

Stanford



Hanjay Wang

- Resident in Cardiothoracic Surgery
- Affiliate, Dean's Office Operations - Dean Other

Bio

PROFESSIONAL EDUCATION

- MD, Columbia University, College of Physicians and Surgeons , Medicine (2015)
- BA, Harvard University , Molecular and Cellular Biology, Music (2011)

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Precision surgery: patient-specific bypass grafting and valve repair strategies

Autonomous robotic surgery

Photosynthetic therapies to circumvent myocardial ischemia

Collateral artery formation as protection against myocardial infarction

Angiogenesis and myocardial regeneration to prevent heart failure

Tissue engineering to limit ventricular remodeling

Understanding the biomechanics of injured and failing hearts

CURRENT CLINICAL INTERESTS

- Coronary Revascularization
- Heart Transplantation
- Mitral Valve Repair
- Minimally Invasive Surgery
- Robotics
- Thoracic Aortic Aneurysm
- Aortic Valve Repair
- Ventricular Assist Devices

LAB AFFILIATIONS

- Joseph Woo, Stanford Advanced Therapeutics for Heart Failure Research Laboratory (7/1/2017 - - 6/30/2020)

Publications

PUBLICATIONS

- **Early Engagement in Cardiothoracic Surgery Research Enhances Future Academic Productivity.** *The Annals of thoracic surgery*
Wang, H., Bajaj, S. S., Williams, K. M., Heiler, J. C., Pickering, J. M., Manjunatha, K., O'Donnell, C. T., Sanchez, M., Boyd, J. H.
2020
- **Multiaxial Lenticular Stress-Strain Relationship of Native Myocardium is Preserved by Infarct-Induced Natural Heart Regeneration in Neonatal Mice.** *Scientific reports*
Wang, H., Bennett-Kennett, R., Paulsen, M. J., Hironaka, C. E., Thakore, A. D., Farry, J. M., Eskandari, A., Lucian, H. J., Shin, H. S., Wu, M. A., Imbrie-Moore, A. M., Steele, A. N., Stapleton, et al
2020; 10 (1): 7319
- **Natural Heart Regeneration in a Neonatal Rat Myocardial Infarction Model.** *Cells*
Wang, H., Paulsen, M. J., Hironaka, C. E., Shin, H. S., Farry, J. M., Thakore, A. D., Jung, J., Lucian, H. J., Eskandari, A., Anilkumar, S., Wu, M. A., Cabatu, M. C., Steele, et al
2020; 9 (1)
- **Endoscopic Radial Artery Harvesting During Anesthesia Line Placement Reduces the Time and Cost of Multivessel Coronary Artery Bypass Grafting.** *Innovations (Philadelphia, Pa.)*
Wang, H., Bilbao, M. S., Miller, S. L., O'Donnell, C. T., Boyd, J. H.
2020: 1556984519882014
