Stanford

Shin Yajima

Postdoctoral Scholar, Cardiothoracic Surgery

NIH Biosketch available Online

Bio

BIO

I am a board-certified attending cardiothoracic surgeon in Japan. Throughout my clinical experience and research, I found that insufficient myocardial blood flow had little impact on myocardial functional recovery since percutaneous coronary intervention or coronary artery bypass grafting (CABG) could approach and supply blood flow to the superficial large coronary arteries, but not to intramyocardial microvascular arteries, particularly where microvasculature was either scarce or absent. In addition, myocardial ischemia-reperfusion (I/R) adversely affected cardiac functional recovery in ischemic hearts, including transplanted hearts. Therefore, I have a keen interest in addressing myocardial microvascular dysfunction and myocardial I/R injury in research.

During my Ph.D. in cardiovascular surgery, I focused on a prostacyclin analog that has thromboxane A2 synthase inhibitory activity and can promote angiogenesis and restore myocardial blood flow through proangiogenic and vasodilatory effects. I applied a microform of this compound in the porcine ischemia cardiomyopathy model with a direct epicardial placement, elucidating promoted myocardial angiogenesis, leading to myocardial function recovery. Then, I developed nanoparticles (NPs) that incorporated this compound which I subsequently applied to a rat ischemia myocardial reperfusion model with intravenous injection to elucidate attenuated myocardial I/R injury with selective accumulation in the ischemic myocardium, better-preserved capillary networks, a better-preserved myocardial blood flow, and a smaller infarct size. Furthermore, I have worked on tissue engineering for myocardial regeneration using induced pluripotent stem cells (iPSCs) and adipose-derived mesenchymal stem cells. With human iPSCs-derived cardiomyocyte sheets of direct implantation on the ischemic myocardial tissue, we elucidated myocardial regeneration through thickened myocardial tissue, proangiogenic effects, improved cardiac performance, and attenuated left ventricular remodeling in both small and large animals. These works have already been published (below are representative), and I gained several academic awards and research grants (ongoing research support; Japan Heart Foundation/Bayer Research Grant Abroad, 01/01/2022 - 12/31/2022).

My career goal is to become a leader in academic cardiovascular surgery. During my postdoctoral fellowship, I plan to develop novel therapeutic methods to obtain better outcomes for ischemic heart disease in which there is room for improvement through engineering analysis and the creation of innovative solutions. I am extremely excited to start on the proposed project, as it perfectly intertwines my bioengineering background and clinical interests. As such, the School of Medicine Dean's Postdoctoral Fellowship will be invaluable to my development as a young investigator. Dr. Woo is an exceptional mentor with remarkable renown for training academic surgeons and Stanford University provides incredible resources for research. I feel extremely fortunate to have such an ideal environment to carry out this project and continue advancing the field of cardiothoracic surgery through bioengineering.

HONORS AND AWARDS

- Best Scientific Paper, The Japanese Association for Thoracic Surgery (2019)
- Best Teaching Award, National Cerebral, and Cardiovascular Center, Japan (2019)
- Japan Heart Foundation/Bayer Research Grant Abroad, Bayer foundation (2019)
- Young Investigator’s Award, Department of Surgery, Osaka University Graduate School of Medicine, Japan (2019)
- Best of Basic Scientific Research for Cardiovascular Surgery, Japan Circulation Society (2018)

- Young Investigator's Award, Department of Cardiovascular Surgery, Osaka University Graduate School of Medicine, Japan (2018)
- Young Investigator Award, The 60th Annual Meeting of Kansai Thoracic Surgical Association, Japan (2017)
- Basic Research Award (Hearse-Yamamoto Award), Japanese Society for Cardiovascular Surgery (2016)
- Best of Basic Scientific Poster Award, American Heart Association (2016)
- Young Investigator Award, The 59th Annual Meeting of Kansai Thoracic Surgical Association, Japan (2016)
- Young Investigator Award, Japanese Surgical Society (2016)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Board Certified Instructor of Cardiovascular Surgery, The Japanese Society of Cardiovascular Surgery, ID: 21-1436 (2021 - present)
- Board Certified International Cardiovascular Surgeon, The Asian Society for Cardiovascular Surgery, ID: 842-6777 (2019 - present)
- Board Certified Cardiovascular Surgeon, The Japanese Society of Cardiovascular Surgery ID: 5001419 (2017 - present)
- Board Certified General Surgeon, The Japan Surgical Society ID: 1003775 (2013 - present)

