

# MICHAEL S. SACKS

James T. Willerson Center for Cardiovascular Modeling and Simulation

Institute for Computational Engineering and Sciences ◊ Department of Biomedical Engineering

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## EDUCATION

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**Ph.D., Biomedical Engineering (Biomechanics)** 1992

Dissertation: Active Wall Tension and Passive Constitutive Relation of the Right Ventricular Free Wall

University of Texas Southwestern Medical Center at Dallas

Advisors: Drs. Cheng-Jen Chuong (BME) and Robert L. Johnson (Internal Medicine)

**Master of Science** 1983

Engineering Mechanics

Thesis: Stability of Response of Canine Tendon to Repeated Elongation

Advisor: Dr. Robert L. Hubbard

Michigan State University

**Bachelor of Science** 1981

Engineering Mechanics

Minors in Mathematics and Biomedical Engineering

Michigan State University

## PROFESSIONAL EXPERIENCE

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**W.A. Moncrief, Jr. Chair in Simulation-Based Engineering Science**

**Professor of Biomedical Engineering**

**Institute for Computational Engineering and Sciences**

**Director, Willerson Center for Cardiovascular Modeling and Simulation**

**The University of Texas at Austin**

8/2011 - Present

*Courtesy Appointments*

- Department of Mechanical Engineering
- Department of Aerospace Engineering and Engineering Mechanics
- Department of Diagnostic Health, Dell Medical School

**John A. Swanson Endowed Chair ◊ Professor of Bioengineering**

**Swanson School of Engineering ◊ The McGowan Institute ◊ University of Pittsburgh** 2009 - 2011

*Courtesy appointments*

- Departments of Mechanical and Civil Engineering
- Department of Biomedical Engineering, Carnegie Mellon University

**W.K. Whiteford Professor of Bioengineering**

**School of Engineering ◊ The McGowan Institute ◊ University of Pittsburgh** 9/2004 - 3/2009

**Associate Professor of Bioengineering and CNG Faculty Fellow** 9/2001 - 8/2008

**Assistant Professor of Bioengineering, University of Pittsburgh** 6/1998 - 8/2001

**Assistant Professor of Biomedical Engineering, University of Miami** 9/1993 - 8/1998

**Research Associate, Biomedical Engineering, UT Southwestern** 6/1992 - 8/1993

**NIH Predoctoral fellow, Biomedical Engineering, UT Southwestern** 9/1987 - 5/1992

**Biomechanical Engineer, ERRC, USDA Philadelphia PA** 6/1979 - 8/1983

**Research Assistant, Department of Biomechanics Michigan State University** 6/1979 - 8/1983

## HONORS

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- Fellow of the American Heart Association. 2016
  - Royal Academy of Engineering Distinguished Visitor Fellowship. 2016
  - ICES Moncrief Grand Challenge Faculty Awardee. 2015
  - Member of the Bioengineering, Technology, and Surgical Sciences Study Section, CSR, NIH. 2015-
  - Van Mow Distinguished Lecture in Applied Mechanics, Mechanical Engineering, RPI, NY. 2014
  - Protege for TAMEST Texas 11th Annual Conference, Austin, TX, Jan. 16-17, 2014. 2014
  - Editor, Journal of Biomechanical Engineering. 2007-2012
  - The Van C. Mow Medal, Bioengineering Division, ASME. 2009
  - Richard Skalak Distinguished Lecture, Dept of Biomedical Engineering, Columbia University, NY. 2008
  - Chancellors Distinguished Research Award, Senior Category, University of Pittsburgh. 2008
  - Sigma-Kappa-Tau Lectureship, Department of Biomedical Engineering, CCNY 2008
  - Fellow of the American Society of Mechanical Engineers. 2008
  - Provosts Doctoral Mentor Award Nominee, University of Pittsburgh 2007
  - Selected as one of the Scientific American 50 (with William R. Wagner) 2006
  - Fellow of the Biomedical Engineering Society (Inaugural Class) 2005
  - Canada Research Chairs College of Reviewers. 2005-
  - Board of Visitors Faculty Award, Swanson School of Engineering, University of Pittsburgh. 2005
  - William Kepler Whiteford Professor, Swanson School of Engineering, University of Pittsburgh. 2004-2009
  - Fellow of the American Institute for Medical and Biological Engineering. 2004
  - Associate Editor, Journal of Biomechanical Engineering. 2001-2005
  - Established Investigator, American Heart Association, National Affiliate. 2001-2005
  - CNG Faculty Fellow, School of Engineering, University of Pittsburgh. 2001-2003
  - Whitaker Young Investigator Award 1994-97
  - Initial Investigator, American Heart Association, Florida Affiliate. 1994-97
  - University of Miami, Summer Support Award in Natural Sciences and Engineering. 1994
  - Tau Beta Pi, the National Engineering Honor Society 1990.
  - Albert Potvin Outstanding Biomedical Engineering Student Award, UTSW. 1989
  - NIH T32 Predoctoral Fellow, UTSW 1987-92

## RESEARCH FOCUS

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My overall research focus on the function of the heart and its valves using a *computational physiological* approach. I bridge the cellular, continuum-cellular, fibrous, tissue, and organ levels with a focus on physiological function in health and disease. I utilize an integrated simulation-experimental approach that incorporates advanced experimental data that are integrated into mathematical models/simulations to develop a sound understanding of the normal and patho-physiological processes, and utilized to develop means for novel therapies.

At the organ level, A prime example of my approach is improving methods for surgical repair of the mitral valve after post myocardial infarction. This involves improving our understanding of mitral valve tissue and cellular responses to altered stresses and the subsequent remodeling, and integrating to the organ level simulations. With my students and fellows, we have development of the first constitutive models for valvular tissues using a meso-structural approach, avoiding ambiguities in material characterization, offering insight into the function, structure, and mechanics of valve tissue components. We have developed computational implementation of these constitutive models for the purposes of accurate organ level simulation. We have extended these approaches to quantify and simulate valve interstitial cell function, both as an isolated cell and integrated with the surrounding extracellular matrix.

Along with members of my research team, I have been utilizing similar approaches to understand growth and remodeling of myocardium to understand the response of the heart to increased wall stress, particularly in pulmonary hypertension and post myocardial infarction (MI). We are currently extending these models account for multiple layers and varying tissue composition and structure, as well as the constituent cellular physiology. These models are being used to integrate the heart valves into a single simulation system to understand the interrelationships between myocardial and valvular dysfunction. Moreover, we are using these approaches in the study of polymeric injection into the heart wall for the treatment of MI.

I have also remained active in the growth and remodeling of engineered tissues and scaffolds, and in particular scaffold design and the in-vitro in-vivo remodeling processes. Recently, we have develop novel models of the anisotropic elastic scaffolds, are using these models to develop novel gel-coated elastomeric scaffolds for transcatheter heart valve leaflets in the adult.

*Current applications:*

### **Functional simulation and mechano-biological function of the mitral valve.**

- MV responses to altered stress.
- Effects of annular geometry on MV tissue stress.
- Cellular basis for long-term durability of MV tissues to altered stress.
- Development of optimal surgical repair designs based on tissue homeostasis.

*Perhaps the most novel aspect of this project is the recent development of our ability to simulate post-surgical repaired mitral valve solely from pre-surgical imaging data.*

### **Organ to cell level simulations of heart valve interstitial cell adaptive mechanobiology and signalling**

- Novel integrated computational and experimental approaches to the study of aortic valve interstitial cells in their native ECM environment.
- Use of PEG gels to simulate the 3D micro-environment of the valve interstitial cell to mechanical and pharmaceutical stimuli.

*Perhaps the most novel aspect of this project is the recent development of the first cell signaling models of the valve interstitial cell.*

### **Cardiac modeling of the response to pathologies and to guide therapies.**

1. Myocardium adaptations to stress in pulmonary hypertension.
2. Novel constitutive models of remodeling myocardium.
3. A computational biventricular model of the heart and its valves.

### **Modeling and Simulation of Bioprosthetic heart valves**

- Biomechanical basis of novel exogeneous crosslinking methods for valvular and pericardial tissues for improved durability of bioprosthetic heart valves.
- Novel fatigue damage models of BHV biomaterials continuum models and FE implementation.
- FSI models of BHV function, both normal and fatigue simulation.

### **Computational Biomaterials.**

- Scaffold design and micro-mechanics.
- Computational models of engineered tissue growth.
- Native tissue post-natal somatic growth metrics and models.

## **INDUSTRIAL COLLABORATIONS**

I have been an external consultant for the following companies.

1. Realistic Human Simulation Industrial Consortium, Simulia, Inc.
2. Boston Scientific
3. Concordia Fibers, Inc.
4. Edwards Lifesciences
5. TEPHA
6. 3F Therapeutics
7. Medtronic
8. Cook Myosite
9. Corevalve
10. Abbott Vascular (formally St. Jude Medical)

I have also served as Expert Witness for several legal firms.

## NATIONAL AND INTERNATIONAL PROFESSIONAL ACTIVITIES

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### *Editorial Boards and Editorships/Current*

1. Associate Editor, Cardiovascular Engineering and Technology, 2015-present
2. Editorial Board of Computational Physiology and Medicine, a specialty section within Frontiers in Bioengineering and Biotechnology and Frontiers in Physiology. 2018-present
3. Editorial Board, Mechanics of Soft Materials, 2018-present.
4. Editorial Board, Cardiovascular Engineering and Technology, 2015-present.
5. Editorial Board, Computer Methods in Biomechanics & Biomedical Engineering, 2014-present.
6. Editorial Board, International Journal for Numerical Methods in Biomedical Engineering, 2013-present.
7. Editorial board, Annual Reviews of Biomedical Engineering, 2012-present.
8. Editorial board, Journal of Biomechanics, 2005-present.
9. Editorial board, Acta Biomaterialia, 2005-present.

### *Editorial Boards and Editorships/Past*

10. Editorial board, Annual Reviews of Biomedical Engineering, 2012-2018.
11. Editor, Journal of Biomechanical Engineering, 2007-2012.
12. Associate Editor, Journal of Biomechanical Engineering, 2004-2007.

### *Professional Service*

1. Heart Valve Society Scientific Program Committee, 2018-present.
2. Scientific Committee member, Biennial Heart Valve Biology and Tissue Engineering Meeting, 2018.
3. IEEE-EMBS Technical Committee (TC) for Computational Biology and the Physiome (CBaP).
4. New Directions Committee, ASME Bioengineering Division, 2012-2018.
5. New Directions Committee, Chair, ASME Bioengineering Division, 2012-2016.
6. Royal Academy of Engineering Distinguished Visitor Fellowship, UK, May 22-June 4, 2016.
7. Member, ASME honors committee for the Van Mow and Melville awards, 2010-2016.
8. Editor, Journal of Biomechanical Engineering 2007-2012.
9. Scientific Committee member, 2014 U.S. National Congress on Theoretical and Applied Mechanics, Michigan State University, June 15-20, 2014.
10. Special Guest Editor, Journal of Biomechanical Engineering, Annual Review Issue, 2012.
11. Technical Program Co-Chair, BMES Annual Meeting 2009.
12. Editorial board for the Cardiovascular Pathology, 2007-2012.
13. Member of the Executive Committee, Bioengineering Division, ASME 2006-2007.
14. Active Review Committee member, Engineering & Urology Society 2007 Annual Meeting, Anaheim, CA.
15. Associate Editor, Journal of Biomechanical Engineering, 2001-2006.
16. Chair, Cell and Tissue Engineering Committee, Bioengineering Division, ASME 2004-2006.

17. Program Chair for the Bioengineering Division, IMECE 2003 Washington, DC.
18. Technical Committee member, European Society for Biomechanics 2004 Annual Meeting in sHertogenbosch, Netherlands, July 4-7, 2004.
19. ASME Cell and Tissue engineering Technical Committee Co-Chair, July 1, 2001 June 30, 2004.
20. Technical Program Representative, IMECE 2003 for the ASME Bioengineering Division.
21. ASTM F04-42-12 Technical Committee Chair on Mechanical Testing Standards for Tissue Engineered Materials.
22. ASME Biomaterials Technical Committee Chair, 1998-2000
23. Editorial Board and Program Committee, ASAIO, 1997-1998

*Reviewer for the following Journals:*

1. Acta Biomaterialia
2. Advanced Drug Delivery Reviews
3. American Journal of Physiology, Heart and Circulation
4. Applied Mathematical Modelling
5. Annals of Biomedical Engineering (Won Reviewer Excellence Award in 2012).
6. Annals of Thoracic Surgery
7. Annual Reviews of Biomedical Engineering
8. ASAIO
9. Biomaterials
10. Biomechanics and Modeling and Mechanobiology
11. Biophysical Journal
12. Biorheology
13. Cardiovascular Pathology
14. Circulation
15. Circulation Research
16. Computer Methods in Applied Mechanics and Engineering
17. Experimental Cell
18. Experimental Mechanics
19. Expert Opinion On Biological Therapy
20. IEEE Transactions on Biomedical Engineering
21. International Journal of Artificial Organs
22. International Journal of Computer Assisted Radiology and Surgery
23. International Journal of Nanomedicine
24. International Journal of Solids and Structures
25. Journal of Biomedical Materials Research
26. Journal of Biomechanical Engineering
27. Journal of Biomechanics
28. Journal of Biomaterials Science, Polymer Edition
29. Journal of Engineering in Medicine
30. Journal of Materials Chemistry B
31. Journal of the Mechanical Behavior of Biomedical Materials
32. Journal of Mechanics of Materials and Structures
33. Journal of Orthopedic Research



34. Journal of Physiology
35. Journal of Theoretical Biology
36. Medical Engineering and Physics
37. Mechanical Behavior of Biomedical Materials.
38. MRS communications.
39. Nature Biomedical Engineering
40. PLoS ONE
41. PLoS Computational Biology
42. PNAS
43. Regenerative Biomaterials
44. Science Translational Medicine
45. Tissue Engineering
46. Trends in Molecular Medicine
47. WIREs Systems Biology and Medicine

*Domestic grant review panels*

1. NIH CSR BTSS study section standing member, July 1, 2015-June 30, 2019.  
This panel meets three times per year and typically reviews 95 grant proposal, with 8-12 assigned to each reviewer.
2. ZHL1-CSR-I-O2-1 0 NHLBI Early Investigator Award (EIA) (R35). June 26, 2018.
3. Special Emphasis Panel/Scientific Review Group 2018/05 ZHL1 CSR-N (M1) 1 for Basic Research in Calcific Aortic Valve Disease, March 28, 2018.
4. NIH CSR reviewer for the 2018/01 ZEB1 OSR-D (J1) S, T32/R25 proposals, October 24, 2017.
5. NHLBI reviewer for Bold New Bioengineering Methods and Approaches, ZHL1 CSR-O (O1) 1, July 13, 2017.
6. US Army Medical Research and Materiel Command, reviewer for Combat Casualty Care panel, April 10, 2017.
7. National Institute of Biomedical Imaging and Bioengineering Special Emphasis Panel, NIBIB, ZEB1 OSR-D (J3), T32 R25 Training Review Meeting (2017/01), 11/07/2016.
8. NHLBI Outstanding investigator award (OIA), ZHL1 CSR-I(O1), Panel member, July 14, 2016.
9. NHLBI Emerging investigator award (EIA), ZHL1 CSR-I(O2), Panel member, July 13, 2016.
10. NIH CSR, NIH Directors Early Independence Award (DP5) Reviewer, April 2016.
11. NIH CSR, BTSS ad-hoc reviewer for the June 3-4, 2014 session, Long Beach, CA.
12. NIH CSR, BTSS ad-hoc reviewer for the February 18, 2014 session, San Diego, CA.
13. NIH CSR, BTSS ad-hoc reviewer for the September 30, 2013 session, Bethesda, MD.
14. NIH/NHLBI Bio-Artificial Heart Working Group member, Bethesda, MD May 23, 2013.
15. NIH CSR, Cardiovascular and Respiratory Sciences IRG Special Emphasis Panel ZRG1 VH-K (02) M, 5/21/2013.
16. NIH CSR, Surgical Sciences and Bioengineering, ZRG1 SBIB-X (02) M, 10/23/2012.
17. NIH CSR, Bioengineering Sciences & Technologies Integrated Review Group, 2013/01 ZRG1 BST-U (02) M, 09/12/2012.
18. NIH CSR, Modeling and Analysis of Biological Systems (MABS) Study Section, June 4-5, 2012.
19. NHLBI National Heart, Lung, and Blood Institute Special Emphasis Panel ZHL1 CSR-X (O1) on Patient Oriented Research Career Enhancement Awards (K23, 24, and 25's), June 8-9, 2010.
20. NSF sponsored Building Partnerships and Pathways to Address Engineering Grand Challenges Conference, The University of Texas at El Paso, February 8-10, 2010.
21. South Carolina EPSCoR/IDeA GEAR Panel Review, August 7, 2009.
22. NIH ZRG1 BIB-V(58) R IAR Reviewer Invitation Special Emphasis Panel/Scientific Review Group, July 20-21, 2009.
23. NIH/NIBIB Enabling Technologies for Tissue Engineering and Regenerative Medicine ZEB1 OSR-D (M1) S, March 20, 2009.
24. NSF Nano and Biomechanics Review panel January 26, 2009.
25. NIH CSR ZEB1 OSR-D J1 NIBIB Review Panel for Enabling Technologies for Tissue Engineering and Regenerative Medicine, November 13, 2008.

26. NIH CSR ZRG1 BST-Z(40) Special emphasis panel to review and hold a reverse site visit for the Tufts/Columbia Tissue Engineering Resource Center, October, 2008.
27. National American Heart Association Reviewer for Cell Transport, Physiology, and Metabolism, April 16, 2008.
28. NIH CSR ZRG1 BST-Z(40) Special emphasis panel to review and site visit the Tufts/Columbia Tissue Engineering Resource Center, March 19-21, 2008.
29. NSF Bioengineering Grant Review Panel, May 17-18, 2007.
30. External reviewer for DOD extramural project entitled Cardiovascular and soft tissue battlefield injury diagnostic and treatment sensors and MEMS technology development , University of South Florida, J. Strom, PI, February 21, 2007.
31. NIH CSR Bioengineering, Technology and Surgical Sciences Study Section (BTSS), San Francisco, CA, October, 5-6, 2006.
32. NIH/NCRR X02 Roadmap Precis IAR review (ZRR1 BT-8-01) Virtual Review Group, August 16, 2006.
33. NIH/NIGMS Minority Biomedical Research Support (MBRS), June, 2006.
34. NIH/NIGMS Minority Biomedical Research Support (MBRS), Bethesda, MD, October 18, 2005.
35. NIH/NIBIB Special Emphasis Panel ZEB1 OSR B(01): Training Review, Bethesda, MD, June 29-30, 2005.
36. NSF CMS Nano and Bio Mechanics Grant Review Panel, May 31, 2005.
37. NIH CSR Special Emphasis Panel ZRG1 SB 50S: PAR-03-032 Bioengineering Partnerships, January 16, 2004.
38. NIH CSR Special Emphasis Panel ZRG1 SB 50R: PAR-03-032 Bioengineering Partnerships, June 1, 2003.
39. NIH/NIBIB Reviewer for special emphasis panel for BISTIC, Bethesda, MD, March 10, 2003.
40. NIH/NHLBI Reviewer for special emphasis panel for RFA HL-02017, Innovative concepts and approaches to developing functional tissues and organs for heart, vascular, lung, and blood applications, Bethesda, MD, July 2002.
41. NIH Surgery and Bioengineering BRP review panel, November 29, 2001.
42. NSF ERC site visit member for the U. Washington Engineered Biomaterials (UWEB), June 5-7, 2001.
43. PTEI Seed Grant Review committee, May 29, 2001.
44. NSF Bioengineering CAREER Grant Review Panel, January 11, 2001.
45. NSF Bioengineering Grant Review Panel, June 5, 2000.
46. NIH Tissue Engineering Study Section (SSS-M), November 19, 1999.
47. NIH Surgery and Bioengineering Study Section, Temporary Member, November 9, 1999.
48. NSF Bioengineering Grant Review Panel, October 28, 1998.
49. PTEI Seed Grant Program Reviewer, May, 1999
50. Research Committee, American Heart Association, FL Affiliate, July 1, 1997-June 1, 1998.
51. Research Peer Review Committee, American Heart Association, FL Affiliate, July 1, 1995 June 30, 1997.

*International science foundations review panels.*

52. Austrian Science Fund (Der Wissenschaftsfonds) reviewer, May 30, 2017.
53. Austrian National Science Foundation (Der Wissenschaftsfonds).

54. Canadian Institute of Health Research (ongoing).
55. Canadian Research Chairs College of Reviewers, 2005-present.
56. Canadian Foundation for Innovation, Toronto, CA, Sept. 27-28, 2001.
57. Health Research Board (HRB) of Ireland, Health Research Awards, Reviewer, 2011.
58. Israel Science Foundation, 2008-present.
59. Israeli Ministry of Science and Technology
60. Israel National Science Foundation.
61. Natural Sciences and Engineering Research Council of Canada (NSERC), Reviewer, 2011.
62. Netherlands Organization for Scientific Research.
63. Science Foundation Ireland, CRAM.
64. Swiss National Science Foundation.
65. Swiss National Research Foundation reviewer, May 23, 2017.
66. Science Foundation Ireland, CRAM - Centre for Research in Medical Devices Program Reviewer, June 6, 2014.

*Organized/chaired the following national/international professional meeting sessions:*

**2018**

1. Chaired session entitled "Mitral Valve Disease," 8th Biennial Heart Valve Biology and Tissue Engineering Meeting, London UK, September 26-28, 2018.
2. Organized and chaired two sessions entitled "Biofluid/solid modeling towards personalized heart valve repair," S206, with Dr. Prasad Dasi, 18th U.S. National Congress on Theoretical and Applied Mechanics, Chicago, IL June 5-9, 2018.
3. Organized and chaired two sessions entitled "Growth and Remodeling of Living Matter," S312, with Dr. Reza Avaz, 18th U.S. National Congress on Theoretical and Applied Mechanics, Chicago, IL June 5-9, 2018.

**2017 and before**

4. Organized sessions on Imaged-based models for biomedical applications, 14th US National Congress on Computational Mechanics, July 17-20, 2017, Montreal, Canada.
5. Mini-symposium organizer, 5th International Conference on Computational and Mathematical Biomedical Engineering, Pittsburgh, PA USA April 10-12, 2017.
6. Co-Organizer and Session Chair, Heart Valve Society Annual Scientific Meeting, Grimaldi Forum, Monaco, March 2-4, 2017.
7. Organized and Co-chaired (with Dr. Ellen Arruda, U. Michigan) Soft tissue mechanics: Theoretical considerations, experimental results, and applications, SES 2016 annual meeting, University of Maryland, October 3-5, 2016.
8. Organized and Co-chaired session entitled Mechanics of Heart Valves at the Summer Biomechanics, Bioengineering and Biotransport Conference, June 29 July 2, 2016 National Harbor, MD, USA.
9. Organized and Co-chaired session entitled Physiological Valves at the Summer Biomechanics, Bioengineering and Biotransport Conference, June 29 July 2, 2016 National Harbor, MD, USA.
10. Organized and co-Chaired session entitled Mechanobiology of cells on biomaterials, 10th World Biomaterials Congress, May 17-22, 2016 Montreal, Canada.
11. Chair for session entitled Biomechanics and Mechanobiology at the Heart Valve Society Scientific Meeting, New York City, New York, March 17-19, 2016.
12. Organizer and Chair for session entitled Contemporary Models of Soft Biosolids: Biological Tissues, Scaffolds, and Cells at the 13th U.S. National Congress on Computational Mechanics, San Diego, California, July 26-30, 2015.
13. Chair for session entitled Heart Valve Structure and Function at the 2015 Summer Biomechanics, Bioengineering and Biotransport Conference, Salt Lake City, Utah, June 17-20, 2015.
14. Co-Chair for session entitled Biological Valve Function and Dynamics at the 4th International Conference on Computational and Mathematical Biomedical Engineering (CMBE15), Cachan, France, June 29 - July 1, 2015.
15. Organizer for the session entitled Molecular and Tissue Mechanics at the 2015 ASME NEMB 4th Annual Global Conference, Minneapolis, Minnesota, April 19-22, 2015.
16. Co-Chair for session entitled Heart Valves and Stents I at the 2014 BMES annual meeting in San Antonio, TX, October 22-25, 2014.
17. Organizer of invited lecturer Ajit Yoganathan, Georgia Tech, at institute for Computational Engineering and Sciences, UT Austin, April 14, 2015.

18. Organizer and reviewer for the heart valve engineering sessions at the 2014 BMES annual meeting in San Antonio, TX.
19. Organizer and Chair for biophysical modeling session, 7th International Conference on Functional Imaging and Modeling of the Heart, London, United Kingdom, June 20-22, 2013.
20. Organizer and Chair of the general session on cardiovascular mechanics and stents. Computer Methods in Biomechanics and Biomedical Engineering, Salt Lake City, Utah, April, 2013.
21. Organizer, reviewer, and chair for the heart valve engineering and biomechanics sessions at the 2013 BMES annual meeting in Seattle, Wa, September, 2013.
22. Organizer and Chair of the biophysical modeling session. 7th International Conference on Functional Imaging and Modeling of the Heart, London, June 2013.
23. Organizer and Chair of the general session on cardiovascular mechanics and stents. Computer Methods in Biomechanics and Biomedical Engineering, Salt Lake City, Utah, April, 2013.
24. Organizer and reviewer for the heart valve engineering sessions at the 2012 BMES annual meeting in Atlanta, Ga:
  - Heart valve pathologies. Also Session Chair
  - Heart valve dynamics and Prosthetics.
25. Organizer for the session Cardiovascular Growth and Remodeling at the 2011 Annual Fall Meeting of the Biomedical Engineering Society, October 2011.
26. Program committee for the 6th Biennial Joint meeting of the Society for Heart Valve Disease and Heart Valve Society of America, to take place in Barcelona, Spain, July 2011.
27. Cardiovascular Engineering Track Co-Chair (with Jane Grande-Allen) for the BMES 2010 annual fall meeting in Austin, TX.
28. Organized the following sessions for the BMES 2010 annual fall meeting in Austin, TX
  - Heart Valves I: Mechanobiology and Pathology
  - Heart Valves II: Mechanics and Simulation
  - Cardiovascular computational modeling and measurement
  - Heart Valve Structure-Function Relations and Computational Simulation, Computational Modeling
29. Organizer and Chair for oral sessions Simulating Heart Valve Function and Heart Valve Mechanobiology along with a large poster session ( 30 posters) at the 2009 Annual Fall Meeting of the Biomedical Engineering Society, Pittsburgh, 2009.
30. Organizer and Chair for session entitled Heart Valve Function and Simulation at the 2008 Annual Fall Meeting of the Biomedical Engineering Society, October 4, 2008.
31. Organizer and Co-Chair for session entitled Growth and Remodeling I at the 10th ASME Summer Bioengineering Conference, June 28, 2008.
32. Organizer and Co-Chair for session entitled Growth and Remodeling II at the 10th ASME Summer Bioengineering Conference, June 29, 2008.
33. Session organizer and reviewer for the 8th World Congress of Biomaterials, Amsterdam, NL, May 28-June 1, 2008.
34. Co-Chair for session entitled Heart Valve Biology and Tissue Engineering at the Royal Society 2008 Meeting, London, England, May 4 - 7, 2008

35. Co-Chair for session entitled Urological Tissue Engineering and Biomaterials at the Society for Biomaterials 2007 Annual Meeting, Chicago, IL, April 18 -21, 2007.
36. Co-Chair for session entitled "Multiscale Models of Aortic Valve Mechanics and Mechano-Biology" at the Annual Fall Meeting of the Biomedical Engineering Society 2006 Annual Fall Meeting, Chicago, IL, October 11 -15, 2006.
37. Chair for session entitled Special Topics Bioengineering of Urinary and Reproductive Systems at the Annual Fall Meeting of the Biomedical Engineering Society 2006 Annual Fall Meeting, Chicago, IL, October 11 -15, 2006.
38. Co-Chair for session entitled "Aortic Valve Interstitial Cell Mechanobiology: Response to Cyclic Tension and TGF-1" at the Annual Fall Meeting of the Biomedical Engineering Society 2006 Annual Fall Meeting, Chicago, IL, October 11 -15, 2006.
39. Co-Chair for session entitled "Effects of Decellularization on Mechanical and Structural Properties of Porcine Aortic Valve Leaflet" at the Annual Fall Meeting of the Biomedical Engineering Society 2006 Annual Fall Meeting, Chicago, IL, October 11 -15, 2006.
40. Co-Chair for the session entitled Biomechanics of Organs: Urinary Tract at the 5th World Congress of Biomechanics, Munich, Germany, July 29 -August 4, 2006.
41. Co-Chair for the session entitled Unresolved Problems in Heart Valve Repair and Replacement at the 10th Annual Hilton Head Workshop: Advances in Innovative Technologies and Tissue Engineering for the Treatment of Heart Valve Disease, Hilton Head, SC, March 1 -5, 2006.
42. Chair for the session entitled Viscoelastic Response I at the 2005 Fall Meeting of the Materials Research Society, Boston, MA, November 28 -December 2, 2005.
43. Organizer and Chair for the two sessions entitled Cardiovascular Engineering: Heart Valves I & II at the 2005 Annual Fall Meeting of the Biomedical Engineering Society, Baltimore, MD, September 28 -October 1, 2005.
44. Organizer and Chair for the session entitled Mechanics of Growth and Remodeling in Native and Engineered Tissues I at the 2005 ASME Summer Bioengineering Conference, Vail, CO, June 22-26, 2005.
45. Organizer and Chair for the session entitled Heart Valve Mechanics at the 2005 ASME Summer Bioengineering Conference, Vail, CO, June 22-26, 2005.
46. Co-Chair for the session entitled Mechanics of Growth and Remodeling in Native and Engineered Tissues II at the 2005 ASME Summer Bioengineering Conference, Vail, CO, June 22-26, 2005.
47. Chair for the session entitled Cardiovascular Biomaterials I: Structure and Mechanics of Engineering Tissues at the 2005 annual Society for Biomaterials meeting in Memphis, TN, April 27-30, 2005.
48. Chair for the session entitled Urological Tissue Engineering Symposium at the 2005 annual Society for Biomaterials meeting in Memphis, TN, April 27-30, 2005.
49. Organizer of four heart valve sessions for the 2004 annual BMES meeting in Philadelphia, PA.
50. Organizer and member of the scientific committee for Advances in Tissue Engineering and Biology of Heart Valves, Florence, Italy, September 15-18, 2004.
51. Organizer and Chair of the Heart Valve Biomechanics Session at the 2004 European Society for Biomechanics, sHertogetbosch, Netherlands, July 4-7, 2004.
52. Organizer and chair of the Heart Valve Sessions at the 2003 Fall BMES meeting, Nashville, TN.
53. Organizer and Chair for the session entitled Tissue Engineering at the IMECE meeting in New Orleans, LA, November 21-23, 2002.

