

**The Faculty of Medicine of Harvard University
Curriculum Vitae**

Date Prepared: May 21, 2024
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Education:

05/1998	M.D	Medicine	Tohoku University School of Medicine, Sendai, Japan
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Postdoctoral Training:

05/98-04/00	Resident	General Surgery	NTT Medical Center Tokyo, Tokyo, Japan
04/00-04/02	Resident	Cardiovascular Surgery	NTT Medical Center Tokyo
05/02-06/05	Fellow	Cardiovascular Surgery	National Cerebral and Cardiovascular Center, Suita, Osaka, Japan
07/05-09/08	Post-doctoral Research Fellow	Cardiovascular Surgery	Stanford University, Palo Alto, CA
10/08-06/11	Clinical Fellow	Cardiovascular Surgery	St. Michael's Hospital, Toronto, ON, Canada
07/11-06/12	Clinical Fellow	Transplant/ Heart Failure	Toronto General Hospital, Toronto, ON, Canada
07/12-12/12	Fellow	Transplant/Heart Failure Advanced Surgical Fellow	Washington University School of Medicine, St. Louis, MO

Faculty Academic Appointments:

01/2013 – 06/2014	Clinical Instructor	Division of Cardiothoracic Surgery	Washington University School of Medicine
07/2014 – 06/2021	Assistant Professor	Division of Cardiothoracic Surgery	Washington University School of Medicine

07/2021 – 12/2021	Associate Professor	Division of Cardiothoracic Surgery	Washington University School of Medicine
01/2022-	Member of the Faculty	Department of Surgery	Harvard Medical School (HMS)

Appointments at Hospitals/Affiliated Institutions:

2011-2021	Attending Surgeon	Cardiothoracic Surgery	Barnes and Jewish Hospital, St. Louis, MO
2014- 2021	Staff Surgeon	Cardiothoracic Surgery	Christian Hospital, St. Louis, MO
2015- 2021	Staff Surgeon	Cardiothoracic Surgery	Southeast Health, Cape Girardeau, MO
2021- 2022	Staff Surgeon	Cardiac Surgery	Saint Francis Medical Center, Cape Girardeau, MO
2022-	Associate Surgeon	Thoracic and Cardiac Surgery	Brigham and Women’s Hospital (BWH), Boston, MA
2022-	Staff Cardiac Surgeon	Cardiac Surgery	Kent Hospital, Warwick, RI

Faculty Membership in Harvard Initiatives, Programs, Centers, and Institutes

Other Professional Positions:

2018-	Clinical consultant, Speaker	Abiomed	Per diem
2014-	Clinical consultant, Speaker	Abbott	Per diem

Major Administrative Leadership Positions:

Local

2014 –	Surgical Director of the Heart Transplant and Ventricular Assist Device Program	Barnes and Jewish Hospital- Washington University School of Medicine
2014 –2021	Director of Surgical Heart Failure Fellowship Program	Barnes and Jewish Hospital- Washington University School of Medicine
2014 –2021	Co-director of Barnes and Jewish SHOCK Program	Barnes and Jewish Hospital- Washington University School of Medicine

2014 –2022	Surgical Director of Heart Transplant and Ventricular Assist Device Program	Washington University School of Medicine Division
2022-	Surgical Director, Heart Transplantation and Mechanical and Circulatory Support	Brigham and Women’s Hospital – Harvard Medical School

Committee Service:

Local

2018-2022	Perioperative Service Committee	Barnes-Jewish Hospital Chair
2022-	Cardiac Surgery Service Physician Work Group	BWH Member
2022-	Cardiac Section Research Committee	BWH Chair, Leader

International

2014-	IDE Study Investigator	HeartMate 3 Institutional Primary Investigator
2019-	Alternative Insertion Pathway Investigator Committee	HeartMate 3 Member (SWIFT Study)

Professional Societies:

2014 -	International Society of Heart Lung Transplant	Member
2015 -	Society of Thoracic Surgeons	Member
2022 -	American Association of Thoracic Surgery	Member

Editorial Activities:

- **Ad hoc Reviewer**

American Heart Association Journals

Annals of Thoracic Surgery

Artificial Organs

ASAIO Journal

Journal of Artificial Organs

Journal of Cardiac Surgery

Journal of Heart and Lung Transplantation

Journal of Thoracic and Cardiovascular Surgery

Honors and Prizes:

2005-2008	Carl and Leah McConnell Cardiovascular Surgical Research Fellow	The Department of Cardiothoracic Surgery at Stanford University Medical Center	Research
2007	The Society for Heart Valve Disease Lillehei Young Investigator Award Finalist	Society for Heart Valve Disease and the Heart Valve Society of America	Research
2008	88th American Association of Thoracic Surgery C. Walton Lillehei-Resident Research Award Finalist	American Association of Thoracic Surgery	Research
2012	Zane Cohen Clinical Fellow- Achievement Award Finalist	Department of Surgery- University of Toronto	Research
2022-2023	Junior Teaching Award	Division of Thoracic and Cardiac Surgery, BWH, HMS	Academic
2023-2024	Lawrence H. Cohn M.D. Teaching Award	Division of Cardiac Surgery, BWH, HMS	Academic

Report of Funded and Unfunded Projects

Past

2011-2012 Three-dimensional echocardiography studies on patients with mitral valve repair with Flexible band annuloplasty
FRCS at Toronto General Hospital
Patient data collector, data analyst
Co-investigators: Annette Vegas, FRCPC, M.D., Massimiliano Meineri, M.D., Terry Yau, M.D., FRCS, Tirone E. David, M.D./PI: Harry Rakowski, FRCPC, M.D.,
The study was to analyze mitral valve annular dynamics by using 3D Transesophageal echocardiogram and software to differentiate the characteristics of mitral annular motion in each disease status, such as mitral valve prolapse in the posterior or anterior leaflet versus Barlow's disease, or mitral valve stenosis.

