

**CURRICULUM VITAE**  
**OF**  
**JOSHUA HUTCHESON**  
**DEPARTMENT OF BIOMEDICAL ENGINEERING**  
**FLORIDA INTERNATIONAL UNIVERSITY**

**EDUCATION**

Degree	Institution	Field	Dates
Ph.D.	Vanderbilt University	Biomedical Engineering	12/2012
M.S.	Georgia Institute of Technology	Chemical Engineering	08/2008
B.S.	Georgia Institute of Technology	Chemical Engineering	12/2005

**FULL-TIME ACADEMIC EXPERIENCE**

Institution	Rank	Field	Dates
Brigham and Women's Hospital	Postdoc	Cardiovascular Medicine	08/2016
Harvard Medical School	Postdoc	Cardiovascular Medicine	08/2016

**EMPLOYMENT RECORD AT FIU**

Rank	Dates
Assistant Professor, Department of Biomedical Engineering	2016-2023
Assistant Professor, Department of Human and Molecular Genetics (Courtesy)	2020-2023
Associate Professor, Department of Biomedical Engineering	2023-

**PUBLICATIONS IN DISCIPLINE (Direct trainees underlined)**

**Books**

1. Cardiovascular Calcification and Bone Mineralization ed. by **Joshua D. Hutcheson** and Elena Aikawa, Springer 2020.

**Articles**

1. Thomas T, Bakhshiannik A, Nautiyal P, **Hutcheson JD**, Agarwal A. Freeze Casting to Engineer Gradient Porosity in Hydroxyapatite-Boron Nitride Nanotube Composite Scaffold for Improved Compressive Strength and Osteogenic Potential. *Journal of the Mechanical Behavior of Biomedical Materials* 2023; Accepted for publication. PMID: 38048712
2. Leizola D, Dargam V, Levia K, Alirezaei H, **Hutcheson JD**, Godavarty A. Effect of Chronic Kidney Disease Induced Calcification on Peripheral Vascular Perfusion using Near-Infrared Spectroscopic Imaging. *Biomedical Optics Express* 2024; 15(1): 277-293.
3. **Hutcheson, JD**. From Flow to Pharmaceuticals: Single-Cell Mechanobiology and Drug Efficacy. *Arteriosclerosis, Thrombosis, and Vascular Biology* 2023; Dec; 43(12): 2282-2284. PMID: 37942613
4. Thatcher K, Mattern CR, Chaparro D, Goveas V, McDermott MR, Fulton J, **Hutcheson JD**, Hoffman BR, Lincoln J. Temporal Progression of Aortic Valve Pathogenesis in a Mouse Model of Osteogenesis Imperfecta. *Journal of Cardiovascular Development and Disease* 2023; Aug 20; 10(8): 355. PMID: 37623368
5. Bakhshian Nik A, Kaiser K, Sun P, Khomtchouk BB, **Hutcheson JD**. Altered Caveolin-1 Dynamics Result in Divergent Mineralization Responses in Bone and Vascular Calcification. *Cellular and Molecular Bioengineering* 2023; Aug 19; 16(4): 299-308. PMID: 37811003
6. Levia K, Leizola D, Gonzalez I, Dargam V, Alirezaei H, Kaile K, Robledo E, **Hutcheson JD**, Godavarty A. Spatial-Temporal Oxygenation Mapping Using a Near-Infrared Optical Scanner: Towards Peripheral Vascular Imaging. *Annals of Biomedical Engineering* 2023; Sep; 51(9): 2035-2047. PMID: 37204547
7. **Hutcheson JD** and Goettsch C. Cardiovascular Calcification Heterogeneity in Chronic Kidney Disease. *Circulation Research* 2023; Apr 13; 132: 993-1012. PMID: 37053279