54. Organizer and Chair for the session entitled Constitutive modeling and computational implementation at the IMECE meeting in New Orleans, LA, November 21-23, 2002.
55. Organizer and Chair for the two sessions on heart valves at the IEEE-BMES meeting, Houston, TX, October 23-27, 2002.
56. Organizer and Chair for the heart valve sessions at the Fall BMES meeting, Durham, NC, October 4-7, 2001.
57. Invited Chair for the session on Calcification at the First Biennial meeting of the Society for Heart Valve Disease, London, UK, June 12-18, 2001.
58. Organizer and Chair for Society for Biomaterials Workshop entitled Biomechanical evaluation of native and engineered tissues, St. Paul, MN, April, 25-29, 2001.
59. Chair on cardiovascular biomaterials for the Workshop entitled Reference Data for Biomaterials, Sponsored by and held at NIST, July 27, 2000.
60. Chair on Heart Valve session entitled Heart Valve Mechanics at the World Congress on Medical Physics and Biomedical Engineering, Chicago, July 23-28, 2000.
61. Organizer and Chair of session entitled Chemical, Thermal, and Mechanical modification to Collagen for the ASME IMECE, 1999, Nashville, TN.
62. Co-Chair, Cardiovascular track, first BMES-EMBS joint meeting, Atlanta, GA, October, 1999.
63. Organized a technical session on cardiac valve materials for the 1998 BMES meeting in Cleveland, OH.
64. Chaired Mechanics of Biologically Derived Materials for the ASME IMECE, Dallas, TX, 1997.
65. NHLBI's special emphasis panel on substitute heart valves, Washington, D.C., April 27, 1996.



**UNIVERSITY/SCHOOL/INSTITUTE/DEPARTMENTAL SERVICE**

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*UT Austin*

1. University Level.
  - Application Reviewer, Dell Medical School, 2018.
  - Reviewer for the Undergraduate Research Fellowship competition, Office of Undergraduate Research, 2018.
  - Reviewer for the 2018 Brain Research Foundation Scientific Innovations Award UT internal competition, 2017.
2. Cockrell School of Engineering
  - Engineering Awards Committee, 2015-present.
  - Special Promotion and Tenure Committee for Senior Chair Professor review, 2017.
  - Promotion and Tenure committee, 2012-2014.
  - Academic Support Committee, 2013-2014.
3. Institute for Computational Engineering and Sciences (ICES).
  - Core faculty member (2011-present).
  - Simulation Based Engineering Recruitment Oversight Committee (2016-present).
  - SBEC Oversight Committee (2015-present).
  - Computational Science, Engineering, and Mathematics Doctoral Program
  - Admissions and Fellowships Committee, Member (2011-present)
  - Admissions and Fellowships Committee, Chair (2014)
  - Graduate Studies Committee, Area C (2011-present).
4. Department of Biomedical Engineering
  - Faculty search committee (2015-present).
  - Chairs Leadership Committee (2016-2017).
  - Chair, Graduate Studies Committee (2015-2017).
  - Graduate Studies Committee (2014-present).
  - Financial Committee member (2011-present).
  - Budget Council (2011-present).

*U. Pittsburgh*

1. School of Engineering:

- Invited Faculty Responder, Faculty Awards, Honors Convocation, University of Pittsburgh, 2009.
- Member, Appointments, Promotion, and Tenure committee (2004-2007).

2. Department of Bioengineering

- Biomechanics Concentration/Track chair (2001-2011)
- Graduate Admissions Committee Chair (2002-2009)
- Graduate Committee member (2002-2011)
- Faculty search committee (2002-2011)
- Faculty search committee chair (2000-2002)
- Bioengineering computation/modeling core leader for Whitaker Development Award (2001)
- Faculty coordinator for startup of the Keck/Whitaker DMM/RP lab (1998-1999)

3. McGowan Institute for Regenerative Medicine.

- Core faculty for Biomechanics, Member, Executive committee (2001-2011).

## **PROFESSIONAL SOCIETY MEMBERSHIPS**

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1. American Heart Association (AHA)
2. American Institute for Medical and Biological Engineering (AIMBE)
3. American Society of Biomechanics.
4. American Society of Mechanical Engineers.
5. Biomedical Engineering Society
6. Biophysical Society (BPS)
7. Heart Valve Society
8. International Society for Applied Cardiovascular Biology (ISACB)
9. Materials Research Society
10. North American Vascular Biology Organization
11. Society for Biomaterials

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## SUMMARY OF MENTORING

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### *Faculty Visitors:*

1. **Elena Di Martino, PhD., Associate Professor**  
**Department of Civil Engineering, University of Calgary** May 1-15, 2018  
*Visit details*
  - Research topic: Bicusped Heart Valve Collaborations.
  - Awarded a JTO Faculty Visitor Award
  
2. **Patrick McGarry, PhD, Lecturer Bar/College Lecturer**  
**Biomedical Engineering, National University of Ireland, Galway** April 5-15, 2017  
*Visit details*
  - Research topic: Cell mechanics.
  - Awarded a JTO Faculty Visitor Award
  
3. **Jack Hale, Ph.D., Research Associate, University of Luxembourg** January 2016  
*Visit details*
  - Research topic: FENICs implementation of incompressible hyperelastic biomaterials.
  - Awarded a JTO Faculty Visitor Award
  
4. **Borys Drach, Ph.D., Assistant Professor**  
**Mechanical & Aerospace Engineering**  
**New Mexico State University** July 2015.  
*Visit details*
  - Research topic: Solution to new experimental biaxial device to solve for stresses.
  - Awarded a JTO Faculty Visitor Award
  
5. **Keefe Manning, Ph.D. Associate Professor, Bioengineering, PSU.** May 2015.  
*Visit details*
  - Research topic: Experiential validation of FSI models of the bioprosthetic heart valve.
  - Awarded a JTO Faculty Visitor Award
  
6. **John Brigham, Ph.D., Assistant Professor**  
**Department of Civil Engineering**  
**University of Pittsburgh** January 2013  
*Visit details*
  - Research topic: Shape analysis of cardiac images.
  - Awarded a JTO Faculty Visitor Award
  
7. **Vicky Wang, Ph.D., Post-doctoral Fellow**  
**Auckland Bioengineering Institute** November, 2012.  
*Visit details*
  - Research topic: Development of a cardiac/valve-modeling project.
  - Sponsored by the USA mobility fund, awarded by Royal Society of New Zealand.

8. **H. Jerry Qi, Ph.D., Associate Professor**  
**Mechanical Engineering**  
**U. Colorado**  
*Visit details*

April 1-June 1, 2012

- Research topic: Estimation of pulmonary artery unloaded configurations.
- Awarded a JTO Faculty Visitor Award.

*Research Associates and Post-doctoral fellows/Current*

1. **Reza Avazmohammadi**

**PhD in Mechanical Engineering and Applied Mechanics (MEAM), UPenn**

**Advisor: Dr. Pedro Ponte-Castaneda**

10/2014-present

*Research focus: Developing novel models of the right heart under pulmonary hypertension.*

*Recognition*

- Received a K99/R00 grant entitled "The effect of systemic hypertension on prognosis of myocardial infarction: Understanding, prediction and therapy evaluation," Total Amount (Five Years): \$ 1,059,957, 2018.
- Awarded a 2018 AHA Career Development Award entitled "The effect of systemic hypertension on prognosis of myocardial infarction: Understanding, prediction & therapy evaluation," AHA Award Number 18CDA34110383
- Awarded a travel grant to attend the 14th U.S. National Congress on Computational Mechanics, Montreal, Canada, July 17-20, 2017.
- Awarded a Ruth L. Kirschstein National Research Service Award F32 grant from the National Institutes of Health. Research project entitled "Adaptive remodeling of the right ventricle in response to pulmonary hypertension: toward physical understanding and modeling."

2. **Rana Zakerzede**

**PhD in Mechanical Engineering, UPitt**

**Advisor: Dr. Paolo Zunino**

9/2016-present

*Research focus: Fluid-structure interactions in native and replacement heart valves.*

*Recognition:*

- 2018 BMES Career Development Award.
- Travel Award for WCCM 2018.
- ICES post-doctoral fellowship.

3. **Daniel Howsman**

**PhD in Chemical Engineering, RPI**

**Advisor: Dr. Jurgan Hahn**

1/2018-present

*Research focus: Development of the first cell signaling models of heart valve interstitial cells.*

*Recognition*

- Awarded an AHA Post-doctoral fellowship entitled "Elucidating the Dynamics of Valve Interstitial Cells in Health and Disease: A Mathematical Modeling Approach," 7/2018.

4. **Emma Lejeune**

**PhD in Civil Engineering, Stanford University**

**Advisor: Dr. Christian Linder**

1/2018-present

*Research focus: Development of an extended multiscale model of the valve interstitial cell and its microenvironment.*

*Recognition*

- ICES post-doctoral fellowship.

*Research Scientists, Associates, and Post-doctoral fellows/Completed*

5. **Andrew Drach**

**PhD in Mechanical Engineering**

November 2014-October 2017

*Research focus: Mitral valve mechanical modeling.*

- Appointed Research Scientist 9/1/2016.

Current position: CEO for Callentis Consulting Group (R&D and engineering), Solwey Consulting (tech and business consulting), and Weymark Commerce (e-commerce)

6. **Joao Soares**

**PhD in Mechanical Engineering, TAMU**

**Advisors: Drs. K. Rajagopal and J.E. Moore**

November 2012-August, 2017

*Research Focus: Cardiac modeling, engineered tissue mechanics.*

*Recognition*

- Best Poster in Cardiac Mechanics, FIMH 9th International Conference, Toronto, CA June 2017.
- Appointed Research Scientist 9/2016.

Current position: Assistant Professor, Departments of Mechanical Engineering and Biomedical Engineering, Virginia Commonwealth University.

7. **Chung-Hao Lee**

**PhD in Civil Engineering, UCLA**

**Advisor: Dr. JS Chen**

March 2012-August, 2016

*Research focus: High fidelity models of the Mitral Valve.*

*Recognition*

- American Heart Association Scientist Development Grant (July 2016).
- American Heart Association, Southwest Affiliate, Post-doctoral Fellowship for work in mitral heart valve biomechanical simulations.
- JTO Post-doctoral Fellowship.

Current position: Assistant Professor, Departments of Mechanical and Aerospace Engineering and Biomedical Engineering, University of Oklahoma.

8. **Samarth Raut**

**PhD in Mechanical Engineering, CMU**

**Advisor: Dr. E. Finol**

November 2012-August, 2015

*Research focus: Development of a biventricular model of the heart for surgical design.*

*Recognition*

- Supported by Medtronic Corporation.

Current position: Senior Research Engineer, Siemens, Inc.

9. **Ankush Aggarwal**

**PhD in Mechanical Engineering, UCLA**

**Advisor: Dr. W. Klug**

April 2012 - May 2015

*Research focus: Development of computational model of the bicuspid heart valve leaflet response.*

*Recognition*

- Awarded a NHS grant for £125,000 entitled Predicting cardiovascular biomechanical stiffening due to the interplay of tissue layers with focus on calcific aortic valve disease.”
- American Heart Association, Southwest Affiliate, Post-doctoral Fellowship for work in mitral heart valve biomechanical simulations.

First Position: NRN Research Fellow, Zienkiewicz Center for Computational Engineering, College of Engineering, Swansea University, UK.

Current position: Lecturer, Infrastructure Environment (Tenured), College of Engineering, University of Glasgow, UK.

10. **Michael Hill**

**PhD in Biomedical Engineering, UPitt**

**Advisor: Dr. A. Robertson**

March 2012 - March 2015

*Research focus: Experimental studies of ventricular myocardium.*

*Recognition*

- AHA postdoctoral fellowship.
- NIH F32 postdoctoral fellowship.

First position: Research Fellow, School of Mathematical Sciences, University of Nottingham, UK.

Current position: Senior Consultant, Biomechanical Division, Rimkus Consulting Group, Inc., Houston, TX.

11. **Aaron Feng**

**PhD in Mechanical Engineering, U. Washington**

**Advisor: Dr. G. Genin**

December 2013 - August 2014

*Research focus: Development of computational model of the bioprosthetic heart valves.*

Current position: Associate Professor, Institute for Medical Imaging Technology, School of Biomedical Engineering, Shanghai Jiao Tong University, China.

12. **Rong Fan**

**PhD in Mechanical Engineering, RPI**

**Advisor: Dr. J. Fish**

June 2010 - November 2013

*Research focus: Computational models of native and engineered heart valves.*

Current position: Research Engineer, Proctor and Gamble, Cincinnati, OH.

13. **Ming-Chen Hsu**

**PhD in Mechanical Engineering, UCSD**

**Advisor: Dr. Y. Bazilev**

August 2012 - August 2013

*Research focus: Coupled Fluid-Solid models of the bioprosthetic heart valve.*

Current position: Assistant Professor, Department of Mechanical Engineering, Iowa State University.



14. **Rouzbeh Amini**  
**PhD in Biomedical Engineering, UMinn**  
**Advisor: Dr. V. Barocas** September 2010 - July 2013  
*Research focus: Computational model of the normal and surgically repaired mitral valve.*  
*Recognition*
- American Heart Association Scientist Development Grant (\$300K, starting July 2016).
  - NIH F32 post-doctoral fellowship.
  - Part of a collaborative team with the University of Pennsylvania School of Medicine.
- Current position: Assistant Professor, Department of Biomedical Engineering, University of Akron.
15. **Daniela Valdez-Jasso**  
**PhD in Mathematics, NC State**  
**Advisor: Dr. Mansoor A. Haider** September 2010 - June 2013  
*Research focus: Right ventricle biomechanical remodeling in pulmonary hypertension.*  
*Recognition*
- American Heart Association Scientist Development Grant (\$300K).
  - AHA Post-doctoral fellowship.
  - AHA SDG awardee.
- First faculty position: Assistant Professor, Department of Bioengineering, UIC.  
Current position: Assistant Professor, Department of Bioengineering, UCSD.
16. **Antonio DAmore**  
**PhD in Biomedical Engineering, University of Palermo**  
**Advisors: Drs. M. Sacks and W.R. Wagner** January 2011 - January 2013  
*Research focus: Elastomeric scaffold characterization and modeling.*  
*Recognition*
- McGowan Institute for Regenerative Medicine Retreat 2011 poster competition first place winner.
  - Ri.MED Postdoctoral Fellowship.
  - McGowan Institute for Regenerative Medicine travel award.
  - University of Pittsburgh Research Scholar Award.
  - Scholarship winner, offered to top ten students of Engineering, University of Palermo
  - Best final ranking among the graduates from the Department of Mechanics, University of Palermo
- Current position: Research Assistant Professor, MIRM.
17. **Erinn Joyce**  
**PhD in Bioengineering, University of Pittsburgh**  
**Advisor: Dr. Michael S. Sacks** July 2009 - June 2011  
*Research focus: Mechanobiology and mechanics of bladder wall smooth muscle cell constructs.*  
Current position: Research Engineer, Engineered Tissue Technologies, Cleveland, OH.

18. **Sharan Ramaswamy**  
**PhD in Biomedical Engineering, University of Iowa**  
**Advisor: Dr. KB Chandran** March 2007 - December 2009  
*Research focus: Bioreactor studies of tissue engineered heart valve in-vitro tissue development using SPIO particles.*  
*Recognition*
  - Dissertation recognized by the Lucas Research Award, focused on modeling approaches to understanding the dynamic pressure-area relationship of systemic arteries.
  - AHA Scientist development grant in 2008.
  - Awarded a travel grant to Termis-NA 2008

Current position: Associate Professor, Department of Biomedical Engineering, Florida International University.
  
19. **Aron Parekh**  
**PhD in Chemical Engineering (Biomolecular Transport Dynamics)**  
**Pennsylvania State University** June 2004-February 2008  
*Research focus: Mechanobiological responses of bladder wall smooth muscle cells to stretch, and in particular the role of TGF $\beta$ .*  
*Recognition*
  - NIH Post-doctoral Fellow (T32, Department of Urology).
  - PTEI Post-doctoral fellow, Department of Otolaryngology, Childrens Hospital, Pittsburgh, Pa.

Current position: Assistant Professor of Otolaryngology, Biomedical Engineering, and Cancer Biology, Vanderbilt University.
  
20. **Julie Myers-Irvin**  
**Phd in Bioengineering** June 2006-June 2007  
*Research Focus: Characterization of Bladder Matrix.*  
*Recognition*
  - PTEI Post-doctoral fellow

Current position: Grants developer, Office of Research, Swanson School of Engineering.
  
21. **Jun Liao**  
**PhD in Biomedical Engineering**  
**Cleveland Clinic** November 2003-December 2006  
*Research focus: Heart Valve Biomechanics.*  
*Recognition*
  - Published 70 peer-reviewed journal articles, 140 conference abstracts, and 6 book chapters in tissue biomechanics and bioengineering field.
  - funded by NIH, AHA, DoD, DOE, NSF, and NASA.
  - Elected as a Fellow of American Heart Association in 2014.

Current position: Associate Professor, Biomedical Engineering, University of Texas at Arlington.
  
22. **Jiro Nagatomi**  
**PhD in Biomedical Engineering, RPI**  
**Advisor: Dr. Rena Bizios** April 2003-July 2005  
*Research focus: Urinary bladder biomechanics, cell mechanics.*  
*Recognition*

Current position: Professor, Department of Biomedical Engineering, Clemson University, SC.

23. **Ali Mirnajafi**  
**PhD in Biomedical Engineering, USNW (Aus)** October 2001-October 2004  
*Research focus: Heart Valve Fatigue experimental studies.*  
Current position: Senior Research Engineer, Edwards Lifescience, Irvine, CA.
24. **Chung Cheng Eric Wang, MD** June 2003-June 2004  
*Research focus: Diabetes induced alterations in the biomechanical properties of the urinary bladder wall.*  
Part of a collaboration with Dr. Michael B. Chancellor, Professor of Urology, U. Pittsburgh.
25. **Sarah M. Wells**  
**PhD in Biomedical Physics, University of Toronto** June 2000-July 2001  
*Research focus: Fatigue properties of collagenous bioprosthetic heart valve biomaterials.*  
*Recognition*
  - NSERC fellowCurrent position: Associate professor, Department of Physics (Materials) and Biomedical Engineering, Dalhousie University, Nova Scotia.
26. **Arun K.S. Iyengar**  
**PhD in Mechanical Engineering** June 1998-May 2000  
*Research focus: Heart valve dynamics.*  
*Recognition*
  - Awarded a 2 year \$100,000 Beginning Grant-in-Aid from the AHA, PA-Delaware Affiliate to study the bioprosthetic dynamic heart valve motion.Current position: CFD scientist, Siemens-Westinghouse, Pittsburgh, PA.
27. **Zhihong Jason Zhou, MD.** June 1998-May 2000  
*Research focus: Vocal Fold Mechanics*  
Co-Advised with Dr. Patricia Hebda, Department of Otolaryngology, Childrens Hospital, Pittsburgh, Pa.

*Doctoral candidates/Current*

1. **Alex Khang, BME** Start date: July 2016  
*Research Focus: Heart valve interstitial cell mechanics and mechanobiology.*  
*Recognition*
  - UNC workshop on biosensors and force measurements in living cells attendee.
  - NSF pre-doctoral (June 2017).
  
2. **David Li, BME** Start date: September 2015  
*Research Focus: Myocardial Tissue Modeling*  
*Recognition*
  - NIH T32 Imaging pre-doctoral fellow.
  - Awarded a Ruth L. Kirschstein F31 Fellowship Starting July 2017.
  
3. **Hao Liu, BME** Start date: September 2017  
*Research Focus: Cardiac biomechanical modeling*
  
4. **Harshita Narang, BME** Start date: September 2018  
*Research Focus: Human mitral valve*
  
5. **Sam Potter, ME** Start date: September 2015  
*Research Focus: BHV fatigue damage modeling.*
  
6. **Bruno Rego, BME** Start date: September 2014  
*Research Focus: Mitral valve remodeling.*  
*Recognition*
  - AHA post-doctoral fellowship, 7/2018-
  - NSF pre-doctoral Fellowship 6/2015-7/2018
  - Fellowship from Cockrell School of Engineering (\$36,000) 7/2015
  - Graduate Deans Prestigious Fellowship Supplement (\$1,000)
  - Thomas Marschall Runge, M.D. Endowed Presidential Fellowship (\$3,500)
  
7. **Wenbo Zhang, CSEM** Start date: September 2017  
*Research and Recognition*
  - Research Focus: Inverse modeling of heart valves.
  - Sarofim Endowed graduate fellowships, 2017-present

*Doctoral candidates/Completed*

8. **Will Goth, BME** Graduate date: November 30, 2018  
*Research Focus: Optical technologies applied to soft biological materials*  
*Co-advised with Dr. James Tunnel (BME).*  
Current Position: Pending.

9. **Amir Khalighi, ME** Graduation date: November 12, 2018  
*Research Focus: Modeling of the mitral valve.*  
*Recognition*

- 2015 IBBM Summer Course Fellow.
- Developed pipeline for in-vivo models of the mitral from patient specific data.

Current Position: Pending.

10. **Will Zhang, BME** Graduation date: August 21, 2018  
*Research Focus: BHV fatigue damage modeling.*  
*Recognition:*

- George J. Heuer Endowed graduate fellowship.
- SB3C 2016 PhD student paper finalist.
- Published 13 peer reviewed journal papers.

Current Position: Post-doctoral fellow, Nordsletten Lab, U. Mich/King College London.

11. **Salma Ayoub, BME** Graduate date: May 2018  
*Research Focus: Mechanobiology of mitral heart valve leaflets.*  
*Recognition:*

- Awarded Graduate Deans Prestigious Fellowship Supplement 9/1/17-8/31/18
- Awarded Honorable Mention, BMES-FDA Frontiers in Medical Devices Conference, May 16-18, 2017, University of Maryland.
- Awarded a Ruth L. Kirschstein F31 Fellowship Starting June 2017.
- Awarded an AHA Predoctoral Fellowship, Spring 2017.
- Honorable Mention, Poster Finalist, ISACB meeting, September 7-10, 2016, Banff, CA.
- 2016 Trainee Travel Award to attend the ISACB meeting, September 7-10, 2016, Banff, CA.
- 2016 BMES Innovation and Career Development Award for the 2016 annual meeting.
- Professional development award (\$650) from the UT Office of Graduate Studies.
- Awarded Novus Biologicals Fall 2015 Scholarship
- 2015 NextProf Fall Engineering Workshop at University of Michigan
- NIH T32 Imaging pre-doctoral fellow.

Current Position: Dell Medical School, Class of 2022.

12. **Yusuke Sakamoto, CSEM** Graduate date: August 2016.  
*Research Focus: Continuum mechanics modeling of valvular interstitial cells.*  
*Recognition*
- Sarofim Fellowship
  - Finalist, 2015 SB3C PhD Podium Competition, 2015
  - Continuing Burton Fellowship, The University of Texas at Austin
  - Graduate School Continuing Fellowship, The University of Texas at Austin
  - ICES Travel Award, The University of Texas at Austin
  - Endocrine Society Summer Research Fellowship.
- Current Position: Insight Data Science, CA.
13. **David Kaminsky, CSEM** Graduate date: July 2016.  
*Research Focus: Fluid-structure interaction modeling of bioprosthetic heart valves.*  
*Recognition*
- Co-advised with Dr. T.J.R. Hughes, UT ASE/EM Department.
  - CSEM fellowship.
- Current Position: Post-doctoral Fellow with Dr. Yuri Bazilev, Brown University.
14. **Rachel Buchanan UT BME** Graduate date: February 2016.  
*Research Focus: In-situ mechanics modeling of valvular interstitial cells.*  
*Recognition*
- First Place, Ph.D.-level paper competition, Cardiovascular area, World Congress of Biomechanics
  - Awarded an AHA, Southwest Affiliate pre-doctoral fellowship.
  - Deans Prestigious Fellowship Award (\$1000), July 1, 2013.
  - Professional development award (\$500) from the UT Office of Graduate Studies.
  - Ohio Mathematical Biosciences Institute Travel Award for October 2013.
- Previous position: Post-doctoral fellow, Johnson and Johnson, Newark, NJ. Current Position: Intel, Austin, TX.
15. **James Carlton UT CSEM program** Graduate date: July, 2016.  
*Research Focus: Computational models of soft fibrous scaffolds.*  
*Recognition*
- Winner, Texas Advanced Computing Center (TACC) parallel programming contest sponsored by BP America
- Current Position: Staff Scientist, Sandia National Labs, Albuquerque, NM.
16. **Chris Carruthers, U. Pittsburgh** Graduate date: August, 2016  
*Research Focus: Soft tissue applications in regenerative medicine.*  
*Recognition*
- NSF Predoctoral Fellowship on Mechano-Dependent Biosynthetic Response of PV Interstitial Cells
  - NIBIB T32 Predoctoral Training Grant Trainee.
- Current Position: Staff Scientist, Medtronic Corporation.

17. **Bahar Fata, UPitt Department of Bioengineering** Graduate date: June, 2012  
*Research Focus: Biomechanical Characterization of postnatal growth Behavior in the Ovine Main pulmonary artery.*  
*Recognition*
- ASME Annual Summer Bioengineering Conference 2012, Phd Student Competition Winner (2nd place).
  - Ruth L. Kirschstein National Research Service Award (NRSA) for Individual Postdoctoral Fellows (Parent F32) entitled 'Effects of aging on biomechanical properties of human vocal folds, March 21, 2014.
- Current Position: Postdoctoral fellow at the UCLA School of Medicine, Department of Head and Neck Surgery, working in the area of vocal cord biomechanics.
18. **John Stella, UPitt Department of Bioengineering** Graduate date: September, 2011  
*Research Focus: Biomechanical Characterization of postnatal growth Behavior in the Ovine Main pulmonary artery.*  
*Recognition*
- Selected best RA for 2010, Department of Bioengineering, University of Pittsburgh.
  - Selected top 10 abstract at the 4th annual society for heart valve disease, New York, June 2007.
  - Cardiovascular Bioengineering NHBLI T32 Predoctoral Training Grant Trainee.
- Current Position: Senior Research Engineer, W.L. Gore
19. **Chad Eckert, UPitt Department of Bioengineering** Graduate date: May, 2011  
*Research Focus: Biomechanical Characterization of postnatal growth Behavior in the Ovine Main pulmonary artery.*  
*Recognition*
- Biomechanics in Regenerative Medicine NIBIB T32 Predoctoral Training Grant Trainee.
  - Awarded an AHA pre-doctoral training fellowship.
  - NSF EAPSI Program Fellow under Dr. Peter Hunter at the University of Auckland, New Zealand. (The NSF EAPSI Program provides US students the opportunity to study abroad and is highly selective)
- Current Position: JJ, Cincinnati, OH.
20. **Antonio DAMore, Dept. of Mechanical Engineering, University of Palermo (Foreign exchange student)** Graduate date: December 2010  
*Research Focus: Biomechanical Characterization of postnatal growth Behavior in the Ovine Main pulmonary artery.*  
*Recognition*
- Current Position: RiMED post-doctoral fellow for training and research in the field of biotechnology and biomedicine in laboratories Dr. Wagner
21. **Silvia Wognum, UPitt Department of Bioengineering** Graduate date: July, 2010  
*Research Focus: Biomechanical Characterization of postnatal growth Behavior in the Ovine Main pulmonary artery.*  
*Recognition*
- Fullbright Fellow (from the Netherlands).
  - 2nd place award, student competition at the 43rd Annual Technology Meeting, Society of Engineering Science, August, 2006.
- Current Position: Post-doctoral fellow, Radiotherapy Department, Academic Medical Center, Amsterdam, Netherlands.