- 2016- 2019 Fibrin Marker analysis in Calf with HeartMate 2 LVAD. Pump thrombosis study.
NIH
Co-PI, primary surgeon, data acquisition
PI: Dr. Gregory Lanza, MD., Ph.D.
This study was processed with actual explanted thrombosed HeartMate 2 from patients then implant to calf under general anesthesia and test the radioisotope labeled fibrin, then acquired images to investigate the sensitivity of the images to the marker and checked background noise. The goal was to bring to the human application with LVAD pump thrombosis.
- 2019- 2020 Mock-loop LVAD model analyses for valvular disease with LVAD in collaboration with Dr. May-Newman, Professor of San Diego State University, Biomedical Engineering Institutional funding by SDSU and Wash U.
Study designer with concept rationalization studies, Data analyst, Data presenter / PI: Dr. May-Newman
This study was to analyze the flow dynamics of LVAD by altering the degree of aortic insufficiency and circuit pressure and LVAD settings. The unique ex-vivo study gave us an opportunity to investigate all detailed changes in the LVAD mock-loop circuit.
- 2021 Co-chief of the working group for hospital acquired pressure ulcer investigation in the perioperative service at Barnes and Jewish Hospital (Director Dr. Jackie Martin)
Barnes and Jewish Cooperation (Quality improvement project)
PI, data analyst, presenter
We used the sacral pressure measurement pads to investigate the best materials and positions to prevent sacral pressure ulcer in the operating room especially for long surgical time and malnourished patients.
- Current
2023- Radiation induced valvular heart disease: Primary investigator in mantle radiation patients who developed valvular disease underwent surgical valve replacements. Guiding Annie Abruzzo, HMS student, to presenting data at 123rd American Association for Thoracic Surgery in Toronto ON in Nov, 2023. Currently working on revising manuscript for publication.
- 2023- HeartMate 3 anticoagulation management, multi-center data analyses: Primary investigator in all HeartMate 3 patients post-surgical anticoagulation management using Coumadin with cerebrovascular and GI bleeding events. Massachusetts General Hospital and University of Rochester Medical Center
- 2023- Optimization of Donor heart size matching using mass databank (UK biobank) looking into normal heart MRI and CT data to make a database for donor heart size matching at the heart transplant donor heart allocations for clinicians to use for their recipients.

Projects Submitted for Funding

- 2023- Total Exclusion of the Thoracic Aorta to Eliminate the Cerebral Blood Flow During Normothermic Regional Perfusion for Thoracic Organ Procurement After Circulatory Death

This pioneering research is a crucial step towards enhancing our understanding of organ recovery and transplantation post-circulatory death, thereby providing more patients with opportunities for transplantation. Specifically, utilizing ECMO offers invaluable data on maintaining and improving the quality of organs in DCD, with the potential to lead to real-world clinical applications.

2024- Donor heart coronary artery ultrasound scan project: Sometimes donor heart is not examined with coronary angiogram especially donation after circulatory death. We proposed a study to utilize unassigned heart with coronary artery disease using epicardiac ultrasound and detect coronary artery disease, verifying with pathological examination to confirm organic disease of the donor heart. Control group will be non-coronary artery disease patients who will be investigated in the same way using epicardiac ultrasound followed by pathological findings.

2024- Donor heart preservation using conventional materials for transportation: With increased amount of organ acquisition costs, there is an impending demand for reasonable setting for heart and lung transportation using conventional materials for high quality temperature maintenance with low cost. The proposal is to test materials to maintain cooler box temperature between 4-10 degrees for over 12 hours using

Report of Local Teaching and Training

Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs):

2012-2021	Cardiothoracic Surgery M&M Residents & advanced fellows	Barnes and Jewish Hospital 1 hour lecture / week
2012-2021	Cardiothoracic Surgery Core Curriculum Residents & advanced fellows	Barnes and Jewish Hospital 1 hour lecture / 4 times per year
2016-2021	Lab Meeting and Educational Sessions Post-doc research fellows	Washington University, St/ Louis 1 hour / week
2022-	Cardiothoracic Surgery Core Curriculum Residents	BWH 1 hour lecture / 4 times per year
2022-	Cardiac Surgery M&M Cardiac Surgery Residents	BWH 1 hour lecture / week
2022-	Cardiac Surgery Nursing Series Cardiothoracic Surgery Residents	BWH 1 hour lecture / year

Clinical Supervisory and Training Responsibilities:

2013-2021	In-patient attending, Cardiothoracic surgery Medical students, residents	Barnes and Jewish Hospital, Washington University in St. Louis 4 hours / week
2022-	Ambulatory cardiac surgery clinic preceptor	BWH, Watkins clinic

