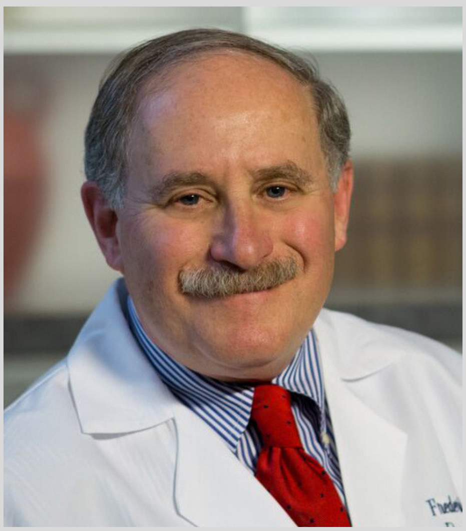
Wallace H. Coulter Foundation Lecture Series presents Heart Day

Cardiac Valve Replacement Surgery: Collaborative Innovation in Design, Biomaterials and Cell-Matrix Biology



Frederick J. Schoen, MD, PhD
Executive Vice-Chair, Pathology, Brigham and Women's Hospital; Professor of Pathology and Health Sciences and Technology, Harvard Medical School

Lecture: Friday, February 16, 2018
9:00AM-10:00AM
Room EC 2300
10555 West Flagler Street
Miami, FL 33174

FIU Engineering & Computing
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Biography

Schoen is Professor of Pathology and Health Sciences and Technology, Harvard Medical School, and Executive Vice-Chairman and a cardiovascular pathologist in the Department of Pathology, Brigham and Women's Hospital. He received a Ph.D. in Materials Science from Cornell University and an M.D. from the University of Miami School of Medicine. His research is in the areas of heart valve substitutes, calcification of bioprosthetic tissues, and cardiovascular tissue engineering. He directs courses in and teaches pathology, biomaterials/tissue engineering, medical device development, and mentoring for translational research. Widely published in the clinical and research literature, Schoen co-edited Biomaterials Science: An Introduction to Materials, and Silver's Cardiovascular Pathology, 3rd Edition. A Past-President of the Society For Biomaterials (SFB), the Society for Cardiovascular Pathology, and the International Society for Applied Cardiovascular Biology, and a Founding Fellow of the American Institute of Medical and Biological Engineering, he received the SFB Clemson Award for Applied Biomaterials Research, SFB Founders Award and SFB Technology Innovation and Development Award, and the SCVP Distinguished Achievement Award. A member of the Massachusetts Life Sciences Center SAB, he has served on many academic/governmental advisory committees, grant review committees and editorial boards, and is consultant to numerous medical device companies.

Abstract

Replacement of a damaged cardiac valve by a prosthesis is common, often life saving and one of the leading clinically important biomedical engineering achievements over the past half century. This presentation summarizes the past, present, and future of heart valve replacement, emphasizing the value of multidisciplinary convergence and collaboration in translational biomedical engineering. Contemporary valve substitutes include mechanical prostheses, rigid flap valves composed of carbon, and tissue valves consisting of chemically treated animal tissue, usually bovine pericardium. Prosthesis associated complications have limited uniform success, particularly 1) thromboembolic complications with mechanical valves, necessitating long term anticoagulation, inducing a risk of hemorrhage, and 2) structural deterioration caused by tissue calcification and/or non-calcific structural damage with bioprostheses. New anticoagulation strategies and anticalcification therapies are showing favorable results with mechanical valves and bioprostheses, respectively. Until recently, open surgery was the only option for valve replacement, a procedure with frequently unacceptable risk. First used clinically in 2002, catheter-based valve implantation techniques to deliver a foldable heart valve, mounted within an expandable stent, to a diseased valve site is highly successful in some patients. However, broad use of transcatheter valve replacement will depend on further development of innovative valve designs and biomaterials. The" holy grail" is a tissue engineered (living) valve replacement that would be durable, resistant to thrombosis, and have the capacity to grow as a young patient matures. Considerable progress toward this goal is being made in many laboratories; pre-clinical results are promising, though considerable challenges remain before clinical use.

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