PROFESSIONAL EDUCATION

- PhD, Osaka University Graduate School of Medicine, Faculty of Medicine, Department of Cardiovascular Surgery, Osaka, Japan (2018)
- MD, Shimane University, Shimane, Japan (2007)

STANFORD ADVISORS

- Joseph Woo, Postdoctoral Faculty Sponsor

LINKS

- Woo lab: https://med.stanford.edu/woolab.html

Publications

PUBLICATIONS

- **Prostacyclin Analogue-Loaded Nanoparticles Attenuate Myocardial Ischemia/Reperfusion Injury in Rats.** *JACC. Basic to translational science*
  Yajima, S., Miyagawa, S., Fukushima, S., Sakai, Y., Iseoka, H., Harada, A., Isohashi, K., Horitsugi, G., Mori, Y., Shiozaki, M., Ohkawara, H., Sakaniwa, R., Hatazawa, et al
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- **Microvascular Dysfunction Related to Progressive Left Ventricular Remodeling due to Chronic Occlusion of the Left Anterior Descending Artery in an Adult Porcine Heart.** *International heart journal*
  Yajima, S., Miyagawa, S., Fukushima, S., Isohashi, K., Watabe, T., Ikeda, H., Horitsugi, G., Harada, A., Sakaniwa, R., Hatazawa, J., Sawa, Y.
  2019; 60 (3): 715-727

- **A prostacyclin agonist and an omental flap increased myocardial blood flow in a porcine chronic ischemia model.** *The Journal of thoracic and cardiovascular surgery*
  Yajima, S., Miyagawa, S., Fukushima, S., Sakai, Y., Isohashi, K., Watabe, T., Ikeda, H., Horitsugi, G., Harada, A., Sakaniwa, R., Hatazawa, J., Sawa, Y.
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- **Late spontaneous internal thoracic artery graft dissection after coronary bypass grafting: a case report** *EUROPEAN HEART JOURNAL-CASE REPORTS*
  Ishibuchi, K., Yajima, S., Yamamoto, W., Otsuji, S.
  2022; 6 (2): ytac040

- **Perceval sutureless aortic valve replacement after ascending aortic replacement.** *Clinical case reports*
  Yajima, S., Satoh, A., Sekiya, N., Yamazaki, S., Uemura, H., Tanaka, H., Yamamura, M., Sakaguchi, T.
  2021; 9 (12): e05126

- **Repair of pacemaker lead-induced right ventricular perforation via a left mini-thoracotomy.** *Journal of cardiology cases*
  Uemura, H., Yajima, S., Sekiya, N., Yamazaki, S., Satoh, A., Tanaka, H., Yamamura, M., Sakaguchi, T.
  2021; 24 (6): 307-309