22. **Erinn Joyce, UPitt Department of Bioengineering** Graduate date: July, 2009  
*Research Focus: Biomechanical Characterization of postnatal growth Behavior in the Ovine Main pulmonary artery.*  
*Recognition*
- Awarded a Pre-Doctoral Fellowship from the University of Pittsburgh's Provost's Development Fund.
- Current Position: Medical Device Industry/
23. **David E. Schmidt, CMU Department of Civil and Environmental Engineering** Graduate date: April, 2009  
*Research Focus: Biomechanical Characterization of the aortic valve.*  
*Recognition*
- Current Position: Associate Professor, Department of Mechanical Engineering, University of Pittsburgh.
24. **Rebecca Long Heise, UPitt Department of Bioengineering** Graduate date: June, 2008  
*Research Focus: Biomechanical Characterization of postnatal growth Behavior in the Ovine Main pulmonary artery.*  
*Recognition*
- Awarded one of five travel awards to the 2008 annual fall BMES meeting, Los Angeles, CA.
  - Selected for the Second Annual NIH National Graduate Student Research Festival, October 2007.
  - CATER T32 trainee.
  - ORAU fellowship, Nobel Laureates in Lindau, Germany, July, 2005.
- Current Position: Post doctoral fellow, National Institute for Environmental Health Sciences.
25. **David Merryman, UPitt Department of Bioengineering** Graduate date: June, 2007  
*Research Focus: Biomechanical Characterization of postnatal growth Behavior in the Ovine Main pulmonary artery.*  
*Recognition*
- Awarded the Tennessee Alumni Promise Award for 2011. The Alumni Promise Award recognizes alumni no older than 40 who have demonstrated distinctive achievement in a career, civic involvement or both. This award is presented to acknowledge alumni who are making a mark early on in their career.
  - Awarded an AHA Pennsylvania-Delaware Predoctoral Fellowship entitled Effects of local stress on aortic valve interstitial cell phenotype and resulting synthetic function.
  - TA of the year, Department of Bioengineering, Spring 2007.
  - Winner of the 2014 ASME BED Y.C. Fung Young Investigator Award.
- Current Position: Assistant Professor, Biomedical Engineering, Vanderbilt University.
26. **George Engelmayr, UPitt Department of Bioengineering** Graduate date: November, 2005  
*Research Focus: Biomechanical Characterization of postnatal growth Behavior in the Ovine Main pulmonary artery.*  
*Recognition*
- AHA Pennsylvania-Delaware Predoctoral Fellowship Awardee.
  - NRSA Post-doctoral awardee.
  - Receptient of an ISACB Young Investigator Award for the 2006 ISACB meeting in La Jolla, CA.
  - Post-doctoral fellow, Drs. Lisa Freed and Robert Langer, MIT, Boston, MA, 1/2008 - 6/2009.



27. **Hsiao-Ying Shadow Huang, UPitt Department of Bioengineering** Graduate date: January, 2004  
*Research Focus: Multi-scale modeling of the aortic heart valve.*  
*Recognition*
- 2006-2009: Post-Doctoral Fellow, Laboratory for Computation and Simulation of Microstructures, Department of Material Science and Engineering, MIT.
  - 2005-2006: Adjunct Professor, Dept. of Mechanical Engineering, University of Pittsburgh.
  - 2004-2005: Adjunct Professor, Dept. of Biological Agricultural Engineering, University of Georgia.
- Current Position: Associate of Professor, Department of Mechanical Engineering, NC State University.
28. **Wei Sun, UPitt Department of Bioengineering** Graduate date: October, 2003  
*Research Focus: Bioprosthetic heart valve modeling.*  
*Recognition*
- 2005-2007: Senior Engineer, Edwards Lifesciences, Irvine, CA.
  - 2003-2005: Post-doctoral Fellow, Department of Biomedical Engineering, Georgia Institute of Technology.
  - Fall 2007-2013: Assistant Professor, Department of Mechanical Engineering, University of Connecticut.
- Current Position: Associate Professor, Department of Biomedical Engineering, Georgia Tech.
29. **Claire Gloeckner, UPitt Department of Bioengineering** Graduate date: April, 2003  
*Research Focus: Mechanical modeling of collagenous ECM for tissue regeneration.*  
*Recognition*
- Biomechanics Engineer, Exponent, Inc., Philadelphia, PA (2003-2005).
- Current Position: Senior Engineer, Bard Inc.
30. **David Smith, UPitt Department of Bioengineering** Graduate date: May, 2001  
*Research Focus: Computational Geometry and modeling of soft tissue structures.*  
*Recognition*
- Current Position: Senior Engineer, Ethicon JJ, Cincinnati, OH
31. **Kristen L. Billiar, UPenn Department of Bioengineering** Graduate date: June, 1998  
*Research Focus: Modeling the mechanical behavior of the aortic heart valve.*  
*Recognition*
- Assistant Professor, Department of Biomedical Engineering, WPI.
  - Senior Research Engineer at Organogenesis, Inc., Canton, MA
  - Assistant Professor, Department of Biomedical Engineering, WPI.
  - Associate Professor, Department of Biomedical Engineering, WPI.
  - Professor, Department of Biomedical Engineering, WPI.
- Current Position: Professor and Head, Department of Biomedical Engineering, WPI.

*Current Doctoral committees.*

1. Gary McGregor, UT BME, Advisor: K. Diller.
2. Kayla Henderson, UT BME, Advisor: A. Baker.
3. Ahmed Aly, UPenn MD-PhD program (PhD in Bioengineering).  
Advisors: Drs. Paul Yushkevich and Robert C. Gorman.

*Completed Doctoral Committees*

1. Peter Voyvodic (UT BME, A. Baker Advisor).
2. Bin Yang (UT BME J. Tunnell Advisor).
3. Jason Lee, UT BME, A. Baker.
4. Andrew Voorhees (UTSA BME, HC Han, Advisor).
5. Nick Amoroso (June 2013, U. Pittsburgh BioE, William R. Wagner, Advisor)
6. Noel Reynolds, Dec. 2015 (National University of Ireland Galway)

*Completed Masters degrees at UT Austin*

1. Karen Tsai, CSEM, 2017.
2. Rose Simmons, CSEM, 2017
3. Devesh Sahu, CSEM, 2015.
4. Kristen Feaver BME, 2015.
5. Mu He ME, 2014.
6. Vanessa Aguilar BME, 2013.

*Completed Masters students at UPitt*

1. Brett Zubiate (June 2007) Professional MS.
2. Todd Courtney (December 2006), Professional MS.
3. Ajay Abad (January 2006) Professional MS. Research project on quantifying heart valve leaflet deformations.
4. Kashayar Toosi (January 2006), Thesis title: The effects of long-term spinal cord injury on the urinary bladder wall tissue mechanics.
5. Jon Grashow (April 2005), Thesis title: Evaluation of the biaxial mechanical properties of the mitral valve anterior leaflet under physiological loading conditions.
6. Thanh Lam (December 2004). Thesis title: Mechanical Properties of Native Porcine Aortic and Pulmonary Heart Valve Leaflets. Outstanding TA/TF for academic year 2002-2003.
7. Daniel Hildebrand (December 2003) Thesis title: Design and evaluation of a novel pulsatile bioreactor for biologically active heart valves.
8. Brent Sugimoto (April 2003) Thesis title: Effects of leaflet stiffness on the dynamic motion of the aortic heart valve.
9. Tiffany Sellaro (April 2003) Thesis title: Effects of collagen orientation on the medium-term fatigue response of heart valve biomaterials.

10. Greg Fulchiero (Professional track with project, 2002). Project title: Alterations in collagen fiber crimp morphology with cyclic loading in zero and low pressure fixed porcine bioprosthetic heart valves.

*Completed Masters Degrees at the University of Miami*

1. Claire Gloeckner (May 1998) Thesis title: Mechanical and structural analyses of an acellular collagenous biomaterial: Intestinal submucosa.
2. Rony Abovitz (May 1998) Thesis title: Analysis of a proposed endosseous dental implant design: The effect of internal implant geometry on internal and external stress distributions.
3. David Smith (December 1996) Thesis title: The effects of in-vitro accelerated testing on the porcine bioprosthetic heart valve.
4. Eric Heister (May 1996) Thesis title: Bovine pericardium as a bioprosthetic material: localization of optimal tissue selection sites.
5. Susan Otano (August 1995) Thesis title: The collagen fiber architecture and mechanical behavior of human cranial dura mater allografts.

*Masters Committees Completed at U. Pitt*

1. Jia Wu, U. Pittsburgh CEE, Brigham C. John, Advisor.
2. Raffaella DeVita, MS, ME, Will Slaughter, Advisor.
3. Rachmadian Wulanda (Ph.D., ME, Anne Robertson, Advisor).
4. Theodore Clineff (BioE, Richard Debski, Advisor).
5. Dennis Song, BioE, David Vorp, Advisor.

*Undergraduate Research Assistants/Current*

1. Jared Williams
2. Shuda Xia
3. Quan Nguyen
4. Ali Abbaspour
5. Olivia Conroy
6. Emily Avalos
7. Channa K Duong
8. Christian Gil
9. Daniel Hernandez
10. Yen-Yu Chen
11. Michelle Lu
12. Alexander Mo
13. Annie Mara
14. Sarah Morales

*Completed Undergraduate Research, UT Austin*

1. MaiQuyen Nguyen
2. Thomas Leahy
3. Pranav Padmanabha
4. Nivedha Ravi
5. Ethan Kwan
6. Lindsay Lehman
7. Elizabeth Shih
8. Eder Medina
9. Lauren Flottrop
10. Simone Siegel
11. Mitchell Katona
12. Kayla Walter
13. Steven LaBelle
14. Pranav Padmanabha
15. Nathan Riojas
16. Tim Smith
17. Connor Hughes
18. Michelle Atkins
19. Simone Siegal
20. Alex Rodriguez
21. Daniel Cheung
22. Dania Malik
23. Nga Tang
24. Chet Murtha
25. Senior Design Team 5
26. Timothy Woodard
27. Paul Lee
28. Emily Rohrer
29. Anil Raj
30. Frank Sebastienelli
31. Trey LaMastres
32. Carlos Placeras
33. Anmol Singh

34. Mishaal Rahman
35. Sarah Poletti
36. Sarah LaBianca
37. Binish Munir
38. Ivana Cuperovic
39. Theodore Weber
40. Nicholas Ahn
41. Lian Shen
42. Hugo Landaverde
43. Javier Solis
44. Vamsi Palivela
45. John Lesicko
46. Laura Klein
47. Jordan Graves
48. Nelson Wu
49. Kyle Seabert
50. Kevin Wu

*Undergraduate Research Assistants Completed at U. Pitt*

1. Steven Boronyak
2. Matt Barron
3. John Degnan
4. Jianxin Zeng
5. Bryan Good
6. Eunice Yi
7. Laura Gump
8. Lauren Anderson
9. Michael McCall
10. Julia Ivanova
11. Jessica Wagner
12. Maggie Saracco
13. Emmanuel Owusu
14. Jocelyn Brown
15. Dana Bruck
16. Rahul Kumar

17. Alex Cigan
18. Paul Bienenke
19. Michael Nilo
20. Chi Zheng
21. Heather Gray
22. Jeremy Raimer
23. Leigh McGuire
24. Brett Zubiate
25. Brooke Odle
26. Nitin Agarwal
27. Dan Hildebrand
28. Jonathan Grashow
29. Jill Ulrich
30. Beth Kaminski
31. Michael Drenzo

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**SUMMARY OF TEACHING**


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*UT Austin/Current*

1. **BME/ME/CSE 385 Biomechanics of tissues, scaffolds, and cells: With applications to biomedical problems. Graduate and Senior Undergraduate, offered Fall.**

*Description.* Biomechanics includes the study of the whole body, its organs and their associated systems, the tissues that make up the organs, their constituent cells, cell organelles, and the large complex molecules that form the basis of the entire living system. In addition to the science of biomechanics, there is a huge area of applications-driven research that includes understanding of many pathophysiological processes, medical device design and failure analysis, and the development of novel biomaterials. Biosolid mechanics covers such areas as stress-strain behavior of tissues, scaffolds, and cells, and anything else that involves the how biological structures deform and respond under loading. This will be a project-based course organized around major application areas to provide context to the theory and applications we will be covering. This should help you understand better why we do what we do and stimulate interest in the materials covered. During the semester we will seek to introduce you to both the fundamentals of biosolid mechanics via the mechanical behavior of living tissues and cells and to applications, such as engineered tissue scaffolds, using applications and examples extensively. The final portion of the course will focus on the cornerstone of many current problems in biomedical research and medical devices.

2. **CSE 397- Computational Modeling in Bioengineering and Medicine. Graduate, Spring.**

*Description.* The course will provide detailed insights in modeling approaches for the Heart, which are applied to describe and reconstruct its physical properties and physiology. Students will be enabled to classify modeling approaches and select appropriate models as research and development tools. We will introduce and analyze mathematical models, which are used to quantify cardiac function, including electro-mechanical physiology at level of single channels, cells, tissue up to whole organs. Models of cellular force development and tissue mechanics will be discussed. Numerical methods for solving of the underlying systems of equations will be addressed with regard to their efficient implementation.

*UT Austin/Previously offered courses.*

3. **CSE 397- Models for growth and remodeling in native and engineered tissue systems. Graduate, Spring 2014.**

*Description.* This course will cover basics of current growth and remodeling theories with a first focus on constitutive model development and its relation to underlying structural elements, including structural proteins and constituent cell populations. The final portion of the course will present contemporary efforts to incorporate these novel models into computational frameworks to solve advanced problems in engineered tissue systems.

4. **BME/CSE/ME 385J Bioelasticity. Graduate, Spring 2012, 2013.**

*Description.* The application of biosolid mechanics to describe and simulate the mechanical behavior of living tissues and cells. A fundamental goal in the cell and tissue mechanics of tissues is the development of the constitutive model, i.e. the ability to predict mechanical behavior under any loading state. Thus, a focus will be on constitutive model development and its relation to the underlying structural elements. The final portion of the course will present contemporary efforts to incorporate these novel models into computational frameworks and show how they are used to solve advanced problems in biomedicine.

5. **BME 344J Biosolid mechanics. Undergraduate, Fall 2012-2014.**

*Description.* This first course in biomechanics focuses on the application of biosolid mechanics to describe and simulate the mechanical behavior of living tissues and cells. A fundamental goal in the cell and tissue mechanics of tissues is predict mechanical behavior. The course will cover solid mechanics fundamentals using biomechanical applications and examples extensively. The final portion of the course will focus on nonlinear problems and viscoelasticity, which form the cornerstone of current problems in biosolid mechanics.

*U. Pittsburgh*



- Principal Investigator for T32 EB003392 from 2005-2011.

*Description.* The goal of this training program is to provide a solid foundation upon which to build a productive and independent career in biomechanics as applied to regenerative medicine. This goal is accomplished via a highly coordinated and mentored interdisciplinary training program with a combination of required and elective courses, research activities, and specialized training opportunities. The proposed Training Program incorporates faculty from the Departments of Bioengineering, Mechanical Engineering, Orthopedic Surgery, Vascular Surgery, Urology, and the McGowan Institute for Regenerative Medicine of the University of Pittsburgh, as well as faculty from the Mechanical and Biomedical Engineering Departments from Carnegie Mellon University. This combination of training faculty research interests and coursework will provide a rich educational experience and more numerous training opportunities for the students than could be obtained within the individual university departments. Moreover, the breadth of research areas that span various physiological systems (cardiovascular, musculo-skeletal, urological) allows for a unique opportunity to train students to become highly skilled problem solvers while avoiding over specialization. Since the BRM program is not central to any one department, this permits the student a much wider choice of options with which to pursue a PhD in tissue bioengineering and regeneration. In the current departmental focus of graduate education, a PhD student in one department that wishes to perform thesis research in a laboratory in the another department finds many departmental based administrative roadblocks in his/her path. The BRM program eliminates these roadblocks and permits ever increasing educational options for the students and research collaborations.

- BIOE 3002 Advanced topics in Biosolid Mechanics (developed/taught).
- BIOE 3000 Advanced Tissue Mechanics (developed/taught)
- BIOE 2072 Functional Tissue Engineering (developed/ offered fall 2003,2007)
- BIOE 2064 Biomechanics of cells, tissues, and organs (developed/ongoing)
- BIOE 2064 Biomechanics of cells, tissues, and organs (developed/ongoing)
- BIOE 1064 Biomechanics IV Tissues and organs (developed/taught)
- BIOE 1631 Biomechanics II (developed/direct)
- BIOE 1150 - Lab section on cardiovascular biomechanics (developed/taught)
- BIOE 2070 - Continuum Mechanics (offered spring 2000 only, ME dept. now offers equivalent)
- BIOE 1160, 1161 - BioE Senior Project (developed/taught)
- BIOE 1163 - Presented lectures on cardiovascular mechanics

#### U. Miami

- BME 575 - Graduate tissue biomechanics
- BME 375 - Undergraduate tissue biomechanics
- BME 335 - Undergraduate Biomaterials
- Supervised senior projects, undergraduate academic advising, and high school research interns.

## FUNDING

### *Current Funding*

1. **Biomechanical indicators of bicuspid aortic valve dysfunction.**  
NIH/NHLBI R01 HL142504, Project dates: 7/2018-6/2022. Total cost \$2.9M.  
Multi-PI grant, with Drs. M. Sacks (Contact PI), R.C. Gorman (U. Penn, MPI), and M.C. Hsu (ISU, MPI).
2. **Novel Simulation Technologies for BHV Long-Term Durability.**  
NIH/NHLBI R01 HL129077, Project Dates: 7/2016-6/2020, Total cost \$2.5M.  
Multi-PI grant, with Drs. M. Sacks (Contact PI), T.J.R. Hughes (PI), K. Manning (PI), and M.C. Hsu (Co-I).
3. **Remodeling potential of the mitral valve following surgical repair.**  
NHLBI Bioengineering Research Partnership, R01 HL119297, Project Dates: 9/1/2013 5/31/2019, total cost \$6.6M.  
Multi-PI grant with Dr. M. Sacks as the Program Director, with Dr. J. Gorman of U.Penn and Dr. Ajit Yoganathan of Georgia Tech.
4. **The effect of systemic hypertension on prognosis of myocardial infarction: Understanding, prediction and therapy evaluation.**  
NIH/NHLBI K99 HL138288 Mentored Transition to Independence grant. Project dates 3/8/2018-2/2023, \$887K total cost.  
Dr. Reza Avazmohammadi, PI, Dr. M. Sacks - Co-I/Faculty mentor.

### *Pending Funding*

1. **Quantitative Methods for Optimizing IMR Repair.**  
NIH/NHLBI R01 HL073021, Project Dates: 9/1/2018-8/31/2022. Multi-PI grant with Dr. M. Sacks and Dr. J. Gorman of U.Penn. Received a 13th percentile.
2. **Optimal design of pericardial leaflets for transcatheter heart valves.**  
NIH/NHLBI - Submitted November 20, 2018.  
Multi-PI grant with Dr. M. Sacks, Dr. J. Gorman of U.Penn and Dr. Ajit Yoganathan of Georgia Tech.

### *Past Funding*

1. "Adaptive remodeling of the right ventricle in response to pulmonary hypertension: towards physical understanding and prediction," F32 HL132543 9/01/2016-8/31/2018. Total Cost \$180K. PI: Dr. R. Avazmohammadi, Faculty Mentor: M Sacks.
2. "The effect of systemic hypertension on prognosis of myocardial infarction: Understanding, prediction therapy evaluation," AHA Career Development Award. Total Cost \$231K. PI: Dr. R. Avazmohammadi, Faculty Mentor: M Sacks. Note that Dr. Avazmohammadi had discontinued this award after being awarded the K99/R00 above.
3. A Novel Approach for the Design and Simulation of Valvular Replacement Biomaterials, NIH/NHLBI R01 HL108330, 4/2012-3/2017, Total cost \$3.09M. Multi-PI grant, with Dr. J. Gorman of U.Penn and Dr. Naren Vyavahare of Clemson University.
4. "A new computational model of right ventricular hypertrophy," F32 HL117535-01A11 9/01/2013-8/31/2016. Total Cost \$180K. PI: MR Hill; Faculty Mentor: M Sacks.
5. "Development of heart simulation tools, Medtronic, Inc., \$210,000 for 2013-2016.
6. Advanced models for cardiac function, Fondren Foundation, \$300,000 for 2012-2015.
7. Advanced models for cardiac function, St. Davids Foundation, \$121,000 for 2013-2015.
8. Mechanisms of In-Vivo Remodeling in Tissue Engineered Heart Valves, NIH/NHLBI R01 HL089750, 7/1/07 6/30/14. Total cost \$3.3M. Co-I is Dr. J.E. Mayer of Boston Childrens Hospital, Harvard University.

9. Development of a Predictive Computational Model of Heart Valve Fatigue, FDA-SOL-1090351A, 9/2011-9/2013, \$105,000.
10. "GAGs: Function and Fixation in Bioprosthetic Heart Valves, NIH/NHLBI R01 HL070969, 7/1/08-6/30/13. Total cost \$1.6M. Multi-PI grant, with Co-PI Dr. Naren Vyavahare, Clemson University.
11. Biomechanical Optimization of Tissue Engineered Heart Valves, R01 HL68816, 2/07-6/30/13, Total cost \$1.9M.
12. Right Ventricular Morphological and Mechanical Behavior, American Heart Association Great Rivers Affiliate Beginning Grant in Aid, 7/2010-6/2012, \$130K total, Dr. Marc Simon, PI.
13. Right Ventricular Morphological and Mechanical Behavior, Pittsburgh Foundation, 10/2010-9/2012, \$125K total, Dr. Marc Simon, PI.
14. Right ventricular regional contractile response to pulmonary vascular disease, 2010 ASPIRE Young Investigator Research Award from Pfizer, Inc., 10/2010-9/2012, \$100K total, Dr. Marc Simon, PI.
15. Biomechanics in Regenerative Medicine, NIH/NIBIB EB003392-01 T32 Predoctoral Training Grant, 9/1/2005-8/31/2011. Total cost: \$1.4M. Note: Renewal approved for funding for five years (2011-2016) by NIBIB Council on 1/2011.
16. Fluid-structure simulation for prosthetic heart valves R01 HL071814 NIH/NIBIB, bridge funding, 9/2009-8/2011.
17. Mechanobiology and Regenerative Medicine, R01 EB008051-01 5/15/09 - 4/30/11 (ARRA funded). Note this is a multi-PI grant, with Co-PI Dr. Steven Badylak, University of Pittsburgh, total cost \$720,000.
18. Biomechanical Evaluation of Abdominal Aortic Aneurysms, David A. Vorp, University of Pittsburgh, PI, NIH/NHLBI R01 HL079313, 6/1/05-5/31/10. Total Cost: \$1,250,000, Sacks sub-contract: \$85,000.
19. Biocompatible Heterograft Biomaterials, Robert J. Levy, University of Pennsylvania, PI, NIH/NHLBI P01-HL074731, 8/1/04-7/31/09. Total cost: \$1,500,000, Sacks sub-contract: \$324,563.
20. Mitral Saddle Shape Preservation Improves Valvuloplasty, Joseph H. Gorman, University of Pennsylvania, PI, NIH R01 HL073021, 4/1/04-3/31/08. Sacks sub-contract: \$249,001.
21. Cardiopulmonary Organ Engineering, William R. Wagner, University of Pittsburgh, PI. NIH BRP R01 HL69368, 7/1/2003-6/30/08. Total cost: \$5,300,000. Role: Director of Biomechanics Core, \$470,000.
22. Fluid Structure Simulation for Prosthetic Heart Valves, K.B. Chandran, University of Iowa, PI, NIH/NHLBI R01-HL071814, 7/1/03-7/31/07. Sacks sub-contract: \$408,827.
23. Functional Tissue Engineering for Stress Incontinence, Michael B. Chancellor, University of Pittsburgh, PI. NIH R01-AR049398 01, 5/1/03-4/30/07. Total cost: \$1,351,000, Sacks sub-contract: \$350,000.
24. Effects of Decellularization and Recellularization on Biomechanics of Porcine Aortic Valve, Jun Liao, University of Pittsburgh, PI. American Heart Association Beginning Grant-in-Aid Award 0565346U, 7/1/05-6/30/07. Total cost: \$100,000. Role: Collaborating Investigator.
25. Biomechanical Optimization of TE Heart Valves, R01 HL068816, NIH/NHLBI, 3/1/02 - 2/28/06. Total cost: \$1,017,553.
26. Mechanics of the Mitral Valve, Ajit Yoganathan, Georgia Institute of Technology, PI, NIH R01 HL520009-04A1, 7/1/01-6/30/05. Total cost: \$1,679,465; Sacks sub-contract: \$370,866.
27. Biomechanical Evaluation of Abdominal Aortic Aneurysms, David A. Vorp, University of Pittsburgh, PI, NIH R01 HL60670-02, 12/1/00-11/30/05. Total cost: 1,697,305; Sacks sub-contract: \$112,000.
28. Development of Novel PHA Based Biodegradable Scaffolds. NIST-ATP, 10/02-9/05, PI: David Martin, TEPHA, Inc., Cambridge, MA. Role: Advise biomechanical evaluations of scaffold biomaterials.

29. Enhanced Durability of Bioprosthetic Heart Valves, R01 HL63026, NIH/NHLBI, 1/1/01 - 12/31/04. Total cost: \$744,000.
30. Mechanisms of Fatigue Damage in Bioprosthetic Heart Valves, Established Investigator Award from the National American Heart Association, 1/1/01 - 12/31/04. Total cost: \$300,000.
31. Commercialization of SALS for Tissue Informatics, Pittsburgh Tissue Engineering Initiative: Development fund seed grant. 7/1/2000 - 6/30/2003. Total cost: \$50,000.
32. Tissue Engineered Heart Valve Prostheses, NIST-ATP award to St. Jude Medical, Inc. Subcontract to study tissue engineered prosthetic heart valve biomaterials, 1/1/2000 - 1/1/2003. Sacks sub-contract: \$300,000.
33. Development of a Novel, Software-Based Tool for the Improved Diagnoses of Abdominal Aortic Aneurysms, David A. Vorp, University of Pittsburgh, PI, Pittsburgh Foundation Program for Medical Research, 7/1/00 - 6/30/03. Total cost: \$150,000, Sacks sub-contract: \$5,500.
34. Fatigue Damage Behavior of Chemically Treated Bioprosthetic Heart Valve Tissues, NSF BED-9978858 (GOALI program), 10/1/99 - 9/30/02. Total cost: \$347,000
35. Calcification-independent Collagen Damage in Explanted Clinical Bioprosthetic Heart Valves, American Heart Association, PA-DE affiliate, 7/1/99 - 6/30/01. Total cost: \$89,500.
36. Structure-strength Relations in Porcine Bioprosthetic Heart Valves, St. Jude Medical, Inc. 1/1/99-12/31/02. Total cost: \$180,000.
37. Interaction between Leaflet Motion and Hemodynamics of Bioprosthetic Heart Valves: An In-Vitro Study, Arun Iyengar, PI, American Heart Association Pennsylvania Affiliate, PEN Beginning Grant-in-Aid, 7/1/98 - 6/31/00. Sacks sub-contract: \$70,000.
38. Extension of SALS to Quantify 3D Fiber Architecture in Cardiac Valvular Tissues, A.W. Ford Foundation, 7/1/98-6/31/99. Total cost: \$20,188.
39. A Novel In-Vitro Tissue Culture SALS-Based Fiber Architecture Apparatus, A.W. Ford Foundation, 7/1/97-6/31/98. Total cost: \$20,000.
40. A Non-Invasive Method to Compute In-Vivo Abdominal Aortic Aneurysm Wall Tensions, American Heart Association, Florida Affiliate, 7/97-6/00. Total cost: \$100,000.
41. Effects of Fixation Pressure on the Durability of Bioprosthetic Heart Valves, St. Jude Medical, Inc., 6/1/97-12/31/97. Total cost: \$25,000.
42. The Durability of Porcine Bioprosthetic Heart Valves: A Micro-mechanical Study, Initial Investigatorship, American Heart Association, Florida Affiliate, 7/94-6/97. Total cost: \$270,000.
43. Bovine Pericardium: A Bioprosthetic Material, Whitaker Foundation, 8/1/94 - 10/31/97. Total cost: \$170,000.
44. A SALS Device for Dermal Tissue Microstructural Analysis, Smith and Nephew, Inc., 1997. Total cost: \$30,000.
45. In-vivo 3D Reconstruction of Porcine Bioprosthetic Heart Valves, St. Jude Medical, Inc., 1/96-1/97. Total cost: \$32,000.
46. Laser Light Scattering of Porcine Intestinal Submucosa, A.W. Ford Foundation, 7/1/96 - 6/30/97. Total cost: \$20,000.
47. Study of Human Explanted Bioprosthetic Heart Valves, A.W. Ford Foundation, 7/1/95 - 6/30/96. Total cost: \$20,000.
48. A SALS Device for Connective Tissue Analysis, A.W. Ford Foundation, 7/1/94 - 6/30/95. Total cost: \$20,000.

49. Dental Implant Project funded by Uri Elias, D.D.S., 1/15/94-12/31/94. Total cost: \$13,000.
50. Summer General Research Support Award, University of Miami, 8/15/94 - 5/14/95. Total cost: \$5,000.