- **Off-Pump Mini Thoracotomy Versus Sternotomy for Left Anterior Descending Myocardial Bridge Unroofing.** *The Annals of thoracic surgery*
Wang, H. n., Pargaonkar, V. S., Hironaka, C. E., Bajaj, S. S., Abbot, C. J., O'Donnell, C. T., Miller, S. L., Honda, Y. n., Rogers, I. S., Tremmel, J. A., Fischbein, M. P., Mitchell, R. S., Schnittger, et al
2020
- **In Vivo Validation of Restored Chordal Biomechanics After Mitral Ring Annuloplasty in a Rare Ovine Case of Natural Chronic Functional Mitral Regurgitation.** *Journal of cardiovascular development and disease*
Wang, H. n., Paulsen, M. J., Imbrie-Moore, A. M., Tada, Y. n., Bergamasco, H. n., Baker, S. W., Shudo, Y. n., Ma, M. n., Woo, J. Y.
2020; 7 (2)
- **Photosynthetic symbiotic therapy.** *Aging*
Wang, H., Wu, M. A., Woo, Y. J.
2019
- **A Unique Collateral Artery Development Program Promotes Neonatal Heart Regeneration.** *Cell*
Das, S., Goldstone, A. B., Wang, H., Farry, J., D'Amato, G., Paulsen, M. J., Eskandari, A., Hironaka, C. E., Phansalkar, R., Sharma, B., Rhee, S., Shamskhov, E. A., Agalliu, et al
2019
- **Bioengineered analog of stromal cell-derived factor 1# preserves the biaxial mechanical properties of native myocardium after infarction.** *Journal of the mechanical behavior of biomedical materials*
Wang, H. n., Wisneski, A. n., Paulsen, M. J., Imbrie-Moore, A. n., Wang, Z. n., Xuan, Y. n., Hernandez, H. L., Lucian, H. J., Eskandari, A. n., Thakore, A. D., Farry, J. M., Hironaka, C. E., von Bornstaedt, et al
2019; 96: 165–71
- **Use of a supramolecular polymeric hydrogel as an effective post-operative pericardial adhesion barrier.** *Nature biomedical engineering*
Stapleton, L. M., Steele, A. N., Wang, H. n., Lopez Hernandez, H. n., Yu, A. C., Paulsen, M. J., Smith, A. A., Roth, G. A., Thakore, A. D., Lucian, H. J., Totherow, K. P., Baker, S. W., Tada, et al
2019; 3 (8): 611–20
- **Scimitar Syndrome in Children and Adults: Natural History, Outcomes, and Risk Analysis.** *The Annals of thoracic surgery*
Wang, H. n., Kalfa, D. n., Rosenbaum, M. S., Ginns, J. N., Lewis, M. J., Glickstein, J. S., Bacha, E. A., Chai, P. J.
2018; 105 (2): 592–98
- **Characterization of academic cardiothoracic surgeons who started as attendings in private or community practice.** *Surgery*
Bajaj, S. S., Wang, H., Williams, K. M., Krishnan, A., Heiler, J. C., Pickering, J. M., Manjunatha, K., O'Donnell, C. T., Sanchez, M., Boyd, J. H.

