Advanced Heart Failure and Transplant Cardiology Fellowship

University of Utah School of Medicine
Division of Cardiovascular Medicine
and the
UTAH Cardiac Transplant Program
Introduction

• This presentation will review multiple aspects of our program including:
  • History of the program.
  • Hospitals and faculty affiliated with the program.
  • Transplant and mechanical support volumes.
  • Subspecialty clinics affiliated with the program.
  • Training curriculum for the fellowship.
  • Research at the University of Utah.
  • Living in Salt Lake City.
U.T.A.H. (Utah Transplantation Affiliated Hospitals) Cardiac Transplant Program

• A unique consortium of 3 adult and 1 children’s hospitals.
  • Common recipient list and shared donor call.
  • Weekly joint meetings to evaluate new candidates and update on significant events occurring post-transplant.
  • Standardized treatment protocols for all aspects of care.
  • Shared database leading to collaborative research.

• As of June 1, 2020 we have performed 1,629 heart only, heart-kidney and heart-liver transplants.

• Since the inception of the program, transplant survival has always met or exceeded the expected survival as defined by UNOS.
• 1960's, 70's, 80's: Pioneering Mechanical Circulatory Support (MCS) - Willem Kolff (“Father of Artificial Organs”) & Multidisciplinary Clinical - Research Team Developed: a) IABP Counterpulsation, b) Total Artificial Heart (TAH)

• 1982: 1st worldwide durable TAH (Jarvik 7) implanted in Barney Clark: "Moonshot effect" for MCS field

• 1985: 1st Heart Transplant (Tx) at the UTAH program

• 1985-1995: Human tissue research from explanted hearts of Tx recipients + Clinical Studies fueled the UTAH-led “Beta Blocker revolution” in HF therapy

• 1993: 1st Durable LVAD implant at the UTAH program

• 1995: UTAH-led Myocarditis Treatment Multicenter Trial

• 2003: CMS National Approval for LVAD Destination Therapy (DT) - UTAH program: Top Enroller + Best Outcomes among REMATCH Trial sites

• 2009: 1000th Heart Transplant: “1000 Lives Saved” recognition at the Utah State Capitol

• 2014: 1st durable LVAD Explanted for Myocardial Recovery (RESTAGE Multicenter Trial)

• 2015: “SHOCK TEAM” for Cardiogenic Shock management
Institutional Memory Matters!
Utah's Innovations & Contributions to the Cardiovascular Field

- Long QT Legend: Revolutionized Arrhythmia and Pharma World
- Defined Role of EP Studies and EKG Holter in Arrhythmias
- Beta-Blocker Therapy in HF
- Defined Myocarditis Diagnosis & Therapy
- Gene Discoveries: Cardiomyopathies, HHT, Supravalvular Stenosis and many others
- Pioneering Mechanical Circulatory Support: IABP + Total Artificial Heart + Continued Driver of Innovation
- U.T.A.H. Cardiac Transplant Program: Driving Innovation + one of handful programs worldwide >1600 Transplants
- Antibody Mediated Rejection (AMR) Legend in Heart Transplantation

History Keeps Repeating Itself
More to come... On-going innovative work in several CV fields!
Advanced Heart Failure and Transplant Cardiology Fellowship at Utah

- Training program started in 1987 and has included over 60 fellows.
- ACGME accreditation in July 1, 2012.
- 19 fellows have completed ACGME training in our program.
- Since formal accreditation all of our graduates have entered full time heart failure positions in either an academic or community practice.
- All 10 fellows who have taken board examination to date have passed.