- **Surgical Strategy for Chronic Type B Dissecting Aortic Aneurysm to Prevent Aorta-Related Events.** *Annals of vascular surgery*
  Ryomoto, M., Sakaguchi, T., Tanaka, H., Yamamura, M., Sekiya, N., Yajima, S., Uemura, H., Sato, A.
  2021
- **Inactive large cerebral hemorrhage is not exacerbated by the adjustment of anticoagulation post open-heart surgery.** *Journal of cardiology cases*
  Satoh, A., Yajima, S., Sekiya, N., Yamazaki, S., Uemura, H., Ueda, D., Tanaka, H., Yamamura, M., Sakaguchi, T.
  2021; 24 (4): 186-189
- **Off-Pump Resection of an Epicardial Cyst by Using a Minimally Invasive Approach.** *The Annals of thoracic surgery*
  Uemura, H., Yajima, S., Ryomoto, M., Sekiya, N., Yamashita, K., Tanaka, H., Yamamura, M., Satoh, A., Ueda, D., Sakaguchi, T.
  2021; 112 (2): e119-e121
- **Reverse remodelling after aortic valve replacement for chronic aortic regurgitation.** *Interactive cardiovascular and thoracic surgery*
  Koga-Ikuta, A., Fukushima, S., Kawamoto, N., Saito, T., Shimahara, Y., Yajima, S., Tadokoro, N., Kakuta, T., Fukui, T., Fujita, T.
  2021; 33 (1): 10-18
- **Graft Traction Resolved Left Ventricular Outflow Tract Obstruction.** *The Annals of thoracic surgery*
  Sekiya, N., Ryomoto, M., Tanaka, H., Yamamura, M., Yamashita, K., Yajima, S., Uemura, H., Satoh, A., Ueda, D., Sakaguchi, T.
  2021; 111 (6): e415-e417
- **Emergency sandwich patch repair via right ventricular incision for postinfarction ventricular septal defects: a case series.** *European heart journal. Case reports*
  Shimahara, Y., Fukushima, S., Yajima, S., Tadokoro, N., Kakuta, T., Asaumi, Y., Kobayashi, J., Fujita, T.
  2021; 5 (5): ytab141
- **Benefits of robotically-assisted surgery for complex mitral valve repair.** *Interactive cardiovascular and thoracic surgery*
  Fujita, T., Kakuta, T., Kawamoto, N., Shimahara, Y., Yajima, S., Tadokoro, N., Kitamura, S., Kobayashi, J., Fukushima, S.
  2021; 32 (3): 417-425
- **Successful surgical resection and reconstruction for a huge primary cardiac lymphoma filling the right heart.** *Journal of cardiac surgery*
  Taguchi, T., Fukushima, S., Yajima, S., Saito, T., Kawamoto, N., Tadokoro, N., Kakuta, T., Fujita, T.
  2021; 36 (1): 342-344
- **Durable ventricular assist device implantation for systemic right ventricle: a case series.** *European heart journal. Case reports*
  Tadokoro, N., Fukushima, S., Hoashi, T., Yajima, S., Taguchi, T., Shimizu, H., Fujita, T.
  2020; 4 (6): 1-9
- **Influence of Induction Therapy Using Basiliximab With Delayed Tacrolimus Administration in Heart Transplant Recipients - Comparison With Standard Tacrolimus-Based Triple Immunosuppression.** *Circulation journal : official journal of the Japanese Circulation Society*
  Watanabe, T., Yanase, M., Seguchi, O., Fujita, T., Hamasaki, T., Nakajima, S., Kuroda, K., Kumai, Y., Toda, K., Iwasaki, K., Kimura, Y., Mochizuki, H., Anegawa, et al
  2020; 84 (12): 2212-2223
- **Early results of robotically assisted mitral valve repair in a single institution: report of the first 100 cases.** *General thoracic and cardiovascular surgery*
  Kakuta, T., Fukushima, S., Shimahara, Y., Yajima, S., Tadokoro, N., Minami, K., Kobayashi, J., Fujita, T.
  2020; 68 (10): 1079-1085
- **Long-term outcomes after reoperation for mitral paravalvular leaks: a single-centre experience.** *European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery*
  Yajima, S., Fukushima, S., Yamashita, K., Shimahara, Y., Tadokoro, N., Kakuta, T., Sakaniwa, R., Kobayashi, J., Fujita, T.
  2020
- **Central conversion from peripheral extracorporeal life support for patients with refractory congestive heart failure.** *Journal of artificial organs : the official journal of the Japanese Society for Artificial Organs*
  Fukushima, S., Tadokoro, N., Koga, A., Shimahara, Y., Yajima, S., Kakuta, T., Kuroda, K., Nakajima, S., Watanabe, T., Yanase, M., Fukushima, N., Kobayashi, J., Fujita, et al
  2020; 23 (3): 214-224
- **Robotic mitral valve repair for rheumatic mitral stenosis and regurgitation: a case report.** *European heart journal. Case reports*
  Yajima, S., Fukushima, S., Kakuta, T., Fujita, T.

2020; 4 (1): 1-6

- **Benefits of the Modified Bicaval Anastomosis Technique for Orthotopic Heart Transplantation From a Size-Mismatched Marginal Donor.** *Circulation journal : official journal of the Japanese Circulation Society*
  Kakuta, T., Fukushima, S., Shimahara, Y., Yajima, S., Kawamoto, N., Tadokoro, N., Fukushima, N., Kitamura, S., Kobayashi, J., Fujita, T.
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- **Three-dimensional simulation for left ventricular assist device implantation in a small patient with chest wall deformity.** *European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery*
  Yajima, S., Toda, K., Tsukiya, T., Sawa, Y.
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- **Tumorigenicity assay essential for facilitating safety studies of hiPSC-derived cardiomyocytes for clinical application.** *Scientific reports*
  Ito, E., Miyagawa, S., Takeda, M., Kawamura, A., Harada, A., Iseoka, H., Yajima, S., Sougawa, N., Mochizuki-Oda, N., Yasuda, S., Sato, Y., Sawa, Y.
  2019; 9 (1): 1881