	Medical students, residents	2 hours every other week
2022-	Inpatient attending, Cardiac surgery	BWH
	Medical students, residents, fellows	2 hours / week
2022-	Integrate teaching in the operating room	BWH
	Medical students, residents	20 hours / week, 40 weeks / year

Research Supervisory and Training Responsibilities:

2022-	Research Supervision	Division of Cardiac Surgery, BWH
	3 Harvard Medical Students, 1 Boston University Medical student, 1 post-doc researcher , one BWH General surgery resident	2 hours per week

Formally Mentored Harvard Students (Medical, Dental, Graduate, and Undergraduate):

2023-	Annie Abruzzo, Class of 2027	Radiation induced heart valve disease, retrospective data analyses in MGB dataset specifically focused on valve type (mechanical valve vs Tissue valve) Presenting at AATS annual meeting in April 2024 in Toronto and preparing manuscript
2023-	Ryan Dimentberg, Class of 2025	Optimal anticoagulation level by Warfarin on Durable Ventricular Assist Device HeartMate 3, multi-center study (Brigham and Women’s Hospital, Massachusetts General Hospital, University of Rochester, NY) Finalizing data analyses, preparing for abstract submission to AHA 2024
2023-	Robert Semco, Class of 2025	Surgeons’ approach to goals of care and palliative care conversation icardiac surgery patients and patients’ satisfaction Review manuscript is drafted, designing the prospective clinical study
2024-	Rami Bikdash, Class of 2028	Designing AI approach for suitable donor heart size assessment for heart transplantation. Analysis healthy UK sample data over 20,000 and matching UNOS data and MGB heart transplant recipient data. Designing the study, planning to start analyzing CT scan and echocardiogram data on Healthy sample data in Summer 2024 as HMS student supported summer research project

Other Mentored Trainees and Faculty:

2012-2014	Toshinobu Kazui, MD / Associate Professor of Surgery, University of Arizona	<i>Career stage:</i> Advanced Heart Transplant and MCS fellow. <i>Mentoring role:</i> Research advisor. <i>Accomplishments:</i> abstract presentations, one first author publications
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- 2014-2016 Sarah Tepper, MD / Resident of Orthopedics, Rush University Medical Center
Career stage: Medical student. *Mentoring role:* Research advisor. *Accomplishments:* abstract presentations, two first author publications
- 2015-2016 Mitsugu Ogawa, MD / Staff Surgeon, Thoracic and Cardiac Surgery, Excelsa Health
Career stage: Advanced Heart Transplant and MCS fellow. *Mentoring role:* Research advisor. *Accomplishments:* abstract presentations, one first author publications
- 2015-2017 Mo Garcia / Engineer, University of Miami
Career stage: Medical student. *Mentoring role:* Research advisor. *Accomplishments:* abstract presentations, one first author publication
- 2015-2017 Yuki Tanaka, MD / Chief Surgeon, Kanto Rosai Hospital
Career stage: Medical student. *Mentoring role:* Research advisor. *Accomplishments:* abstract presentations, two first author publications
- 2016 Allen Cheng, MD / Staff Surgeon, Rochester General Hospital
Career stage: Advanced Heart Transplant and MCS fellow. *Mentoring role:* Research and clinical advisor. *Accomplishments:* passed American board of thoracic surgery. Re-training in Heart Failure and Mechanical Circulatory Support
- 2017-2018 Kunal Kotkar, MD / Assistant Professor of Surgery, Washington University
Career stage: Advanced Heart Transplant and MCS fellow. *Mentoring Role:* Research and clinical advisor. *Accomplishments:* Advanced training in Heart Failure and Mechanical Circulatory Support, remained in the program as a junior faculty
- 2017-2020 Tomohiro Nakajima, MD / Associate Professor, Sapporo Medical School
Career stage: Medical student. *Mentoring role:* Research advisor. *Accomplishments:* abstract presentations, two first author publications
- 2018-2020 Brandon Jocher, MD / Resident in Primary Care, Mayo Clinic
Career stage: Medical student. *Mentoring role:* Research advisor. *Accomplishments:* abstract presentations, two first author publications
- 2019-2020 Siddarth Sarangi, MD / Staff Surgeon, OSF Healthcare
Career stage: Advanced Heart Transplant and MCS fellow. *Accomplishments:* A completion of one book chapter
- 2019-2021 Aaron Guo, BS / 4th year Medical Student, Washington University School of Medicine
Career stage: Medical student. *Mentoring role:* Research advisor. *Accomplishments:* abstract presentations, three first author publications
- 2021 Antonio Polanco, MD / Staff Surgeon, Johns Hopkins Medical Center
Career stage: Advanced Heart Transplant and MCS fellow.
Mentoring Role: Research and clinical advisor. *Accomplishments:* Advanced training in Heart Failure and Mechanical Circulatory Support. Matched to the current job as the co-director of heart transplant program at Johns Hopkins.
- 2023- Naoki Tadokoro, MD PHD / Junior Cardiac and Vascular Surgery faculty, National Cardiovascular and Cerebral Center, Osaka Japan

Career stage: post-doc research fellow at BWH. *Mentoring role:* Research Advisory.
Accomplishments: Planned projects-Heart transplant donor heart assessment using rodent ECMO model, clinical outcome research in heart transplant and MCS patient population at MGB dataset.

