The Board of Directors of the International Society for Minimally Invasive Cardiothoracic Surgery (ISMICS) created awards for the best manuscripts received before and after the annual meeting. They were submitted to Innovations for publication. All of these papers were presented at the 2014 Annual Meeting in Boston, MA USA. Of the 23 manuscripts in contention, they were from 11 countries. Eleven made it through the review and revision process (7 before/during the meeting; 4 after the meeting) and were accepted for publication. There were 16 manuscripts in the group submitted before or during the annual meeting and 7 manuscripts in competition that were submitted afterward. A committee was convened and graded the manuscripts. The committee consisted of the two past presidents of ISMICS, the editor of Innovations, the secretary of ISMICS, and three members of our Editorial Board.

The winner for the best paper submitted before or during the annual meeting was “A Geometric Model of the Normal Human Aortic Root and Design of a Fully Anatomic Aortic Root Graft” by Philip S. Crooke, PhD, L. Alan Beavan, MSE, Charles D. Griffin, MSE, Domenico Mazzitelli, MD, and J. Scott Rankin, MD (Fig. 1).

**A Geometric Model of the Normal Human Aortic Root and Design of a Fully Anatomic Aortic Root Graft**

**Philip S. Crooke, PhD, L. Alan Beavan, MSE, Charles D. Griffin, MSE, Domenico Mazzitelli, MD, and J. Scott Rankin, MD**

*Objective:* Available aortic root grafts generally flare outward in the sinus region, and this feature improves procedural ease. However, no current device is based on normal aortic root geometry, and a fully anatomic aortic root graft could further facilitate valve-sparing root operations.

*Methods:* To develop a model of the normal human aortic root, high-resolution computed tomographic angiogram images from 11 normal human aortas generated high-density x, y, z coordinates of valve and root structures in Mathematica. Three-dimensional least-squares regression analyses assessed geometry of the aortic valve and root. Shapes and dimensions were quantified, and minor variations in geometry were simplified during graft design.

*Results:* Normal aortic valve and root geometry was represented as three leaflet-sinus general ellipsoids nested within a cylindrical aorta. Sinotubular junction diameter was 5 mm larger than the valve base—with a slight funnel-shaped outward commissural flare but cylindrical geometry above the supravalve. The valve base was ellipsoidal, but the mitral valve and the sinotubular junction were circular above the midvalve level. Commissural locations on the base circumference were equidistant. On the basis of average three-dimensional geometry, a root graft was designed for root remodeling procedures—to be used with an internal geometric annuloplasty ring of the same design.

*Conclusions:* Aortic root graft was designed on the basis of mathematical analysis of computed tomographic angiogram images. The design incorporated three anatomic sinuses, commissural symmetry, and compatibility with geometric annuloplasty. The anatomic graft may prove useful for restoring aortic root geometry toward normal during aortic valve and root surgery.

**Key Words:** Aortic root repair, Aortic root geometry, Aortic root graft, Aortic valve annuloplasty, Aortic valve repair.

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Valve-sparing root replacement for aortic root aneurysm is being performed with increasing frequency, and our group has been involved with development of internal geometric aortic annuloplasty rings (HAART 300 [Hemosol Science & Engineering, Inc., Austin, TX USA] for trileaflet valve annuloplasty and HAART 200 [Hemosol Science & Engineering, Inc.] for bicuspival valves) that could simplify and further standardize this procedure. After ring annuloplasty and leaflet repair, the sinuses are recreated, coronary sinuses are developed, and a remodeling root replacement is performed. Early results with this root “restoration” procedure have been excellent, and the approach obviates external deep root dissection and perhaps some subjectivity associated with valve replacement. One problem, however, is that the root graft has to be cut to fit the sinus at the operating table. This requirement could introduce some subjectivity, and it also modestly increases operative time. In addition, current grafts generally flare outward in the sinus area but do not follow anatomic patterns regarding sinus height, degree of flare, individual sinus definition, and geometry of the sinus bases. The goal of this study was to reanalyze previously reported root geometry data and to design a more anatomic aortic root graft—one that not only models normal sinus and root dimensions but also couples geometrically with the HAART 300 annuloplasty ring (Hemosol Science & Engineering, Inc.).

**FIGURE 1.** 2014 Best Manuscript among those submitted before or at the annual meeting.
The best paper submitted after the annual meeting was from Dr Dominic A. Emerson and his group at the Veterans Affair Medical Center in Washington, DC USA, entitled "Long-term Outcomes After Off-Pump or Conventional Coronary Artery Bypass Grafting Within a Veteran Population" (Dominic A. Emerson, MD, Conor F. Hynes, MD, and Gregory D. Trachiotis, MD; Fig. 2).

All of the manuscripts in contention for the 2014 awards were excellent, and the authors should be proud of their work. The group of manuscripts was an excellent reflection of both the innovation and diversity that makes ISMICS such a unique and exciting society. The 23 manuscripts in contention were from 11 countries.

Our sincere congratulations go out to the authors of the best manuscripts. A $2,000 award was given to the best manuscript submitted before or during the meeting and a $1,000 award was given to the best manuscript submitted after the meeting. We would like to thank all of the members of ISMICS for their enthusiastic participation in the annual meeting and their continued confidence in our journal.

Sincerely,

Ralph J. Damiano, Jr, MD
Editor-in-Chief
Innovations: Technology and Techniques in Cardiothoracic and Vascular Surgery