## INVITED LECTURES

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### 2018

1. "Towards Patient Specific Mitral Valve Surgical Simulations," The 2nd Cheeloo Conference on Computational Medicine and Big Data, Jinan, PRC, November 9-10, 2018.
2. "Multi-resolution models of the mitral heart valve: From Mechanobiology to Surgical Repair," PennCVI (UPenn Cardiovascular Institute, Perelman School of Medicine), Fall Seminar Series, October 31, 2018.
3. "Tissue Mechanics of bioprosthetic heart valves," Invited Lecture for the Special Session entitled "Scientific Advances in the biomechanics of prosthetic heart valves," Michael S. Sacks, 2018 BMES Annual Meeting, Atlanta, GA, October 17-20, 2018.
4. "Putting on the squeeze - How valve interstitial cells adapt to their local environment," Keynote Lecture, 8th Biennial Heart Valve Biology and Tissue Engineering Meeting, Royal Society of Medicine, London, UK 26-28 September, 2018.
5. "A macro-micro modeling approach to determine in-situ heart valve interstitial cell contractile behaviors in native and synthetic environments," Invited Lecture, ASME NEMB NanoEngineering for Medicine and Biology Conference, Omni Los Angeles Hotel, California Plaza, CA, August 21-24, 2018.
6. "A novel time-evolving model for the in-vivo maturing pulmonary artery conduit," Invited Lecture, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
7. "A macro-micro modeling approach to determine in-situ heart valve interstitial cell contractile state," Invited Lecture, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
8. "State of the art simulation of bioprosthetic heart valve durability," Invited Lecture, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
9. "Multi-resolution models of the mitral heart valve," Department of Surgery, University of Nebraska at Omaha, Omaha, NB, May 2, 2018.
10. "Computational Modeling of the Mitral Heart Valve: From Mechanobiology to Surgical Repair," Distinguished Medical Engineering Seminars, Department of Medical Engineering, CalTech, Pasadena CA, April 5, 2018.
11. "In vivo myocardial compressibility and its impact on the contractile energetics of the heart," Department of Aerospace and Mechanical Engineering, University of Oklahoma, Norman OK, April 2, 2018.
12. "Multi-Resolution Models of the Mitral Heart Valve," Invited Speaker, 15th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering and 3rd Conference on Imaging and Visualization, Instituto Superior Tecnico, Lisbon, Portugal, 26-29 March 2018.
13. "Multi-resolution models of the mitral heart valve: From mechanobiology to surgical repair," Libin Cardiovascular Institute, University of Calgary, Calgary, Alberta CA March 20, 2018.

### 2017

14. Multi-resolution modeling of the Mitral Valve: From cellular biophysics to surgical planning, Department of Biomedical Engineering, University of Alabama at Birmingham, November 3, 2017.
15. Multi-resolution models of the Mitral Valve, 11th MICCAI workshop on Augmented Environments for Computer Assisted Interventions (AE-CAI), Quebec City, Canada, September 10, 2017.
16. On the remodeling of the healthy and infarcted left ventricle: The impact of myocardium compressibility on the accuracy of computational simulations, Society of Engineering Science, ASME-AMD joint conference, July 25-28, 2017, Boston MA.

17. A novel numerical-experimental inverse modeling approach to investigate the three dimensional mechanical behavior of ovine myocardium, Keynote Lecture, Engineering Mechanics Institute Conference (EMI 2017), June 4-7, San Diego, CA.
18. On the biomechanics of engineered heart valve tissues, Wallace H. Coulter Foundation Lecture Series, Department of Biomedical Engineering, Florida International University, FL USA, April 14, 2017.
19. A novel approach to image-based modeling of the mitral valve, Keynote Presentation, 5th International Conference on Computational and Mathematical Biomedical Engineering, Pittsburgh, PA USA April 10-12, 2017.
20. Advances in the simulation of the heart and its valves, Grand Rounds, Department of Radiology, UT Southwestern Medical Center at Dallas, January 12, 2017.
21. What is so different between biological and mechanical valves?, Heart Valve Society Scientific Meeting, Grimaldi Forum, Monaco, March 2-4, 2017.
22. Mechanobiology of valve function, Heart Valve Society Scientific Meeting, Grimaldi Forum, Monaco, March 2-4, 2017.

## **2016**

23. On the Biomechanics of Heart Valves: From cellular biophysics to surgical repair, Department of Biomedical Engineering, University of Michigan, December 8, 2016.
24. Cardiovascular Biomechanics, Distinguished Seminar Speaker, Department of Biomedical Engineering, University of Arkansas, Fayetteville, AK, November 17-18, 2016.
25. The Valve Interstitial Cell: From Cellular Biophysics to Surgical Repair, Department of Biomedical Engineering, Ohio State University, November 10, 2016.
26. Constitutive modeling, computational implementation, and cellular mechanics, The 1st Sino-US Conference on Biomedical Engineering and Biomedical Robotics, Taihu Jingu Conference Center, Suzhou, China. November 5th-6th, 2016,
27. The Valve Interstitial Cell: From Cellular Biophysics to Surgical Repair, Department of Biomedical Engineering, University of Texas at Arlington, November 2, 2016.
28. Building the ICES-CCS at UT Austin, Invited talk for the 2016 NSF Cyberbridges Workshop, Rochester Institute of Technology, October 21-22, 2016.
29. A Framework For Parameter Estimation Of Heart Valves Using Inverse-Modeling Approach, Special Industry Topics Session organized by Christopher Basciano on BMES Medical Devices SIG on VV in medical devices, BMES 2016 Annual Meeting, Minneapolis, MN, October 5-8, 2016.
30. Stress fiber contractile behaviors in aortic valve interstitial cells, Session on Mechanical Behaviors of Cytoskeleton and Cells, SES 2016 annual meeting, University of Maryland, October 3-5, 2016.
31. Biomechanical aspects of AV valve function, 12th Deutsches Herzzentrum Berlin Lange Symposium, September 17-18, 2016.
32. Mitral Valve Function, 12th Deutsches Herzzentrum Berlin Lange Symposium, September 17-18, 2016.
33. In situ approach to estimate the layer specific biophysical state of aortic valve interstitial cells, ISACB 15th Biennial Meeting, Banff, Canada, September 7-10, 2016.
34. The Valve Interstitial Cell: From Cellular Biophysics to Surgical Repair, Heart Valve Disorders Conference, Cambridge University, July 23-24, 2016.
35. In-vivo Deformation of Semi-Lunar Heart Valves, Frontiers Medical Devices Conference, BMES Medical Devices SIG, May 23-25, 2016.

36. The valve interstitial cell: from cellular biophysics to surgical planning, Department of Mechanical Engineering, University of Texas at Dallas, May 6, 2016.
37. The valve interstitial cell: from cellular biophysics to surgical planning, Department of Biomedical Engineering, Washington University, April 16, 2016.

## **2015**

38. Keynote Lecture, Texas Mechanobiology Symposium, Texas AM University, October 25, 2015.
39. Biomechanics of heart valve tissue engineering, Department of Chemical and Biological Engineering, Center for Biomedical Engineering, Nanoscience and Microsystems Program, University of New Mexico, September 16, 2015.
40. Putting on the squeeze how valvular interstitial cells adapt to their local environments, Joint BME and ME seminar, UT San Antonio, September 9, 2015.
41. On Biomechanics of heart valves: Multiscale modeling, Southwest Research Institute, September 8, 2015.
42. Structural modeling of tissues and organs, Keynote Speaker, 2015 ASME NEMB 4th Annual Global Conference, Minneapolis, Minnesota, April 19-22, 2015.
43. On the Development of an Anatomical, Structural, and Biomechanical Integrated Model of the Mitral Valve, Keynote Lecture, 4th International Conference on Computational and Mathematical Biomedical Engineering, Cachan, France, June 29 - July 1, 2015.
44. Heart valve organ, tissue, and cell mechanics, Invited Lecture, Ohio State University, College of Medicine, March 23, 2015.

## **2014**

45. On the Development of an anatomical, structural, and biomechanical integrated model of the mitral valve, Invited Lecture, Department of Biomedical Engineering, Colorado State University, Nov. 3, 2014.
46. Fibrous Scaffolds for Engineering Tissues: Using Simulations to Find the Achievable Range of Material Behaviors, Keynote lecture, Society for Engineering Science 51st Annual Technical Meeting, Purdue University, October 1-3, 2014.
47. Anatomical, structural, and biomechanical integrated modeling of the mitral valve, Chevron Frontiers in Mechanical Engineering Distinguished Lecture, UT Mechanical Engineering, Sept. 26, 2014.
48. On the development of an anatomical, structural, and biomechanical integrated model of the mitral valve, Department of Mechanical Engineering, Rensselaer Polytechnic Institute, Sept. 24, 2014.
49. On the development of an anatomical, structural, and biomechanical integrated model of the mitral valve, Department of Mechanical Engineering, Washington University, Sept. 17-19, 2014.
50. Insights Into Regional Adaptions in the Growing Pulmonary Artery Using a Meso-Scale Structural Model: Effects of Ascending Aorta Impingement, 6th Biennial Conference on Heart Valve Biology and Tissue Engineering, London, United Kingdom, September 10-12, 2014.
51. On Development of an Anatomical, Structural, and Mechanical Integrated Model of the Mitral Valve, Keynote Lecture, CompIMAGE 2014, Pittsburgh, Pennsylvania, September 3-5, 2014.
52. New Trends in Valvular Tissue Modeling and Applications, 26th Annual American Venous Forum, New Orleans, LA, Feb. 19-22, 2014.

## **2013**

53. Structural Deterministic Micro-Meso Scale Mechanical Model for Fibrous Elastomeric Scaffolds, Keynote Speaker, 2013 MRS Fall Meeting, Boston, Massachusetts, December 3, 2013.



54. Multiscale modeling of the mitral valve, Presented at CTW: Mathematics Guiding Bioartificial Heart Valve Design, Mathematical Biosciences Institute, Ohio State University, Columbus, Ohio, October 28, 2013.
55. New Trends in Valvular and Cardiac Modeling and Applications, BME Distinguished Seminars, Boston University, Boston, Massachusetts, October 9, 2013.
56. On the Biomechanics of Native and Engineered Soft Tissues: Computational and Experimental Approaches. Northeastern University, March 2013.

## **2012**

57. On the Biomechanics of Native and Engineered Valvular Tissues, Department of Bioengineering, University of Utah, November 9, 2012.
58. On the function and simulation of the cardiac valve, Mechanical Engineering Seminar, Michigan State University, October 16, 2012.
59. On Function and Simulation of the Cardiac Valve, BME Seminar Series, Texas AM University (TAMU), College Station, Texas USA, October 1, 2012.
60. Structural and Mechanical Requirements for Bio-Engineered Heart Valves, Biological Valve Symposium, Mayo Clinic, Rochester, Minnesota USA, September 12, 2012.
61. Simulation of prosthetic heart valve damage evolution using a micro-mesoscale structural constitutive model, Keynote Lecture, 6th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2012), Vienna, Austria, September 10-14, 2012.
62. On the Function and Simulation of the Cardiac Valve, BME Seminar Series, University of Texas at San Antonio (UTSA), San Antonio, Texas USA, September 5, 2012.
63. Biomedical Considerations for Cardiovascular Tissue Engineering: Some New Questions, Advances in Tissue Engineering 2012, Rice University, Houston, Texas USA, August 10, 2012.
64. Soft Tissue Simulations Using Meso-Scale Structural Models, Presented at 10th World Congress on Computational Mechanics (WCCM2012), Sao Paulo, Brazil, July 8-13, 2012.
65. New Trends in Valvular and Cardiac Tissue Constitutive Models, EMI/PMC 2012 Joint Conference of the Engineering Mechanics Institute and the 11th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability, Notre Dame, Indiana USA, June 17-20, 2012.
66. Effects of large deformation mechanical stimuli on the development of engineered heart valve leaflet tissue, 2nd BMES-SPRBM Conference on Cellular and Molecular Bioengineering, San Juan, Puerto Rico, Jan 3-7, 2012.

## **2011**

67. New trends in the mitral valve biomechanics, Department of Mechanical Engineering, UC Boulder, November 13, 2011.
68. New trends in the biomechanics of cardiovascular tissues, Department of Mechanical Engineering, Johns Hopkins University, October 27, 2011.
69. Towards a unified understanding of valvular mechano-biology and mechanics, Vascular matrix biology and bioengineering workshop III, NAVBO Workshops in Vascular Biology 2011, October 16-20, Hyannis, MA.
70. Novel constitutive models for short- and long-term vascular tissue engineering, 48th Annual Technical Conference on the Society of Engineering Sciences, October 12-14, 2011.
71. On the biomechanics of native and engineered valvular tissues, OSU Institute for Materials Research and the Center for Emergent Materials, September 13, 2011.

72. Constitutive models for native and engineered valvular tissues, IUTAM Symposium on Computer Models in Biomechanics, Stanford, CA, August 29-Sept 2, 2011.
73. Structural deterministic biomechanical models of elastomeric scaffolds for soft tissue regeneration, Semi-plenary speaker, 11th U.S. National Congress on Computational Mechanics, Minneapolis, Minnesota, July 25-28, 2011.
74. A structural constitutive model for right ventricular myocardium, 4th Cardiac Physiome Workshop, Merton College, Oxford 8th -10th July 2011.
75. Heart Valve Biomechanics Special Session Mechanics of Heart Valves: from Structure to Flow, Cardiovascular Fluid Mechanics: from theoretical aspects to diagnostic and therapeutic support. Euromech Colloquium 529, Part of the ERCOFTAC WORKSHOP SIG 37 2011-01, Faculty of Engineering, University of Cagliari, Cagliari (Italy), June 2011.
76. Multi-level studies of valvular cellular deformation and tissue formation using elastomeric scaffolds, SPRBM 29th Scientific Conference, Eden Roc Renaissance Hotel, Miami Beach, Fla., January 4-8, 2011.

## **2010**

77. Invited Lecturer and Mentor, Student meet mentor luncheon, TERMIS 2010 annual conference and exposition, December 5-8, 2010.
78. A novel approach to account for non-affine fiber kinematics in structural constitutive models, IMECE 2010, Vancouver, BC, Canada, November 18, 2010.
79. Biomechanics of Native and Engineered heart valves Department of Biomedical Engineering, Cleveland Clinic, Cleveland, OH, September 30, 2010.
80. Bioengineering Challenges in Engineered Tissue Valves, ASAIO 56th Annual Conference, May 27-29, 2010, Baltimore, MD.

## **2009**

81. Biomechanics of Native and Engineered heart valves Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN, December 7, 2009.
82. Biomechanics of Native and Engineered heart valves WFIRM/Wake Forest University, Wake-Forest, NC, December 5, 2009.
83. Mechanics of the Pulmonary Valve and Artery Biomechanics of Arteries Mini-Symposium, Temple University, Philadelphia, PA, November, 24 2009.
84. How closely does the pulmonary autograft adapt in the systemic circulation? The Ross Summit 2009, Kennesaw, GA September 25, 2009.
85. Multi-scale biomechanics of heart valves Biomechanics Day 2009, Sponsored by Carnegie Mellon University, September 22, 2009.
86. "On The Function Of Heart Valves A Biomechanical Journey," The 2009 Van C. Mow Medal Awardee Lecture, Summer Bioengineering Conference, Lake Tahoe, CA, June 19, 2009.

## **2008**

87. Integrating the Biomechanics of Native and Engineered Heart Valve Tissues, Department of Cell Biology and Anatomy, School of Medicine, University of South Carolina, Columbia, South Carolina,. November 21, 2008.
88. Biomechanics of Native and Engineered Heart Valve Tissues, Mechanics of Cardiovascular Organs and tissues session, American Society of Mechanical Engineers, Boston, MA. November 5, 2008.

89. Biomechanics of Native and Engineered Heart Valve Tissues, Department of Mechanical Engineering, Southern Methodist University, Dallas, TX. October 24, 2008.
90. Cardiology Grand Rounds, Biomechanics of Native and Engineered Heart Valve Tissues, Sponsored by the Cardiovascular Institute and the University of Pittsburgh Medical Center. September 16, 2008.
91. Richard Skalak Lecture at the Department of Biomedical Engineering, Columbia University, NY, entitled Biomechanics of Native and Engineered Heart Valve Tissues, September 12, 2008.
92. Biomechanics of Native and Engineered Heart Valve Tissues, Keynote address, 16th International Conference on Mechanics in Medicine and Biology, Pittsburgh, PA, July 23-25, 2008.
93. Extracellular matrix-contractile response coupling of the aortic heart valve interstitial cell invited keynote lecture presented at the 3rd Biennial Heart Valve Biology and Tissue Engineering Meeting, The Royal Society, London, UK, May 4-7, 2008.
94. Sigma-Kappa-Tau Lecture at the Department of Biomedical Engineering, CCNY entitled Biomechanics of Native and Engineered Heart Valve Tissues, April 9, 2008.
95. Biomechanics of native and engineered heart valve tissues, Keynote address, Symposium on valve mechanics, 25th Annual Houston Society for Engineering in Medicine and Biology, Houston, TX, Feb. 8, 2008
96. Biomechanical design of heart valve tissues, Boston Scientific Corporation, Applied Research Division, Maple Grove, MN, January 18, 2008.

## **2007**

97. Biomechanics of native and engineered heart valve tissues, Distinguished Lecturer Series, Institute for Medicine and Engineering, University of Pennsylvania, October 16, 2007.
98. Biomechanics of native and engineered heart valve tissues, Distinguished Lecturer Series, BioMatrix Engineering and Regenerative Medicine Center, University of Alabama at Birmingham, October 9, 2007.
99. Biomechanics of native and engineered heart valve tissues, Distinguished Academic Speaker for the Research Day 2007, School of Biomedical Engineering, Dalhousie University, Halifax, Nova Scotia, May 11, 2007.
100. Differences in tissue remodeling potential of the aortic and pulmonary heart valve interstitial cells, Invited Lecture for the Session entitled Bioengineering in Development and Disease at the 2007 FASEB annual meeting, April 30, 2007. Sponsored by the American Association of Anatomists.
101. Biomechanics of native and engineered heart valve tissues, Departments of Biomedical Engineering, Mechanical and Industrial Engineering, University of Iowa, February 22, 2007.
102. Biomechanics of native and engineered heart valve tissues, Distinguished Lecturer Series, Department of Biomedical Engineering, University of Texas at Austin, February 8, 2007.
103. Biomechanics of engineered heart valve tissues, Distinguished Lecturer Series, Department of Biomedical Engineering, Cornell University, February 5, 2007.

## **2006**

104. Biomechanics of native and engineered heart valve tissues, Keynote Address, Workshop Two: Cardiac Mechanics and Remodeling, Mathematical Biosciences Institute at the Ohio State University, October 2-6, 2006, The Ohio State University, Columbus, OH. Available at <http://mbi.osu.edu/2006/ws2abstracts.htmlsacks>
105. Mechanics of engineered heart tissue, Keynote Address, American Society of Biomechanics, September 6 -9, 2006, Blacksburg, VA.
106. Biomechanics of engineered heart valve tissues, Presented at the 28th IEEE EMBS Annual International Conference, August 30-September 3, 2006, New York City, NY.

107. Structural constitutive models for engineered tissue scaffolds, Presented at the 43rd Annual Technical Meeting Society of Engineering Science, August 13 - 16, 2006, Pennsylvania State University, University Park, PA.
108. The role of mechanical stimulation in ECM development in in-vitro engineered valvular tissue development, Leibniz Symposium on Transplantation and Regeneration of Thoracic Organs, Hannover, GY, May 19 - 20, 2006.

## **2005**

109. Heart valve tissue engineering, Session 5, Tissue Engineering Applications, Part I, National University of Singapore Tissue Engineering Program ICBME 2005 Pre-Conference Workshop on Regenerative Medicine and Tissue Engineering, Singapore, December 5-6, 2005.
110. Biomechanics of native and engineered heart valve tissues, Symposium S9: Current Trends in Native and Prosthetic Valve Dynamic Simulation, 12th International Conference on Biomedical Engineering, Singapore, December 7 -10, 2005.
111. Analysis and design of novel electrospun PEUU scaffolds for soft tissue engineering, Materials Research Society 2005 Annual Fall Meeting, Boston, MA, November 28 - December 2, 2005. Note that this talk was voted top five presentations for the entire MRS meeting.
112. Biomechanics of native and engineered heart valve tissues, Department of Bioengineering, The Pennsylvania State University, State College, PA, November 11, 2005.
113. Biomechanics of native and engineered heart valve tissues, Institute of Biomaterials and Biomedical Engineering, Distinguished Speakers in Bioengineering, University of Toronto, Toronto, Ontario, October 25, 2005.
114. Changes in the biomechanical function of the neurogenic bladder after spinal cord injury, 51th Annual Meeting of the American Paraplegia Society, Las Vegas, NV. September 7, 2005.
115. Biomechanics of Native and Engineered Heart Valve Tissues Mechanical Engineering, Michigan State University East Lansing, MI. October 18, 2005.
116. Changes in the structure-strength relations of the bladder wall after spinal cord injury, Invited presentation for the National Bladder Foundations 2005 International Bladder Symposium, Linthicum, MD, April 15-16, 2005.
117. Biomechanics of heart valves, Invited presentation for the Medtronic Forum presentation series, Medtronic Heart Valve Division, Irvine, CA, February 18, 2005.
118. Biomechanical analyses of heart valves, Invited presentation for Vascular Biology and Transplant, Yale University, February 14, 2005.
119. Invited participant for NIDDK/NIH Workshop entitled Research progress report and strategic plan for pediatric urology, College, Park, MD, February 2 - 4, 2005.

## **2004**

120. Biomechanics of engineered heart valve tissues, Invited presentation at the Department of Biomedical Engineering, Yale University, October 27, 2004.
121. Biomechanics of engineered heart valve tissues, Invited presentation at LOEX, University of Laval, Quebec, Canada, October 22, 2004.
122. Heart valve biomechanics and mechanobiology, Invited presentation at the BMES annual fall meeting, part of the session entitled Heart valve disease and treatment: Clinical and Engineering perspectives, Organized by Peter F. Davies, Philadelphia, PA, October 16, 2004.
123. Biomechanics of the native and engineered pulmonary valve, Invited presentation at the Department of Biomedical Engineering, Purdue University, October 4, 2004.

124. A structural model for the native pulmonary valve, Presented at Advances in Tissue Engineering and Biology of Heart Valves, Florence, Italy, September 15-18, 2004.
125. Electrospun poly(ester-urethane) urea scaffolds for tissue engineered heart valve leaflets, Invited presentation at the UWEB 8th Summer Symposium, University of Washington, Seattle, WA, August 25-27, 2004. Published in Book of Abstracts, page 28.
126. Biomechanics of native and engineered heart valve tissues, Department of Biomedical Engineering, Clemson University, July 16, 2004.
127. Viscoelastic behavior of heart valve tissues under biaxial stretch, 2004 European Society for Biomechanics, sHertogenbosch, Netherlands, July 7, 2004.
128. A structural constitutive model for the native pulmonary valve, International Union for Theoretical and Applied Mechanics Symposium on Soft Tissue Mechanics, Graz, Austria, June 27, 2004.
129. Towards tissue engineered heart valves, Cardiothoracic Surgery Grand Rounds, University of Pittsburgh School of Medicine, June 16, 2004.
130. Biomechanics of native and engineered heart valve tissues, Department of Biomedical Engineering, Boston University, March 22, 2004.

### **2003**

131. Biomechanics of native and engineered heart valve tissues, Department of Biomedical Engineering, Texas AM University, December 12, 2003.
132. Workshop entitled "Biology for Engineers" coordinated by Prof. Jane Grande-Allen of Rice University and Prof. Michael Sacks of the University of Pittsburgh, part of the 3-day symposium on Biological and Biologically Inspired Materials and Systems," First fall meeting of the Society for Experimental Mechanics, October 1, 2003, Springfield, MA.
133. FE implementation of Fung elastic model for planar anisotropic biological materials, Keynote talk at the 7th US National Congress on Computational Mechanics, Albuquerque, New Mexico, July 30, 2003.
134. How mechanical stresses are transmitted to the cellular level Invited talk for the Gordon Research Conference on Biomaterials and Biocompatibility, Holderness School, Plymouth, NH, July, 2003.
135. Effects of fixation pressure on the durability of porcine bioprosthetic heart valves, Society of Thoracic Surgeons 39th Annual Meeting, San Diego, CA, February 1, 2003.

### **2002**

136. Biomechanical considerations in Tissue Engineered Heart Valves Presented at the Tissue Engineering meeting held at Cold Spring Harbor Laboratory, November 21-24, 2002.
137. Constitutive models for heart valves tissues, Biocomplexity meeting, Norte Dame, IN, November 7-10, 2002.
138. Recent advances in constitutive models for heart valve tissues, International Society for Heart Research, Madison, WI, July 24-27, 2002.
139. Biomechanical design and analysis of engineered tissues, Engineering Tissue Growth, March 19, 2002, Pittsburgh, PA.
140. Heart valve biomechanics and extracellular matrix, International Society for Applied Cardiovascular Biology (ISACB) at the 8th Biennial Meeting, Feb. 27-March 2, 2002, St. Gallen, Switzerland.
141. Constitutive models for soft tissues, Department of Mechanical Engineering, CMU, Pittsburgh, PA, February 15, 2002.
142. Biomechanics of native and engineered heart valve biomaterials University of Washington (UWEB), Seattle, WA, Feb. 7, 2002.

**2001**

143. Integration of quantitative morphological data into structural constitutive models, University of Massachusetts Medical School, Worcester, MA, December 17, 2001.
144. Planar testing methods: Overview and applications, Invited by Dr. Robert Tranquillo for the IPRIME annual meeting, University of Minnesota, May 15, 2001.
145. Biomechanics of Soft Biomaterials, Organized and chaired workshop at the 2001 Society for Biomaterials, St. Paul, MN, April 24, 2001.
146. Biomechanical and structural properties of native and biologically-derived soft tissues, Invited keynote speaker at the Engineering Tissue Growth International Conference and Exposition, Pittsburgh, PA, March 26-29, 2001.

**2000**

147. Biomechanical considerations in developing autogenous heart valve substitutes, Invited lecture at the 73rd National American Heart Association Scientific Sessions, New Orleans, LA, November 13, 2000.

**1999**

148. "Structure-strength relations in heart valve bioprosthetic tissues," Invited by Dr. Ajit Yoganathan, Georgia Institute of Technology, November 2, 1999.
149. "Micro-mechanics of the bioprosthetic aortic valve cusp: effects of chemical fixation and fatigue," ASB annual meeting in Pittsburgh, PA, October, 1999.
150. "Cardiovascular tissue mechanics" at the SFB workshop entitled "Cardiovascular Implantology: Biological, Biomaterial, and Device Issues," Sponsored by the Society for Biomaterials, April 28-May 2, 1999, Providence, Rhode Island.
151. "Structural constitutive models for planar collagenous tissues," Invited by Dr. Stephen Cowin, Department of Mechanical Engineering, CUNY, February, 1999.

**1998**

152. "Constitutive models for bioprosthetic heart valves," Invited Dr. Derek Boughner, John P. Robarts Research Institute, University of Western Ontario, December 1998.

## PUBLICATIONS

### BOOKS

1. "Biomechanics of Natural and Synthetic Biological Structures: Application, Approach, and Simulation," Dr. M.S. Sacks, Springer, To appear Fall 2019.
2. "Advances in Heart Valve Biomechanics," Drs. Michael S. Sacks and Jun Liao, Co-Editors. Springer, to be published Fall 2018.
3. "Structure-Based Mechanics of Tissues and Organs - A Tribute to Professor Yoram Lanir," Co-Editors: G. Kassab and M.S. Sacks, Springer, SBN 978-1-4899-7630-7, DOI 10.1007/978-1-4899-7630-7. 2016.

### BOOK CHAPTERS

1. Alex Khang, Rachel M. Buchanan, Salma Ayoub, Bruno V. Rego, Chung-Hao Lee, Giovanni Ferrari, Kristi S. Anseth, and Michael S. Sacks, "Mechanobiology of the heart valve interstitial cell: Simulation, experiment, and discovery," *Mechanobiology in Health and Disease*. doi.org/10.1016/B978-0-12-812952-4.00008-8, 2018.
2. M.S. Sacks, "Finite Element Implementation of Structural Constitutive Models," *Structure-Based Mechanics of Tissues and Organs*, G. Kassab and M.S. Sacks, Eds., pp. 347-364, 2016.
3. C.H. Lee, M.S. Sacks, "Fibers to Organs: How Collagen Fiber Properties Modulate the Closing Behavior of the Mitral Valve," *Structure-Based Mechanics of Tissues and Organs*, G. Kassab and M.S. Sacks, Eds., pp. 365-382, 2016.
4. M.S. Sacks and S. Wognum, Extensions of structural models for soft tissues, *Structure-Based Mechanics of Tissues and Organs*, G. Kassab and M.S. Sacks, Eds.
5. Chad Eckert, A. DAmore, M.S. Sacks, Microstructural models for engineered tissue scaffolds, *Structure-Based Mechanics of Tissues and Organs A Tribute to Professor Yoram Lanir*, G. Kassab and M.S. Sacks, Eds.
6. C.H. Lee, R. Amini, Y. Sakamoto, C. Carruthers, A. Aggarwal, R.C. Gorman, J.H. Gorman, III, M.S. Sacks, "A Computational Framework for Multi-scale Modeling of the Mitral Valve," to be published in "Multi-scale Modeling in Biomechanics and Mechanobiology, W. Hwang, E. Kuhl, and Suvranu De, Eds. Springer, in-press.
7. M.S. Sacks, A. DAmore, and C. Hobson, "Chapter I.1.4: Finite Element Methods in Biomechanics," *Biomaterials Science: An introduction to Materials in Medicine*, 3rd edition, Buddy Ratner, Frederick Schoen, Allan Hoffman, and Jack Lemons, Eds., pp. 2134, 2013.
8. M.S. Sacks, S. Wognum, J.A. Stella, E.M. Joyce, *The Mechanics of Native and Engineered Cardiac Soft Tissues*, *Comprehensive Biomaterials*, Vol. 3 Methods of Analysis. Ducheyne, Healy, Hutmacher, Grainger, Kirkpatrick, Eds., Pages 113132, 2011
9. M. S. Sacks and Jia Lu, Formulation and Computational Implementation of Constitutive Models for Cardiovascular Soft Tissue Simulations, in *Image-based computational modeling in the human circulatory and pulmonary systems: Method and Applications*, K.B. Chandran, H.S. Udaykumar, and J.M. Reinhardt (Editors), 2010.
10. M. S. Sacks, G.C. Engelmayr, D.K. Hildebrand, J.E. Mayer, Jr., "Chapter 11 - Biomechanical considerations for tissue engineered heart valve bioreactors," *An invited chapter for Bioreactors for Tissue Engineering*, Julian Chadhuri and Mohamed Al Rubeai, Eds., Springer, pp. 235-267, 2005.
11. M.S. Sacks, "Small angle light scattering methods for soft tissue connective tissue structural analysis," *An invited chapter for the Encyclopedia for Biomaterials and Biomedical Engineering*, G. Wnek and G. Bowlin, Eds, Marcel Dekker, 2004.