**Heart Failure Positions Taken By Fellows Graduating From Utah Over the Last 10 years**

<table>
<thead>
<tr>
<th>Type of Practice</th>
<th>Geographic Location</th>
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<tbody>
<tr>
<td>Academic: 7</td>
<td>![Map of United States with heart failure positions marked]</td>
</tr>
<tr>
<td>Private Practice: 10</td>
<td></td>
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<tr>
<td>Other Training: 2</td>
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Hospitals

UTAH Cardiac Transplant Program
University of Utah Hospital

• 425 bed hospital serving the Intermountain West.
• Cardiovascular Intensive Care Unit.
  • Independent Cardiology and Cardiothoracic Surgery services.
  • Coverage by general cardiology fellow and medicine resident.
• Inpatient Heart Failure Service.
  • Coverage by medicine resident and advanced practice clinician.
• Outpatient Heart Failure Clinic.
  • Operates five days a week
  • 90 to 100 patient visits per week.
Intermountain Medical Center

- 504 bed hospital serving as the flagship for Intermountain Healthcare.
- Cardiovascular Intensive Care Unit.
  - Coverage by Intensivists.
- Inpatient Heart Failure Service.
  - Coverage by Advanced Practice Clinicians.
- Outpatient Clinic.
  - Operates five days a week.
  - 170-190 patient visits per week.
George E. Wahlen Department of Veterans Affairs Medical Center

- 121 bed hospital serving veterans in the Intermountain West.
- One of only five VA hospitals with a heart transplant/LVAD program.
- Inpatient Heart Failure Service.
  - Coverage by medicine residents.
- Outpatient Heart Failure Clinic.
  - Operates two days a week
  - 25-40 patient visits per week.
The UTAH Cardiac Transplant Program’s unique location results in a referral base that is much larger than the Salt Lake City metropolitan area.

- It is the only program in the intermountain region.
- Routinely receives referrals from Utah, Idaho, Montana, Nevada, Wyoming, New Mexico, and Western Colorado.
- Patients have been referred from 27 states, including Alaska and Hawaii.

LVAD Centers Across the United States

Salt Lake City
Faculty

UTAH Cardiac Transplant Program
Program Directors

Edward Gilbert, MD
Professor of Medicine
Program Director

Rami Alharethi, MD
Adjunct Assistant Professor
Associate Program Director
Medical Director, Heart Transplantation and Mechanical Circulatory Support at Intermountain Medical Center

Line Kemeyou, MD
Assistant Professor
Associate Program Director
Sarcoidosis Program Director
University of Utah/VA Faculty

James Fang, MD
Professor of Medicine
Chief, Division of
Cardiovascular Medicine

Josef Stehlik, MD, MPH
Professor of Medicine
Medical Director of Heart
Transplant Program

Stavros G. Drakos, MD, PhD
Professor of Medicine
Medical Director of Cardiac
Mechanical Support Program
University of Utah/VA Faculty

Jose Nativi-Nicolau, MD
Associate Professor
Cardiovascular Director of the Amyloidosis Program

Omar Wever-Pinzon, MD
Assistant Professor
Director of Hypertrophic Cardiomyopathy Clinic

Kevin S. Shah, MD
Assistant Professor
Cardio-Renal Program Director
Intermountain Medical Center Faculty

Abdallah G Kfoury, MD
Adjunct Professor of Medicine
Director, Heart Failure Prevention and Treatment Program

Virginia B Hebel, MD
Co-Director, Hypertrophic Cardiomyopathy Clinic, IMC

Michael D. McCulloch, MD
Director, Heart Failure Program
Director, Cardio-Oncology, IHC

Ross A. Butschek, MD
Advanced Heart Failure Cardiologist
Program Volumes

UTAH Cardiac Transplant Program
Heart Transplant Volumes at the Utah Cardiac Transplant Program

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adult Recipients</strong></td>
<td>39</td>
<td>45</td>
<td>39</td>
<td>23</td>
</tr>
<tr>
<td><strong>Pediatric Recipients</strong></td>
<td>6</td>
<td>11</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Recipients</strong></td>
<td>45</td>
<td>56</td>
<td>51</td>
<td>26</td>
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* Cases up to June 5, 2020
**Adult Mechanical Assist Device Volumes at UTAH Cardiac Transplant Program**

<table>
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<tr>
<th></th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020 YTD*</th>
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<tbody>
<tr>
<td><strong>Durable Devices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>54**</td>
<td>38**</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td><strong>Temporary Devices</strong></td>
<td>166</td>
<td>201</td>
<td>188</td>
<td>112</td>
</tr>
</tbody>
</table>

* Cases up to June 5, 2020, ** Includes 1 total artificial heart
Programs Integrated with Advanced Heart Failure- Transplant Team

UTAH Cardiac Transplant Program
CARDIOGENIC SHOCK?
No Specific Criteria On Purpose: Instructions to Fellows For Low Threshold in Activating Shock Team

*Shock Team:*
- HF attending
- CT Surgery attending
- Interventional attending
- CVICU attending

PAGE SHOCK TEAM *

STEMI?