2023- Taylor Nordan/ General Surgery Resident at BWH. Mentoring role: Research and carrier advisory. Accomplishments: Plenary session presentation at AATS in Toronto 2003 and paper publications. On-going research projects in heart transplant surgery.

Local Invited Presentations:

- No presentations below were sponsored by 3rd parties/outside entities*
 Those presentations below sponsored by outside entities are so noted and the sponsor(s) is (are) identified.

2022- Harvard Heart Society: Cardiothoracic Surgery Workshop
Medical students

2023- PA Lunch & Learn: Donation After Circulatory Death / lecture
Division of Cardiac Surgery, BWH

Report of Regional, National and International Invited Teaching and Presentations

- No presentations below were sponsored by 3rd parties/outside entities*
 Those presentations below sponsored by outside entities are so noted and the sponsor(s) is (are) identified.

National

2016 ECMO in Acute Heart Failure; strategies. American Heart Association/Invited presentation

American Heart Association Annual / Scientific meeting

2016 Advanced surgical treatment options for patients with low cardiac function and cardiogenic shock/Hannibal BJH CME meeting

Hannibal, MO

New Orleans, LA

2017 Heart Transplant Association Annual Meeting

Saint Louis, MO

2017 How can we support Cardiogenic/Respiratory shock patients? Program Development and Outcome/Willis-Knighton Health System

Shreveport, LA

2018 Medtronic MCS Summit

Orlando, FL

- 2018 LV apex positioning, HeartMate3/Abbott HeartMate 3 Surgical Meeting
Denver, CO
- 2018 Hostile LV apex for LVAD implant/Abbott Users' Meeting
Phoenix, AZ
- 2018 Left thoracotomy LVAD implant with upper hemi-sternotomy/Medtronic surgical
investigator meeting
Boston, MA
- 2019 1. Long term Management of LVAD patients 2. Preoperative optimization of LVAD
patients, surgical view/Abbott Fellows Course
Dallas, TX
- 2019 Surgical Proctor/HeartMate 3 implant and related talks
Iowa City, IA
- 2019 Abbott invited surgical meeting
Danvers, MA
- 2020 Acute circulatory support with CentriMag ECMO/Philadelphia cardiovascular meeting
Philadelphia, PA
- 2021 101st American Association of Thoracic Surgery/Right ventricular assist device
Virtual
- 2021 Temporary mechanical circulatory support for bridge to transplant. American Society for
Artificial Internal Organs (ASAIO) University Webinar
Virtual
- 2021 Lateral thoracotomy LVAD implant/Northwestern University School of Medicine
Chicago, IL
- 2021 Surgical proctor of HeartMate 3 implant/Hillcrest Hospital
Tulsa, Ok
- 2021 HeartMate 3 surgical proctor and education/Saint Louis Children's Hospital
Saint Louis, MO
- 2022 ABIOMED, Surgical Users' Meeting, Faculty
Boston, MA

International

- 2017 Current trend in mechanical circulatory support in acute cardiogenic shock in North
America / Grand Round/ Invited speaker
Kyushu University Cardiovascular Surgery
Fukuoka, Japan
- 2017 Heart transplant patient selection challenge in the era of stable durable left ventricular
assist device. Optimal bridge strategies/ Grand Round/ Invited speaker
Tohoku University Cardiovascular Surgery

- Sendai, Japan
- 2018 Destination therapy of LVAD using HeartMate 3/ Invited speaker
55th Annual meeting of the Japanese Society of Artificial Organs
Tokyo, Japan
- 2019 HeartMate 3 surgical implant didactic, introduction to the new technology and cutting-edge implant technique/ Invited talk in Ground Round followed by wet lab as surgical proctor
Tohoku University
Sendai, Japan
- 2019 Challenges in mechanical circulatory support device in bridge to heart transplant, LVAD, BIVAD and acute devices/ Grand Rounds speech/ Invited speaker
Kyushu University
Fukuoka, Japan
- 2019 HeartMate 3 didactic, introduction to optimal surgical implant technique/ Invited speaker/ followed by surgical proctorship in wet lab
Abbott Headquarter
Tokyo, Japan
- 2019 HeartMate 3 Implant/ Surgical proctor
University of Toyama
Toyama, Japan
- 2019 HeartMate 3 Implant/ Surgical proctor
University of Tokyo
Tokyo, Japan
- 2022 ABIOMED National Meeting for Surgical Impella Implant / Invited presentation/ Speaker
Tokyo, Japan
- 2022 New Trend in Heart Transplant in North America After the Allocation System Change/
Invited talk/ Invited Speaker
Japanese Association of Thoracic Surgery
Yokohama, Japan

Report of Clinical Activities and Innovations

Past and Current Licensure and Board Certification:

- 05/98 Japan National Medical License (#395232)
- 12/02 Japanese Board of Surgery (#1803358), Recertified 12/2018
- 12/05 Japanese Board of Cardiovascular Surgery (#5000098), Recertified 12/2017
- 10/08 Ontario Physician Limited License (#89924)
- 07/12 Missouri Med Physician/Surgeon Temporary License (#2012023545)
- 10/12 New York Physician Permanent License (# 60-267408)
- 01/13 Missouri Visiting Professor Physician License (#2013001190)
- 01/15 The Society of Thoracic Surgeons, International Member
- 11/15 Missouri Physician License (#2015041384)
- 03/21 Illinois and Oklahoma Physician License