12. M. S. Sacks (Ed.), "2003 Advances in bioengineering", Proceedings of the IMECE 2003, vol. 1, ASME Press, ISBN 0-7918-4663-6, 2003.
13. M.S. Sacks, "Biomechanics of native and engineered heart valve tissues," Chapter 18 of Functional Tissue Engineering, pp. 243-257, Springer-Verlag, 2003.
14. M.S. Sacks, et al. "Overcoming bladder disease A strategic plan for research," A report to the Bladder Research Progress Review Group, National Institute of Diabetes & Digestive Kidney Diseases (NIDDK). Published by the NIH, August 2002.
15. N. Katsube, W. Soboyejo, and M.S. Sacks (Eds.), "Functional biomaterials," Published as part of the Key Engineering Materials series, vols. 198-199, Trans-Tech Publications, Zurich, 2001.
16. M.S. Sacks, "Biaxial mechanical evaluation of planar biological materials," in Cardiovascular Soft Tissue Mechanics, S.C. Cowin and J.D. Humphrey, Eds., pp. 199-246, Kluwer Academic Publishers, 2001.
17. W.S. Slaughter and M.S. Sacks, "Modeling fatigue damage in chemically treated soft tissues," Functional Biomaterials, pp. 255-260, Trans-Tech, Zurich, 2001.
18. M.S. Sacks and K.L. Billiar, "Biaxial mechanical properties of bioprosthetic heart valve cusps subjected to accelerated testing," Advances in Anti-Calcific and Anti-Degenerative Treatment of Heart Valve Bioprostheses, S. Gabbay and R.W.M. Frater, Eds., pp. 35-50, 1997.



## **SPECIAL CITATIONS AND JOURNAL COVERS**

1. Journal Cover: Khalighi AH, Rego BV, Drach A, Gorman RC, Gorman JH 3rd, Sacks MS., "Development of a Functionally Equivalent Model of the Mitral Valve Chordae Tendineae Through Topology Optimization," *Ann Biomed Eng.* 2019 Jan;47(1):60-74. doi: 10.1007/s10439-018-02122-y. Epub 2018 Sep 5.
2. Journal Cover: Bruno V Rego, Amir H Khalighi, Andrew Drach, Eric K Lai, Alison M Pouch, Robert C Gorman, Joseph H Gorman III, Michael S Sacks, "A noninvasive method for the determination of in vivo mitral valve leaflet strains," *International journal for numerical methods in biomedical engineering*, 21 August 2018 <https://doi.org/10.1002/cnm.3142>
3. Journal Cover: Salma Ayoub, Karen C Tsai, Amir H Khalighi, Michael S Sacks, "The Three-Dimensional Microenvironment of the Mitral Valve: Insights into the Effects of Physiological Loads," *Cellular and Molecular Bioengineering*, August 2018, Volume 11, Issue 4, pp 291306
4. Special Citation: Long Heise, R. et al. Generating elastin-rich SIS-based smooth muscle constructs utilizing exogenous growth factors and cyclic mechanical stimulation. *Tissue Engineering Part A*, 2009.

## **PATENTS**

1. Steven M. Boronyak , George C. Engelmayr, Jr., Sharan Ramaswamy, M.S. Sacks, David E. Schmidt, Mohammed S. El-Kurdi, Flow-Stretch-Flexure Bioreactor, US Patent Number 8,852,923, Published October 7, 2014.
2. M.B. Chancellor, J. Huard, C. Capelli, S. Chung, M.S. Sacks, patent: Rapid preparation of stem cell matrices for use in tissue and organ treatment and repair,

## JOURNALS

2018

1. "Porphyrin-Based SOD Mimic MnTnBuOE-2-PyP5+ Inhibits Mechanisms of Aortic Valve Remodeling in Human and Murine Models of Aortic Valve Sclerosis," Wanda Anselmo, Emanuela Branchetti, Juan B. Grau, Gen Li, Salma Ayoub, Eric K. Lai, Nancy Rioux, Artak Tovmasyan, Jacqueline H. Fortier, Michael S. Sacks, Ines Batinic-Haberle, Stanley L. Hazen, Robert J. Levy, Giovanni Ferrari, *J Am Heart Assoc.* 7:e007861. DOI: 10.1161/JAHA.117.007861, 2018.
2. "A framework for designing patientspecific bioprosthetic heart valves using immersogeometric fluidstructure interaction analysis," Fei Xu, Simone Morganti, Rana Zakerzadeh, David Kamensky, Ferdinando Auricchio, Alessandro Reali, Thomas JR Hughes, Michael S Sacks, MingChen Hsu, *International journal for numerical methods in biomedical engineering*, Volume 34(4), 2018.
3. "An anisotropic constitutive model for immersogeometric fluid-structure interaction analysis of bioprosthetic heart valves," Wu MCH, Zakerzadeh R, Kamensky D, Kiendl J, Sacks MS, Hsu MC., *J Biomech.* 2018 Jun 6;74:23-31. doi: 10.1016/j.jbiomech.2018.04.012. Epub 2018 Apr 12.
4. "Serotonin receptor 2B signaling with interstitial cell activation and leaflet remodeling in degenerative mitral regurgitation," Driesbaugh KH, Branchetti E, Grau JB, Keeney SJ, Glass K, Oyama MA, Rioux N, Ayoub S, Sacks MS, Quackenbush J, Levy RJ, Ferrari G.J *Mol Cell Cardiol.* 2018 Feb;115:94-103. doi: 10.1016/j.yjmcc.2017.12.014. Epub 2017 Dec 30.PMID: 29291394, 2018
5. "Multi-resolution geometric modeling of the mitral heart valve leaflets," Khalighi AH, Drach A, Gorman RC, Gorman JH 3rd, Sacks MS.*Biomech Model Mechanobiol.* 2018 Apr;17(2):351-366. doi: 10.1007/s10237-017-0965-8. Epub 2017 Oct 5.PMID: 28983742, 2018
6. "Development of a Functionally Equivalent Model of the Mitral Valve Chordae Tendineae Through Topology Optimization," Khalighi AH, Rego BV, Drach A, Gorman RC, Gorman JH 3rd, Sacks MS.*Ann Biomed Eng.* 2018 Sep 5. doi: 10.1007/s10439-018-02122-y. [Epub ahead of print]PMID: 30187238, 2018
7. "An integrated inverse model-experimental approach to determine soft tissue three-dimensional constitutive parameters: application to post-infarcted myocardium," Avazmohammadi R, Li DS, Leahy T, Shih E, Soares JS, Gorman JH, Gorman RC, Sacks MS.*Biomech Model Mechanobiol.* 2018 Feb;17(1):31-53. doi: 10.1007/s10237-0170943-1. Epub 2017 Aug 31.PMID: 28861630, 2018
8. "An anisotropic constitutive model for immersogeometric uid-structure interaction analysis of bioprosthetic heart valves," Wu MCH, Zakerzadeh R, Kamensky D, Kiendl J, Sacks MS, Hsu MC.*J Biomech.* 2018 Jun 6;74:23-31. doi: 10.1016/j.jbiomech.2018.04.012. Epub 2018 Apr 12.PMID: 29735263, 2018
9. Perspectives on Sharing Models and Related Resources in Computational Biomechanics Research, Ahmet Erdemir, Peter J. Hunter, Gerhard A. Holzapfel, Leslie M. Loew, John Middleton, Christopher R. Jacobs, Perumal Nithiarasu, Rainald Lhner, Guowei Wei, Beth A. Winkelstein, Victor H. Barocas, Farshid Guilak, Joy P. Ku, Jennifer L. Hicks, Scott L. Delp, Michael S. Sacks, Jeffrey A. Weiss, Gerard A. Ateshian, Steve A. Maas, Andrew D. McCulloch, Grace C. Y. Peng, *Journal of biomechanical engineering* 140 (2), 024701, 2018.
10. "A noninvasive method for the determination of in vivo mitral valve leaflet strains," Rego BV, Khalighi AH, Drach A, Lai EK, Pouch AM, Gorman RC, Gorman JH 3rd, Sacks MS.*Int J Numer Method Biomed Eng.* 2018 Aug 21:e3142. doi: 10.1002/cnm.3142. PMID: 30133180, 2018.
11. "A material modeling approach for the effective response of planar soft tissues for efficient computational simulations," Zhang W, Zakerzadeh R, Zhang W, Sacks MS.*J Mech Behav Biomed Mater.* 2018 Sep 20;89:168-198. doi: 10.1016/j.jmbbm.2018.09.016. PMID: 30286376, 2018
12. "A framework for designing patient-specific bioprosthetic heart valves using immersogeometric uid-structure interaction analysis," Xu F, Morganti S, Zakerzadeh R, Kamensky D, Auricchio F, Reali A, Hughes TJR, Sacks MS, Hsu MC.*Int J Numer Method Biomed Eng.* 2018 Apr;34(4):e2938. doi: 10.1002/cnm.2938, 2018.

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2. "On the need for multi-scale geometric modeling of the mitral heart valves," Michael S. Sacks, Amir Khalighi, Bruno Rego, Salma Ayoub and Andrew Drach, *HEALTHCARE TECHNOLOGY LETTERS* October 2017 Vol.4 No.5

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**PEER REVIEWED ABSTRACTS**

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**EXTENDED CONFERENCE PROCEEDINGS (>2 pages)**

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## ABSTRACTS

*In the following, all are podium presentations unless specified as a poster.*

### 2018

1. "A Murine Computational Cardiac Model of the Adaptation to Pulmonary Arterial Hypertension," Reza Avaz, Emilio Mendiola, David Li, Richard Dixon, and Michael S. Sacks, 2018 BMES Annual Meeting, Atlanta, GA, October 17-20, 2018.
2. "A Mathematical Model for the Post-Implant Collagen Maturation Behavior of Pulmonary Artery Engineered Tissue Conduits," Michael S. Sacks, 2018 BMES Annual Meeting, Atlanta, GA, October 17-20, 2018.
3. "Assessment of the Mitral Valve After Infarction Through Clinical Imaging," Bruno Rego, Amir Khalighi, Robert C. Gorman, Joseph H. Gorman, and Michael S. Sacks, 2018 BMES Annual Meeting, Atlanta, GA, October 17-20, 2018.
4. "The Effect of Leaflet Prestrain on the Dynamic Function of the Aortic Heart Valve," Rana Zakerzadeh, Ming-Chen Hsu, and Michael S. Sacks, 2018 BMES Annual Meeting, Atlanta, GA, October 17-20, 2018.
5. "A First Mathematical Model for Valvular Interstitial Cell Signaling," Dan Howsmon, Michael S. Sacks, 2018 BMES Annual Meeting, Atlanta, GA, October 17-20, 2018. (Poster)
6. "Simultaneous 2D Strain and Structural Analysis of Collagenous Tissues Using Polarized Spatial Frequency Domain Imaging," Samuel Potter, Will Goth, James Tunnell, and Michael S. Sacks, 2018 BMES Annual Meeting, Atlanta, GA, October 17-20, 2018. (Poster)
7. "Patient-specific Image-based Prediction of Mitral Valve Function After Annuloplasty Surgery," Amir Khalighi, Bruno Rego, Andrew Drach, Robert Gorman, Joseph Gorman, and Michael S. Sacks, 2018 BMES Annual Meeting, Atlanta, GA, October 17-20, 2018. (Poster)
8. "A Computational Study of the Role of Pericardium on Cardiac Function in Normal and Hypertensive Hearts," Emilio Mendiola, Huan Nguyen, Reza Avaz, and Michael S. Sacks, 2018 BMES Annual Meeting, Atlanta, GA, October 17-20, 2018. (Poster)
9. "Characterization of Composite Electrospun Hydrogel Materials for Prosthetic Heart Valves," Alex Khang, Siliang Wu, John Carruth, Will Goth, James Tunnell, and Michael S. Sacks, 2018 BMES Annual Meeting, Atlanta, GA, October 17-20, 2018. (Poster)
10. "A computational study of aortic valve function," Rana Zakerzadeh, Ming-Chen Hsu, and Michael S. Sacks, IGA 2018, October 10-12, 2018, Austin, TX 2018.
11. "Putting on the squeeze - How valve interstitial cells adapt to their local environment," Michael S. Sacks, 8th Biennial Heart Valve Biology and Tissue Engineering Meeting, Royal Society of Medicine, London, UK 26-28 September, 2018.
12. "Remodeling of the mitral valve anterior leaflet after ischemic mitral regurgitation," Michael S. Sacks, 8th Biennial Heart Valve Biology and Tissue Engineering Meeting, Royal Society of Medicine, London, UK 26-28 September, 2018.
13. "A mathematical model for valvular interstitial cell signalling," Dan Howsman and Michael S. Sacks, 8th Biennial Heart Valve Biology and Tissue Engineering Meeting, Royal Society of Medicine, London, UK 26-28 September, 2018.
14. "A novel downscale model for the estimation of 3D heart valve interstitial cell contractile state in-vivo," Michael S. Sacks, Rachel Buchanan, and Alex Khang, 8th Biennial Heart Valve Biology and Tissue Engineering Meeting, Royal Society of Medicine, London, UK 26-28 September, 2018. (Poster).
15. "A macro-micro modeling approach to determine in-situ heart valve interstitial cell contractile behaviors in native and synthetic environments," Michael S. Sacks, ASME NEMB NanoEngineering for Medicine and

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16. "On the 3D mechanical properties of passive myocardium using a novel numerical-experimental approach," David Li, Reza Avaz, and Michael S. Sacks, 13th World on Computational Mechanics, New York, NY, July 22-27, 2018.
17. "A computational heart model of pulmonary arterial hypertension," Reza Avaz and Michael S. Sacks, 13th World on Computational Mechanics, New York, NY, July 22-27, 2018.
18. "How the aortic valve functions," Rana Zakerzadeh, Ming-Chen Hsu, and Michael S. Sacks, 13th World on Computational Mechanics, New York, NY, July 22-27, 2018.
19. "A downscale model to determine in-situ aortic valve cell function," Michael S. Sacks, 13th World on Computational Mechanics, New York, NY, July 22-27, 2018.
20. "A fiber specific model of myocardial growth and remodeling under hypertension," Reza Avaz and Michael S. Sacks, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
21. "A non-invasive method for the determination of in-vivo mitral valve leaflet strains," Bruno Rego, Amir H. Khalighi, Robert C. Gorman, Joseph H. Gorman, and Michael S. Sacks, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
22. "Effects of ischemic regurgitation on mitral valve mechanics and structure," Bruno Rego, Salma Ayoub, Robert C. Gorman, Joseph H. Gorman, and Michael S. Sacks, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
23. "A computational heart model of pulmonary arterial hypertension," Reza Avaz and Michael S. Sacks, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
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25. "A macro-micro modeling approach to determine in-situ heart valve interstitial cell contractile state," Michael S. Sacks, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
26. "State of the art simulation of bioprosthetic heart valve durability," Michael S. Sacks, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
27. "Development of a mechanically equivalent mitral valve sub-valvular apparatus," Amir H. Khalighi, Bruno Rego, Robert C. Gorman, Joseph H. Gorman, and Michael S. Sacks, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
28. "Using simulation to find the achievable range of heart valve tissue emulating behaviors," Michael S. Sacks, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
29. "A comprehensive parametric study of aortic valve functionality," Rana Zakerzadeh, Ming-Chen Hsu, and Michael S. Sacks, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
30. "On the presence of affine fiber kinematics in the mitral valve anterior leaflet under simulated physiological loading," Chung-Hao Lee and Michael S. Sacks, 8th World Congress of Biomechanics, Dublin, Ireland, 8-12, July 2018.
31. "Simulations and parametric analysis of trileaflet valve function," Rana Zakerzadeh, Ming-Chen Hsu, and Michael S. Sacks, 18th U.S. National Congress on Theoretical and Applied Mechanics, Chicago, IL June 5-9, 2018.
32. "A Novel Mathematical Model for Maturing Collagenous Tissues," Michael S. Sacks, 18th U.S. National Congress on Theoretical and Applied Mechanics, Chicago, IL June 5-9, 2018.
33. "Patient specific optimization of mitral valve annuloplasty surgery," Amir H. Khalighi, Bruno V. Rego, Andrew Drach, Robert C. Gorman, Joseph H. Gorman, and Michael S. Sacks, The Heart Valve Society 2018 Annual

Scientific Meeting, New York, NY, April 12-14, 2018.

34. "Quantifying infarction-induced changes in mitral valve," Bruno V. Rego, Amir H. Khaligi, Andrew Drach, Robert C. Gorman, Joseph H. Gorman, and Michael S. Sacks, The Heart Valve Society 2018 Annual Scientific Meeting, New York, NY, April 12-14, 2018.
35. "Mechanically equivalent mitral valve sub-valvular apparatus," Amir H. Khaligi, Bruno V. Rego, Andrew Drach, Robert C. Gorman, Joseph H. Gorman, and Michael S. Sacks, The Heart Valve Society 2018 Annual Scientific Meeting, New York, NY, April 12-14, 2018. (Poster)
36. "State of the Art Simulation of Bioprosthetic Heart Valve Durability," Will Zhang and Michael S. Sacks, The Heart Valve Society 2018 Annual Scientific Meeting, New York, NY, April 12-14, 2018. (Poster)
37. "Valve Interstitial Cell Mechanics within a 3D poly(ethylene glycol) hydrogel," Alex Khang, Andrea Gonzalez Rodriguez, Megan Schroeder, Kristi Anseth, and Michael S. Sacks, The Heart Valve Society 2018 Annual Scientific Meeting, New York, NY, April 12-14, 2018. (Poster)
38. "Mitral valve remodeling during ischemic regurgitation: Implications for restoring tissue homeostasis," Bruno V. Rego, Salma Ayoub, Amir H. Khaligi, Robert C. Gorman, Joseph H. Gorman, and Michael S. Sacks, The Heart Valve Society 2018 Annual Scientific Meeting, New York, NY, April 12-14, 2018. (Poster)
39. "The aortic heart valve: Why it is the way it is," Rana Zakerzede, Ming-Chen Hsu, and Michael S. Sacks, The Heart Valve Society 2018 Annual Scientific Meeting, New York, NY, April 12-14, 2018. (Poster)
40. "Elucidating Valve Interstitial Cell-ECM Biomechanical Interactions Using Poly(ethylene glycol) Hydrogels," Alex Khang, Andrea Gonzalez Rodriguez, Megan Schroeder, Kristi S. Anseth, and Michael S. Sacks, Society for Biomaterials Annual Meeting, Atlanta, GA 2018.

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41. "Alterations in the mechanical properties and in-vivo geometry of the mitral valve following myocardial infarction," Bruno Rego, Salma Ayoub, Amir H. Khalighi, Andrew Drach, Joseph H. Gorman, Robert C. Gorman, and Michael S. Sacks, 2017 Summer Biomechanics, Bioengineering, and Biotransport Conference, Tucson, AZ, June 21-24, 2017. (Poster)
42. Effects of geometric remodeling on mitral valve leaflet mechanics: An ex-vivo investigation, Charles Bloodworth, Eric L. Pierce, Nancy J. Deaton, Michael S. Sacks, and Ajit P. Yoganathan, Tucson, AZ, June 21-24, 2017. (Poster)
43. Patient Specific mitral valve annuloplasty repair: The optimal ring design for treating ischemic mitral regurgitation, Amir H. Khalighi, Andrew Drach, and Michael S. Sacks, 2017 Summer Biomechanics, Bioengineering, and Biotransport Conference, Tucson, AZ, June 21-24, 2017. (Poster)
44. Characterizing the three-dimensional mechanical properties of passive myocardium injected with hydrogels using a novel numerical-experimental inverse modeling approach, David S. Li, Reza Avazmohammadi, Joao S. Soares, Jason A. Burdick, Joseph H. Gorman, Robert C. Gorman, and Michael S. Sacks, 2017 Summer Biomechanics, Bioengineering, and Biotransport Conference, Tucson, AZ, June 21-24, 2017. (Poster)
45. Determination of the mechanical properties of de-novo engineered tissue in needled-nonwoven scaffolds, Joao S. Soares, Will Zhang, and Michael S. Sacks, 2017 Summer Biomechanics, Bioengineering, and Biotransport Conference, Tucson, AZ, June 21-24, 2017. (Poster)
46. A novel small-specimen planar biaxial testing device for inverse model validation of soft tissues, Samuel Potter, Jordan Graves, Borys Drach, Tim Woodard, Thomas Leahy, Chris Hammel, Aaron Feng, Aaron Baker, and Michael S. Sacks, 2017 Summer Biomechanics, Bioengineering, and Biotransport Conference, Tucson, AZ, June 21-24, 2017. (Poster)
47. Modeling of myocardium compressibility and its impact in computational simulations of the functioning heart, Joao S. Soares, David S. Li, Eric Lai, Joseph H. Gorman, Robert C. Gorman, and Michael S. Sacks,



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48. A parametric study of the optimal shape and leaflet properties in bioprosthetic heart valves, Rana Zakerzadeh, Fei Xu, Michael C.H. Wu, Ming-Chen Hsu, and Michael S. Sacks, 2017 Summer Biomechanics, Bioengineering, and Biotransport Conference, Tucson, AZ, June 21-24, 2017. (Poster)
  49. Image-based estimation of mitral valve strains in the beating heart, Bruno Rego, Amir Khalighi, Andrew Drach, Joseph H. Gorman, Robert C. Gorman, and Michael S. Sacks, 14th US National Congress on Computational Mechanics, Montreal, Canada, July 17-20, 2017. (Poster)
  50. Minimum required spatial resolution for image-based simulations of the mitral valve, Andrew Drach, Amir Khalighi, and Michael Sacks, 14th US National Congress on Computational Mechanics, Montreal, Canada, July 17-20, 2017. (Poster)
  51. Parametric stimulations of trileaflet valve function, Rana Zakerzadeh, Ming-Chen Hsu, and Michael S. Sacks, 14th US National Congress on Computational Mechanics, Montreal, Canada, July 17-20, 2017. (Poster)
  52. Divergence-conforming immersogeometric analysis of heart valve fluid-structure interaction, David Kamen-sky, Ming-Chen Hsu, John A. Evans, Yuri Baziliev's, Michael S. Sacks, and Thomas J.R. Hughes, Engineering Mechanics Institute Conference (EMI 2017), San Diego, CA, June 4-7, 2017. (Poster)
  53. A macro-micro modeling approach to estimate in-situ valve interstitial cell contractile behaviors, Michael S. Sacks, Rachel M. Buchanan, Yusuke Sakamoto, Engineering Mechanics Institute Conference (EMI 2017), San Diego, CA, June 4-7, 2017. (Poster)
  54. Multi-resolution modeling of the mitral heart valve for image based biomechanical simulations, Amir Khalighi, Andrew Drach, and Michael Sacks, Engineering Mechanics Institute Conference (EMI 2017), San Diego, CA, June 4-7, 2017. (Poster)
  55. A permanent set constitutive model for exogenously cross-linked collagenous tissues Will Zhang and Michael Sacks, Engineering Mechanics Institute Conference (EMI 2017), San Diego, CA, June 4-7, 2017. (Poster)
  56. Modeling of Myocardium Compressibility and its Impact in Computational Simulations of the Healthy and Infarcted Heart, Joao S. Soares , David S. Li , Eric Lai , Joseph H. Gorman III, Robert C. Gorman , and Michael S. Sacks, FIMH2017 9th International Conference, June 11-13, 2017. (Poster)
  57. Leaflet Geometry and Anisotropy of Bioprosthetic Heart Valves; Do they matter?, Rana Zakerzadeh, Ming-Chen Hsu, and Michael S. Sacks, BMES-FDA Frontiers in Medical Devices, University of Maryland, May 16-18, 2017. (Poster)
  58. Valve interstitial cell phenotypic state after surgical repair: An integrated Experimental-Computational study, Salma Ayoub and Michael S. Sacks, BMES-FDA Frontiers in Medical Devices, University of Maryland, May 16-18, 2017. (Poster)
  59. Towards Accurate Simulations of Patient Specific Mitral Valve Annuloplasty Repair, Andrew Drach and Michael S. Sacks, BMES-FDA Frontiers in Medical Devices, University of Maryland, May 16-18, 2017. (Poster)
  60. Modeling the role of dynamic mechanical stimuli on dense connective tissue formation and properties in cardiovascular tissue engineering, J.S. Soares and M.S. Sacks, 5th International Conference on Computational and Mathematical Biomedical Engineering, Pittsburgh, PA USA April 10-12, 2017. (Poster)
  61. Modeling exogenously cross-linked tissue under cyclic loading: Permanent set as a first step, Will Zhang and M.S. Sacks, 5th International Conference on Computational and Mathematical Biomedical Engineering, Pittsburgh, PA USA April 10-12, 2017.(Poster)
  62. On the 3D properties of passive myocardium: Inverse model-experimental approach, Reza Avazmohammadi and M.S. Sacks, 5th International Conference on Computational and Mathematical Biomedical Engineering, Pittsburgh, PA USA April 10-12, 2017. (Poster)

63. Immersogeometric fluid-structure interaction analysis of patient-specific heart valve designs, Ming-Chen Hsu, David Kamenski, Yuri Bazilevs, Thomas Hughes, and M.S. Sacks, 5th International Conference on Computational and Mathematical Biomedical Engineering, Pittsburgh, PA USA April 10-12, 2017. (Poster)
64. The Mitral Valve Leaflets: Multi-resolution modeling for image-based simulations, A.H. Khalighi, A. Drach, R.C. Gorman, J.H. Gorman, III, and M.S. Sacks, 5th International Conference on Computational and Mathematical Biomedical Engineering, Pittsburgh, PA USA April 10-12, 2017. (Poster)
65. Dynamic simulation of aortic valves: Comparison between isotropic and anisotropic material models, Rana Zakerzadeh, Ming-Chen Hsu, and M.S. Sacks, 5th International Conference on Computational and Mathematical Biomedical Engineering, Pittsburgh, PA USA April 10-12, 2017. (Poster)
66. Explicit modeling of myocardium compressibility, M.S. Sacks and J.S. Soares, 5th International Conference on Computational and Mathematical Biomedical Engineering, Pittsburgh, PA USA April 10-12, 2017. (Poster)
67. Effects of Annuloplasty on in-vivo MV tissue stress and cellular phenotype, C.H. Lee and M.S. Sacks, Heart Valve Society Scientific Meeting, Grimaldi Forum, Monaco, March 2-4, 2017. (Poster)
68. Alterations in mechanical properties and in-vivo geometry of the mitral valve following myocardial infarction, B.V. Rego, S. Ayoub, A.H. Khalighi, A. Drach, J.H. Gorman, III, R.C. Gorman, and M.S. Sacks, Heart Valve Society Scientific Meeting, Grimaldi Forum, Monaco, March 2-4, 2017. (Poster)
69. Multi-resolution models of the mitral valve leaflets for high fidelity image-based simulations, A.H. Khalighi, A. Drach, R.C. Gorman, J.H. Gorman, III, and M.S. Sacks, Heart Valve Society Scientific Meeting, Grimaldi Forum, Monaco, March 2-4, 2017. (Poster)
70. The Three-Dimensional Microenvironment of Valve Interstitial Cells, S. Ayoub, K.C. Tsai, A.H. Khalighi, and M.S. Sacks, Heart Valve Society Scientific Meeting, Grimaldi Forum, Monaco, March 2-4, 2017. (Poster)
71. Towards accurate simulations of patient-specific mitral valve annuloplasty, A. Drach, A.H. Khalighi, R.C. Gorman, J.H. Gorman, III, A.P. Yoganathan, and M.S. Sacks, Heart Valve Society Scientific Meeting, Grimaldi Forum, Monaco, March 2-4, 2017. (Poster)
72. A permanent set constitutive model for exogenously cross-linked tissues, M.S. Sacks and W. Zhang, EUROMECH Colloquium 585: Advanced Experimental Methods in Tissue Biomechanics, Burg-Warberg, Germany, February 12-16, 2017. (Poster)
73. A novel numerical-experimental inverse modeling approach to investigate the passive three-dimensional mechanical properties of ovine myocardium, D.S. Li, R. Avazmohammadi, J.S. Soares, J.H. Gorman, III, R.C. Gorman, and M.S. Sacks, EUROMECH Colloquium 585: Advanced Experimental Methods in Tissue Biomechanics, Burg-Warberg, Germany, February 12-16, 2017. (Poster)