Yes

CARDIOGENIC SHOCK WITH STEMI
(if possible two interventional attendings in the lab)
1. Establish central arterial access for LVEDP measurement
2. Consider MCS (See Criteria**) and simultaneously Angiogram-PCI (preferably while the patient is already mechanically supported)
3. RHC (CCO Swan) ASAP

No

CARDIOGENIC SHOCK WITHOUT STEMI
1. RHC (CCO Swan)
2. Consider MCS (See Criteria**)
3. Possible LHC depending on the clinical scenario

** MCS (e.g. Impella, ECMO, etc) to be considered when:
A. Low SBP; SBP < 90 mm Hg or MAP < 50 for > 30 minutes OR needed inotropes/pressors to maintain SBP > 90 or MAP > 50,
B. Plus ONE of the following:
   - PCWP or LVEDP > 15 mmHg and CI < 2.2, or
   - Clinical or radiological signs of pulmonary edema, or
   - Impaired end-organ perfusion

Cutting Edge of Cardiogenic Shock Care: SHOCK TEAM
A Utah First

Circulation 2019;140:98–100
Multi-Specialty Clinics Affiliated with the UTAH Cardiac Transplant Program

- Amyloidosis Clinic at the University of Utah and Huntsman Cancer Institute.
  - [https://healthcare.utah.edu/amyloidosis/](https://healthcare.utah.edu/amyloidosis/)

- Hypertrophic Cardiomyopathy Program at the University of Utah.

- University of Utah Pulmonary Hypertension Center.
  - [https://healthcare.utah.edu/cardiovascular/conditions/pulmonary-hypertension.php](https://healthcare.utah.edu/cardiovascular/conditions/pulmonary-hypertension.php)

- Adult Congenital Heart Disease Program.

- Sarcoidosis Clinic.

- Cardio-Renal Program.
Training in Utah: What Do Fellows Do?
Goals for our Fellowship Trainees

• Acquire the knowledge and experience necessary to become an expert in the diagnosis and management of all aspects of heart failure.

• Sit for and pass the board examination for Advanced Heart Failure and Transplant Cardiology.

• Practice in either an academic or community setting with a full-time career as a heart failure specialist.
**Training Goals for Heart Failure Fellows**

**Gain Core Competency in:**

<table>
<thead>
<tr>
<th>Pathophysiology, prevention, diagnosis, and treatment of heart failure.</th>
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<tbody>
<tr>
<td>Evaluation for advanced heart failure treatment including heart transplantation and mechanical circulatory support.</td>
</tr>
<tr>
<td>Understand and implement disease management strategies, including pharmacologic, electrical device and mechanical circulatory support as well as cardiac transplant options for this patient population.</td>
</tr>
<tr>
<td>Indications and interpretation of right heart catheterization, heart biopsy and various imaging modalities including echocardiography, CT scan, MRI, and PET.</td>
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<thead>
<tr>
<th>Arrhythmia mechanisms and management (pharmacologic, interventional and device-based)</th>
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<tr>
<td>Donor management skills and donor procurement procedure and processes, as well as the intraoperative procedures for heart transplantation and mechanical circulatory devices.</td>
</tr>
<tr>
<td>Care of patients pre- and post-heart transplantation.</td>
</tr>
</tbody>
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<tr>
<th>Immunology of cellular and antibody-mediated rejection, as well as screening and monitoring protocols, pharmacologic interventions.</th>
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<tr>
<td>Evaluation of patients with implantable cardioverter defibrillators, implantable hemodynamic monitors, and cardiac resynchronization therapy.</td>
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<tr>
<th>Care of pts pre- and post-mechanical circulatory support.</th>
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Advanced Heart Failure Training at UTAH Cardiac Transplant Program: Role of the Fellow