8. Bakhshian Nik A, Ng HH, Ashbrook SK, Sun P, Iacoviello F, Shearing PR, Bertazzo S, Mero D, Khomtchouk BB, **Hutcheson JD**. Epidermal Growth Factor Receptor Inhibition Prevents Vascular Calcifying Extracellular Vesicle Biogenesis. *American Journal of Physiology – Heart and Circulatory Physiology* 2023; Feb 24; Online ahead of print. PMID: 36827229.
9. Ashbrook SK, Valentin Cabrera AM, Shaver M, **Hutcheson JD**. Analysis of Extracellular Vesicle-Mediated Vascular Calcification Using In Vitro and In Vivo Models. *Journal of Visualized Experiments* 2023; Jan 27; 191. PMID: 36779615.
10. Sesena-Rubfiaro A, Prajapati NJ, Paolino L, Lou L, Cotayo D, Pandey P, Shaver M, **Hutcheson JD**, Agarwal A, He J. Membrane Remodeling of Human-Engineered Cardiac Tissue by Chronic Electric Stimulation. *ACS Biomaterials Science and Engineering* 2023; Feb 10; Online ahead of print. PMID: 36765460.
11. Laverde EE, Polyzos AA, Tsegay PP, Shaver M, **Hutcheson JD**, Balakrishnan L, McMurray CT, Liu Y. Flap Endonuclease 1 Endonucleolytically Processes RNA to Resolve R-Loops through DNA Base Excision Repair. *Genes (Basel)* 2022; Dec 29; 14(1):98. PMID: 36672839.
12. Iqbal F, Schlotter F, Becker-Greene D, Lupieri A, Goettsch C, **Hutcheson JD**, Rogers MA, Itoh S, Halu A, Lee LH, Blaser MC, Mlynarchik AK, Hagita S, Kuraoka S, Chen HY, Engert JC, Passos LSA, Jha PK, Osborn EA, Jaffer FA, Body SC, Robson SC, Thanassoulis G, Aikawa M, Singh SA, Sonawane AR, Aikawa E. Sortilin enhances fibrosis and calcification in aortic valve disease by inducing interstitial cell heterogeneity. *European Heart Journal* 2023; Jan 20; ehac818. PMID: 36660854.
13. Krohn JB, Aikawa E, Aikawa M, **Hutcheson JD**, Sahoo S, Fish JE. Editorial: Extracellular vesicles in cardiovascular inflammation and calcification. *Frontiers in Cardiovascular Medicine* 2022; Nov 8; 9:1077124. PMID: 36426218.
14. Aikawa E and **Hutcheson JD**. The Developmental Origin of Calcific Aortic Stenosis. *The New England Journal of Medicine* 2022; April 7;386:1372-1374; PMID: 35388675.
15. Hsu CP, Tchir A, Mirza A, Chaparro D, Herrera RE, **Hutcheson JD**, Ramaswamy S. Valve Endothelial Cell Exposure to High Levels of Flow Oscillations Exacerbates Valve Interstitial Cell Calcification. *Bioengineering*; 2022 Aug 16;9(8):393. PMID: 36004918.
16. Bakhshian Nik A, Ng HH, Russo MG, Iacoviello F, Shearing PR, Bertazzo S, **Hutcheson JD**. The Time-Dependent Role of Bisphosphonates on Atherosclerotic Plaque Calcification. *Journal of Cardiovascular Development and Disease*; 2022 May 25 ;9(6):168; PMID: 35735797.
17. Dargam V, Ng HH, Nasim S, Chaparro D, Irion CI, Seshadri SR, Barreto A, Danziger ZC, Shehadeh LA, **Hutcheson JD**. S2 Heart Sound Detects Aortic Valve Calcification Independent of Hemodynamic Changes in Mice. *Frontiers in Cardiovascular Medicine*; 2022 May 25;9:809301; PMID: 35694672.
18. Nasim S, Pandey P, Kanashiro-Takeuchi RM, He J, **Hutcheson JD**, Kos L. Pigmentation Affects Elastic Fiber Patterning and Biomechanical Behavior of the Murine Aortic Valve. *Frontiers in Cardiovascular Medicine* 2021; Dec 10;8:754560. PMID: 34957247
19. Iwata H, Osborn EA, Ughi GJ, Murakami K, Goettsch C, **Hutcheson JD**, Mauskopf A, Mattson PC, Libby P, Singh SA, Matamalas J, Aikawa E, Tearney GJ, Aikawa M, Jaffer FA. Highly Selective PPAR $\alpha$  (Peroxisome Proliferator-Activated Receptor  $\alpha$ ) Agonist Pemafibrate Inhibits Stent Inflammation and Restenosis Assessed by Multimodality Molecular-Microstructural Imaging. *Journal of the American Heart Association* 2021; Oct 19;10(20):e020834; PMID: 34632804.
20. Tong L, **Hutcheson JD**. A surface-based calibration approach to enable dynamic and accurate quantification of colorimetric assay systems. *Analytical Methods* 2021; Sep 30;13(37):4290-4297; PMID: 34473147.
21. **Hutcheson JD**, Schlotter F, Creager MD, Li X, Pham T, Vyas P, Higashi H, Body SC, Aikawa M, Singh SA, Kos L, Aikawa E. Elastogenesis Correlates with Pigment Production in Murine Aortic Valve Leaflets. *Frontiers in Cardiovascular Medicine* 2021; Jun 22;8:678401; PMID: 34239903.
22. Ruiz JL, **Hutcheson JD**, Cardoso L, Bakhshian Nik A, Condado de Abreu A, Pham T, Buffolo F, Busatto S, Federici S, Ridolfi A, Aikawa M, Bertazzo S, Bergese P, Weinbaum S, Aikawa E. Nanoanalytical analysis of bisphosphonate-driven alterations of microcalcifications using a 3D hydrogel system and in vivo mouse model. *Proceedings of the National Academy of Science* 2021; 118(14): e1811725118; PMID: 33795519.

23. Rogers MA, **Hutcheson JD**, Okui T, Goettsch C, Singh SA, Halu A, Schlotter F, Higashi H, Wang L, Whelan MC, Mlynarchik AK, Daugherty A, Nomura M, Aikawa M, Aikawa E. Dynamin-related protein 1 inhibition reduces hepatic PCSK9 secretion. *Cardiovascular Research* 2021; cvab034; PMID: 33523181.
24. Boonya-Ananta T, Rodriguez AJ, Ajmal A, Du Le VN, Hansen AK, **Hutcheson JD**, Ramella-Roman JC. Synthetic photoplethysmography (PPG) of the radial artery through parallelized Monte Carlo and its correlation to body mass index (BMI). *Scientific Reports* 2021; 11(1): 2570; PMID: 33510428.
25. Büttner P, Feistner L, Lurz P, Thiele H, **Hutcheson JD**, Schlotter F. Dissecting Calcific Aortic Valve Disease—The Role, Etiology, and Drivers of Valvular Fibrosis. *Frontiers in Cardiovascular Medicine* 2021; May 10;8:660797; PMID: 34041283.
26. Schlotter F, de Freitas RCC, Rogers MA, Blaser MC, Wu PJ, Higashi H, Halu A, Iqbal F, Andraski AB, Rodia CN, Kuraoka S, Wen JR, Creager M, Pham T, **Hutcheson JD**, Body SC, Kohan AB, Sacks FM, Aikawa M, Singh SA, Aikawa E. ApoC-III is a novel inducer of calcification in human aortic valves. *Journal of Biological Chemistry* 2020; 296: 100193; PMID: 33334888.
27. Heuschkel MA, Skenteris NT, **Hutcheson JD**, van der Valk DD, Bremer J, Goody P, Hjortnaes J, Jansen F, Bouten CVC, van den Bogaerdt A, Matic L, Marx N, Goettsch C. Integrative multi-omics analysis in calcific aortic valve disease reveals a link to the formation of amyloid-like deposits. *Cells* 2020; 9(10): 2164; PMID: 32987857.
28. Chaparro D, Dargam V, Alvarez P, Yeung J, Saytashev I, Bustillo J, Loganathan A, Ramella-Roman J, Agarwal A, **Hutcheson JD**. A method to quantify tensile biaxial properties of mouse aortic valve leaflets. *Journal of Biomechanical Engineering* 2020; doi: 10.1115/1.4046921; PMID: 32291440.
29. Jiang Z, Lai Y, Beaver JM, Tsegay PS, Zhao ML, Horton JK, Zamora M, Rein HL, Miralles F, Shaver M, **Hutcheson JD**, Agoulnik I, Wilson SH, Liu Y. Oxidative DNA damage modulates DNA methylation pattern in human Breast Cancer 1 (BRCA1) gene via the crosstalk between DNA polymerase  $\beta$  and a de novo DNA methyltransferase. *Cells* 2020; 9(1): 225; PMID: 31963223.
30. Hsu CD, **Hutcheson JD**, Ramaswamy S. Oscillatory fluid-induced mechanobiology in heart valves with parallels to the vasculature. *Vascular Biology* 2020; 2(1): R59-R71; PMID: 32923975.
31. **Hutcheson JD**, Goergen CJ, Schoen FJ, Aikawa M, Zilla P, Aikawa E, Gaudette GR. After 50 years of heart transplants: What does the next 50 years hold for cardiovascular medicine? A perspective from the international Society for Applied Cardiovascular Biology. *Frontiers in Cardiovascular Medicine* 2019; 6: 8; PMID: 30838213.
32. Tesfamariam MD, Mirza AM, Chaparro D, Ali AZ, Montalvan R, Saytashev I, Gonzalez BA, Barreto A, Ramella-Roman J, **Hutcheson JD**, Ramaswamy S. Elastin-dependent aortic heart valve leaflet curvature changes during cyclic flexure. *Bioengineering (Basel)* 2019; 6(2): 39; PMID: 31067726.
33. Bhushan P, Umasankar Y, **Hutcheson JD**, Bhansali S. Toxicity assessment of wearable wound sensor constituents on keratinocytes. *Toxicology In Vitro* 2019; 58: 170-177; PMID: 30928693.
34. Creager MD,\* Hohl T,\* **Hutcheson JD**,\* Moss AJ, Schlotter F, Blaser MC, Park MA, Lee LH, Singh SA, Alcaide-Corral CJ, Tavares AAS, Newby DE, Kijewski MF, Aikawa M, Di Carli M, Dweck MR, Aikawa E.  $^{18}\text{F}$ -Fluoride signal amplification identifies microcalcifications associated with atherosclerotic plaque instability in positron emission tomography/computed tomography images. *Circulation: Cardiovascular Imaging* 2019; 12(1): e007835; PMID: 30642216; \*co-first authorship.
35. RoyChoudhury S, Umasankar Y, **Hutcheson JD**, Lev-Tov HA, Kirsner RS, Bhansali S. Uricase based enzymatic biosensor for non-invasive detection of uric acid by entrapment in PVA-SbQ polymer matrix. *Electroanalysis* 2018; 30(10): 2374-2385.
36. **Hutcheson JD**, Aikawa E. Extracellular vesicles in cardiovascular homeostasis and disease. *Current Opinion in Cardiology* 2018; 33(3): 290-297; PMID: 29465447.
37. Schlotter F, Halu A, Goto S, Blaser MC, Body SC, Lee LH, Higashi H, DeLaughter DM, **Hutcheson JD**, Vyas P, Pham T, Rogers MA, Sharma A, Seidman CE, Loscalzo J, Seidman JG, Aikawa M, Singh SA, Aikawa E. Spatiotemporal multi-omics mapping generates a molecular atlas of the aortic valve and reveals networks driving disease. *Circulation* 2018; 138(4): 377-393; PMID: 29588317.