- **Cell Spray Transplantation of Adipose-derived Mesenchymal Stem Cell Recovers Ischemic Cardiomyopathy in a Porcine Model.** *Transplantation*
  Mori, D., Miyagawa, S., Yajima, S., Saito, S., Fukushima, S., Ueno, T., Toda, K., Kawai, K., Kurata, H., Nishida, H., Isohashi, K., Hatazawa, J., Sawa, et al
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- **Development of a vitrification method for preserving human myoblast cell sheets for myocardial regeneration therapy.** *BMC biotechnology*
  Ohkawara, H., Miyagawa, S., Fukushima, S., Yajima, S., Saito, A., Nagashima, H., Sawa, Y.
  2018; 18 (1): 56

- **Multiple coronary stenting negatively affects myocardial recovery after coronary bypass grafting.** *General thoracic and cardiovascular surgery*
  Yajima, S., Yoshioka, D., Fukushima, S., Toda, K., Miyagawa, S., Yoshikawa, Y., Hata, H., Saito, S., Domae, K., Sawa, Y.
  2018; 66 (8): 446-455

- **Definitive Determinant of Late Significant Tricuspid Regurgitation After Aortic Valve Replacement.** *Circulation journal : official journal of the Japanese Circulation Society*
  Yajima, S., Yoshioka, D., Toda, K., Fukushima, S., Miyagawa, S., Yoshikawa, Y., Saito, S., Domae, K., Ueno, T., Kuratani, T., Sawa, Y.
  2018; 82 (3): 886-894

- **Pivotal Role of Non-cardiomyocytes in Electromechanical and Therapeutic Potential of Induced Pluripotent Stem Cell-Derived Engineered Cardiac Tissue.** *Tissue engineering. Part A*
  Iseoka, H., Miyagawa, S., Fukushima, S., Saito, A., Masuda, S., Yajima, S., Ito, E., Sougawa, N., Takeda, M., Harada, A., Lee, J. K., Sawa, Y.
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- **Human Pluripotent Stem Cell-Derived Cardiac Tissue-like Constructs for Repairing the Infarcted Myocardium.** *Stem cell reports*
  Li, J., Minami, I., Shiozaki, M., Yu, L., Yajima, S., Miyagawa, S., Shiba, Y., Morone, N., Fukushima, S., Yoshioka, M., Li, S., Qiao, J., Li, et al
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- **Intravenous retro-uterine echographic surveillance of the foetus during surgical thrombectomy for life-threatening pulmonary thromboembolism.** *European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery*
  Yajima, S., Saito, S., Toda, K., Sawa, Y.
  2017; 52 (5): 995-997

- **Redo coronary bypass grafting for congenital left main coronary atresia: a case report.** *Journal of cardiothoracic surgery*
  Yajima, S., Toda, K., Nishi, H., Yoshioka, D., Nakamura, T., Miyagawa, S., Yoshikawa, Y., Fukushima, S., Sawa, Y.
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- **Bilateral internal thoracic artery grafting via T-shaped partial sternotomy in a patient with terminal tracheostoma.** *Journal of cardiac surgery*
  Yajima, S., Tsutsumi, Y., Monta, O., Uenaka, H., Ohashi, H.
  2016; 31 (11): 690-691

- **Symptomatic peripheral artery disease is associated with decreased long-term survival after coronary artery bypass: a contemporary retrospective analysis.** *Surgery today*
  Nakamura, T., Toda, K., Miyagawa, S., Yoshikawa, Y., Fukushima, S., Saito, S., Yoshioka, D., Yajima, S., Yoshida, S., Sawa, Y.
  2016; 46 (11): 1334-40

- **Total arch replacement for a subacute type A dissection in a patient with a terminal tracheostoma after total laryngectomy: report of a case.** *Surgery today*

Yoshioka, D., Takahashi, T., Suhara, H., Higuchi, T., Sijo, T., Yajima, S., Ishizaka, T., Satoh, H.
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