2021

- **The Use of Factor Eight Inhibitor Bypass Activity (FEIBA) for the Treatment of Perioperative Hemorrhage in Left Ventricular Assist Device Implantation.** *Journal of cardiothoracic and vascular anesthesia*
O'Donnell, C., Rodriguez, A. J., Madhok, J., Sharifi, H., Wang, H., O'Brien, C. G., Boyd, J., Hiesinger, W., Hsu, J., Hill, C. C.
2021
- **Career Research Productivity Correlates With Medical School Ranking Among Cardiothoracic Surgeons.** *The Journal of surgical research*
Bajaj, S. S., Wang, H., Williams, K. M., Pickering, J. M., Heiler, J. C., Manjunatha, K., Sanchez, M., O'Donnell, C. T., Boyd, J. H.
2021; 264: 99–106
- **Successful beating-heart repair of pulmonary artery dissection using a composite valve-tube graft.** *Journal of cardiac surgery*
de Biasi, A. R., Wang, H., Medina, M. G., Burton, E., Ogden, W. D.
2021
- **THE SAFETY AND EFFICACY OF PERIOPERATIVE FEIBA AFTER LEFT VENTRICULAR ASSIST DEVICE IMPLANTATION**
ODonnell, C., Rodriguez, A., Madhok, J., Wang, H., Shad, R., Sharifi, H., Boyd, J., William, H., Hsu, J., Hill, C.
LIPPINCOTT WILLIAMS & WILKINS.2021: 168
- **Navigating the Crossroads of Cell Therapy and Natural Heart Regeneration** *Frontiers in Cell and Developmental Biology*
Elde, S., Wang, H., Woo, Y.
2021: 674180
- **The Expanding Armamentarium of Innovative Bioengineered Strategies to Augment Cardiovascular Repair and Regeneration** *Frontiers in Bioengineering and Biotechnology*
Elde, S., Wang, H., Woo, Y.
2021: 674172
- **Heart Valve Biomechanics: The Frontiers of Modeling Modalities and the Expansive Capabilities of Ex Vivo Heart Simulation.** *Frontiers in cardiovascular medicine*
Park, M. H., Zhu, Y., Imbrie-Moore, A. M., Wang, H., Marin-Cuartas, M., Paulsen, M. J., Woo, Y. J.
2021; 8: 673689
- **National Institutes of Health R01 Grant Funding Is Associated with Enhanced Research Productivity and Career Advancement Among Academic Cardiothoracic Surgeons.** *Seminars in thoracic and cardiovascular surgery*
Bajaj, S. S., Wang, H., Williams, K. M., Pickering, J. M., Heiler, J. C., Manjunatha, K., O'Donnell, C. T., Sanchez, M., Boyd, J. H.
2020
- **New Attending Surgeons Hired by Their Training Institution Exhibit Greater Research Productivity.** *The Annals of thoracic surgery*
Bajaj, S. S., Wang, H., Williams, K. M., Pickering, J. M., Heiler, J. C., Manjunatha, K., O'Donnell, C. T., Sanchez, M., Boyd, J. H.
2020
- **Impact of advanced clinical fellowship training on future research productivity and career advancement in adult cardiac surgery.** *Surgery*
Wang, H., Bajaj, S. S., Williams, K. M., Pickering, J. M., Heiler, J. C., Manjunatha, K., O'Donnell, C. T., Sanchez, M., Boyd, J. H.
2020
- **Collagen-Supplemented Incubation Rapidly Augments Mechanical Property of Fibroblast Cell Sheets.** *Tissue engineering. Part A*
Zhu, Y., Thakore, A. D., Farry, J. M., Jung, J., Anilkumar, S., Wang, H., Imbrie-Moore, A. M., Park, M. H., Tran, N. A., Woo, Y. J.
2020
- **Transcriptional Profiling of Normal, Stenotic, and Regurgitant Human Aortic Valves.** *Genes*
Greene, C. L., Jaatinen, K. J., Wang, H., Koyano, T. K., Bilbao, M. S., Woo, Y. J.
2020; 11 (7)
- **Ex Vivo Analysis of a Porcine Bicuspid Aortic Valve and Aneurysm Disease Model.** *The Annals of thoracic surgery*
Zhu, Y., Imbrie-Moore, A. M., Park, M. H., Paulsen, M. J., Wang, H., MacArthur, J. W., Woo, Y. J.
2020
- **Novel bicuspid aortic valve model with aortic regurgitation for hemodynamic status analysis using an exvivo simulator.** *The Journal of thoracic and cardiovascular surgery*
Zhu, Y., Imbrie-Moore, A. M., Paulsen, M. J., Priomprintr, B., Wang, H., Lucian, H. J., Farry, J. M., Woo, Y. J.