## 2016

74. Adaptive Remodeling of the Right Ventricle Myocardium in Response to Pulmonary Hypertension: Towards Physical Understanding and Prediction, R. Avazmohammadi and M.S. Sacks, BMES Annual Meeting, 10/5-8/2016, Minneapolis, MN. (Poster)
75. Interrelationships between In Vivo Tissue Stress and Interstitial Cell Deformations in the Mitral Valve Anterior Leaflet in Normal and Surgically Modified States, C.H. Lee, K. Feaver, W. Zhang, R.C. Gorman, J.H. Gorman, and M.S. Sacks, BMES Annual Meeting, Minneapolis, MN, October 5-8, 2016. (Poster)
76. Wide-field Mapping of Collagen Fiber Orientation and Orientation Distribution in Soft Tissues, Will Goth., Michael Sacks., and James Tunnell, BMES Annual Meeting, Minneapolis, MN, October 5-8 2016. (Poster)
77. In Silico Organ-Level Modeling of Infarcted Myocardium and Cardiac Function Impairment, Joao S. Soares, David S. Li, Samarth Raut, Joseph H. Gorman III, Robert C. Gorman, and Michael S. Sacks, BMES Annual Meeting, Minneapolis, MN, October 5-8, 2016. (Poster)

78. Modeling and Simulating Fatigue in Bioprosthetic Heart Valves: Permanent Set as a First Step, Will Zhang and Michael Sacks, BMES Annual Meeting, Minneapolis, MN, October 5-8, 2016. (Poster)
79. An In-Situ Approach to Estimate the Layer-Specific Biophysical State of Aortic Valve Interstitial Cells, R.M. Buchanan and M.S. Sacks, BMES Annual Meeting, Minneapolis, MN, October 5-8, 2016. (Poster)
80. Pre- and Post-Infarct Left Ventricular Myocardium: It's Compressible., Eder Medina, Devesh Sahu, Joseph H. Gorman III, Robert C. Gorman, and M.S. Sacks, BMES Annual Meeting, Minneapolis, MN, October 5-8, 2016. (Poster)
81. Attribute-rich Models of the Mitral Valve Leaflets for Patient-specific Simulations, Amir Khalighi., Andrew Drach., Robert C. Gorman., Joseph H. Gorman., and Michael S. Sacks, BMES Annual Meeting, Minneapolis, MN, October 5-8, 2016. (Poster)
82. Stochastic Models of the Mitral Valve Chordae Tendineae for High-fidelity Simulations, Amir Khalighi., Andrew Drach., Robert C. Gorman., Joseph H. Gorman., and Michael S. Sacks, BMES Annual Meeting, Minneapolis, MN, October 5-8, 2016. (Poster)
83. Stress Fiber Contractile Behaviors in Aortic Valve Interstitial Cells, Yusuke Sakamoto, Rachel Buchanan, Joannah Adams, Farshid Guilak., and Michael Sacks, BMES Annual Meeting, Minneapolis, MN, October 5-8, 2016. (Poster)
84. Strain-rate Dependent Mechanical Responses of the Aortic Valve Interstitial Cells, Yusuke Sakamoto, Rachel Buchanan, Joannah Adams, Farshid Guilak., and Michael Sacks, BMES Annual Meeting, Minneapolis, MN, October 5-8, 2016. (Poster)
85. Optimization of a Decellularization Technique for the Study of Human Mitral Valve Interstitial Cells, Ethan Kwan, Elizabeth Shih, Connor Hughes, Kayla Walter, Salma Ayoub, and Michael Sacks, BMES Annual Meeting, Minneapolis, MN, October 5-8, 2016. (Poster)
86. Developing a LabVIEW Virtual Instrument for a Planar Biaxial Bioreactor System, Lindsay Lehman, Brenda Rodriguez, Annie Mara, Ethan Kwan, Salma Ayoub, and Michael Sacks, BMES Annual Meeting, Minneapolis, MN, October 5-8, 2016. (Poster)
87. Characterizing Infarcted Myocardium Ultrastructure using Electron Microscopy, Elizabeth Shih, Ethan Kwan, Salma Ayoub, David Li, Michael Sacks, Joseph Gorman III, and Robert Gorman, BMES Annual Meeting, Minneapolis, MN, October 5-8, 2016. (Poster)
88. Modeling and simulating fatigue in bioprosthetic heart valves: permanent set as a first step, W. Zhang and M.S. Sacks, ES 2016 annual meeting, University of Maryland, October 3-5, 2016. (Poster)
89. A functionally graded material model for the transmural stress distribution of the aortic valve leaflet, B.V. Rego and M.S. Sacks, SES 2016 annual meeting, University of Maryland, October 3-5, 2016. (Poster)
90. A multi-resolution analysis of the mitral valve geometry for the development of personalized models, M.S. Sacks, Computer Methods in Biomechanics and Biomedical Engineering, Tel Aviv, Israel, September 20, 2016. (Poster)
91. Linking Layer-Specific Mitral Valve Interstitial Cell Deformation to Biosynthetic Response: Implications for Mitral Valve Repair, S. Ayoub, C.H. Lee, K. Driesbaugh, W. Anselmo, C. Hughes, G. Ferrari, M.S. Sacks, ISACB 15th Biennial Meeting, Banff, CA, September 7-10, 2016. (Poster)
92. Evidence for Interstitial Cell-Driven Restoration of Homeostasis in Heart Valve Remodeling, B.V. Rego, S. Wells, M.S. Sacks, ISACB 15th Biennial Meeting, Banff, CA, September 7-10, 2016.
93. Linking Mitral Valve Interstitial Cell Deformation To Biosynthetic Response: Implications for Mitral Valve Repair, Salma Ayoub, Chung-Hao Lee, Connor T. Hughes, Giovanni Ferrari, and Michael S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016.(Poster)

94. Stress fiber contractile behavior in aortic valve interstitial cells, Yusuke Sakamoto, Rachel M. Buchanan, Johannah S. Adams, Farshid Guilak, and Michael S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster)
95. Novel Irreversible Chemistry Produces Structurally More Stable Tissue Based Biomaterials, H. Tam, W. Zhang, D. Infante, N. Parchment, and M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster)
96. Mathematical Modeling of Fluid-Structure Interaction in Bioprosthetic Heart Valves: Numerical Approximation and Experimental Validation, D. Kamensky, M.C. Hsu, J.G. Lesicko, M.A. Katona, J.L. Graves, S.J. Potter, T.J.R. Hughes, and M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster)
97. In-vivo residual strains in semilunar heart valves, A. Aggarwal, A. Pouch, E. Lai, J.G. Lesicko, J.H. Gorman, R.C. Gorman, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster)
98. Multi-resolution Models of the Mitral Valve Leaflets for High Fidelity Biomechanical Simulations, A.H. Khalighi, A. Drach, C. Bloodworth, E.L. Pierce, A.P. Yoganathan, R.C. Gorman, J.H. Gorman, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster)
99. Inverse Modeling Based Estimation of In-vivo Stresses and Their Relation to Simulated Layer-Specific Interstitial Cell Deformations in Mitral Valve, C.H. Lee, K. Feaver, W. Zhang, R.C. Gorman, J.H. Gorman, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster)
100. Mitral Valve Leaflet Remodeling During Pregnancy: Implications for Modelign Valvular Adaptation, B.V. Rego, S.M. Wells, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster).
101. The Mitral Valve Chordae Tendinae: A Topological and Geometric Analysis, A.H. Khalighi, A. Drach, C. Bloodworth, E.L. Pierce, A.P. Yoganathan, R.C. Gorman, J.H. Gorman, and M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster)
102. A Novel Numerical-Experimental Inverse Modeling Approach to Investigate the Time-Evolving Three-Dimensional Mechanical Properties of Infarcted Myocardium, D.S. Li, J.S. Soares, J.G. Lesicko, R. Avazmohammadi, J.H. Gorman, R.C. Gorman, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster)
103. A Robust Framework for Building Attribute-Rich FE Models of the Mitral Valve from Medical Images, A. Drach, A.H. Khalighi, R.C. Gorman, J.H. Gorman, A.P. Yoganathan, and M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster)
104. A Permanent Set Constitutive Model for Exogenously Cross-linked Collagenous Tissues, W. Zhang, H. Tam, W. Sun, N. Vyavahare, and M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster)
105. Strain Rate Dependent Mechanical Responses of the Aortic Valve Interstitial Cells, Y. Sakamoto, R.B. Buchanan, J.S. Adams, F. Guilak, and M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster)
106. A Novel Structural Constitutive Model for Passive Right Ventricular Myocardium: Towards an Understanding of Remodeling During Pulmonary Hypertension, R. Avazhomadi and M. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, National Harbor, MD, USA, June 29 July 2, 2016. (Poster)
107. An active contraction model of the valve interstitial cell, M.S. Sacks and Y. Sakamoto, 10th World Biomaterials Congress, Montreal, Canada, May 17-22, 2016. (Poster)

108. Using simulations with realistic fibrous network geometry to determine the achievable ranges of macroscopic mechanical behaviors in elastomeric scaffolds, M.S. Sacks, Jimmy Carleton, and Greg Rodin, 10th World Biomaterials Congress, Montreal, Canada, May 17-22, 2016. (Poster)
109. Modeling and simulation of the response of heterograft biomaterials to fatigue, W. Zhang and M.S. Sacks, 10th World Biomaterials Congress, Montreal, Canada, May 17-22, 2016. (Poster)
110. Multi-Scale Approaches to Heart Valve Function, M.S. Sacks, Heart Valve Society Annual Meeting, New York, NY, March 17-19, 2016. (Poster)
111. Multi-Scale Approaches to Heart Valve Function, M.S. Sacks, Heart Valve Society Annual Meeting, New York, NY, March 17-19, 2016. (Poster)
112. Bioprosthetic Heart Valve Structural Degradation: Biomechanical Mechanisms, Modeling, Performance, M.S. Sacks, Multiscale Methods and Validation in Medicine and Biology III, Los Angeles, CA, Feb. 25-26, 2016. (Poster)

## **2015**

113. On the Development of an Anatomical, Structural, and Biomechanical Integrated Model of the Mitral Valve. M.S. Sacks, Keynote presentation. Society of Engineering Science conference, College Station, TX, Oct. 25-27, 2015. (Poster)
114. An Active Contraction Model of Valvular Interstitial Cells. Y. Sakamoto, Society of Engineering Science conference, College Station, TX, Oct. 25-27, 2015. (Poster)
115. Modeling the Enhancement of Extracellular Matrix Quantity and Quality in Large-Deformation Mechanically-Conditioned Tissue Engineering. J. Soares, Society of Engineering Science conference, College Station, TX, Oct. 25-27, 2015. (Poster)
116. A Mesoscale Model on the Mechanical Role of Collagen and Elastin within the Mitral Valve. W. Zhang, Society of Engineering Science conference, College Station, TX, Oct. 25-27, 2015. (Poster)
117. Inverse Models for Characterization of the In-vivo Valvular Mechanics Behaviors. Chung-Hao Lee, Society of Engineering Science conference, College Station, TX, Oct. 25-27, 2015.
118. A Novel Fiber-level Structural Constitutive Model for Viable Right Ventricular Myocardium. R. Avazmohammadi, Society of Engineering Science conference, College Station, TX, Oct. 25-27, 2015. (Poster)
119. The Micro-geometric Environment of Mitral Valve Interstitial Cells Under Physiological Loading. S. Ayoub, Society of Engineering Science conference, College Station, TX, Oct. 25-27, 2015. (Poster)
120. A 3D Constitutive Model for the Aortic Valve Leaflet. B. Rego, Society of Engineering Science conference, College Station, TX, Oct. 25-27, 2015. (Poster)
121. Effects of Leaflet Microstructure and Constitutive Model on the Closing Behavior of the Mitral Valve. C.H. Lee, J-P Rabbah, A. Yoganathan, R.C. Gorman, J.H. Gorman, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, Salt Lake City, Utah, June 17-20, 2015.
122. True 3D Stresses in Heart Valve Leaflets. B. Rego, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, Salt Lake City, Utah, June 17-20, 2015. (Poster)
123. A Framework for Parameter Estimation of Heart Valves Using Inverse-Modeling Approach. A. Aggarwal, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, Salt Lake City, Utah, June 17-20, 2015. (Poster)
124. Immersogeometric Fluid-Structure Interaction Analysis of Bioprosthetic Heart Valves: Realistic Material Modeling and Experimental Validation. D. Kamensky, M-C Hsu, M.S. Sacks, T.J.R. Hughes, Summer Biomechanics, Bioengineering and Biotransport Conference, Salt Lake City, Utah, June 17-20, 2015. (Poster)

125. Layer-specific Mitral Valve Interstitial Cell Deformations Under Physiological Loading. C.H. Lee, C. A. Carruthers, S. Ayoub, R.C. Gorman, J.H. Gorman, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, Salt Lake City, Utah, June 17-20, 2015. (Poster)
126. On the Characterization of Mitral Valve Geometry and Development of a Population-averaged Model. A. Khalighi, A. Drach, F. Huurne, C.H. Lee, C. Bloodworth, E. Pierce, M. Jensen, A. Yoganathan, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, Salt Lake City, Utah, June 17-20, 2015. (Poster)
127. Characterization of Soft Tissue Microstructure via Transmural SALS. J. G. Lesicko, K.R. Feaver, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, Salt Lake City, Utah, June 17-20, 2015. (Poster)
128. Microgeometry and Microenvironment of Mitral Valve Interstitial Cells Under Physiological Loads. S. Ayoub, C.H. Lee, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, Salt Lake City, Utah, June 17-20, 2015. (Poster)
129. An Active Contraction Model of Valvular Interstitial Cells. Y. Sakamoto, M.S. Sacks, Summer Biomechanics, Bioengineering and Biotransport Conference, Salt Lake City, Utah, June 17-20, 2015. (Poster)
130. Estimation of Fully Three-Dimensional Properties of Passive Myocardium: A Coupled Inverse Model-Experimental Study. R. Avazmohammadi, S. Raut, J.G. Lesicko, M.S. Sacks, 2015 Cardiac Physiome Workshop, Auckland, New Zealand, April 8-10, 2015. (Poster)
131. Population-average Geometric Model of Mitral Valve from Patient-Specific Imaging Data. A. Drach, A. Khalighi, F. Huurne, C.H. Lee, M. Jensen, C. Bloodworth, A. Yoganathan, M.S. Sacks, Design of Medical Devices Conference, University of Minnesota, April 13-16, 2015. (Poster)
132. Simulation of Fatigue in Bioprosthetic Heart Valve Biomaterials. M.S. Sacks, Design of Medical Devices Conference, University of Minnesota, April 13-16, 2015. (Poster)
133. Predictive Computational Simulations of the Functioning Mitral Valve. C.H. Lee, M.S. Sacks, 2015 BMES/FDA Frontiers in Medical Devices Conference, Washington, DC, May 18-20, 2015. (Poster)
134. A Comprehensive Framework for the Characterization of the Complete Mitral Valve Geometry for the Development of a Population-Averaged Model. A. Khalighi, A. Drach, F. Huurne, C.H. Lee, C. Bloodworth, E. Pierce, M. Jensen, A. Yoganathan, M.S. Sacks, 8th International Conference on Functional Imaging and Modeling of the Heart, Maastricht, Netherlands, June 25-27, 2015. (Poster)
135. A Framework for Determination of Heart Valves Mechanical Properties using Inverse-Modeling Approach. A. Aggarwal, M.S. Sacks, 8th International Conference on Functional Imaging and Modeling of the Heart, Maastricht, Netherlands, June 25-27, 2015. (Poster)
136. Immersogeometric Fluid Thin Structure Interaction Analysis: Enhanced Conservation and Application to Heart Valve Simulation. D. Kamensky, M-C. Hsu, J.A. Evans, M.S. Sacks, T.J.R. Hughes, 13th U.S. National Congress on Computational Mechanics, San Diego, California, July 26-30, 2015. (Poster)
137. Estimation of Fully Three-Dimensional Properties of Passive Myocardium: A Coupled Inverse Model-Experimental Study. R. Avazmohammadi, S. Raut, J.G. Lesicko, M.S. Sacks, 13th U.S. National Congress on Computational Mechanics, San Diego, California, July 26-30, 2015. (Poster)
138. An Inverse Modeling Framework for Determination of Heart Valves Mechanical Properties. A. Aggarwal, M.S. Sacks, 13th U.S. National Congress on Computational Mechanics, San Diego, California, July 26-30, 2015. (Poster)
139. On the Effects of Leaflet Microstructure and Constitutive Model on the Closing Behavior of the Mitral Valve. C.H. Lee, M.S. Sacks, 13th U.S. National Congress on Computational Mechanics, San Diego, California, July 26-30, 2015. (Poster)

140. A Framework for the Characterization and Population-averaging of Full Mitral Valve Geometry. A. Khalighi, A. Drach, C.H. Lee, M.S. Sacks, 13th U.S. National Congress on Computational Mechanics, San Diego, California, July 26-30, 2015. (Poster)
141. Simulation of Fatigue in Bioprosthetic Heart Valve Biomaterials. M.S. Sacks, 13th U.S. National Congress on Computational Mechanics, San Diego, California, July 26-30, 2015. (Poster)
142. An Active Contraction Model of Valvular Interstitial Cells. Y. Sakamoto, M.S. Sacks, 13th U.S. National Congress on Computational Mechanics, San Diego, California, July 26-30, 2015. (Poster)

#### **2014**

143. Quantification and Simulation of the Mechanical Roles of Collagen and Elastin in Mitral Valve Leaflets. W. Zhang, C. Carruthers, J. Liao, M.S. Sacks, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014.
144. An Inverse Modeling-Based Diagnostic Tool for Heart Valves Leaflets Biomechanical Properties. A. Aggarwal, M.S. Sacks, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
145. Response of Isolated Bioprosthetic Heart Valve Biomaterials to In-Vivo Stress. K. Feaver, W. Zhang, H. Tam, M. Lee, J. McGarvey, C. Aoki, S. Takebayashi, N. Kondo, R. Gorman, J. Gorman III, N. Vyavahare, M.S. Sacks, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
146. Handheld Spatial Frequency Domain Imaging System for Skin Imaging. B. Young, J.G. Lesicko, M.S. Sacks, J. Tunnell, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
147. Finite Element Simulation of Valvular Interstitial Cells under Atomic Force Microscopy and Microindentation Experiments. Y. Sakamoto, M.S. Sacks, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
148. On the Biomechanical Behavior of the Layers of the Mitral Valve Anterior Leaflet. S. Ayoub, M.S. Sacks, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
149. Modeling the Enhancement of Extracellular Matrix Quantity and Quality in Large-Deformation Mechanically-Conditioned Heart Valve Tissue Engineering. J. Soares, M.S. Sacks, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
150. Fibrous Tissue Scaffolds: Relationships between Geometric Structure and Mechanical Behavior. J. Carleton, G. Rodin, M.S. Sacks, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
151. Quantitative Histomorphological Analysis of Right Ventricular Myocardium Under Chronic Pressure Overload. S.M. Siegel, U.A. Dar, M. Rahman, M.R. Hill, M.A. Simon, M.S. Sacks, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
152. Time-Evolving Growth and Remodeling Response of Right Ventricular Myocardium to Pressure Overload. M. Hill, M. Simon, M.S. Sacks, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
153. Simulation of Heart Valve Biomaterial Fatigue. M.S. Sacks, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
154. A Computational-Experimental Approach for the In Situ Estimation of Aortic Valve Interstitial Cell Biophysical State. R. Buchanan, M.S. Sacks, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
155. Design of an In Vitro Simulation Pipeline for the Development of Computational Mitral Valve Modeling. C. Bloodworth IV, E. Pierce, T. Easley, M. Toma, A. Khalighi, C.H. Lee, M.S. Sacks, A. Siefert, M. Jensen, A. Yoganathan, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)

156. Integrated Experimental-Computational Modeling of Mitral Valve Interstitial Cell Deformation Under In Situ Physiological Loading. C.H. Lee, C. Carruthers, B. Good, S. Ayoub, R. Gorman, J. Gorman, M.S. Sacks, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
157. A Wireless, Real-Time Embedded Hand Gesture Recognition System For Myoelectric Control. M.S. Sacks, X. Liu, M. Zhang, J. Van der Spiegel, BMES 2014 Annual Meeting, San Antonio, Texas, October 22-25, 2014. (Poster)
158. Generalized Large Deformation Structural Constitutive Model for Forming Tissues in Needled Non-Woven Scaffolds. M.S. Sacks, Society of Biomaterials 2015 Annual Meeting and Exposition, Charlotte, North Carolina, April 15-18, 2014. (Poster)
159. Tissue Formation and Remodeling in Tissue Engineered Pulmonary Conduits. M.S. Sacks, Society of Biomaterials 2015 Annual Meeting and Exposition, Charlotte, North Carolina, April 15-18, 2014. (Poster)
160. Characterization of Soft Tissue Transmural Microstructure. J.G. Lesicko, K.R. Feaver, M.S. Sacks, Society of Biomaterials 2015 Annual Meeting and Exposition, Charlotte, North Carolina, April 15-18, 2014. (Poster)
161. Parameter Estimation of Heart Leaflet Hypereleastic Mechanical Behavior Using an Inverse Modeling Approach. A. Aggarwal, M.S. Sacks, 6th Biennial Conference on Heart Valve Biology and Tissue Engineering, London, United Kingdom, September 10-12, 2014. (Poster)
162. A Computational Framework for Multiscale modeling of the Mitral Valve. C.H. Lee, M.S. Sacks, 6th Biennial Conference on Heart Valve Biology and Tissue Engineering, London, United Kingdom, September 10-12, 2014. (Poster)
163. In-vivo assessment of valvular function: An Inverse modeling approach A. Aggarwal, M.S. Sacks, 11th World Congress on Computational Mechanics (WCCM2014), Barcelona, Spain, July 20-25, 2014. (Poster)
164. A Computational Framework for Multiscale modeling of the Mitral Valve. C.H. Lee, M.S. Sacks, 11th World Congress on Computational Mechanics (WCCM2014), Barcelona, Spain, July 20-25, 2014. (Poster)
165. Insights into regional adaptations in the growing pulmonary artery using meso-scale structural model: Effects of Ascending aorta impingement. M.S. Sacks, B. Fata, W. Zhang, R. Amini, 11th World Congress on Computational Mechanics (WCCM2014), Barcelona, Spain, July 20-25, 2014. (Poster)
166. Fluid-structure interaction analysis of bioprosthetic heart valves. M. Hsu, D. Kamensky, D. Schillinger, J. Evans, A. Aggarwal, Y. Bazilevs, M. S. Sacks, T. Hughes, 11th World Congress on Computational Mechanics (WCCM2014), Barcelona, Spain, July 20-25, 2014. (Poster)
167. Modeling the Role of Oscillatory Flow and Dynamic Mechanical Conditioning on Dense Connective Tissue Formation in Mesenchymal Stem Cell Derived Heart Valve Tissue Engineering. J. Soares, T. Le, F. Sotiropoulos, M.S. Sacks, 11th World Congress on Computational Mechanics (WCCM2014), Barcelona, Spain, July 20-25, 2014. (Poster)
168. Understanding the Relationships Between Scaffold Geometric Structure and Mechanical Behavior Using Computational Modeling J. Carleton, G. Rodin, M.S. Sacks, 11th World Congress on Computational Mechanics (WCCM2014), Barcelona, Spain, July 20-25, 2014. (Poster)
169. Immersed fluid-structure interaction for isogeometric shell structures, with application to bioprosthetic heart valves. D. Kamensky, M. Hsu, D. Schillinger, J. Evans, A. Aggarwal, Y. Bazilevs, M. S. Sacks, T. Hughes, 11th World Congress on Computational Mechanics (WCCM2014), Barcelona, Spain, July 20-25, 2014. (Poster)
170. A computational approach for in situ estimation of aortic valve interstitial cell mechanical state from tissue level measurements. R. Buchanan, R.J. Fagan, M.S. Sacks, 11th World Congress on Computational Mechanics (WCCM2014), Barcelona, Spain, July 20-25, 2014. (Poster)
171. A Novel Constitutive Model for Mitral Valve Leaflet Based on Quantified Microstructure M.S. Sacks, W. Zhang, 7th World Congress of Biomechanics, Boston, Massachusetts, July 6-11, 2014. (Poster)



172. Parameter Estimation of Heart Valve Leaflet Hyperelastic Mechanical Behavior Using an Inverse Modeling Approach M.S. Sacks, 17th U.S. National Congress of Theoretical and Applied Mechanics, June 15-20, 2014. (Poster)
173. Simulation Heart Valve Biomaterial Fatigue M.S. Sacks, W. Zhang, Presented at The Society of Biomaterials 2014 Annual Meeting and Exposition, Denver Colorado, April 16-19, 2014. (Poster)
174. A Novel Experimental/Numerical Method to Assess BHV Biomaterial Fatigue Response in-vivo K.R. Feaver, W. Zhang, C.-H. Lee, H. Tam, J. McGarvey, N. Kondo, R.C. Gorman, J.H. Gorman, III, N. Vyavahare, M. S. Sacks, Presented at The Society of Biomaterials 2014 Annual Meeting and Exposition, Denver Colorado, April 16-19, 2014. (Poster)
175. Biomechanics of Right Ventricular Myocardial Remodeling in Response to Pressure Overload M.A. Simons, M. Hill, H.C. Champion, M.S. Sacks, 34th Annual Meeting Scientific Sessions, April 10-13, 2014. (Poster)
176. Collagen Fiber Orientation Mapping with Top Layer Discrimination using Polarized Light Spatial Frequency Domain Imaging (pSFDI) on Native Heart Tissue, Bin Yang, John Lesicko, Manu Sharma, Michael Hill, M.S. Sacks, and James W Tunnell, Biomedical Optics, BM4B.5, Optical Society of America, April 26 2014. (Poster)
177. Understanding the Relationships Between Scaffold Geometric Structure and Mechanical Behavior Using Computational Modeling J. Carleton, G. Rodin, M.S. Sacks, Presented at the 3rd Global Congress on Nanoengineering for Medicine and Biology, San Francisco, California, February 2-5, 2014. (Poster)
178. Fluid-Structure Coupling for Immersed Isogeometric Shell Structures: Solution Strategies and Fluid Stabilization D. Kamensky, M. Hsu, D. Schillinger, J. Evans, Y. Bazilevs, M. S. Sacks, T. Hughes, Presented at IGA 2014, Austin, Texas, January 8-10, 2014. (Poster)
179. Isogeometric Immersed Boundary Fluid-Structure Interaction Analysis of Bioprosthetic Heart Valves M. Hsu, D. Kamensky, D. Schillinger, J. Evans, A. Aggarwal, Y. Bazilevs, M. S. Sacks, T. Hughes, Presented at IGA 2014, Austin, Texas, January 8-10, 2014. (Poster)

### **2013**

180. Effects of local architectural mapping and material model on modeling the mitral valve M.S. Sacks, 3rd International Conference on Computational Mathematical Biomedical Engineering (CMBE15), City University of Hong Kong, December 16, 2013.
181. Right ventricular Adaption to Pulmonary Hypertension. M.R. Hill, D. Valdez-Jasso, M.A. Simon, H.C. Champion, M.S. Sacks, BMES 2013 Annual Meeting, Seattle, Washington, September 25-28, 2013. (Poster)
182. The Role of Cyclic Flexure and Oscillatory Shear Stress on Mesenchymal Stem Cell Proliferation and Extracellular Matrix Production in Engineering Heart Valve Tissue Formation. J. Soares, T. Le, F. Sotiropoulos, M.S. Sacks, BMES 2013 Annual Meeting, Seattle, Washington, September 25-28, 2013. (Poster)
183. One Cell as a Mixture: Simulations of the Micropipette Aspiration Responses of Valvular Interstitial Cells. Y. Sakamoto, S. Prudhomme, M.S. Sacks, BMES 2013 Annual Meeting, Seattle, Washington, September 25-28, 2013. (Poster)
184. Micromechanics of the Aortic Valve Leaflet Layers: Do They Slide or Not? R. Buchanan, M.S. Sacks, BMES 2013 Annual Meeting, Seattle, Washington, September 25-28, 2013. (Poster)
185. "Non-Glutaraldehyde Extracellular Matrix Stabilization in Porcine Aortic Heart Valves. H. Tam, W. Zhang, M.S. Sacks, N. Vyavahare, BMES 2013 Annual Meeting, Seattle, Washington, September 25-28, 2013. (Poster)
186. A Micro-anatomically Accurate Finite Element Model for Investigation of Functional Mitral Valve and its Relationship to Interstitial Cell Deformations. C.H. Lee, R.C. Gorman, J.H. Gorman, R. Amini, M.S. Sacks, BMES 2013 Annual Meeting, Seattle, Washington, September 25-28, 2013. (Poster)