12/21 Massachusetts Physician License (#290316)
 04/22 Rhode Island Physician License (#MD18439)

Practice Activities:

2012	inpatient/outpatient procedures ambulatory care	Cardiothoracic Surgery, Barnes and Jewish Hospital	40 hours/week
2014	Inpatient procedures/ ICU care	Cardiothoracic Surgery, Christian Hospital	1 weekend per month
2015	Inpatient/outpatient procedures ambulatory care	Cardiothoracic Surgery, Southeast Health	Per-diem coverage (a week/year)
2021	Inpatient/outpatient procedures ambulatory care	Cardiac Surgery, Saint Francis Medical Center	Per-diem coverage (a week in 2021)
2022-	Inpatient/outpatient procedures ambulatory care	Cardiac and Thoracic Surgery, BWH	40 hours per week
2022-	Ambulatory Valvular and Structural Heart Disease Clinic	Cardiac Surgery, Care New England Cardiology, Kent Hospital	2 half day sessions per month
2022	Ambulatory Valvular and Structural Heart Disease Clinic	Cardiac Surgery, 22 Patriot Pl, Foxborough, Mass General Brigham	2 half day sessions per month

Clinical Innovations:

Example(s):

Systematic ECMO utilization for primary graft failure post heart transplant (2014-present) Primary graft failure following heart transplant is the primary cause of death in the short-term, which is a detrimental outcome in heart transplants. It is important to maintain the program outcomes at least above national average. When I started the leadership role in surgical heart transplant group at Wash U in 2014, we had a hard time to uniformly delivering mechanical circulatory support care for PGF patients. We worked with surgeons, anesthesia and intensive care physicians to organize the criteria for ECMO support post heart transplant and improved outcomes in patients with PGF dramatically. This work resulted in top 5 excellent post-transplant survival in 2018 and a publication listed below (Guo, Itoh, Annals of Thoracic Surgery 2022)

HeartMate3 Implant to the Left Atrium through an e-PTFE Restricted cardiomyopathy with low cardiac output and pediatric heart failure in patients with small LV, are a surgical challenge for durable ventricular assist devices with very sensitive device positioning and later management with

conduit for pts with small LV (2021-present)	potential frequent suck-down events. This novel technique was adopted from the pediatric patient population to the adult restrictive cardiomyopathy patients utilizing HeartMate 3 device, reported for the first time as a case report. I have done 3 total cases so far. I am planning to publish the surgical technique manuscript (currently under preparation).
Impella 5.5 implant through brachiocephalic artery for low EF high risk cardiac surgery patient (2022-present)	Patients with low ejection fraction (EF) who are at high risk for cardiac surgery and require coronary artery bypass or valve replacements now have the option of being mechanically supported by the Impella 5.5 device. This device is implanted immediately after the CABG or valve replacement surgery and is used in conjunction with cardiopulmonary bypass during the index surgery. It is intended to aid in the recovery of these patients in the ICU following the operation. This is a novel application of the Impella 5.5 device. I initiated the placement of the device into the brachiocephalic artery through the median sternotomy incision. Subsequently, a wire was inserted for Impella 5.5 insertion after the aorta was unclamped. By eliminating the necessity for fluoroscopy, this strategy enhances the efficiency of the surgery. Additionally, it avoids the conventional axillary cutdown method typically used for this procedure. I delivered a presentation at the ASAIO national meeting in Chicago in May 2024, and am currently publishing a case series in ASAIO.
Heart Transplantation utilizing Donation after Circulatory Death (2022-present)	Heart transplant using donation after circulatory death has been utilized over the nation. Since I joined Brigham and Women's Hospital in 2022, we initiated this heart procurement method and organized the protocol, conducted team and patient educational sessions to enroll donors in UNOS for this particular donor pathway. Since starting the procurement method in January 2023, all recipients have made it through hospital admissions without mortality. Annual heart transplant volume has increased since 2022, as compared to previous years. The rate of DCD is also increasing to 40% of our entire donor population. This innovative approach for the untouched donor pool will become the standard method especially over the next 3 to 5 years.

Report of Education of Patients and Service to the Community

- No presentations below were sponsored by 3rd parties/outside entities.*
- Those presentations below sponsored by outside entities are so noted and the sponsor(s) is (are) identified.*

Activities

2016	Heart Transplant Association Patient Group / St. Louis Heart Transplant Association Saint Louis, MO
2022	Chris Klug Foundation Webinar – Living with a Recycled Heart [Heart Transplant Webinar] Virtual

Report of Scholarship

Peer-Reviewed Scholarship in print or other media:

Research Investigations

1. Nguyen TC, **Itoh A**, Carlhäll CJ, Bothe W, Timek TA, Ennis DB, Oakes RA, Liang D, Daughters GT, Ingels NB Jr, Miller DC. The effect of pure mitral regurgitation on mitral annular geometry and three-dimensional saddle shape. *J Thorac Cardiovasc Surg.* 2008 Sep;136(3):557-65. doi: 10.1016/j.jtcvs.2007.12.087. PMID: 18805251; PMCID: PMC2581499.
2. Carlhäll CJ, Nguyen TC, **Itoh A**, Ennis DB, Bothe W, Liang D, Ingels NB, Miller DC. Alterations in transmural myocardial strain: an early marker of left ventricular dysfunction in mitral regurgitation? *Circulation.* 2008 Sep 30;118(14 Suppl): S256-62. doi:10.1161/CIRCULATIONAHA.107.753525. PMID: 18824764; PMCID: PMC2763536.
3. Stephens EH, Nguyen TC, **Itoh A**, Ingels NB Jr, Miller DC, Grande-Allen KJ. The effects of mitral regurgitation alone are sufficient for leaflet remodeling. *Circulation.* 2008 Sep 30;118(14 Suppl): S243-9. doi: 10.1161/CIRCULATIONAHA.107.757526. PMID: 18824762; PMCID: PMC4406326.
4. Ennis DB, Nguyen TC, **Itoh A**, Bothe W, Liang DH, Ingels NB, Miller DC. Reduced systolic torsion in chronic "pure" mitral regurgitation. *Circ Cardiovasc Imaging.* 2009 Mar;2(2):85-92. doi:10.1161/CIRCIMAGING.108.785923. Epub 2009 Jan 22. PMID: 19808573; PMCID: PMC2760031.
5. **Itoh A**, Krishnamurthy G, Swanson JC, Ennis DB, Bothe W, Kuhl E, Karlsson M, Davis LR, Miller DC, Ingels NB Jr. Active stiffening of mitral valve leaflets in the beating heart. *Am J Physiol Heart Circ Physiol.* 2009 Jun;296(6):H1766-73. doi: 10.1152/ajpheart.00120.2009. Epub 2009 Apr 10. PMID: 19363135; PMCID: PMC4060839.
6. Bothe W, Nguyen TC, Roberts ME, Timek TA, **Itoh A**, Ingels NB Jr, Miller DC. Presystolic mitral annular septal-lateral shortening is independent from left atrial and left ventricular contraction during acute volume depletion. *Eur J Cardiothorac Surg.* 2009 Aug;36(2):236-42; discussion 242-3. doi: 10.1016/j.ejcts.2009.03.021. Epub 2009 Apr 25. PMID: 19394855.
7. Krishnamurthy G, **Itoh A**, Bothe W, Swanson JC, Kuhl E, Karlsson M, Craig Miller D, Ingels NB Jr. Stress-strain behavior of mitral valve leaflets in the beating ovine heart. *J Biomech.* 2009 Aug 25;42(12):1909-16. doi: 10.1016/j.jbiomech.2009.05.018. Epub 2009 Jun 16. PMID: 19535081; PMCID: PMC2725213.
8. Swanson JC, Davis LR, Arata K, Briones EP, Bothe W, **Itoh A**, Ingels NB, Miller DC. Characterization of mitral valve anterior leaflet perfusion patterns. *J Heart Valve Dis.* 2009 Sep;18(5):488-95. PMID: 20099688; PMCID: PMC2863300.
9. Bothe W, Chang PA, Swanson JC, **Itoh A**, Arata K, Ingels NB, Miller DC. Releasable annuloplasty ring insertion--a novel experimental implantation model. *Eur J Cardiothorac Surg.* 2009 Nov;36(5):830-2. doi: 10.1016/j.ejcts.2009.06.028. Epub 2009 Jul 30. PMID: 19646892; PMCID: PMC2770589.
10. **Itoh A**, Ennis DB, Bothe W, Swanson JC, Krishnamurthy G, Nguyen TC, Ingels NB Jr, Miller DC. Mitral annular hinge motion contribution to changes in mitral septal-lateral dimension and annular area. *J Thorac Cardiovasc Surg.* 2009 Nov;138(5):1090-9. doi: 10.1016/j.jtcvs.2009.03.067. Epub 2009 Sep 11. PMID: 19747697; PMCID: PMC2892855.

11. Bothe W, Ennis DB, Carlhäll CJ, Nguyen TC, Timek TA, Lai DT, **Itoh A**, Ingels NB Jr, Miller DC. Regional mitral leaflet opening during acute ischemic mitral regurgitation. *J Heart Valve Dis.* 2009 Nov;18(6):586-96; discussion 597. PMID: 20099707; PMCID: PMC2863307.
12. Krishnamurthy G, **Itoh A**, Swanson JC, Bothe W, Karlsson M, Kuhl E, Craig Miller D, Ingels NB Jr. Regional stiffening of the mitral valve anterior leaflet in the beating ovine heart. *J Biomech.* 2009 Dec 11;42(16):2697-701. doi: 10.1016/j.jbiomech.2009.08.028. Epub 2009 Sep 18. PMID: 19766222; PMCID: PMC2874962.
13. Krishnamurthy G, **Itoh A**, Swanson JC, Miller DC, Ingels NB Jr. Transient stiffening of mitral valve leaflets in the beating heart. *Am J Physiol Heart Circ Physiol.* 2010 Jun;298(6):H2221-5. doi: 10.1152/ajpheart.00215.2010. Epub 2010 Apr 16. PMID: 20400687; PMCID: PMC2886651.
14. **Itoh A**, Fischbein M, Arata K, Miller DC. "Peninsula-style" transverse aortic replacement in patients with bicuspid aortic valve. *Ann Thorac Surg.* 2010 Oct;90(4):1369-71. doi: 10.1016/j.athoracsur.2009.11.029. PMID: 20868855.
15. Swanson JC, Krishnamurthy G, **Itoh A**, Kvitting JP, Bothe W, Craig Miller D, Ingels NB Jr. Multiple mitral leaflet contractile systems in the beating heart. *J Biomech.* 2011 Apr 29;44(7):1328-33. doi: 10.1016/j.jbiomech.2011.01.006. Epub 2011 Feb 2. PMID: 21292268; PMCID: PMC3079073.
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Letters to the Editor