38. Pokhrel R, Gerstman BS, **Hutcheson JD**, Chapagain PP. In silico investigations of calcium phosphate mineralization in extracellular vesicles. *The Journal of Physical Chemistry B* 2018; 122(14): 3782-3789; PMID: 29519123.
39. Rogers MA, Maldonado N, **Hutcheson JD**, Goettsch C, Goto S, Yamada I, Faits T, Sesaki H, Aikawa M, Aikawa E. Dynamin-Related Protein 1 inhibition attenuates cardiovascular calcification in the presence of oxidative stress. *Circulation Research* 2017; 121(3): 220-233; PMID: 28607103.
40. **Bakhshian Nik A**, **Hutcheson JD**, Aikawa E. Extracellular vesicles as mediators of cardiovascular calcification. *Frontiers in Cardiovascular Medicine* 2017; 4: 78; PMID: 29322046.
41. Goettsch C, Iwata H, **Hutcheson JD**, O'Donnell CJ, Chapurlat R, Cook NR, Aikawa M, Szulc P, Aikawa E. Serum sortilin associates with aortic calcification and cardiovascular risk in men. *Arteriosclerosis, Thrombosis, and Vascular Biology* 2017; 37(5): 1005-1011; PMID: 28279970.
42. Yabusaki K, **Hutcheson JD**, Vyas P, Bertazzo S, Body SC, Aikawa M, Aikawa E. Quantification of calcified particles in human valve tissue reveals asymmetry of calcific aortic valve disease development. *Frontiers in Cardiovascular Medicine* 2017; 3: 44; PMID: 27867942.
43. **Hutcheson JD**, Blaser MC, Aikawa E. Giving calcification its due: Recognition of a diverse disease: A first attempt to standardize the field. *Circulation Research* 2017; 120(2): 270-273; PMID: 28104767.
44. Ruiz JL, Weinbaum S, Aikawa E, **Hutcheson JD**. Zooming in on the genesis of atherosclerotic plaque microcalcifications. *Journal of Physiology* 2016; 594(11): 2915-27; PMID: 27040360.
45. Krohn JB, **Hutcheson JD**, Martínez-Martínez E, Aikawa E. Extracellular vesicles in cardiovascular calcification: expanding current paradigms. *Journal of Physiology* 2016; 594(11): 2895-903; PMID: 26824781.
46. Kramann R, Goettsch C, Wongboonsin J, Iwata H, Schneider RK, Kuppe C, Kaesler N, Chang-Panesso M, Machado FG, Gratwohl S, Madhurima K, **Hutcheson JD**, Jain S, Aikawa E, Humphreys BD. Adventitial MSC-like cells are progenitors of vascular smooth muscle cells and drive vascular calcification in chronic kidney disease. *Cell Stem Cell* 2016; 19(5): 628-642; PMID: 27618218.
47. Goettsch C,\* **Hutcheson JD**,\* Hagita S,\* Rogers MA, Creager MD, Pham T, Choi J, Mlynarchik AK, Pieper B, Kjolby M, Aikawa M, Aikawa E. A single injection of gain-of-function mutant PCSK9 adeno-associated virus vector induces cardiovascular calcification in mice with no genetic modification. *Atherosclerosis* 2016; 251: 109-18; PMID: 27318830; \*Equal Contribution.
48. O'Rourke C, Shelton G, **Hutcheson JD**, Burke MF, Martyn T, Thayer TE, Shakartzi HR, Buswell MD, Tainsh RE, Yu B, Bagchi A, Rhee DK, Wu C, Derwall M, Buys ES, Yu PB, Bloch KD, Aikawa E, Bloch DB, Malhotra R. Calcification of vascular smooth muscle cells and imaging of aortic calcification and inflammation. *Journal of Visualized Experiments* 2016; (111): 54017; PMID: 27284788.
49. Hjortnaes J, Goettsch C, **Hutcheson JD**, Camci-Unal G, Lax L, Scherer K, Body S, Schoen FJ, Kluin J, Khademhosseini A, Aikawa E. Simulating early calcific aortic valve disease within a 3D heart valve-like construct: A role for myofibroblast differentiation. *Journal of Molecular and Cellular Cardiology* 2016; 94: 13-20; PMID: 26996755.
50. Goettsch C, **Hutcheson JD**, Aikawa M, Iwata H, Pham T, Nykjaer A, Kjolby M, Rogers M, Michel T, Shibasaki M, Hagita S, Kramann R, Rader DJ, Libby P, Singh SA, Aikawa E. Sortilin mediates vascular calcification via its recruitment into extracellular vesicles. *Journal of Clinical Investigation* 2016; 126(4): 1323-36; PMID: 26950419.
51. West JD, Carrier EJ, Bloodworth NC, Schroer AK, Chen P, Ryzhova LM, Gladson S, Shay S, **Hutcheson JD**, Merryman WD. Serotonin 2B receptor antagonism prevents heritable pulmonary arterial hypertension. *PLoS One* 2016; 11(2): e0148657; PMID: 26863209.
52. Krohn JB, **Hutcheson JD**,\* Martínez-Martínez E, Irvin WS, Bouten CV, Bertazzo S, Bendeck MP, Aikawa E.\* Discoidin Domain Receptor-1 regulates calcific extracellular vesicle release in vascular smooth muscle cell fibrocalcific response via TGF- $\beta$  signaling. *Arteriosclerosis, Thrombosis, and Vascular Biology* 2016; 36(3): 525-33; PMID: 26800565. \*Co-corresponding authors.
53. **Hutcheson JD**, Goettsch C, Bertazzo S, Maldonado N, Ruiz JL, Goh W, Yabusaki K, Faits T, Bouten C, Franck G, Quillard T, Libby P, Aikawa M, Weinbaum S, Aikawa E. High-resolution microscopic visualization of vascular calcification genesis, growth, and association with collagen in atherosclerotic plaques. *Nature Materials* 2016; 15(3): 335-43; PMID: 26752654.