2020

- **Bilateral vs. Single Internal Mammary Artery Grafts for Coronary Artery Bypass in the United States.** *The Annals of thoracic surgery*
Zhu, Y., Lingala, B., Wang, H., Woo, Y. J.
2020
- **Safety of photosynthetic *Synechococcus elongatus* for in vivo cyanobacteria-mammalian symbiotic therapeutics.** *Microbial biotechnology*
Williams, K. M., Wang, H., Paulsen, M. J., Thakore, A. D., Rieck, M., Lucian, H. J., Grady, F., Hironaka, C. E., Chien, A. J., Farry, J. M., Shin, H. S., Jaatinen, K. J., Eskandari, et al
2020
- **A novel cross-species model of Barlow's disease to biomechanically analyze repair techniques in an exvivo left heart simulator.** *The Journal of thoracic and cardiovascular surgery*
Imbrie-Moore, A. M., Paulsen, M. J., Zhu, Y., Wang, H., Lucian, H. J., Farry, J. M., MacArthur, J. W., Ma, M., Woo, Y. J.
2020
- **A novel 3D-Printed preferential posterior mitral annular dilation device delineates regurgitation onset threshold in an ex vivo heart simulator.** *Medical engineering & physics*
Imbrie-Moore, A. M., Paullin, C. C., Paulsen, M. J., Grady, F., Wang, H., Hironaka, C. E., Farry, J. M., Lucian, H. J., Woo, Y. J.
2020
- **Multi-phase catheter-injectable hydrogel enables dual-stage protein-engineered cytokine release to mitigate adverse left ventricular remodeling following myocardial infarction in a small animal model and a large animal model.** *Cytokine*
Steele, A. N., Paulsen, M. J., Wang, H. n., Stapleton, L. M., Lucian, H. J., Eskandari, A. n., Hironaka, C. E., Farry, J. M., Baker, S. W., Thakore, A. D., Jaatinen, K. J., Tada, Y. n., Hollander, et al
2020; 127: 154974
- **Long-term outcome of orthotopic heart transplantation in Asians: An analysis of the United Network of Organ Sharing database.** *The Journal of heart and lung transplantation : the official publication of the International Society for Heart Transplantation*
Kohsaka, S. n., Shudo, Y. n., Wang, H. n., Lingala, B. n., Kawana, M. n., Woo, Y. J.
2020
- **A Novel Aortic Regurgitation Model from Cusp Prolapse with Hemodynamic Validation Using an Ex Vivo Left Heart Simulator.** *Journal of cardiovascular translational research*
Zhu, Y. n., Imbrie-Moore, A. M., Paulsen, M. J., Priromprintr, B. n., Park, M. H., Wang, H. n., Lucian, H. J., Farry, J. M., Woo, Y. J.
2020
- **A Bioengineered Neuregulin-Hydrogel Therapy Reduces Scar Size and Enhances Post-Infarct Ventricular Contractility in an Ovine Large Animal Model.** *Journal of cardiovascular development and disease*
Cohen, J. E., Goldstone, A. B., Wang, H. n., Purcell, B. P., Shudo, Y. n., MacArthur, J. W., Steele, A. N., Paulsen, M. J., Edwards, B. B., Aribeara, C. N., Cheung, N. C., Burdick, J. A., Woo, et al
2020; 7 (4)
- **Quadrupling the N95 Supply during the COVID-19 Crisis with an Innovative 3D-Printed Mask Adaptor.** *Healthcare (Basel, Switzerland)*
Imbrie-Moore, A. M., Park, M. H., Zhu, Y. n., Paulsen, M. J., Wang, H. n., Woo, Y. J.
2020; 8 (3)
- **Biomimetic six-axis robots replicate human cardiac papillary muscle motion: pioneering the next generation of biomechanical heart simulator technology.** *Journal of the Royal Society, Interface*
Imbrie-Moore, A. M., Park, M. H., Paulsen, M. J., Sellke, M. n., Kulkarni, R. n., Wang, H. n., Zhu, Y. n., Farry, J. M., Bourdillon, A. T., Callinan, C. n., Lucian, H. J., Hironaka, C. E., Deschamps, et al
2020; 17 (173): 20200614
- **Women in Thoracic Surgery Scholarship: Impact on Career Path and Interest in Cardiothoracic Surgery.** *The Annals of thoracic surgery*
Williams, K. M., Hironaka, C. E., Wang, H. n., Bajaj, S. S., O'Donnell, C. T., Sanchez, M. n., Boyd, J. n., Kane, L. n., Backhus, L. n.
2020
- **Artificial papillary muscle device for off-pump transapical mitral valve repair.** *The Journal of thoracic and cardiovascular surgery*
Imbrie-Moore, A. M., Zhu, Y. n., Park, M. H., Paulsen, M. J., Wang, H. n., Woo, Y. J.
2020