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Abstracts, Poster Presentations, and Exhibits Presented at Professional Meetings:

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5. **Itoh A**, Nguyen TC, Cheng A, Ennis DB, Oakes R, Kameda Y, Daughters GT, Ingels NB, Miller DC, Dobutamine Myocardial Strain Rate Response is Transmurally Inhomogeneous, American Heart Association Scientific Session, 2006, Chicago, IL
6. **Itoh A**, Nguyen TC, Ennis DB, Bothe W, Carlhall C, Rodriguez F, Ingels NB, Miller DC Papillary muscle torsion: A potential role in ischemic mitral regurgitation, The Society for Heart Valve Disease, 4th Biennial meeting 2007, New York, NY (Lillehei Young Investigator Award Finalist)
7. **Itoh A**, Krishnamurthy G, Swanson JC, Ennis DB, Bothe W, Daughters GT, Miller DC, Ingels NB Jr, *Electrical Stimulation Stiffens Ovine Mitral Leaflets In Vivo*, 3rd Biennial heart Valve Biology and Tissue Engineering, London, UK 2008
8. **Itoh A**, Ennis DB, Bothe WB, Swanson JC, Krishnamurthy G, Nguyen TC, Ingels NB Jr, Miller DC. Mitral annular hinge motion contributes to changes in mitral septal-lateral dimension and annular area. (Original title: "Is Mitral Valve Hinge Motion Important for Leaflet Closure?"), 88th American Association of Thoracic Surgery C. Walton Lillehei Resident Research Award Finalist, San Diego, CA, 2008
9. Raymer DS, Vader JM, Nassif ME, Sparrow CT, LaRue SJ, Ewald GA, **Itoh A**, Silvestry SC. Poster Session: Increased BMI is associated with left ventricular assist device-related infectious complications. ISHLT – 4/10/14, San Diego, CA.
10. Xu WD, Silvestry SC, Bierhals AJ, **Itoh A**, Novak E, Joseph JM. Poster Session: Sarcopenia is associated with increased post left ventricular assist device implantation morbidity. ISHLT – 4/10/14, San Diego, CA.
11. Robertson JO, Meyers SL, Kirklin JK, Mertz GD, Prasad S, **Itoh A**, Silvestry SC. Featured Abstract: Concomitant Aortic Valve Procedures in Patients Undergoing Implantation of Continuous-Flow LVADs: An Intermacs Database Analysis. ISHLT – 4/11/14, San Diego, CA.
12. Tibrewala A, Nassif M, Andruska A, Vader J, Novak E, Shuster J, Jackups R, LaRue SJ, Ewald GA, **Itoh A**. Poster Session: Use of ADP Receptor Inhibitor Prior to LVAD Implantation Does Not Increase Risk of Bleeding. ISHLT – 4/11/14, San Diego, CA.
13. Silvestry SC, **Itoh A**, Kazui T, Prasad SM. Concurrent Session: The Impact of LVAD Program Volume and Transplant Status on Cost, Quality, and Survival in the UHC Database 2010-2012. ISHLT – 4/11/14, San Diego, CA.
14. Andruska AM, Nassif M, Novak E, Ewald GA, LaRue J, Silvestry, **Itoh A**. LVAD Exchange for Thrombosis is Associated with Higher Recurrent Rates of Hemolysis, Thrombosis, and Death. Mini Oral Session 10: VADs Gone Bad, Complications after MCS. ISHLT – 4/12/14, San Diego, CA.
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 21. Contemporary ECMO Therapy for Post cardiectomy Shock: From Registry for Cardiogenic Shock: Utility and Efficacy of Device Therapy (RESCUE). H. Takayama, J. Han, M. Baltazar-Garcia, M. Lucas, M. Kai, M. Camacho, B. Sun, D. Ranney, M.A. Daneshmand, **Itoh A**. The Journal of Heart and Lung Transplantation. 2017; Volume 36, Issue 4, Supplement, Pages S138-S139
 22. Clinical Outcomes and Left Ventricular Unloading with Intra-Aortic Balloon Pump During Extracorporeal Life Support. S Tepper, MF Masood, M Garcia, M Pisani, A Ahmed, A Khan, **Itoh A**. The Journal of Heart and Lung Transplantation. 2017; Volume 36, Issue 4, Supplement, Page S138
 23. Abstract 1346: Clinical Benefits and Complications in Patients with Percutaneous VAD versus Surgical LV Vent with ECLS: Multicenter Registry for Cardiogenic Shock - Utilization and Efficacy of Device Therapy (RESCUE). **A. Itoh**, M. Pisani, M. Baltazar, K.R. Balsara, M.F. Masood, S. Tepper, J. Han, D. Ranney, M. Daneshmand, B. Sun, M. Kai, M. Camacho, H. Takayama. The Journal of Heart and Lung Transplantation. 2017; Volume 36, Issue 4, Supplement, Page S439. (Presented at ISHLT 37th Annual Meeting and Scientific Sessions)
 24. Abstract 675: Negative Pressure Dressings Reduce the Incidence of Driveline Infections Following LVAD Implantation. K Balsara, L Jolliff, M Masood, **Itoh A**. The Journal of Heart and Lung Transplantation. 2017; Volume 36, Issue 4, Supplement, Page S257