54. Hjortnaes J, Shapero K, Goettsch C, **Hutcheson JD**, Keegan J, Kluin J, Mayer JE, Bischoff J, Aikawa E. Valvular interstitial cells suppress calcification of valvular endothelial cells. *Atherosclerosis* 2015; 242(1): 251-260; PMID: 26232165.
55. **Hutcheson JD**, Goettsch C, Rogers MA, Aikawa E. Revisiting cardiovascular calcification: A multifaceted disease requiring a multidisciplinary approach. *Seminars in Cells & Developmental Biology* 2015; 46: 68-77; PMID: 26358815.
56. Ruiz JL, **Hutcheson JD**, Aikawa E. Cardiovascular calcification: current controversies and novel concepts. *Cardiovascular Pathology* 2015; 24(4): 207-12; PMID: 25797772.
57. Hjortnaes J, Camci-Unal G, **Hutcheson JD**, Jung SM, Schoen FJ, Kluin J, Aikawa E, Khademhosseini A. Directing valvular interstitial cell myofibroblast-like differentiation in a hybrid hydrogel platform. *Advanced Healthcare Materials* 2015; 4(1): 121-130; PMID: 24958085.
58. **Hutcheson JD**, Goettsch C, Pham T, Iwashita M, Aikawa M, Singh SA, Aikawa E. Enrichment of calcifying extracellular vesicles using density-based ultracentrifugation protocol. *Journal of Extracellular Vesicles* 2014; 3: 25129; PMID: 25491249.
59. **Hutcheson JD**, Maldonado N, Aikawa E. Small entities with large impact: microcalcifications and atherosclerotic plaque vulnerability. *Current Opinion in Lipidology* 2014; 25(5): 327-32; PMID: 25188916.
60. **Hutcheson JD**, Aikawa E, Merryman WD. Potential drug targets for calcific aortic valve disease. *Nature Reviews Cardiology* 2014; 11(4): 218-31; PMID: 24445487.
61. **Hutcheson JD**, Chen J, Sewell-Loftin MK, Ryzhova LM, Fisher CI, Su YR, Merryman WD. Cadherin-11 regulates cell-cell tension necessary for calcific nodule formation by valvular myofibroblasts. *Arteriosclerosis, Thrombosis, and Vascular Biology* 2013; 33(1): 114-20; PMID: 23162011.
62. Goettsch C, **Hutcheson JD**, Aikawa E. MicroRNA in cardiovascular calcification: Focus on targets and extracellular vesicle delivery mechanisms. *Circulation Research* 2013; 112(7): 1073-84; PMID: 23538277.
63. Aikawa E, Gardiner C, **Hutcheson JD**, Ochiya T, Osteikoetxea X, Pegtel M, Piper M, Quesenberry P, Schiffelers RM, Szabó TG, Buzas EI. International Society for Extracellular Vesicles: Second Annual Meeting, 12-20 April 2013, Boston, MA (ISEV 2013). *Journal of Extracellular Vesicles* 2013; 2: 23070; PMID: 26082318.
64. **Hutcheson JD**, Ryzhova LM, Setola V, Merryman WD. 5-HT<sub>2B</sub> antagonism arrests non-canonical TGF- $\beta$ <sub>1</sub>-induced myofibroblast differentiation. *Journal of Molecular and Cellular Cardiology* 2012; 53(5): 707-714; PMID: 22940605.
65. **Hutcheson JD**, Venkataraman R, Baudenbacher FJ, Merryman WD. Intracellular Ca<sup>(2+)</sup> accumulation is strain-dependent and correlates with apoptosis in aortic valve fibroblasts. *Journal of Biomechanics* 2012; 45(5): 888-894; PMID: 22176709.
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67. **Hutcheson JD**, Schlicher RK, Hicks HK, Prausnitz MR. Saving cells from ultrasound-induced apoptosis: quantification of cell death and uptake following sonication and effects of targeted calcium chelation. *Ultrasound in Medicine and Biology* 2010; 36(6): 1008-1021; PMID: 20447754.
68. Schlicher RK, **Hutcheson JD**, Radhakrishna H, Apkarian RP, Prausnitz MR. Changes in cell morphology due to plasma membrane wounding. *Ultrasound in Medicine and Biology* 2010; 36(4): 677-692; PMID: 20350691.
69. **Hutcheson JD**, Setola V, Roth BL, Merryman WD. Serotonin receptors and heart valve disease - it was meant 2B. *Pharmacology & Therapeutics* 2011; 132(2): 146-157; PMID: 21440001.
70. Kamaev PP, **Hutcheson JD**, Wilson ML, Prausnitz MR. Quantification of optison bubble size and lifetime during sonication dominant role of secondary cavitation bubbles causing acoustic bioeffects. *Journal of the Acoustical Society of America* 2004; 115: 1818-1825; PMID: 15101659.