- **Comprehensive Ex Vivo Comparison of 5 Clinically Used Conduit Configurations for Valve-Sparing Aortic Root Replacement Using a 3-Dimensional-Printed Heart Simulator.** *Circulation*
Paulsen, M. J., Imbrie-Moore, A. M., Baiocchi, M. n., Wang, H. n., Hironaka, C. E., Lucian, H. J., Farry, J. M., Thakore, A. D., Zhu, Y. n., Ma, M. n., MacArthur, J. W., Woo, Y. J.
2020; 142 (14): 1361–73
- **Mitral chordae tendineae force profile characterization using a posterior ventricular anchoring neochordal repair model for mitral regurgitation in a three-dimensional-printed ex vivo left heart simulator.** *European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery*
Paulsen, M. J., Imbrie-Moore, A. M., Wang, H., Bae, J. H., Hironaka, C. E., Farry, J. M., Lucian, H. J., Thakore, A. D., MacArthur, J. W., Cutkosky, M. R., Woo, Y. J.
2019
- **Heart-lung transplantation with concomitant aortic arch reconstruction for Eisenmenger syndrome and type B interrupted aortic arch.** *The Journal of heart and lung transplantation : the official publication of the International Society for Heart Transplantation*
Wang, H., Shudo, Y., MacArthur, J. W., Woo, Y. J.
2019
- **Custom Patient-Specific Three-Dimensional Printed Mitral Valve Models for Pre-Operative Patient Education Enhance Patient Satisfaction and Understanding** *JOURNAL OF MEDICAL DEVICES-TRANSACTIONS OF THE ASME*
Hung, K. S., Paulsen, M. J., Wang, H., Hironaka, C., Woo, Y.
2019; 13 (3)
- **Modeling conduit choice for valve-sparing aortic root replacement on biomechanics with a 3-dimensional-printed heart simulator** *JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY*
Paulsen, M. J., Kasinpila, P., Imbrie-Moore, A. M., Wang, H., Hironaka, C. E., Koyano, T. K., Fong, R., Chiu, P., Goldstone, A. B., Steele, A. N., Stapleton, L. M., Ma, M., Woo, et al
2019; 158 (2): 392–403
- **Ex vivo biomechanical study of apical versus papillary neochord anchoring for mitral regurgitation.** *The Annals of thoracic surgery*
Imbrie-Moore, A. M., Paulsen, M. J., Thakore, A. D., Wang, H., Hironaka, C. E., Lucian, H. J., Farry, J. M., Edwards, B. B., Bae, J. H., Cutkosky, M. R., Woo, Y. J.
2019
- **A Biocompatible Therapeutic Catheter-Deliverable Hydrogel for In Situ Tissue Engineering.** *Advanced healthcare materials*
Steele, A. N., Stapleton, L. M., Farry, J. M., Lucian, H. J., Paulsen, M. J., Eskandari, A., Hironaka, C. E., Thakore, A. D., Wang, H., Yu, A. C., Chan, D., Appel, E. A., Woo, et al
2019; e1801147
- **Cardioaortic replacement for a ruptured root pseudoaneurysm with pulsatile subcutaneous extension.** *European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery*
Wang, H., Shudo, Y., Hittinger, S. A., Woo, Y. J.
2019
- **Development and ex vivo validation of novel force-sensing neochordae for measuring chordae tendineae tension in the mitral valve apparatus using optical fibers with embedded Bragg gratings.** *Journal of biomechanical engineering*
Paulsen, M. J., Bae, J. H., Imbrie-Moore, A. n., Wang, H. n., Hironaka, C. n., Farry, J. M., Lucian, H. n., Thakore, A. n., Cutkosky, M. R., Woo, Y. J.
2019
- **Vascularization of Engineered Spatially Patterned Myocardial Tissue Derived From Human Pluripotent Stem Cells in vivo.** *Frontiers in bioengineering and biotechnology*
Wanjare, M. n., Kawamura, M. n., Hu, C. n., Alcazar, C. n., Wang, H. n., Woo, Y. J., Huang, N. F.
2019; 7: 208
- **Evaluation of Risk Factors for Heart-Lung Transplant Recipient Outcome: An Analysis of the United Network for Organ Sharing Database.** *Circulation*
Shudo, Y. n., Wang, H. n., Lingala, B. n., He, H. n., Kim, F. Y., Hiesinger, W. n., Lee, A. M., Boyd, J. H., Currie, M. n., Woo, Y. J.
2019; 140 (15): 1261–72
- **Utilization of Del Nido Cardioplegia in Adult Coronary Artery Bypass Grafting - A Retrospective Analysis.** *Circulation journal : official journal of the Japanese Circulation Society*
O'Donnell, C., Wang, H., Tran, P., Miller, S., Shuttleworth, P., Boyd, J. H.