187. Spline Based Microstructural Mapping for Soft Biological Tissues: Application to Aortic Valves. A. Aggarwal, V.S. Aquilar, C.H. Lee, G. Ferrari, J.J Gorman, R.C. Gorman, M.S. Sacks, BMES 2013 Annual Meeting, Seattle, Washington, September 25-28, 2013. (Poster)
188. A Method for Quantifying Fiber Orientation in Valvular Tissues with Polarized Spatial Frequency Domain Imaging. B. Yang, M. Sharma, M.R. Hill, J.W. Tunnell, M.S. Sacks, BMES 2013 Annual Meeting, Seattle, Washington, September 25-28, 2013. (Poster)
189. Modeling the Role of Oscillatory Flow and Dynamic Mechanical Conditioning on Dense Connective Tissue Formation in Mesenchymal Stem Cell Derived Heart Valve Tissue Engineering. J. Soares, T. Le, F. Sotiropoulos, M.S. Sacks, ASME Frontiers in Medical Devices, Hyattsville, Maryland, September 11-13, 2013. (Poster)
190. Simulation Heart Valve Biomaterial Fatigue Damage using Structural Approach. M.S. Sacks, ASME Frontiers in Medical Devices, Hyattsville, Maryland, September 11-13, 2013. (Poster)
191. Biomechanical Properties Extraction on a Think Sample with Highly Ordered Structure Using Polarized Spatial Frequency Domain Processing. B. Yang, M. Sharma, M.R. Hill, M.S. Sacks, J.W. Tunnell, ECI Conference, September 2013. (Poster)
192. Simulation of the Role of Oscillatory Shear Stress on Mesenchymal Stem Cell Proliferation and Extracellular Matrix Production in Engineering Heart Valve Tissue Formation. J. Soares, T. Le, F. Sotiropoulos, M.S. Sacks, ASME Summer 2013 Bioengineering Conference, Sunriver, Oregon, Jun 26-29, 2013. (Poster)
193. Spline Based Microstructural Mapping for Soft Biological Tissues: Application to Aortic Valves. A. Aggarwal, V.S. Aquilar, C.H. Lee, G. Ferrari, J.J Gorman, R.C. Gorman, M.S. Sacks, ASME Summer 2013 Bioengineering Conference, Sunriver, Oregon, Jun 26-29, 2013. (Poster)
194. A High-Fidelity and Micro-anatomically accurate 3D Finite Element Model for Simulations of Functional Mitral Valve. C.H. Lee, P.J.A. Oomen, J. Rabbah, A. Yoganathan, R.C. Gorman, J.H. Gorman, R. Amini, M.S. Sacks, ASME Summer 2013 Bioengineering Conference, Sunriver, Oregon, Jun 26-29, 2013. (Poster)
195. Interlayer Micromechanics of Semilunar Heart Valve Leaflets. R. Buchanan, M.S. Sacks, ASME Summer 2013 Bioengineering Conference, Sunriver, Oregon, Jun 26-29, 2013. (Poster)
196. Implementation and validation of planar soft tissue structural constitutive model. R. Fan, M.S. Sacks, ASME Summer 2013 Bioengineering Conference, Sunriver, Oregon, Jun 26-29, 2013. (Poster)
197. Patient-Specific Modeling of Heart Valves: From Image to Simulation. A. Aggarwal, V.S. Aquilar, C.H. Lee, G. Ferrari, J.J Gorman, R.C. Gorman, M.S. Sacks, 7th International Conference on Functional Imaging and Modeling of the Heart, London, United Kingdom, June 20-22, 2013. (Poster)
198. A High-Fidelity and Micro-anatomically accurate 3D Finite Element Model for Simulations of Functional Mitral Valve. C.H. Lee, P.J.A. Oomen, J. Rabbah, A. Yoganathan, R.C. Gorman, J.H. Gorman, R. Amini, M.S. Sacks, 7th International Conference on Functional Imaging and Modeling of the Heart, London, United Kingdom, June 20-22, 2013. (Poster)
199. A Nutrient-Cell-Matrix Triphasic Mixture Model of Growth of Tissue Engineering Constructs. J. Soares, M.S. Sacks, Computer Methods in Biomechanics and Biomedical Engineering, Salt Lake City, Utah, April 3-6, 2013. (Poster)
200. A Process for Creating Scaffold Fiber Network Geometry Using Random Walks. J. Carleton, G. Rodin, M.S. Sacks, Computer Methods in Biomechanics and Biomedical Engineering, Salt Lake City, Utah, April 3-6, 2013. (Poster)
201. Simulation Heart Valve Biomaterial Fatigue. M.S. Sacks, R. Fan, Computer Methods in Biomechanics and Biomedical Engineering, Salt Lake City, Utah, April 3-6, 2013. (Poster)
202. Effects of Finite Deformation on extracellular Matrix Production and Mechanical Properties. M.S. Sacks, J. Stella, A. D'Amore, W. Wagner. Second Global Congress on Nanoengineering for Medicine and Biology, Boston, Massachusetts, February 24-27, 2013. (Poster)

203. A Novel Constitutive Model for Heart Valve Biomaterial Fatigue. M.S. Sacks, Advances in Computational Mechanics, San Diego, California, February 24-27, 2013. (Poster)
204. Fluid-Structure Interaction Analysis with Emphasis on nonmatching Discretizations. M. Hsu, Y. Bazilevs, M.S. Sacks, T.J.R. Hughes, Advances in Computational Mechanics, San Diego, California, February 24-27, 2013. (Poster)
205. A Computational Model for the Geometric and Mechanical Characterization of Electrospun Scaffolds. J. Carleton, A. DAmore, G. Rodin, M.S. Sacks, Second Global Congress on Nanoengineering for Medicine and Biology, Boston, Massachusetts, February 24-27, 2013. (Poster)
206. A Novel Bioreactor for Mechanical Conditioning Studies of Engineered Heart Valve Tissue Formation Under Physiological Flow Conditions. S. Ramaswamy, F. Sotiropoulos, M.S. Sacks, BMES Annual Conference, January 1-5, 2013. (Poster)
207. "In Situ Estimation of Aortic Valve Interstitial Cell States from Tissue Level Measurements Using a Multi-Scale Finite Element Approach. R. Buchanan, M.S. Sacks, BMES Annual Conference, January 1-5, 2013. (Poster)
208. Osteopontin-DC44v6 Binding Mediates Calcium Deposition via Akt in Valve Interstitial Cells from Patients with Non-calcified Aortic Valve Sclerosis P. Poggio, E. Branchetti, J. Grau, E. Lai, R. Gorman, J. Gorman, M.S. Sacks, J. Bavaria, G. Ferrari, ATVB/2013/303017R1, 2013. (Poster)

## **2012**

209. In Situ Estimation of Extracellular Matrix-Interstitial Cell Mechanical Coupling in the Aortic Heart Valve Leaflet Using a Multi-Scale Finite Element Approach, Bahar Fata, H.J. Qi, and M.S. Sacks, BMES Annual meeting, Atlanta, GA, October, 2012. (Poster)
210. In Situ Estimation of Extracellular Matrix-Interstitial Cell Mechanical Coupling in the Aortic Heart Valve Leaflet Using a Multi-Scale Finite Element Approach, Rachel Buchanan and M.S. Sacks, BMES Annual meeting, Atlanta, GA, October, 2012. (Poster)
211. A novel model for heart valve biomaterial fatigue response, M.S. Sacks, BMES Annual meeting, Atlanta, GA, October, 2012. (Poster)
212. Physically-Based Microstructural Simulations of Electrospun Scaffolds, J. Carleton, A. DAmore, G. Rodin, and M.S. Sacks, BMES Annual meeting, Atlanta, GA, October, 2012. (Poster)
213. A Novel Model for Heart Valve Biomaterial Fatigue Response, R. Amini, M.S. Sacks, Presented at 22nd International Workshop on Computational Mechanics of Materials, Baltimore, Maryland, USA, September 24-26, 2012. (Poster)
214. Simulation of prosthetic heart valve damage evolution using a micro-mesoscale structural constitutive model, M.S. Sacks, Keynote Lecture, 6th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2012), Vienna, Austria, September 10-14, 2012. (Poster)
215. Alterations in the Microstructure of the Anterior Mitral Valve Leaflet Under Physiological Stress C. Carruthers, B. Good, A. DAmore, R. Amini, S. Watkins, J. Liao, M.S. Sacks, Presented at ASME 2012 Summer Bioengineering Conference (SBC2012), Fajardo, Puerto Rico, June 20-23, 2012. (Poster)
216. Regional Biomechanical and Microstructural Alterations of the Ovine Main Pulmonary Artery During Post-natal Growth, B. Fata, C. Carruthers, G. Gibson, S. Watkins, D. Gottlieb, J. Mayer, M.S. Sacks, Presented at ASME 2012 Summer Bioengineering Conference (SBC2012), Fajardo, Puerto Rico, June 20-23, 2012. (Poster)
217. Optimization of Engineered Ovine Pulmonary Heart Valve Leaflet Tissue Shape for Single Leaflet Replacement R. Fan, A. Bayoumi, W. Wagner, J. Mayer, M.S. Sacks, Presented at ASME 2012 Summer Bioengineering Conference (SBC2012), Fajardo, Puerto Rico, June 20-23, 2012. (Poster)

218. Integration of Microstructural Architecture of the Mitral Valve Into An Anatomically Accurate Finite Element Mesh, R. Amini, I.A.E.W. (Inge) van Loosdregt, K. Koomalsingh, R. Gorman, J. Gorman III, M.S. Sacks, Presented at ASME 2012 Summer Bioengineering Conference (SBC2012), Fajardo, Puerto Rico, June 20-23, 2012. (Poster)
219. A Murine for Viable Right-Ventricular Myocardial Mechanical Behavior, D. Valdez-Jasso, M. Simon, M.S. Sacks, Presented at ASME 2012 Summer Bioengineering Conference (SBC2012), Fajardo, Puerto Rico, June 20-23, 2012. (Poster)
220. Computational Structural Biomechanical Models to Guide Tissue Engineered Heart Valve Leaflet Fabrication, DAmore, A. Bayoumi, N. Amoroso, W. Wagner, J. Mayer, M.S. Sacks, Presented at 5th Biennial Conference on Heart Valve Biology and Tissue Engineering, Myconos Island, Greece, May 18-20, 2012. (Poster)
221. Biomechanical Activation of Human Valvular Interstitial Cells from Early Stage of CAVD, Paolo Poggio, Rachana Sainger, Juan B Grau, Emanuela Branchetti, Eric Lai, Robert C Gorman, Joseph H Gorman III, Joseph E Bavaria, M.S. Sacks, Giovanni Ferrari, QScience Proceedings: Vol. 2012, Heart Valve Biology and Tissue Engineering, 67. DOI:10.5339/qproc.2012.heartvalve.4.67. (Poster)
222. A Multi-Scale Finite Model for In Situ Estimation of Extracellular Matrix-Interstitial Cell Mechanical Coupling in the Aortic Heart Valve Leaflet, RM Buchanan, M.S. Sacks, Southern Biomedical Engineering Conference (SBEC 2012), MD Anderson Cancer Center, Houston, Texas USA, May 4-6, 2012. (Poster)

## **2011**

223. Tailoring Flexural and In-Plane Mechanics of Electrospun Polyurethanes toward Heart Valve Applications, N. Amoroso, A. DAmore, Y. Hong, W. Wagner, M.S. Sacks, termis North America 2011 Annual Conference and Exposition, Houston, Texas USA, December 11-14, 2011. (Poster)
224. Use of finite deformation during in-vitro conditioning dramatically enhances de novo extracellular matrix production and mechanical properties, J. Stella, N. Amoroso, J. Mayer, Jr., W Wagner, M.S. Sacks, Termis North America 2011 Annual Conference and Exposition, Houston, Texas USA, December 11-14, 2011. (Poster)
225. Investigation of the Collagen Structure of Right-Ventricular Myocardium D. Valdez-Jasso, H.C. Hunter, M.A. Simon, M.S. Sacks, Poster Session, BMES 2011 Annual Meeting, Hartford, Connecticut USA, October 12-15, 2011. (Poster)
226. Long-Term Remodeling of a Tissue Engineered Pulmonary Arterial Conduit, C.E. Eckert, D. Gottlieb, J.E. Mayer, M.S. Sacks, Oral Presentation, BMES 2011 Annual Meeting, Hartford, Connecticut USA, October 12-15, 2011. (Poster)
227. Towards the Development of Meso and Micro-scale High Fidelity Models of the Mitral Valve, R. Amini, K. Koomalsingh, C. Carruthers, T. Shuto, R.C. Gorman, J.H. Gorman, M.S. Sacks, Oral Presentation, BMES 2011 Annual Meeting, Hartford, Connecticut USA, October 12-15, 2011. (Poster)
228. Physiological Micromechanics of the Mitral Valve Anterior Leaflet, B. Good, C. Carruthers, A. DAmore, R. Amini, J. Gorman, M.S. Sacks, Joint Meeting of the Society for Heart Valve Disease Heart Valve Society of America, Biennial Meeting, Barcelona, Spain, June 25-28, 2011. (Poster)
229. Design of a Tissue-Engineered Leaflet Shape for a Pulmonary Valve Single Leaflet Replacement, R. Fan, C. Hobson, A. Bayoumi, J. Meyer, Jr., W. Wagner, M.S. Sacks, Joint Meeting of the Society for Heart Valve Disease Heart Valve Society of America, Biennial Meeting, Barcelona, Spain, June 25-28, 2011. (Poster)
230. In Vivo Time-course Changes in the Mechanical Quality of Tissue Engineered Pulmonary Valve Conduit, C. Eckert, D. Gottlieb, J. Mayer, Jr., M.S. Sacks, Joint Meeting of the Society for Heart Valve Disease Heart Valve Society of America, Biennial Meeting, Barcelona, Spain, June 25-28, 2011. (Poster)
231. Structural Deterministic Biomechanical Models of Elastomeric Scaffolds for Soft Tissue Regeneration, DAmore, C. Hobson, J. Stella, N. Amoroso, W.R. Wagner, M.S. Sacks, Oral Presentation, Southern Biomedical Engi-

neering Conference, Bioengineering Department, College of Engineering, The University of Texas at Arlington, Arlington, Texas USA, April 29-May 1, 2011. (Poster)

232. A Design Framework of Unloaded Leaflet Shape for the Ovine Pulmonary Valve Single Leaflet Replacement Surgery, R. Fan, C. Hobson, A. Bayoumi, J. Mayer, W. Wagner, M.S. Sacks, Design of Medical Devices Conference 2011, Radisson University Hotel, University of Minnesota, Minneapolis, Minnesota USA, April 12-14, 2011. (Poster)
233. In-Vivo Dynamic Stress History of the Mitral Valve Anterior Leaflet, R. Amini, C.E. Eckert, C.A. Carruthers, K. Koomalsingh, M. Minakawa, J.H. Gorman, R.C. Gorman, M.S. Sacks, 2nd International Conference on Computational Mathematical Biomedical Engineering, Washington, D.C., USA, March 30-April 1, 2011. Published in Conference Proceedings CMBE11. (Poster)
234. Optimal Unloaded Leaflet Shape for the Ovine Pulmonary Valve Single Leaflet Replacement Surgery, R. Fan, C.M. Hobson, A. Bayoumi, J.E. Mayer, W.R. Wagner, M.S. Sacks, 2nd International Conference on Computational Mathematical Biomedical Engineering, Washington, D.C., USA, March 30-April 1, 2011. Published in Conference Proceedings CMBE11. (Poster)
235. Micro-Meso Scale Based Biomechanical Models to Assist the Design and Fabrication of Scaffolds for Cardiac Tissue Regeneration, DAmore, C. Hobson, J. Stella, N. Amorosa, R. Fan, W.R. Wagner, M.S. Sacks, Won first place at the MIRM 2011 Retreat Competition (Category Computation and Modeling), March 10, 2011. (Poster)

## 2010

236. Tailoring Electrospinning Fabrication for Scaffolds for Heart Valve Tissue Engineering, N.J. Amoroso, A. DAmore, W.R. Wagner, M.S. Sacks, Poster Session, BMES 2010 Annual Meeting, Austin, Texas USA, October 6-9, 2010. (Poster)
237. A Microstructure Based Mechanical Model for Planar Fibrous Scaffolds, DAmore, C.M. Hobson, W.R. Wagner, M.S. Sacks, Poster Session, BMES 2010 Annual Meeting, Austin, Texas USA, October 6-9, 2010. (Poster)
238. Differential Gene Expression, Ecm Organization And Multi-scale Mechanics Of The Aortic and Pulmonary Valve, C.A. Carruthers, C.M. Alfieri, E.M. Joyce, K.E. Yutzey, M.S. Sacks, Oral Presentation, BMES 2010 Annual Meeting, Austin, Texas USA, October 6-9, 2010. (Poster)
239. Micromechanics of the Anterior Mitral Valve Leaflet Under Physiological Deformations, C.A. Carruthers, J. Liao, M.S. Sacks, Poster Session, BMES 2010 Annual Meeting, Austin, Texas USA, October 6-9, 2010. (Poster)
240. Comparison of the Postnatal Somatic Growth Patterns between the Pulmonary Trunk and Ascending Aorta, B. Fata, D. Gottlieb, A. Cois, G. Stetten, J. Mayer, M.S. Sacks, Oral Presentation, BMES 2010 Annual Meeting, Austin, Texas USA, October 6-9, 2010. (Poster)
241. Evaluating the Mechanical Contribution of De-novo Matrix in Engineered Heart Valve Scaffolds, J.A. Stella, N.J. Amoroso, J.E. Mayer, W.R. Wagner, M.S. Sacks, Oral Presentation, BMES 2010 Annual Meeting, Austin, Texas USA, October 6-9, 2010. (Poster)
242. In Situ Estimation of Extracellular Matrix Stiffness-Interstitial Cell Mechanical Coupling in the Heart Valve Leaflet, M.S. Sacks, Oral Presentation, BMES 2010 Annual Meeting, Austin, Texas USA, October 6-9, 2010. (Poster)
243. In Vivo Dynamic Stresses in the Functional Mitral Valve,” C.E. Eckert, M. Morita, K. Koomalsingh, M. Minakawa, R.C. Gorman, J.H. Gorman III, M.S. Sacks, Oral Presentation, BMES 2010 Annual Meeting, Austin, Texas USA, October 6-9, 2010. (Poster)
244. Matrix synthesis and cellular deformations in fibrous engineered heart valve scaffolds, J. Stella, N.J. Amoroso, J.E. Mayer, Jr., W.R. Wagner, M.S. Sacks, SPRBM Scientific Conference, Tucson, Arizona USA, January 13-16, 2010. (Poster)

245. Oscillatory shear stresses promote engineered heart valve tissue development in-vitro, S. Ramaswamy, D. Gottlieb, G.C. Engelmayr Jr., E. Aikawa, J.E. Mayer Jr., M.S. Sacks, SPRBM Scientific Conference, Tucson, Arizona USA, January 13-16, 2010. (Poster)
246. Differential gene expression and ECM organization in the aortic and pulmonary valves, C.A. Carruthers, C.M. Alfieri, K.E. Yutzey, M.S. Sacks, SPRBM Scientific Conference, Tucson, Arizona USA, January 13-16, 2010. (Poster)
247. Computational Analysis and Comparison of Geometric Features of the Human Right Ventricle, with and without Pulmonary Hypertension, J. Wu, J.C. Brigham, M. Simon, S. Tripathy, K. Kim, M.S. Sacks, Presented at ECCM 2010, Paris, France, May 16-21, 2010. Published on CD ROM. (Poster)
248. Photoreactive, Cholesterol-containing Polymers Enhance Blood Outgrowth Endothelial Cell Attachment to Polyurethane, S.J. Stachelek, I. Alferiev, M. Ueda, J.M. Connolly, R.W. Bianco, R.P. Hebbel, M.S. Sacks, R.J. Levy, Presented at Society for Biomaterials 2010 Annual Meeting and Exposition, Seattle, WA, April 21-24, 2010. Published on CD ROM. (Poster)
249. Changes in Flexural Mechanical Behavior of Neomycin Treated GLUT Fixed Aortic Valve Tissue, M.D. McCall, C.E. Eckert, V.M. Fribe, N.R. Vyavahare, M.S. Sacks, Presented at Society for Biomaterials 2010 Annual Meeting and Exposition, Seattle, WA, April 21-24, 2010. Published on CD ROM. (Poster)
250. Effects of Rastering Velocity on Electrospun Polyurethane Structure and Mechanical Properties, A. D'Amore, N. Amoroso, W.R. Wagner, and M.S. Sacks, Presented at Society for Biomaterials 2010 Annual Meeting and Exposition, Seattle, WA, April 21-24, 2010. Published on CD ROM. (Poster)
251. Biaxial Bladder Biomechanics, M.S. Sacks, Presented at Society for Urodynamics and Female Urology, St. Petersburg, February 23, 2010, FL. Published on CD ROM. (Poster)
252. A Micro-Architectural Based Structural Model for Elastomeric Electrospun Scaffolds, M.S. Sacks, S.I. Stupp, J.E. Moore, Jr., Presented at the First Global Congress on NanoEngineering for Medicine and Biology (NEMB): Advancing Health Care through Nanoengineering and Computing, Houston, TX, February 7-10, 2010. Published on CD ROM. (Poster)
253. Matrix Synthesis and Cellular Deformations in Fibrous Engineered Heart Valve Scaffolds, J.A. Stella, N.J. Amoroso, J.E. Mayer, Jr., W.R. Wagner, and M.S. Sacks, Presented at the Society for Physical Regulation in Biology and Medicine 28th Annual Meeting, Tucson, AZ, January 13-16, 2010. Published on CD ROM. (Poster)
254. Oscillatory Shear Stresses Promote Engineered Heart Valve Tissue Development In-Vitro, S. Ramaswamy, D. Gottlieb, G.C. Engelmayr, Jr., E. Aikawa, J.E. Mayer, Jr., and M.S. Sacks, Presented at the Society for Physical Regulation in Biology and Medicine 28th Annual Meeting, Tucson, AZ, January 13-16, 2010. Published on CD ROM. (Poster)

## **2009**

255. Effects of Particulate and Cellular Integration and Mandrel Size on the Structure and Mechanical Anisotropy of Electrospun, J. Amoroso, W.R. Wagner, and M.S. Sacks, Presented at 2009 Materials Research Society Fall Meeting, Boston, MA, December 1, 2009. Published on CD ROM. (Poster)
256. A Structural Deterministic Model for Electrospun Scaffolds. D'Amore, J.A. Stella, D.E. Schmidt, W.R. Wagner, and M.S. Sacks, Presented at 2009 Materials Research Society Fall meeting, November 30, 2009, Boston, MA. Published on CD ROM. (Poster)
257. Effects of Physiological Hemodynamics on Engineered Heart Valve in vitro Tissue Development Using Bone Marrow-derived Mesenchymal Stem Cells, Symposium on Cardiovascular Regenerative Medicine, Bethesda, MD, October 15, 2009. (Poster)
258. A MRI-Compatible Bioactor for Monitoring Conditioned Marrow-Derived Stem Cell Seeded Scaffolds, S. Ramaswamy, A. Smelko, S. Boronyak, P. Schornack and M.S. Sacks, Presented at Biomedical Engineering

- Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
259. A Novel Device for the Characterization of Membrane Tissues during Failure, E.M. Joyce, J.J. Moore and M.S. Sacks, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
  260. MRI of Vascular Cells Labeled with SPIO-PLL Complexes for Heart Valve Tissue Engineering Studies, S. Ramaswamy, P. Schornack, J Ivanova, A Smelko and M.S. Sacks, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
  261. Analysis of Electrospun Scaffolds Micro-Architectural Data, A D'Amore, J.A. Stella, D.E. Schmidt, W.R. Wagner and M.S. Sacks, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
  262. Estimation of In Vivo Growth Strains of the Pulmonary Trunk in the Ovine Model, B. Fata, D. Gottlieb, J Mayer, and M.S. Sacks, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
  263. Strain Energy Functions for Biaxial Vascular Wall Mechanics of Small Renal Arteries, J.L.Hancy, D.O. Debrah, M.S. Sacks and G. Shroff, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009, Published on CD ROM. (Poster)
  264. "Effects of Mechanical Stimulation on Matrix Synthesis of Cells in Fibrous Elastomeric Scaffolds, J. Stella, N. Amoroso, W. Wagner and M.S. Sacks, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
  265. Elastomeric Fibrous Poly(ester urethane)urea/Dermal ECM Biohybrid Scaffolds for Abdominal Wall Reconstruction, Y.Hong, E.P. Brennan, N.J. Amoroso, M.S. Sacks and W.R. Wagner, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
  266. Deterious Effects of Heightened Aortic Valve Tissue Stress on Interstitial Cell Phenotype and Subsequent Gene Expression of Extracellular Matrix Constituents, C.A. Carruthers, C.M. Alfieri, K.E. Yutzey and M.S. Sacks, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
  267. Dynamic FE Analysis of a Simulated Congenital Bicuspid Aortic Valve, P.Jermiov, J. Lu, R. Gorman, M.S. Sacks and K.B. Chandran, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
  268. Influence of Annular Geometry and Deformation on the Simultaneous In Vivo Deformation of the Mitral Valve Apparatus C.E. Eckert, J.H. Gorman, R.C. Gorman and M.S. Sacks, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
  269. Development of a Cyclic Stretch Biaxial Bioreactor to Study Mechanotransduction of the Aortic Valve, C.A. Carruthers, and M.S. Sacks, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
  270. Flow Patterns under Combined Flexural States for Engineered Heart Valve Tissue Development, S.Ramaswamy, D. Schmidt, S. Boronyak, A. Smelko, and M.S. Sacks, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
  271. Design of a Flow-Stretch-Flexure Bioreactor for Physiologic Conditioning of Engineered Tissue, S. Boronyak, A. Smelko, M.S. Sacks and S. Ramaswamy, Presented at Biomedical Engineering Society 2009 Annual Meeting, October 7-10, 2009, Pittsburgh PA Published on CD ROM. (Poster)
  272. Structural Information of Cardiovascular Tissues Using Small Angle Light Scattering, D.M. Gaitan-Leon, D.E. Schmidt, D.W. Chew, D.A. Vorp, M.S. Sacks, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)

273. Elucidating Soft Tissue Remodeling Utilizing a Structural Constitutive Model, S. Wognum and M.S. Sacks, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
274. On some Nonlinearities in Structural Models for Valvular Tissues and Their Resolution, M.S. Sacks and D.E. Schmidt, Presented at Biomedical Engineering Society 2009 Annual Meeting, Pittsburgh PA, October 7-10, 2009. Published on CD ROM. (Poster)
275. A Hypoelastic Framework for Membranous Soft-Tissues, Including Cardiac Valves and Pericardium, A.D. Freed, M.S. Sacks and D.R. Einstein, Presented at Biomedical Engineering Society 2009 Annual Meeting, October 7-10, 2009, Pittsburgh PA Published on CD ROM. (Poster)
276. Synchronous Dynamic In-Vivo Deformation of the Mitral Valve Leaflet and Annulus, C. Eckert, J. Gorman, R. Gorman, and M.S. Sacks, Presented at 2009 Summer Bioengineering Conference, Lake Tahoe, CA, June 18, 2009. Published on CD ROM. (Poster)
277. Flow Patterns in a Flow-Stretch-Flexure Bioreactor System: Implications for the Conditioning of Engineered Heart Valve Tissue, S. Ramaswamy, D. Schmidt, S. Boronyak, and M.S. Sacks, Presented at 2009 Summer Bioengineering Conference, Lake Tahoe, CA, June 18, 2009. Published on CD ROM.
278. 3D Structural Information of Soft Tissues Using Small Angle Light Scattering, D.M. Gaitan, D.E. Schmidt, D.W. Chew, D.A. Vorp, and M.S. Sacks, Presented at 2009 Summer Bioengineering Conference, Lake Tahoe, CA, June 18, 2009. Published on CD ROM. (Poster)
279. Micro-Meso Scale Model of Electrospun Poly(Ester Urethane) Urea Scaffolds, A. DAmore, J. Stella, D. Schmidt, W. Wagner, and M.S. Sacks, Presented at 2009 Summer Bioengineering Conference, Lake Tahoe, CA, June 18, 2009. Published on CD ROM. (Poster)
280. Tissue Engineered and Native Ovine Pulmonary Valves: A High Resolution Three Dimensional Structural Characterization, C. Eckert, B. Mikulis, D. Gerneke, I. LeGrice, D. Gottlieb, J. Mayer, and M.S. Sacks, Presented at 2009 Summer Bioengineering Conference, Lake Tahoe, CA, June 17-21, 2009. Published on CD ROM. (Poster)
281. Characterizing the Influence of Scaffold Anisotropy on Engineered Heart Valve Leaflet Function, D.E. Schmidt and M.S. Sacks, Presented at 2009 Summer Bioengineering Conference, Lake Tahoe, CA, June 17-21, 2009. Published on CD ROM. (Poster)
282. Flow Patterns in Flow-Stretch-Flexure Bioreactors: Implications for Engineered Heart Valve Tissue Formation, S. Ramaswamy, D.E. Schmidt, S.M. Boronyak, and M.S. Sacks, Presented at U.S. Food and Drug Administration/National Heart, Lung and Blood Institute/ National Science Foundation Workshop on Computer Methods in Cardiovascular Device Design and Evaluation, Rockville, MD, June 1-2, 2009. Published on CD ROM. (Poster)
283. "Characterizing the Influence of Scaffold Anisotropy on Engineered Heart Valve Leaflet Function, D.E. Schmidt and M.S. Sacks, Presented at U.S. Food and Drug Administration/National Heart, Lung and Blood Institute/ National Science Foundation Workshop on Computer Methods in Cardiovascular Device Design and Evaluation, Rockville, MD, June 1-2, 2009. Published on CD ROM. (Poster)
284. Three-Dimensional structural characterization of tissue engineered and native ovine pulmonary valves, C.E. Eckert, B. Gernecke, D. Smaill, D. Gottlieb, J.E. Mayer, and M.S. Sacks, Society for Biomaterials 2009 Annual Meeting, San Antonio, TX, April 22-25. Published on CD ROM. (Poster)
285. Effects of mechanical stimulation on matrix synthesis of bone marrow derived stem cells in fibrous elastomeric scaffolds, J.A. Stella, W.D. Merryman, N.J. Amaroso, W.R. Wagner, and M.S. Sacks, Society for Biomaterials 2009 Annual Meeting, April 22-25, San Antonio, TX. Published on CD ROM. (Poster)
286. Design of a novel curved tube flow-stretch-flexure bioreactor for mechanistic studies in heart valve tissue engineering, S. Ramaswamy, S. Boronyak, D. Schmidt, and M.S. Sacks, Society for Biomaterials 2009 Annual Meeting, April 22-25, San Antonio, TX. Published on CD ROM. (Poster)