25. Prolonged Ventilator Dependence Following LVAD Implant Is an Independent Predictor of Reduced Survival. K Balsara, L Jolliff, M Masood, **Itoh A**. The Journal of Heart and Lung Transplantation. 2017; Volume 36, Issue 4, Supplement, Page S435

26. Impact of mitral valve regurgitation at the time of LVAD implant, repair or not to repair? **Itoh A**, Fischer I, Balsara K, Masood FM American Association of Thoracic Surgery Scientific meeting 2018, San Diego, CA

Narrative Report

I am an Associate Physician in the Cardiac Surgery Division in the Department of Surgery at BWH and a Member of the Faculty at HMS. My area of excellence is Clinical Expertise and Innovation and my significant supporting activity is Special Merit in Teaching.

My main clinical focus is orthotopic heart transplant and mechanical circulatory assist device surgery on the growing patient population with chronic end-stage and acute heart failure. At BWH, we have a comprehensive heart failure/transplant team which continues to work with patients referred to me and my team from other centers. My role in the heart failure group is to lead the large, multi-disciplinary heart failure team consisting of more than 100 providers including 3 additional surgeons, 2 cardiac surgery fellows, 8 full time heart failure cardiologists, 3 cardiology heart failure fellows, 6 nurse practitioners, and more than 30 nursing, social and financial specialists. The BWH team treated 17 heart transplants, over 35 LVADs and 100 ECMO patients and many other heart failure patients in 2021 before I joined. Since I joined the group in January 2022, the heart transplant volume increased to 27 in 2022, then 29 in 2023. My team and I started accepting the donor heart from circulatory death patients in 2022 and finally completed the first case in January 2023, with a successfully patient outcome. The SRTR heart transplant outcomes and LVAD survivals have been in an excellent outcome considering the severity of illness for those patients. Working with Drs. Mehra and Givertz as well as my surgical colleagues, we are organizing the procurement, implant, and management team to maximize the opportunity of heart transplants. I also implanted HeartMate 3 LVAD in an alternative way by going through an e-PTFE graft sewn to the Fossa Ovalis and attaching HM3 to the conduit. This method can be applied to patients with small sized hearts which may not be able to accommodate the 2cm HM3 inflow cannula through the left ventricular apex. In this way, I have implanted HM3 for three patients (2 at BWH) so far and a case report is already published. We are now discussing a possible clinical study to investigate the feasibility and efficacy of this procedure. All of these have been built on the relentless and persistent effort and dedications by the entire team.

In addition, I am also experienced in coronary artery revascularization, complex valvular and aortic surgery with my integrated understanding of cardiac and aortic anatomy based on my heart transplant experience. My philosophy is to use multiple arterial grafts in all patients undergoing CABG. Aortic dissections and aortic root and arch replacements are another patient population in our daily practice. Complex re-operative valve surgery and aortic root surgery is another focus of mine, utilizing Homograft for reconstructive surgery. Over the last two years at BWH, I started covering the Care New England Brigham and Women's Cardiology Group in Rhode Island. I participate in a multi-disciplinary Valvular and Structural Heart Disease Clinic, where I see 4-10 patients a month. I operate on patients who are candidates for surgery at BWH in Boston and see them for post-operative follow up in RI.

My clinical and translational research concerns are heart failure and the clinical impact of valvular surgery concomitant with mechanical assist device implantation and reverse remodeling in mechanically unloaded condition. Also, clinical outcomes of acute and chronic circulatory support with extracorporeal oxygen membrane circulatory support and durable ventricular assist, such as intra-aortic balloon pump, Impella, and HeartMate 3 LVAD are major subjects we continue to investigate. Based upon the previous research experience in valvular/ventricular physiology and transesophageal echocardiography, I would like

to contribute to the development of the clinical and translational research in the heart failure field. As for heart transplantation, primary graft dysfunction is the major cause of mortality in the acute phase as well as mid to long term. By having a collegial collaboration with basic science research laboratories, investigations into primary graft dysfunction utilizing donor and recipient data are undergoing.

Resident and student education is a priority in my career. Since working at Washington University in St. Louis in 2012, I have been deeply involved in students, residents and fellows' research projects as well as clinical educations in the OR. In the last 12 years, I have been mentoring over 12 students and post docs for clinical outcome research projects and published 15 manuscripts. Currently a total of 5 HMS students are working with me on their own projects. Annie Abruzzo, 2nd year HMS student just presented at 104th American Association for Thoracic Surgery scientific meeting in Toronto Ontario, preparing a manuscript. My career in clinical education of cardiac surgery has been characterized by a constant dedication to improve skills of future cardiac surgeons. As the result of dedicated work in resident education, I received a teaching award for the BWH cardiac surgery program in 2023, followed by Larry H. Cohn Teaching Award in 2024.