## Proceedings

1. T. Boonya-ananta, A. J. Rodriguez, A. K. Hansen, **J. D. Hutcheson**, and J. C. Ramella-Roman, "Monte

- Carlo Modeling of a Photoplethysmographic (PPG) in Individuals with Obesity," in Biophotonics Congress: Biomedical Optics 2020 (Translational, Microscopy, OCT, OTS, BRAIN), OSA Technical Digest (Optica Publishing Group, 2020), paper JTU3A.39.
2. V. Dargam, H.H. Ng, A. Sanchez, S. Nasim, C.I. Irion, S.R. Seshadri, L. Shehadeh, **J.D. Hutcheson**, "Tracking Acoustic and Electrophysiological Changes Associated with CKD-induced Cardiac and Valvular Remodeling in a Mouse Model." Structural Heart. Vol 5 Suppl 1, 23, June 2021.
  3. T. Boonya-Ananta, A.J. Rodriguez, A. Ajmal, D. Le, **J.D. Hutcheson**, J.C. Ramella-Roman, "Synthetic photoplethysmographic waveform at the radial artery," Proc. SPIE 11640, Optical Interactions with Tissue and Cells XXXII, 116400O (5 March 2021).
  4. D. Leizola, V. Dargam, K. Leiva, H. Alirezai, **J.D. Hutcheson**, A. Godavarty, "Peripheral oxygenation differences in mice with chronic kidney disease," in Biophotonics Congress: Biomedical Optics 2022 (Translational, Microscopy, OCT, OTS, BRAIN), Technical Digest Series (Optica Publishing Group, 2022), paper JM3A.23.

#### Chapters in Books

1. **Hutcheson JD** and Aikawa E. The History of Cardiovascular Calcification, Cardiovascular Calcification and Bone Mineralization ed. by **Joshua D. Hutcheson** and Elena Aikawa, Springer 2020.
2. Ng HH, Molina JE, and **Hutcheson JD**. Calcifying Extracellular Vesicles: Biology, Characterization and Mineral Formation, Cardiovascular Calcification and Bone Mineralization ed. by **Joshua D. Hutcheson** and Elena Aikawa, Springer 2020.
3. **Hutcheson JD** and Aikawa E. Pathobiology and optical imaging of calcific aortic valve disease, Cardiovascular Imaging - Arterial and Aortic Valve Inflammation and Calcification ed. by Elena Aikawa, Springer, 2015.
4. **Hutcheson JD** and Aikawa E. Optical Molecular Imaging of Inflammation and Calcification in Atherosclerosis, Cardiovascular Imaging - Arterial and Aortic Valve Inflammation and Calcification ed. by Elena Aikawa, Springer, 2015.
5. **Hutcheson JD** and Aikawa E. Valvular Heart Disease, Pathobiology of Human Disease ed. by Linda M. McManus and Richard N. Mitchell, Elsevier, 2014.
6. **Hutcheson JD**, Nilo MP, and Merryman WD. Mechanobiology of Heart Valves, Mechanobiology Handbook ed. by Jiro Nagatomi, CRC Press, 2011.

#### PRESENTED PAPERS AND LECTURES (Direct trainees underlined)

##### Abstracts

1. Valentin Cabrera A. M., Melo R., Wilson K. J., Marugan J. J., **Hutcheson J. D.**, AgoulNIK A. (10/01/2022). "Relaxin receptor agonist ML290 causes dose-dependent vascular calcification attenuation in poloxamer induced mouse model of atherosclerosis." International Society for Applied Cardiovascular Biology. Memphis, TN. Podium presentation
2. Ashbrook, S. K., Bakhshiannik, A., & **Hutcheson, J. D.** (September 29, 2022). "EGFR Inhibition Alters Caveolin-1 Trafficking and Prevents Vascular Calcification In Vitro". International Society for Applied Cardiovascular Biology. Memphis, TN. Poster Presentation
3. Shaver, M., Hamed, B., & **Hutcheson, J.D.** (2022) "Mechanical Stretch Influences the Calcifying Potential of Caveolin-1-dependent Extracellular Vesicles from Vascular Smooth Muscle Cells", International Society for Applied Cardiovascular Biology, Memphis TN. Poster Presentation
4. Hsu, C.-P. D., **Hutcheson J.D.**, Ramaswamy S. "Valve Endothelial Cell Secretions Augment Calcification by Valve Interstitial Cells". Oral presentation, 9th World Congress of Biomechanics 2022, July 10-14, Taipei, Taiwan
5. Armel P.A., Hsu C.-P. D., Mirza A., **Hutcheson J.D.**, Ramaswamy S. "Computational Assessment of Oscillatory Flows to Induce Valve Calcification". ePoster presentation, 53rd Biomedical Engineering Society Annual Meeting 2021, October 6-9, Orlando, FL, USA
6. Tong, L., **Hutcheson, J.D.** (2021). "A surface-based calibration approach to enable dynamic and accurate quantification of colorimetric assay systems". ISACB, Atlanta, GA
7. Shaver, M., & **Hutcheson, J.D.** (2021) "Mechanical Stretch Leads to The Caveolin 1-dependent Release

of Mineral Forming EVs From VSMCs”, Biomedical Engineering Society, Orlando, FL. Oral Presentation

