Professor Ajit P. Yoganathan, PhD: "From bench to bedside": Celebrating his contributions to cardiac surgery with an honorary fellowship from the American Association for Thoracic Surgery

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The American Association for Thoracic Surgery (AATS), from time to time, has recognized cardiothoracic surgeons who have made highly significant contributions to the advancement of our field and to the care of our patients through either a Scientific Achievement or Lifetime Achievement Award. Earlier this year, the Association established an Honorary Fellowship Award to pay tribute to noncardiothoracic surgeons who have made seminal and transformative contributions to cardiothoracic surgery by nature of their scientific contributions within their own field. Moreover, these individuals are required to have established longstanding collaborations and partnerships with the cardiothoracic surgical community, because these interactions between surgeons, other medical specialists, scientists, and engineers is how we translate theory to bench to beside, which elevates the care of our patients.

As the inaugural recipient of the Honorary Fellowship Award, the AATS has chosen Ajit P. Yoganathan, PhD, the Wallace H. Coulter Distinguished Faculty Chair in Biomedical Engineering, and Regents' Professor in the Wallace H. Coulter Department of Biomedical Engineering at the Georgia Institute of Technology and Emory University. For more than 40 years, Professor Yoganathan has been a pioneer in basic and translational cardiovascular research, applying computational fluid mechanics to the development and analysis of prosthetic heart valves, heart function, and complex congenital heart defects. Indeed, it is safe to say that all prosthetic heart valves in use in United States since 1975 have been evaluated in Dr Yoganathan's Cardiovascular Fluid Mechanics laboratory. He has worked with the Food and Drug Administration and European Union developing standards and has worked with every manufacturer that has a replacement heart valve, from large multinational corporations to small startups. Dr Yoganathan, through his collegiality and knowledgeable instruction, has helped us understand disease processes and prosthetic devices in a way that goes beyond physiology and pathology but also incorporates fundamental engineering principles.

Ajit and postdoctoral fellow with a surgical planning tool for a novel Fontan procedure.

CENTRAL MESSAGE

Ajit P. Yoganathan, PhD—Honorary Fellowship from the AATS.

Ajit Prithiviraj Yoganathan was born on December 6, 1951, in Colombo, Sri Lanka. Son of Ponniah and Mangay (Navaratnam) Yoganathan, he received a Bachelor of Science in 1973 from University College, University of London, and then went on to receive Doctor of Philosophy in Chemical Engineering in 1978 from the California Institute of Technology. He then joined the engineering faculty at Georgia Tech in 1979. Over the subsequent 40+ years, "Ajit," as he is called by his colleagues and friends, has pioneered the field of applied cardiovascular engineering and through collaborations with clinicians and basic scientists has demonstrated the value of applying basic engineering science to develop and evaluate novel technology and devices that have benefited millions of patients. His work has used experimental and computational biomechanical methods to study native and artificial heart valves, the structure and function of the heart, and has applied these

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Disclosures: The authors reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication Sept 1, 2020; revisions received Sept 1, 2020; accepted for publication Sept 2, 2020; available ahead of print Sept 18, 2020.

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J Thorac Cardiovasc Surg 2021;161:728-9

0022-5223/$36.00

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https://doi.org/10.1016/j.jtcvs.2020.09.073

techniques to not only help us understand the hemodynamics of complex congenital heart disease but also develop new surgical procedures to optimize the cardiovascular dynamics of these children's hearts. The mission of his laboratory is "to provide answers to life-saving clinical questions using engineering approaches."

Dr Yoganathan has received a number of high honors from his colleagues in engineering in the United States and around the world. In 1985, Dr Yoganathan was awarded an Alexander von Humboldt Fellowship from West Germany to spend 9 months at the Helmholtz Institute for Biomedical Engineering, Technical University of Aachen. He received the Edwin Walker Prize from the Institute of Mechanical Engineers, United Kingdom, in 1988. In 1992, he was elected a founding fellow of the American Institute of Medical and Biological Engineering. The same year, he also spent 6 months at the University of Aarhus, Denmark, as a Visiting Professor of the Danish Research Academy, and returned there in 2003 as the Honorary Professor of Hemodynamics. In the United States, he received the H. R. Lissner Award for his contributions to the field of bioengineering in 1997 from the American Society of Mechanical Engineers. In 2012, he was selected to be the Biomedical Engineering Society's *Pritzker Lecturer Award*, one of the highest honors given to a Biomedical Engineering Society Member. In 2012, he was also awarded the *Ann Newman Lecturer Award* from the Children's Hospital of Philadelphia, the only engineer to have been awarded this honor. In 2015, in recognition of his significant contributions to the field of engineering, he was elected to the prestigious *National Academy of Engineers* in Washington, DC.

In addition to Dr Yoganathan's scientific contributions, he has served for many years on the International Standards Organization–Technical Committee on Cardiac Valves developing standards for designing, testing, and labeling prosthetic heart valves. For his leadership and work on International and US standards on cardiovascular medical devices, he was presented the 2015 *Standards Developer Award* from the Association for the Advancement of Medical Instrumentation. He has also been appointed Chair of the Cardiovascular Sub-Committee, International Standards Organization Technical Committee.

As a teacher, Dr Yoganathan has mentored more than 50 doctoral students, 35 master's students, and 30 postdoctoral trainees, many of whom have now gone on to become important leaders in their own right. He played a pivotal role in the creation of Georgia Tech's master's and PhD degree programs in bioengineering as well as the joint PhD in Biomedical Engineering with the Emory University School of Medicine. In 2005, he was awarded the Theo Pilkington Award for his contributions to Biomedical Engineering education by the American Society of Engineering Education. In 2010 he was appointed the Founding Editor in Chief of *Cardiovascular Engineering and Technology*, the newest journal of the Biomedical Engineering Society, which in 2015 was accepted to PubMed. He currently has 16 issued US patents, with another 5 patent applications under review, and to date has published more than 400 peer-reviewed journal articles and 40 book chapters.

On a personal note, we are both grateful the AATS Board followed the lead of the AATS Nominating Committee to establish a means to recognize individuals who through their scientific work and collaboration with surgeons have directly impacted the lives of so many of our patients. Our field has advanced greatly through their contributions, and establishment of the Honorary Fellowship Award provides a means of acknowledging their work. Selecting Ajit Yoganathan, PhD, as its inaugural Honorary Fellow sets the highest standard for this award.