efficient, and reduce the cost of managing acute coronary syndrome (ACS). Device manufacturers marketing the technology enthusiastically embraced these assumptions.

The Rule Out Myocardial Infarction Using Computer Assisted Tomography II (ROMICAT-II) study was published in the New England Journal of Medicine on July 26, 2012 (N Engl J Med, 367;4, July 26, 2012). This well-designed, randomized controlled trial (RCT) studied the use of CCTA in the Emergency Department as part of a triage strategy to evaluate chest pain. Some of the results were expected, but some were surprising. As expected, CCTA made the triage of chest pain more efficient. However, participants in the CCTA group had more downstream testing, increased radiation exposure, and saw no decrease in the overall cost of care. The study may not be the final word on the efficacy of CCTA, but at this point, its use in emergency care does not appear to achieve better health, better care, or lower cost (let alone all three).

The lesson I take from this study is that all new medical technologies must be subjected to rigorous, evidence-based review. We must learn not only whether and how they work, but also how they compare to available services used to manage important health conditions like heart disease. Cardiac imaging, illuminating as it is, will still have to pass the Triple Aim test before earning its spot among other approaches to cardiac care.

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He has served on the Institute of Medicine Forum on Drug Discovery, Development and Translation; the Institute of Medicine Committee to Identify Highly Effective Clinical Services; the American Medical Association CPT® Project; the American Medical Association Initiative to Transform Medical Education (ITME); and an expert panel developing an Evidence Report on diabetes education for children with type 1 diabetes, commissioned by the Agency for Healthcare Research and Quality (AHRQ). Dick served two terms on the AHRQ Stakeholders’ Panel for its Effective Health Care program.