8. Hsu C.-P. D., Tchir A., **Hutcheson J. D.**, Ramaswamy S. “Calcific Media Combined with Media from Oscillatory Flow-Conditioned Valve Endothelial Cells Leads to Valve Interstitial Cell Calcification”. Video presentation, 52nd Biomedical Engineering Society Annual Meeting 2020, October 14-17, San Diego, CA, USA
9. Dargam, V., Bakhshiannik, A., & **Hutcheson, J. D.** (2019). “Diagnosing Early Aortic Valve Disease: Correlation Between Heart Sounds and Remodeling.” Biomedical Engineering Society. Philadelphia, PA. Oral Presentation
10. Hsu C.-P. D., Tchir A., **Hutcheson J. D.**, Ramaswamy S. “Vascular Smooth Muscle Cell Alpha-Smooth Muscle Actin Expression after Exposure to Conditioned Media from Endothelial Cells Cultured in Oscillatory Flow Environments”. Poster presentation, 51st Biomedical Engineering Society Annual Meeting 2019, October 16-19, Philadelphia, PA, USA
11. Shaver, M., Molina, J., & **Hutcheson, J. D.** (2019). “Cyclic Stretch Causes Liberation of Caveolin-1 in Extracellular Vesicles from Vascular Smooth Muscle Cells.” American Society of Mechanical Engineering Summer Biomechanics, Bioengineering, and Biotransport Conference. Seven Springs Mountain Resort, Pennsylvania. Oral Presentation
12. Hsu C.-P. D., Tchir A., **Hutcheson J. D.**, Ramaswamy S. “The Effects of Oscillatory Shear Regulation on Paracrine Signaling between Vascular Endothelial Cells and Vascular Smooth Muscle Cells”. Poster presentation, 5th Summer Biomechanics, Bioengineering, and Biotransport Conference 2019, June 25-28, Seven Springs, PA, USA
13. Shaver, M., & **Hutcheson, J.D.** (2018) “Cyclic Stretch Induces Caveolin-1 Release in Extracellular Vesicles From Vascular Smooth Muscle Cells” Biomedical Engineering Society, Atlanta, GA. Poster Presentation
14. Molina J., **Hutcheson J.D.** (2018) “Using Tunable Resistive Pulse Sensing to Identify and Quantify Extracellular Vesicles” Biomedical Engineering Society, Atlanta, GA. Oral Presentation
15. Bakhshian Nik A., **Hutcheson J.D.** (2018) “Glucose-mediated Smooth Muscle Cell Contraction Is Required for Calcification In Vitro” Biomedical Engineering Society, Atlanta, GA. Oral Presentation

#### Invited Presentations

1. **Hutcheson, J. D.** (2024). “Therapeutic and Diagnostic Considerations in Cardiovascular Disease.” Treasure Coast Translational Science Lecture Series, Center for Translational Sciences, Port St. Lucie, FL.
2. **Hutcheson, J. D.** (2024). “Therapeutic and Diagnostic Considerations in Cardiovascular Disease.” Departmental Seminar, University of Arkansas, Fayetteville, AR.
3. **Hutcheson, J. D.** (2024). “Reaching Outside the Lab.” Faculty Development Seminar, Institute for Integrative & Innovative Research (i3R), University of Arkansas, Fayetteville, AR.
4. **Hutcheson, J. D.** (2024). “Therapeutic and Diagnostic Considerations in Cardiovascular Disease.” FIU Center for Translational Science-3rd Annual South Florida Translational Research Symposium, Center for Translational Sciences, Port St. Lucie, FL.
5. **Hutcheson, J. D.** (2024). “Therapeutic and Diagnostic Considerations in Cardiovascular Disease.” Departmental Seminar, University of Louisville, Louisville, KY.
6. **Hutcheson, J. D.** (2024). “Therapeutic and Diagnostic Considerations in Cardiovascular Disease.” Departmental Seminar, Medical College of Wisconsin, Milwaukee, WI.
7. **Hutcheson, J. D.** (2023). “Cellular Heterogeneity in Aortic Valve Patterning.” Presented at the Gordon Research Conference - Biomechanics in Vascular Biology and Disease, Mount Holyoke College, MA.
8. **Hutcheson, J. D.** (2022). Invited departmental seminar. In University of Alabama at Birmingham Department of Biomedical Engineering. Birmingham, AL.
9. **Hutcheson, J. D.** (2022). Invited departmental seminar. In University of Pittsburgh Department of Bioengineering. Pittsburgh, PA.
10. **Hutcheson, J. D.** (2022). Florida Institute of Technology - Departmental Seminar. In Florida Institute of Technology - Biomedical Engineering Program. Zoom.
11. **Hutcheson, J. D.** (2021). Invited Keynote Lecture on Cardiovascular Calcification. Presented at the

International Society of Applied Cardiovascular Biology, Atlanta, GA.

12. **Hutcheson, J. D.** (2021). Invited lecture on translational cardiovascular research. In Florida Chapter of the American College of Cardiology. Orlando, FL.
13. **Hutcheson, J. D.** (2020). "Extracellular vesicles and their role in cardiovascular diseases and calcification." Presented at the Heart Valve Society Meeting, Abu Dhabi, UAE.
14. **Hutcheson, J. D.** (2018). "Cardiovascular mechanics and extracellular vesicles" at the North American Vascular Biology Organization Meeting. Newport, Rhode Island.
15. **Hutcheson, J. D.** (2018). "Detecting the Undetectable: Mechanisms and Clinical Implications of Microcalcification" at the European Union INTRICARE meeting. Aachen, Germany.
16. **Hutcheson, J. D.** (2017). "Aortic Valve Melanocytic Cells Control Valvular Elastogenesis." Presented at The 50th Anniversary Celebration of the First Heart Transplant, Cape Town, South Africa.

#### EXTERNALLY FUNDED RESEARCH (Direct trainees underlined)

##### *Ongoing*

NSF PATHS-UP Engineering Research Center      Ramella-Roman J (PI)      10/01/2022-09/30/2023  
FIU Thrust 1.1 Research Project; **Role: Project Lead**

Leading a project to develop a platform that stratifies cardiovascular risk in underserved populations. Year 6 of expected 10-year funding mechanism.