- Inpatient care on cardiology ward and CVICU. Time divided between the member hospitals of the program:
  - Intermountain Medical Center
  - University of Utah Hospital
  - Veterans Affair Medical Center
- Outpatient continuity clinic.
- Cardiac catheterization laboratory.
- Elective rotations in center of excellence sub-specialty clinics:
  - Pulmonary hypertension
  - Amyloid
  - Hypertrophic
- Educational activities.
- Research activities.
Additional Activities

- Review of endomyocardial biopsies with cardiac pathologists.
- Presentation of patients to the weekly multi-disciplinary advanced therapies conference.
- Interested fellows have the opportunity for more advanced procedures:
  - Intra-aortic balloon pump and Impella placement with the interventional attending.
  - CardioMEMs pressure sensor placement with Dr. Gilbert.
- Elective Options:
  - Pulmonary hypertension
  - Amyloid
  - Hypertrophic
  - Sarcoid
  - Advanced cardiac imaging in heart failure
  - Cardiac Intensive Care with the Cardiac Surgery Intensivist Team for more direct hands on training in temporary mechanical support and post-operative management of LVAD and transplant recipients
Annual Symposia at the University of Utah

• Utah Cardiac Recovery Symposium (U-CARS)
  • Annual meeting on ground-breaking research in the field of cardiac recovery spanning clinical, translational and basic sciences.
  • Endorsed by the Heart Failure Society of America.
  • Internationally recognized keynote speakers have included Eugene Braunwald, Valentin Fuster, Milton Packer and Douglas Mann.

• Utah Amyloidosis Symposium
  • One of a kind sub-specialty meeting is now being used as a template for similar events around the country, held bi-annually.
  • Internationally recognized key-note speakers have included Giovanni Palladini, Mathew Maurer, Vaishali Sanchorawala, & Daniel Lenihan.

• Hypertrophic Cardiomyopathy Virtual Conference
  • HCM Strong Bighearted Warriors Virtual Conference Tour will be held November 2020 in partnership with Hypertrophic Cardiomyopathy Association
U-CARS
Utah Cardiac Recovery Symposium
Annual International Conference
Held every January

Topics Span Bedside to Bench and Back
>500 international attendees

COURSE DIRECTORS
Stavros G. Drakos, M.D., Ph.D.
Abdallah G. Kfoury, M.D.
Craig H. Selzman, M.D.
Josef Stehlik, M.D., M.P.H.
Utah Amyloidosis Symposium
Bi-Annual Conference

Hypertrophic Cardiomyopathy Virtual Conference
HCM Strong Bighearted Warriors Tour - December 2020
Research Opportunities

UTAH Cardiac Transplant Program
Research During Heart Failure Fellowship

• All fellows are expected to develop their scholarship in the form of research and writing.
• Fellows will identify a research mentor during the first three months of their training.
• With the assistance of his or her mentor, fellows will identify a research project that can be reasonably completed during the fellowship.
• There are many opportunities for involvement in on-going clinical and translational research programs as well as co-authorship of review articles, book chapters, and other scientific publications.
• Previous fellows have presented their research at national meetings and published manuscripts in peer reviewed journals.
Living in Utah

- Population
  - Salt Lake City: 200,544.
  - Salt Lake County: 1,135,649.
  - Wasatch Front: 2,192,225.
  - State: 3,101,833.

- Climate
  - Arid mountain desert environment.
  - Four seasons
  - Elevation 4,330 feet.

- Mountain Time Zone

- Transportation
  - Salt Lake City International Airport.
  - Ten minutes from downtown.
  - Delta hub.

https://uofuhealth.utah.edu/living_in_utah/

https://uofuhealth.utah.edu/why-utah.php
Salt Lake City: Life in the Mountains