287. Effects of particulate integration and mandrel size on the structure and mechanical anisotropy of electrospun constructs, N.J. Amoroso, W.R. Wagner, and M.S. Sacks, Society for Biomaterials 2009 Annual Meeting, April 22-25, San Antonio, TX. Published on CD ROM. (Poster)

## **2008**

288. Quantitative Finite Element Mesh Incorporating the Microanatomy of the Aortic Valve Leaflet, M. McCall, J. Stella, and M. Sacks, Presented at the 2008 Annual Fall Meeting of the Biomedical Engineering Society, St. Louis, MO, October 2, 2008. Published on CD ROM. (Poster)
289. 3D In Vivo Geometric Characterization of the Right Ventricular Outflow Tract, B. Fata, M. Sacks, A. Cois, G. Stetten, D. Gottlieb, and J. Mayer, Presented at the 2008 Annual Fall Meeting of the Biomedical Engineering Society, October 2, 2008, St. Louis, MO. Published on CD ROM. (Poster)
290. Scale Dependent Kinematics of Fibrous Elastomeric Scaffolds for Tissue Engineering, M. Sacks, J. Stella, and W. Wagner, Presented at the 2008 Annual Fall Meeting of the Biomedical Engineering Society, St. Louis, MO, October 3, 2008. Published on CD ROM. (Poster)
291. Determinants of Relaxin-Induced Changes in Passive Compliance of Small Renal Arteries, D. Debrah, J. Debrah, M. Sacks, K. Conrad, and S. Shroff, Presented at the 2008 Annual Fall Meeting of the Biomedical Engineering Society, St. Louis, MO, October 4, 2008. Published on CD ROM. (Poster)
292. Mechanical Stimulation Induced Elastogenesis in Scaffolds Seeded with Bladder Smooth Muscle Cells, J. Ivanova, R. Long, A. Parekh, and M. Sacks, Presented at the 2008 Annual Fall Meeting of the Biomedical Engineering Society, St. Louis, MO, October 4, 2008. Published on CD ROM. (Poster)
293. A Multi-Layer Constitutive Model for Heart Valve Leaflets, M. Sacks and D. Schmidt, Presented at the 2008 Annual Fall Meeting of the Biomedical Engineering Society, St. Louis, MO, October 4, 2008. Published on CD ROM.
294. In Vivo Geometric Characterization of the Right Ventricular Outflow Tract, Fata, M.S. Sacks, A. Cois, G. Stetten, D. Gottlieb, and J. Mayer. Presented at Biomedical Engineering Society (BMES) Annual Meeting, St. Louis, MO, October 2, 2008. Published on CD ROM. (Poster)
295. A Fluid-Structure Interaction Model for 3D Heart Valve Dynamics, S. Vigmostad, H. Udaykumar, J. Lu, M.S. Sacks, and K. Chandran, Presented at the 10th ASME Summer Bioengineering Conference, June 29, 2008. Listed Page 58 of the proceedings. Published on CD ROM. (Poster)
296. Towards a Structurally Based Constitutive Model of Urinary Bladder Wall Tissue Remodeling After Spinal Cord Injury, S. Wognum and M.S. Sacks, Presented at the 10th ASME Summer Bioengineering Conference, June 28, 2008. Listed Page 51 of the proceedings. Published on CD ROM. (Poster)
297. Mechanical Stimulation Induced Elastogenesis in Collagenous Scaffolds Seeded with Bladder Smooth Muscle Cells, R. Long, Julia Ivanova, A. Parekh and M.S. Sacks, Presented at the 10th ASME Summer Bioengineering Conference, June 27, 2008. Listed Page 42 of the proceedings. Published on CD ROM. (Poster)
298. Engineered Heart Valve Tissue Formation at the Organ Level: Effects of Flow Dynamics on Tissue Development, S. Ramaswamy, D. Gottlieb, J. Meyer, and M.S. Sacks, Presented at the 10th ASME Summer Bioengineering Conference, June 27, 2008. Listed Page 32 of the proceedings. Published on CD ROM. (Poster)
299. The Intrinsic Durability of Aortic Valve ECM in Absence of Cellular Maintenance, J. Liao, E. Joyce, H. Jones, M. Tahai, A. Borazjani, D. Merryman, and M.S. Sacks, Presented at the 10th ASME Summer Bioengineering Conference, June 26, 2008. Listed Page 24 of the proceedings. Published on CD ROM. (Poster)
300. Extracellular Matrix-Contractile Response Coupling, M.S. Sacks, D. Schmidt, and D. Merryman, Presented at the 10th ASME Summer Bioengineering Conference, June 26, 2008. Listed Page 18 of the proceedings. Published on CD ROM. (Poster)

301. Non-Planar Shape of the Mitral Annulus Reduces Systolic Strain on the Posterior Leaflet by Increasing Leaflet Curvature, M. Padala, M.S. Sacks, and A. Yoganathan, Presented at the 10th ASME Summer Bioengineering Conference, June 26, 2008. Listed Page 19 of the proceedings. Published on CD ROM. (Poster)
302. Tissue-Cellular Deformation Coupling in Cell Microintegrated Elastomeric Scaffolds, J.A. Stella, J. Liao, Y. Hong, W.D. Merryman, W. R. Wagner, and M.S. Sacks, Presented at IUTAM Symposium on Cellular, Molecular and Tissue Mechanics, June 18, 2008. Published Page 10 of the proceedings. (Poster)
303. Effects of scaffold anisotropy on engineered heart valve stress/strain distributions, M.S. Sacks, D. Schmidt, J. Mayer, W. Wagner, Presented at the World Congress of Biomaterials, Amsterdam, May 29, 2008. Published on CD ROM. (Poster)
304. Effects on specimen motion on flow induced shear stresses in engineered heart valve tissues, S. Ramaswamy and M.S. Sacks, Presented at the World Congress of Biomaterials, Amsterdam, May 29, 2008. Published on CD ROM. (Poster)
305. Guiding in-vitro engineered heart valve tissue formation in the pulmonary valve physiologic environment," S. Ramaswamy and M.S. Sacks, Presented at the World Congress of Biomaterials, Amsterdam, May 29, 2008. Published on CD ROM. (Poster)
306. A meso-structural constitutive model for electrospun scaffolds for cardiovascular tissue engineering, M.S. Sacks, Presented at the World Congress of Biomaterials, Amsterdam, May 30, 2008. Published on CD ROM. (Poster)
307. Exogenous growth factors enhance bladder wall smooth muscle cell ingrowth into Small Intestinal Submucosa, R. Long, J. Ivanova, M.B. Chancellor, and M.S. Sacks, Presented at the World Congress of Biomaterials, Amsterdam, May 30, 2008. Published on CD ROM. (Poster)
308. "3D in-vivo geometric characterization of the right ventricular outflow track, B. Fata, D. Gottlieb, A. Cois, G. Stetten, J.E. Mayer, and M.S. Sacks, presented at the 3rd Biennial Heart Valve Biology and Tissue Engineering Meeting, The Royal Society, London, UK, May 4-7, 2008. Published Page 52 of the proceedings. (Poster)
309. Dynamic in-vivo deformation of the mitral valve leaflet and annulus in synchrony, C. Eckert, J. Gorman, and M.S. Sacks, presented at the 3rd Biennial Heart Valve Biology and Tissue Engineering Meeting, The Royal Society, London, UK, May 4-7, 2008. Published Page 43 of the proceedings. (Poster)
310. Collagen fiber recruitment structural constitutive models for valvular tissues, M.S. Sacks, presented at the 3rd Biennial Heart Valve Biology and Tissue Engineering Meeting, The Royal Society, London, UK, May 4-7, 2008. Published Page 98 of the proceedings. (Poster)
311. The role of physiological biaxial deformations on cellular mechanotransduction in the native pulmonary valve: Implications for heart valve tissue engineering, C. Carruthers and M.S. Sacks, presented at the 3rd Biennial Heart Valve Biology and Tissue Engineering Meeting, The Royal Society, London, UK, May 4-7, 2008. Published Page 94 of the proceedings. (Poster)
312. Effects of organ-level mechanical pre-conditioning in the development of tissue engineering heart valves, S. Ramaswamy, D. Gottlieb, J.E. Mayer, Jr., and M.S. Sacks, presented at the 3rd Biennial Heart Valve Biology and Tissue Engineering Meeting, The Royal Society, London, UK, May 4-7, 2008. Published Page 118 of the proceedings. (Poster)
313. Tissue-cellular deformation coupling in cell-microintegrated elastomeric scaffolds, J. Stella, W. Wagner, and M.S. Sacks, presented at the 3rd Biennial Heart Valve Biology and Tissue Engineering Meeting, The Royal Society, London, UK, May 4-7, 2008. Published Page 119 of the proceedings. (Poster)
314. Physiological Conditioning of TEPVs seeded with ovine bone marrow mesenchymal stem cells, S. Ramaswamy, D. Gottlieb, J.E. Mayer, Jr., and M.S. Sacks, Presented at Regenerative Medicine Advancing to Next Generation Therapies, Hilton Head Island, SC, March 12-16, 2008. Published Page 58 of the proceedings. (Poster)

315. Tissue-cellular deformation coupling in cell-microintegrated elastomeric scaffolds, M.S. Sacks, presented at the Society for Biological Engineering First International Conference on Stem Cell Engineering, Coronado Island, CA, Jan. 20-23, 2008. Published on page 30 of the proceedings. (Poster)
316. Synergistic acceleration of stem cell mediated heart valve tissue formation by cyclic flexure and laminar flow, G. Engelmayr, M.S. Sacks, and J.E. Mayer, presented at the Society for Biological Engineering First International Conference on Stem Cell Engineering, Coronado Island, CA, Jan. 20-23, 2008. Published on page 47 of the proceedings. (Poster)

## **2007**

317. A structural-based constitutive model for valvular tissues under generalized deformation, D.E. Schmidt and M.S. Sacks, Presented at the 44th Annual Technical Meeting, Society for Engineering Science, College Station, TX, Oct. 21-24, 2007. Published on CDROM. (Poster)
318. Local non-affine deformations and fiber kinematics of elastomeric electrospun scaffolds, J. Stella, M.S. Sacks, W.R. Wagner, Presented at the 44th Annual Technical Meeting, Society for Engineering Science, College Station, TX, Oct. 21-24, 2007. Published on CDROM. (Poster)
319. Viscoelastic deformation of the aortic valve interstitial cell during diastole, W.D. Merryman, F. Guilak, and M.S. Sacks, presented at the BMES annual fall meeting, Los Angeles, CA, Sept. 26-29, 2007. Published on CDROM. (Poster)
320. Characterization Of Aortic Valve Endothelial Cell Strain Response To Global Tissue Stretch, S.A. Metzler, S.C. Waller, M.S. Sacks, J. Liao, and J.N. Warnock, presented at the BMES annual fall meeting, Los Angeles, CA, Sept. 26-29, 2007. Published on CDROM. (Poster)
321. Stress Overload Of The In Situ Aortic Valve Interstitial Cell Under Circumferential Strain, W.D. Merryman, H. Lukoff, R. Hopkins, and M.S. Sacks, presented at the BMES annual fall meeting, Los Angeles, CA, Sept. 26-29, 2007. Published on CDROM. (Poster)
322. Ex Vivo Strain Induced Bladder Wall Remodeling, R.A. Long, A. Parekh, and M.S. Sacks, presented at the BMES annual fall meeting, Los Angeles, CA, Sept. 26-29, 2007. Published on CDROM. (Poster)
323. Structural Properties Of Extracellular Matrix In Decellularized Rabbit Carotid Arteries, C. Williams, E.M. Joyce, J.B. Leach, M.S. Sacks, J. Liao, J.Y. Wang, presented at the BMES annual fall meeting, Los Angeles, CA, Sept. 26-29, 2007. Published on CDROM. (Poster)
324. Cellular Deformations In Micro-Integrated Electrospun Scaffolds For Heart Valve Tissue Engineering, J. Stella, J. Liao, Y. Hong, W.D. Merryman, W.R. Wagner, M.S. Sacks, presented at the BMES annual fall meeting, Los Angeles, CA, Sept. 26-29, 2007. Published on CDROM. (Poster)
325. Influence Of Simulated Physiological Hemodynamics On Engineered Heart Valve Tissue Formation, S. Ramaswamy and M.S. Sacks, presented at the BMES annual fall meeting, Los Angeles, CA, Sept. 26-29, 2007. Published on CDROM. (Poster)
326. In Vivo Geometric Specification of the Ovine Right Ventricular Outflow Tract, Gottlieb, C.A. Cois, A.J. Powell, A. Nedder, D. Annese, G. Stetten, M.S. Sacks and J. Mayer, Presented at Methods in Bioengineering, Boston, MA. July 12-13, 2007. Published on CD ROM. (Poster)
327. Cellular deformations in microintegrated electrospun poly (ester urethane) urea scaffolds under biaxial stretch, J. Liao, W. D. Merryman, Y. Hong, S. Watkins, W. Wagner, M. S. Sacks, and J. Stella, Presented at the ASME 2007 Summer Bioengineering Conference, Keystone, CO, June 20 24, 2007. (Poster)
328. A structural based constitutive model for valvular tissues, D. Schmidt, M. S. Sacks, Presented at the ASME 2007 Summer Bioengineering Conference, Keystone, CO, June 20 24, 2007. (Poster)
329. The digital leaflet: Quantitative image analysis and 3-D digital reconstruction of the aortic valve leaflet, J. Stella, M. S. Sacks, Presented at the ASME 2007 Summer Bioengineering Conference, Keystone, CO, June 20 24, 2007. (Poster)

330. Strain induced bladder smooth muscle remodeling, R. Long, A. Parekh, M. S. Sacks, Presented at the ASME 2007 Summer Bioengineering Conference, Keystone, CO, June 20-24, 2007. (Poster)
331. Local non-affine deformations and fiber kinematics of elastomeric electrospun scaffolds, T. Courtney, M. S. Sacks, W. Wagner, J. Liao, Presented at the ASME 2007 Summer Bioengineering Conference, Keystone, CO, June 20-24, 2007. (Poster)
332. Aortic valve interstitial cell viscoelasticity, W. D. Merryman, M. S. Sacks, P. Bieniek, F. Guilak, Presented at the ASME 2007 Summer Bioengineering Conference, Keystone, CO, June 20-24, 2007. (Poster)
333. In vivo dynamic strains of the MV annulus, B. Zubiate, M.S. Sacks, Presented at the ASME 2007 Summer Bioengineering Conference, Keystone, CO, June 20-24, 2007. (Poster)
334. In-vivo dynamic strains of the mitral valve annulus, B. Zubiate, M. S. Sacks, R. Gorman, and J. Gorman, Society for Heart Valve Disease 4th Biennial Meeting, New York, NY, June 15-18, 2007. Abstract P132, page 58 of the proceedings. (Poster)
335. A novel flex-stretch-flow bioreactor for the study of engineered heart valve tissue mechanobiology, G.C. Engelmayr and M. S. Sacks, Society for Heart Valve Disease 4th Biennial Meeting, New York, NY, June 15-18, 2007. Abstract P98, page 47 of the proceedings. (Poster)
336. High resolution 3D geometric model of the ovine mitral valve, C. Eckert, L. Ryan, J. Gorman, R. Gorman, and M. S. Sacks, Society for Heart Valve Disease 4th Biennial Meeting, New York, NY, June 15-18, 2007. Abstract P36, page 30 of the proceedings. (Poster)
337. Differences in tissue remodeling potential of aortic and pulmonary heart valve interstitial cells, W. D. Merryman and M. S. Sacks, Society for Heart Valve Disease 4th Biennial Meeting, New York, NY, June 15-18, 2007. Abstract 133, page 56 of the proceedings. (Poster)
338. Cellular deformations of micro-integrated elastomeric electrospun scaffolds for heart valve tissue engineering, M. S. Sacks, W.R. Wagner, and John E. Mayer, Jr, Society for Heart Valve Disease 4th Biennial Meeting, New York, NY, June 15-18, 2007. Abstract 46, page 26 of the proceedings. (Poster)
339. The digital leaflet: Quantitative image analysis and 3D digital reconstruction of the aortic valve leaflet, J. Stella and M. S. Sacks, Society for Heart Valve Disease 4th Biennial Meeting, New York, NY, June 15-18, 2007. Abstract 6, page 19 of the proceedings. Note that this abstract was selected as one of the 10 top abstracts out of a total of 133 abstracts presented at the meeting. (Poster)
340. A structural model of the unirinary bladder wall: Effects of connective tissue remodeling, S. Wognum and M. S. Sacks, Presented at the Engineering and Urology Society 22nd Annual Meeting, Anaheim, CA, May, 2007. (Poster)
341. In vivo expression of TGF- $\beta$ 1 in spinal cord injury bladders and in vitro effects on bladder smooth muscle cell contraction and remodeling, A. Parekh, R. A. Long, M. S. Sacks, Presented at the Engineering and Urology Society 22nd Annual Meeting, Anaheim, CA, May, 2007. (Poster)
342. Collagen gel matrix reorganization by human adult and fetal dermal fibroblasts is differentially regulated by prostaglandin E2, A. Parekh, T. Singh T, M. S. Sacks, J. E. Dohar, P. A. Hebda, Presented at the Wound Healing Society 17th Annual Meeting and Exhibition: Symposium on Advanced Wound Care, Tampa, FL, April 28-May 1, 2007. (Poster)
343. Differences in tissue remodeling potential of the aortic and pulmonary heart valve interstitial cells, M. S. Sacks and W. D. Merryman, 2007 Annual Meeting, American Association of Anatomists, Federation of American Societies for Experimental Biology, Washington, DC, April 30, 2007. Published on CD, Experimental Biology: Today's Research: Tomorrow's Health, Abstract 187.1. (Poster)
344. Automated segmentation of the right heart using an optimized shells and spheres algorithm, C.A. Cois, K. Rockot, J. Galeotti, R. Tamburo, D. Gottlieb, J.E. Mayer, Jr., A. Powell, M. Sacks, and G. Stetten, Presented

and published (Abstract SA-AM-PS4.10) in the Proceedings of the International Symposium on Biomedical Imaging, April 12-15, Washington, DC, 2007. (Poster)

345. Bladder smooth muscle cell responses to contact guidance and biaxial mechanical stretch, R. A. Long, A. Parekh, M. B. Chancellor, M. S. Sacks, Presented at the Society for Biomaterials 2007 Annual Meeting, Chicago, IL, April 18 -21, 2007. Published on CD Transactions of the 32nd Annual Meeting. Vol. XXX, Abstract 154. (Poster)
346. Micromechanical deformations of electrospun elastomeric scaffolds for tissue engineering, T. Courtney, J. Stella, J. Liao, W. Wagner, M. S. Sacks, Presented at the Society for Biomaterials 2007 Annual Meeting, Chicago, IL, April 18 -21, 2007. Published on CD Transactions of the 32nd Annual Meeting. Vol. XXX, Abstract 347. (Poster)
347. The intrinsic durability of the aortic valve extracellular matrix, Presented at the Society for Biomaterials 2007 Annual Meeting, Chicago, IL, April 18 -21, 2007. Published on CD E. M. Joyce, J. Liao, W. D. Merryman, M. S. Sacks, Presented at the Society for Biomaterials 2007 Annual Meeting, Chicago, IL, April 18 -21, 2007. Published on CD Transactions of the 32nd Annual Meeting. Vol. XXX, Abstract 69. (Poster)
348. Effects of glutaraldehyde fixation and cyclic loading on the thermoelastic properties of aortic heart valve leaflets, S. M. Wells, M. S. Sacks, Presented at the Society for Biomaterials 2007 Annual Meeting, Chicago, IL, April 18 -21, 2007. Published on CD Transactions of the 32nd Annual Meeting. Vol. XXX, Abstract 104. (Poster)
349. Cellular deformations in micro-integrated elastomeric electrospun scaffolds under biaxial stretch, M. S. Sacks, J. Liao, W. D. Merryman, Y. Hong, W. R. Wagner, Presented at the 11th Annual Hilton Head Workshop, Hilton Head, SC, March 7 -11, 2007. Published in *Engineering Tissues: Replace Repair Regenerate*, page 26. (Poster)
350. Micromechanical deformations of electrospun elastomeric scaffolds for tissue engineering, M. S. Sacks, J. A. Stella, J. Liao, W. R. Wagner, Presented at the 11th Annual Hilton Head Workshop, Hilton Head, SC, March 7 -11, 2007. Published in *Engineering Tissues: Replace Repair Regenerate*, page 40. (Poster)
351. Independent and coupled effects of ascorbic acid-2-phosphate and basic fibroblast growth factor on bone marrow mesenchymal stem cell-mediated engineered tissue formation, G. C. Engelmayr, Jr., V. L. Sales, D. Gottlieb, J. E. Mayer, Jr., M. S. Sacks, Presented at the 11th Annual Hilton Head Workshop, Hilton Head, SC, March 7 -11, 2007. Published in *Engineering Tissues: Replace Repair Regenerate*, page 61. (Poster)
352. Automated Segmentation of the Right Heart Using an Optimized Shells and Spheres Algorithm, C.A. Cois, K. Rockot, J. Galeotti, R. Tamburo, D. Gottlieb, J. Mayer, A. Powell, M.S. Sacks, G. Stetten, Presented at Proceedings of the IEEE Symposium on Biomedical Imaging (ISBI), 2007, Arlington, VA. Published on pages 876-879. (Poster)

## **2006**

353. Protein pre-coating of elastomeric tissue-engineering scaffolds: Extracellular matrix formation and phenotypic changes of circulation endothelial progenitor cells, V. L. Sales, G. C. Engelmayr, D. Gottlieb, J. A. Johnson, Jr., J. Gao, Y. Wang, M. S. Sacks, J. E. Mayer, Jr, American Heart Association Scientific Sessions, Chicago, IL, November 12 -15, 2006. (Poster)
354. "Multiscale models of aortic valve mechanics and mechano-biology," M.S. Sacks and D. Schmidt, Presented at the Biomedical Engineering Society 2006 Annual Fall Meeting, Chicago, IL, October 11 -15, 2006. Published on CD, Proceedings of the 2006 BMES Annual Fall Meeting: Unlimited Horizons, Abstract 238 (Poster)
355. "Aortic valve interstitial cell mechanobiology: Response to cyclic tension and TGF-1," W. D. Merryman, H. D. Lukoff, R. A. Long, G. C. Engelmayr. R. A. Hopkins, M. S. Sacks, Presented at the Biomedical Engineering Society 2006 Annual Fall Meeting, Chicago, IL, October 11 -15, 2006. Published on CD, Proceedings of the 2006 BMES Annual Fall Meeting: Unlimited Horizons, Abstract 316. (Poster)

356. "Effects of decellularization on mechanical and structural properties of porcine aortic valve leaflet," E. M. Joyce, J. Liao, M. S. Sacks, Presented at the Biomedical Engineering Society 2006 Annual Fall Meeting, Chicago, IL, October 11 - 15, 2006. Published on CD, Proceedings of the 2006 BMES Annual Fall Meeting: Unlimited Horizons, Abstract 873. (Poster)
357. "Structural constitutive model of the urinary bladder wall with basal smooth muscle tone," S. Wognum, M. S. Sacks, Presented at the Biomedical Engineering Society 2006 Annual Fall Meeting, Chicago, IL, October 11 - 15, 2006. Published on CD, Proceedings of the 2006 BMES Annual Fall Meeting: Unlimited Horizons, Abstract 1379. (Poster)
358. Comparing the remodeling capabilities of aortic and pulmonary valve interstitial cells, W. D. Merryman, J. Liao, A. Parekh, J. E. Candiello, H. Lin, M. S. Sacks, Presented at the Biomedical Engineering Society 2006 Annual Fall Meeting, Chicago, IL, October 11 - 15, 2006. Published on CD, Proceedings of the 2006 BMES Annual Fall Meeting: Unlimited Horizons, Abstract 1471. (Poster)
359. Constitutive models for cell-integrated elastomeric scaffolds for soft tissue engineering, T. Courtney, J. Liao, J. Stankus, J. Guan, W. R. Wagner, M. S. Sacks, Presented at the Biomedical Engineering Society 2006 Annual Fall Meeting, Chicago, IL, October 11 - 15, 2006. Published on CD, Proceedings of the 2006 BMES Annual Fall Meeting: Unlimited Horizons, Abstract 1576. (Poster)
360. Diabetes induced alternations in the biomechanic properties of the urinary bladder wall, C. Wang, J. Nagatomi, K. Toosi, N. Yoshimura, M. B. Chancellor, M. S. Sacks, Presented at the Biomedical Engineering Society 2006 Annual Fall Meeting, October 11 - 15, 2006, Chicago, IL. Published on CD, Proceedings of the 2006 BMES Annual Fall Meeting: Unlimited Horizons, Abstract 1097. (Poster)
361. Regional dynamic strains of the native aortic valve, D. M. Gaitan, P. Bienek, B. Zubiante, M. S. Sacks, Presented at the Biomedical Engineering Society 2006 Annual Fall Meeting, Chicago, IL, October 11 - 15, 2006. Published on CD, Proceedings of the 2006 BMES Annual Fall Meeting: Unlimited Horizons, Abstract 1187. (Poster)
362. Towards a structural model of the urinary bladder wall, S. Wognum, M. S. Sacks, Presented at 43rd Annual Technical Meeting Society of Engineering Science, Pennsylvania State University, University Park, PA, August 13 - 16, 2006. (Poster)
363. Micromechanics of electrospun poly ester urethane urea scaffolds for soft tissue engineering, T. Courtney, J. Liao, J. Stankus, J. Guan, W. Wagner, M. S. Sacks, Presented at the 5th World Congress of Biomechanics, Munich, Germany, July 29 - August 4, 2006. Published on CD, Abstracts of the 5th World Congress of Biomechanics. Abstract 7515 and Journal of Biomechanics 2006; Vol. 39 Suppl. 1, page S262. (Poster)
364. Regional dynamic strains of the native aortic valve, D. M. Gaitan, M. S. Sacks, Presented at the 5th World Congress of Biomechanics, July 29 - August 4, 2006, Munich, Germany. Published on CD, Abstracts of the 5th World Congress of Biomechanics, Abstract 7509 and Journal of Biomechanics 2006; Vol. 39 Suppl. 1, page S307. (Poster)
365. Biaxial mechanical behavior of the aortic valve under physiologic loading conditions, J. A. Stella, M. S. Sacks, Presented at the 5th World Congress of Biomechanics, Munich, Germany, July 29 - August 4, 2006. Published on CD, Abstracts of the 5th World Congress of Biomechanics, Abstract 7512 and Journal of Biomechanics 2006; Vol. 39 Suppl. 1, page S307.
366. "Contribution of the extracellular matrix to the viscoelastic behavior of the bladder: A new modeling approach for bladder wall tissue, J. Nagatomi, M. S. Sacks, Presented at the 5th World Congress of Biomechanics, Munich, Germany, July 29 - August 4, 2006. Published on CD, Abstracts of the 5th World Congress of Biomechanics, Abstract 4649 and Journal of Biomechanics 2006; Vol. 39 Suppl. 1, page S391. (Poster)
367. Fiber architecture and biaxial mechanical behavior of porcine urinary bladder extracellular matrix, T. W. Gilbert, D. O. Freytes, A. R. Willment, M. S. Sacks, S. F. Badylak, Presented at the 5th World Congress of Biomechanics, Munich, Germany, July 29 - August 4, 2006. Published on CD, Abstracts of the 5th World Congress of Biomechanics, Abstract 5324 and Journal of Biomechanics 2006; Vol. 39 Suppl. 1, page S391.

368. Geometric changes in heart valve interstitial cell nuclei with transvalvular pressure, H.-Y. S. Huang, M. S. Sacks, Presented at the 5th World Congress of Biomechanics, Munich, Germany, July 29 August 4, 2006. Published on CD, Abstracts of the 5th World Congress of Biomechanics, Abstract 7524 and Journal of Biomechanics 2006; Vol. 39 Suppl. 1, page S640.
369. Long-term changes in material class of the urinary bladder wall following spinal cord injury, K.K. Toosi, J. Nagatomi, M. B. Chancellor, M. S. Sacks, Presented at the 5th World Congress of Biomechanics, Munich, Germany, July 29 August 4, 2006. Published on CD, Abstracts of the 5th World Congress of Biomechanics, Abstract 7501 annal of Biomechanics 2006; Vol. 39 Suppl. 1, page S390.
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461. Relationship between tissue morphology, composition, and biomechanics of the urinary bladder, J. Nagatomi, J. Grashow, K. Attar-Toosi, M.B. Chancellor, and M.S. Sacks, Presented at the Annual BMES Fall meeting, Nashville, TN, October 1-4, 2003. CD ROM. (Poster)
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487. Finite element implementation of a structural constitutive model for heart valve biomaterials, W. Sun, M.S. Sacks, and M. Scott, presented at the ASME IMECE 2002. (Poster)
488. Age related differences in the biaxial mechanical behavior of human abdominal aorta, J.P. Vande Geest, M.S. Sacks, and D.A. Vorp, to be presented at the ASME IMECE 2002.(Poster)
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