Total annual Project 1.1 funding: \$94,211 (\$66,066 Direct)

Florida Heart Research Foundation      **Hutcheson J.D. (PI)**      08/01/2021-07/31/2024  
"A Novel Small Molecule Therapy for Late-Stage Atherosclerosis"

To study the therapeutic potential of a small molecule relaxin agonist to reverse late-stage arterial remodeling  
Co-PI: Alexander Agoulnik (FIU HWCOR); Total funding: \$450,000 (\$450,000 Direct; 65% to Hutcheson)

NIH 1R01HL160740      **Hutcheson J.D. (PI)**      12/01/2021-11/31/2026  
"Targeting the Caveolae-Dependent Mechanism of Calcifying Extracellular Vesicle Formation"

To study and therapeutically target the initiating mechanisms in vascular calcification

Total funding: \$1,796,377 (\$1,250,000 Direct)

Florida Heart Research Foundation      **Hutcheson J.D. (PI)**      03/01/2023-02/28/2026  
"A Nanoanalytical Approach to Unraveling Differences Between Physiological and Pathological Mineralization"

To study the similarities and differences between bone and vascular mineralization

Total funding: \$450,000 (\$450,000 Direct)

NIH 1F31HL154671      Dargam V (PI)      09/07/2020-06/06/2024  
NIH F31 Graduate Fellowship; **Role: Faculty Sponsor**

Fellowship to support stipend, tuition, and partial research support for Ph.D. student studying low-cost techniques to diagnose and monitor cardiovascular remodeling.

Total funding: \$135,973 (\$135,973 Direct)

Florida Heart Research Foundation      Chaparro D (PI)      12/01/2022-11/30/2023  
Florida Heart Research Foundation Doctoral Student Grant; **Role: Faculty Mentor**

Grant provides complete stipend support and \$30,000 in research support for Ph.D. student studying the role of atypical cells in aortic valve function and disease

Total funding: \$60,000 (\$60,000 Direct)

Florida Heart Research Foundation      Shaver M (PI)      12/01/2022-11/30/2024  
Florida Heart Research Foundation Doctoral Student Grant; **Role: Faculty Mentor**



Grant provides complete stipend support and \$30,000 in research support for Ph.D. student studying the role of mechanics in calcifying extracellular vesicle formation

Total funding: \$120,000 (\$120,000 Direct)

### ***Completed***

American Heart Association

**Hutcheson J.D. (PI)**

07/01/2017-06/30/2020

Scientist Development Grant: “Tracing the Therapeutic Efficacy of Bisphosphonates in Bone and Vascular Mineralization”

To study the similarities and differences between bone and vascular mineralization and the use of bisphosphonates as a treatment strategy for each.

Total funding: \$231,000 (\$210,000 Direct)

NSF PATHS-UP Engineering Research Center

**Hutcheson J.D. (PI)**

09/01/2019-09/30/2021

Seed Grant: “Development of a Biosensing Platform for Vascular Calcification”

To study the extracellular vesicle-mediated mechanisms of vascular calcification and develop a platform that can diagnose the presence of these vesicles in blood serum

Total funding: \$25,000 (\$25,000 Direct)

NSF I-Corps Program

**Hutcheson J.D. (PI)**

10/01/2020-06/30/2022

“Cardiacoustics: AI-based Heart Sound Screening for Early-Stage Heart Disease”

To study the commercialization potential and perform customer discovery for new diagnostic techniques for aortic valve disease

Total funding: \$50,000 (\$45,000 Direct)

NSF PATHS-UP Engineering Research Center

**Hutcheson J.D. (PI)**

10/01/2021-09/30/2022

Seed Grant: “Low-cost Assessment of Cardiac Function and Remodeling in Heart Failure with Preserved Ejection Fraction”

To study the potential of non-invasive measures of cardiac pressures to diagnose and monitor heart failure

Total funding: \$25,000 (\$25,000 Direct)

### **PATENT DISCLOSURES, APPLICATIONS, AND AWARDS**

1. Hutcheson, J.D., & Dargam, V. (2023). Systems and methods for quantifying duration of heart sounds. US11771378B2.
2. Hutcheson, J.D., Bakhshiannik A., & Ng, H.H. (2023). Targeting epidermal growth factor to treat vascular calcification. US11612601.
3. Hutcheson, J. D., Agoulnik, A., & Ng, H. H. (2022). Materials and methods for the treatment of vascular calcification. US11235033B1.
4. Hutcheson, J. D., & Dargam, V. (2022). Methods and devices for processing heart sounds. US20210251598A1.
5. Aikawa, E., Hutcheson, J. D., Goettsch, C., & Aikawa, M. (2019). Mitochondrial phosphate carrier targets for treating soft-tissue calcification. US10190119B2.
6. Hutcheson, J. D., Aikawa, E., & Aikawa, M. (2018). System and method for imaging of matrix vesicle calcification. US10107823B2.

### **PROFESSIONAL HONORS, PRIZES, FELLOWSHIPS**

2018 Researcher of the Year Award, Florida Heart Research Foundation

2023 Young Innovator Award, Cellular and Molecular Bioengineering

### **OFFICES HELD IN PROFESSIONAL SOCIETIES**

2010- Member, Biomedical Engineering Society (BMES)

- 2013- Member, North American Vascular Biology Organization (NAVBO)
- 2013- Member, American Heart Association (AHA)
- 2013- Webinar Committee, International Society of Applied Cardiovascular Biology (ISACB)
- 2016- Editor of eCirculator Newsletter, ISACB
- 2018- Executive committee member, ISACB

#### OTHER PROFESSIONAL ACTIVITIES AND PUBLIC SERVICE

- 2017 Grant Proposal Reviewer, AHA
- 2017- Director, Coulter Undergraduate Research Excellence (CURE) Program, FIU
- 2017- Member, Graduate Program Committee, Department of Biomedical Engineering, FIU
- 2017 Panel member, NSF BMMB
- 2017-2018 College of Engineering IT Committee, FIU
- 2018- Co-director, Miami Heart Month and Heart Day Symposia, FIU
- 2018 Session co-chair, World Congress of Biomechanics
- 2018- Co-founder, Thirst for Science
- 2018- Advisory board member, MARC U\*STAR Program, FIU
- 2019 Grant Proposal Reviewer, AHA
- 2019 Early Career Reviewer, NIH AICS Study Section
- 2019-2020 College of Engineering Awards Committee, FIU
- 2020 Acting Graduate Program Director, Department of Biomedical Engineering, FIU
- 2020 Co-editor, Cardiovascular Calcification and Bone Mineralization, Springer
- 2020 Panel member, NSF BMMB
- 2020- Associate Editor, Frontiers in Cardiovascular Medicine
- 2020-2021 Secretary, College of Engineering Faculty Council, FIU
- 2021- Associate Editor, Journal of Cardiovascular Development and Disease
- 2021-2022 Member, College Curriculum Committee, FIU
- 2022 Organizer and Session Chair, International Conference of Tissue Engineered Heart Valves
- 2022 Ad Hoc Member, NIH AVI Study Section
- 2022 Member, Undergraduate Program Committee, Department of Biomedical Engineering, FIU
- 2023 Organizer and Session Chair, International Conference of Tissue Engineered Heart Valves
- 2023 Acting Graduate Program Director, Department of Biomedical Engineering, FIU
- 2023 Ad Hoc Member, NIH AVI Study Section
- 2023- Graduate Program Director, Department of Biomedical Engineering, FIU
- 2023- University Graduate Faculty Evaluation Committee, FIU
- 2023- Engineering II Building Program Committee, FIU
- 2023- Conflict of Interest (COI) Research Committee, FIU
- 2024 Ad Hoc Member, NIH AVI Study Section
- 2024 Organizer and Session Chair, International Conference of Tissue Engineered Heart Valves