2018

- **How to start a successful robotic mitral surgery program: It's not just about the surgery!** *JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY*
Wang, H., Boyd, J. H.
2018; 155 (4): 1472–73
- **Heart transplant after profoundly extended ambulatory central venoarterial extracorporeal membrane oxygenation.** *The Journal of thoracic and cardiovascular surgery*
Shudo, Y., Wang, H., Ha, R. V., Hayes, A. D., Woo, Y. J.
2018
- **Second Arterial Versus Venous Conduits for Multivessel Coronary Artery Bypass Surgery in California.** *Circulation*
Goldstone, A. B., Chiu, P. n., Baiocchi, M. n., Wang, H. n., Lingala, B. n., Boyd, J. H., Woo, Y. J.
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- **Rapid Self-Assembly of Bioengineered Cardiovascular Bypass Grafts From Scaffold-Stabilized, Tubular Bilevel Cell Sheets.** *Circulation*
von Bornstädt, D. n., Wang, H. n., Paulsen, M. J., Goldstone, A. B., Eskandari, A. n., Thakore, A. n., Stapleton, L. n., Steele, A. N., Truong, V. N., Jaatinen, K. n., Hironaka, C. n., Woo, Y. J.
2018; 138 (19): 2130–44
- **Tissue-engineered smooth muscle cell and endothelial progenitor cell bi-level cell sheets prevent progression of cardiac dysfunction, microvascular dysfunction, and interstitial fibrosis in a rodent model of type 1 diabetes-induced cardiomyopathy.** *Cardiovascular diabetology*
Kawamura, M. n., Paulsen, M. J., Goldstone, A. B., Shudo, Y. n., Wang, H. n., Steele, A. N., Stapleton, L. M., Edwards, B. B., Eskandari, A. n., Truong, V. N., Jaatinen, K. J., Ingason, A. B., Miyagawa, et al
2017; 16 (1): 142
- **Sodium tanshinone IIA sulfate adjunct therapy reduces high-sensitivity C-reactive protein level in coronary artery disease patients: a randomized controlled trial.** *Scientific reports*
Li, S. n., Jiao, Y. n., Wang, H. n., Shang, Q. n., Lu, F. n., Huang, L. n., Liu, J. n., Xu, H. n., Chen, K. n.
2017; 7 (1): 17451
- **A modified technique for orthotopic heart transplantation to minimize warm ischaemic time.** *European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery*
Shudo, Y. n., Wang, H. n., Woo, Y. J.
2017
- **Bloodless Repair of Isolated Pulmonary Artery in a Neonate.** *World journal for pediatric & congenital heart surgery*
Wang, H., Brewer, M. P., Lai, W. W., Krishnamurthy, G., Chai, P. J.
2016; 7 (1): 112-115
- **Delayed gastric emptying after living donor hepatectomy for liver transplantation.** *Case reports in transplantation*
Wang, H., Griesemer, A. D., Parsons, R. F., Graham, J. A., Emond, J. C., Samstein, B.
2014; 2014: 582183-?
- **The Effect of Sodium Tanshinone IIA Sulfate and Simvastatin on Elevated Serum Levels of Inflammatory Markers in Patients with Coronary Heart Disease: A Study Protocol for a Randomized Controlled Trial** *EVIDENCE-BASED COMPLEMENTARY AND ALTERNATIVE MEDICINE*
Shang, Q., Wang, H., Li, S., Xu, H.
2013