#### GRADUATE STUDENT SUPERVISION AND SUPPORT

PhD: Major Advisor

##### *Current PhD Trainees*

- 2021- Sophie Ashbrook, D1 completed, RA support from NIH R01
- 2021- Ana Valentin, co-mentor with Alexander Agoulnik, D1 completed, T32 Fellowship from TBBS Program
- 2019- Lin Tong, D3 completed, RA support from PATHS-UP ERC
- 2018- Valentina Dargam, D3 completed, McNair Fellow (2018-2020), NIH F31 (since 2020)
- 2018- Daniel Chaparro, D3 completed, Start-up agreement (2018-2020), FHRF Doctoral Student Grant (since 2020)
- 2022- Perony Da Silva Nogueira, co-mentor with Lidia Kos, D2 completed, FHRF Doctoral Student Grant
- 2023- Katherine Kaiser, RA Support from FHRF Grant, Recipient Wallace H. Coulter Fellowship

2023- Aasma Dahal, co-mentor with Anuradha Godavarty, GA Support provided to Graduate Program Director

#### *Previous PhD Trainees*

2017-2022 Amirala Bakhshian Nik, Graduated 2022, RA support from AHA SDG (2017-2020), Start-up agreement (2020-2021), Dissertation Year Fellowship (2021-2022), Current postdoctoral researcher at Medical College of Wisconsin

2018-2020 Sana Nasim, Graduated 2020, FHRF Doctoral Student Grant, Current postdoctoral researcher at Harvard Medical School/Boston Children's Hospital

2017-2022 Denise Hsu, co-mentor with Sharan Ramaswamy, TA support (2017-2021), Dissertation Year Fellowship (2021-2022), Previous postdoctoral researcher at the University of Pittsburgh, Current Sr. Product Development Engineer at Aptar

2018-2023 Mohammad Shaver, RA Support from Biomolecular Sciences Institute (2018-2022), FHRF Doctoral Student Grant (2022-2023), Current Research Scientist at Vivex Biologics

#### PhD: Committee Member

2017-2022 Mehenu Sarwar, Major Professor: Wei-Chiang Lin

2018-2022 Mariacarla Gonzalez, Major Professor: Jessica Ramella-Roman

2018-2022 Seyedeh Maedeh Mozneb, Major Professor: Anthony McGoron

2018- Tananant Boonya-Ananta, Major Professor: Jessica Ramella-Roman

2019-2020 Brittany Gonzalez, Major Professor: Sharan Ramaswamy

2020-2023 Andres Rodriguez, Major Professor: Jessica Ramella-Roman

2020- Manuel Perez, Major Professor: Sharan Ramaswamy

2020- Asad Mirza, Major Professor: Sharan Ramaswamy

2021- Muhtadi Munawar Zahin, Major Professor: Darryl Dickerson

2021- Alejandro Suarez, Major Professor: Jorge Riera

2022- Yih-Mei Lin, Major Professor: Sharan Ramaswamy

2022- Ariadna Herrera, Major Professor: Sharan Ramaswamy

2022- Jonathan Tabares, Major Professor: Jin He

2022- Daniela Leizaola, Major Professor: Anuradha Godavarty

2023- FNU Ajmal, Major Professor: Jessica Ramella-Roman

2023- Santosh Khatri, Major Professor: Jin He

2023- Reshmi Banerjee, Major Professor: Markondeyraj Pulugurtha

2023- Claudia Ponce Aportela, Major Professor: Sharan Ramaswamy

2023- Dabasish Kumar Saha, Major Professor: Nikolaos Tsoukias

2023- JunZhu Pei, Major Professor: Jessica Ramella-Roman

2023- Fatama Huda, Major Professor: Darryl Dickerson

2023- Mohammad Salman Ibna Jamal, Major Professor: Anamika Prasad

2024- Sajad Farrokhi, Major Professor: Christian Poellabauer

#### MS Thesis: Major Advisor

2022- Aashiya Kolengaden

2022-2023 Aasma Dahal

#### COURSES TAUGHT (by year and semester)

BME 3632 – Spring 2017, Fall 2017, Fall 2018, Fall 2019, Fall 2021, Fall 2022

BME 4230 – Spring 2018, Spring 2019, Spring 2020, Spring 2021, Spring 2022, Spring 2023, Spring 2024

BME 5410 – Fall 2017, Fall 2018, Fall 2019, Fall 2020, Fall 2021, Fall 2022

BME 5233 – Spring 2020, Spring 2021, Spring 2022, Spring 2023, Spring 2024

#### NEW COURSE DEVELOPMENT AND MAJOR COURSE CHANGES

Prior to teaching the course in Spring 2018, BME 4230 – Biomechanics of Cardiovascular Systems had not

been offered in several years. I redesigned the course within the catalog description to include content that connects solid tissue biomechanics to physiology and disease. I also introduced new modules focused on using biomechanics principles to address current problems in cardiovascular medicine. In Spring 2020, I introduced a graduate level section of this course (BME 5233), which includes in-depth discussions on nonlinear soft tissue behavior and analysis of published research in cardiovascular biomechanics.

#### K-12 OUTREACH ACTIVITIES

- 2017- Served as a mentor for the Summer Research Internship Program, FIU
- 2021 FIU FLAME presentation at Coral Park Senior High School
- 2022 Presenter at Howard Drive Elementary School Career Day
- 2022 Presenter at Ronald Reagan Doral Senior High School, Science National Honor Society
- 2023 Techlab exposition at Frost Science Museum
- 2023 Presenter at MAST@Homestead, Science National Honor Society
- 2024 Community outreach session, FIU Heart Day Symposium