



2016 Heart Failure Essentials for Cardiology Fellow
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What the Cardiology Fellow needs to Know About “Heart Transplantation”

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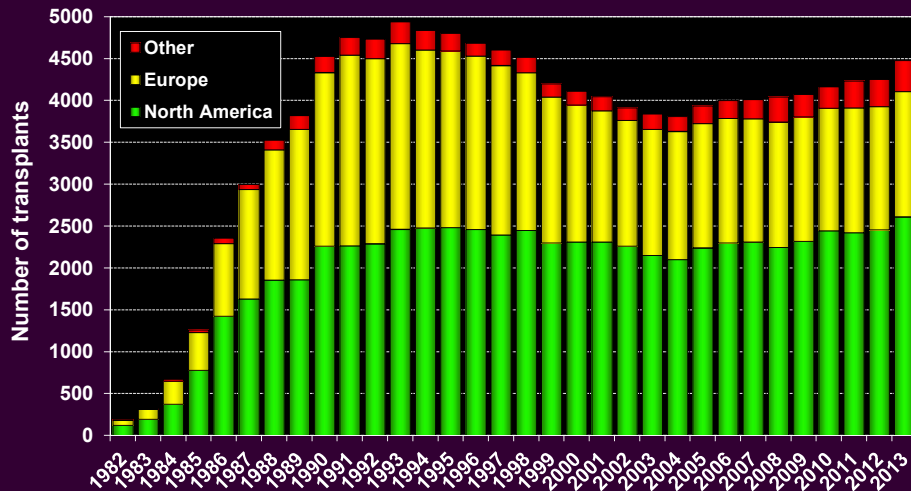
คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล
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Agenda

- Background
- Candidate selection
- Contraindications
- Transplant process

Adult and Pediatric Heart Transplants Number of Transplants by Year and Location

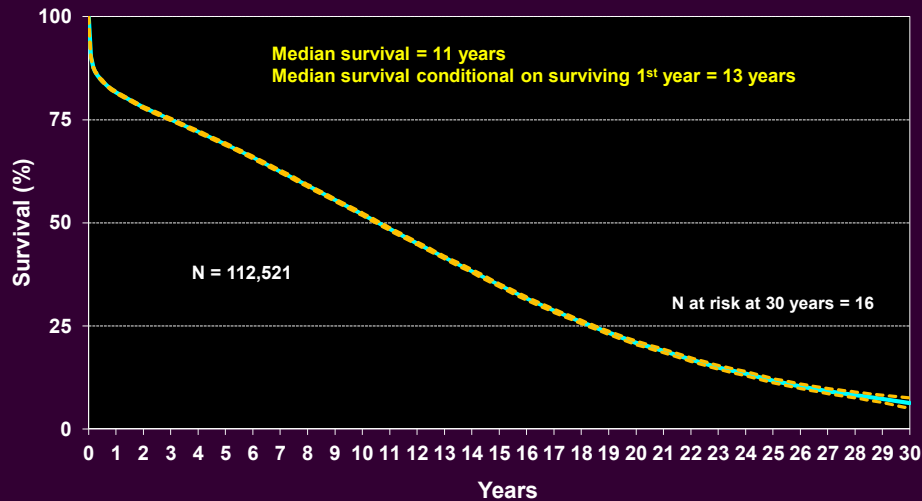


NOTE: This figure includes only the heart transplants that are reported to the ISHLT Transplant Registry. As such, the presented data may not mirror the changes in the number of heart transplants performed worldwide.

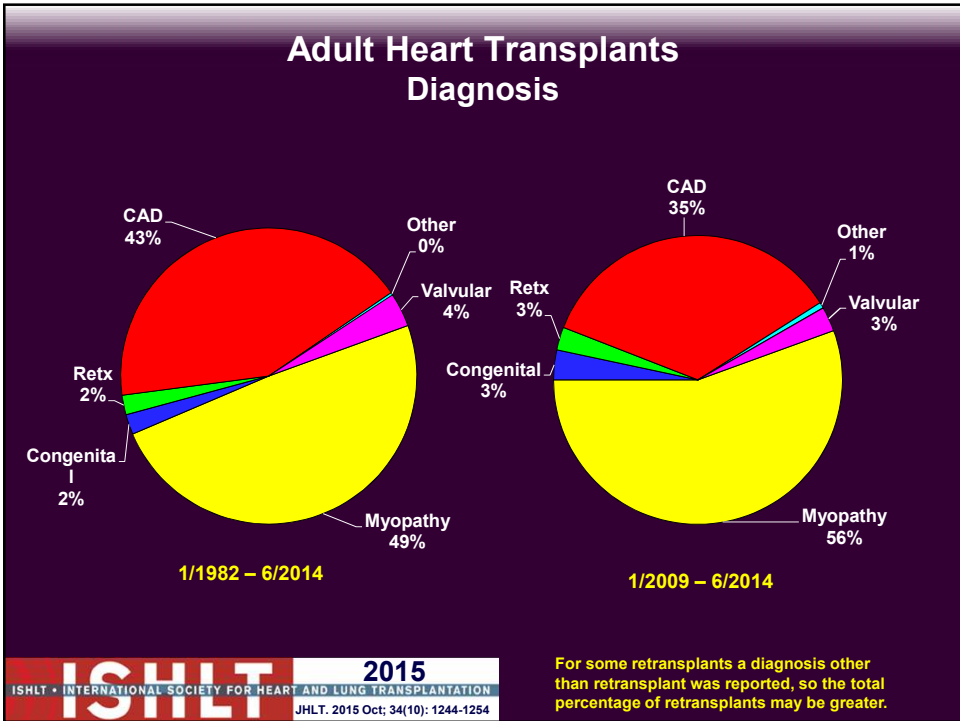
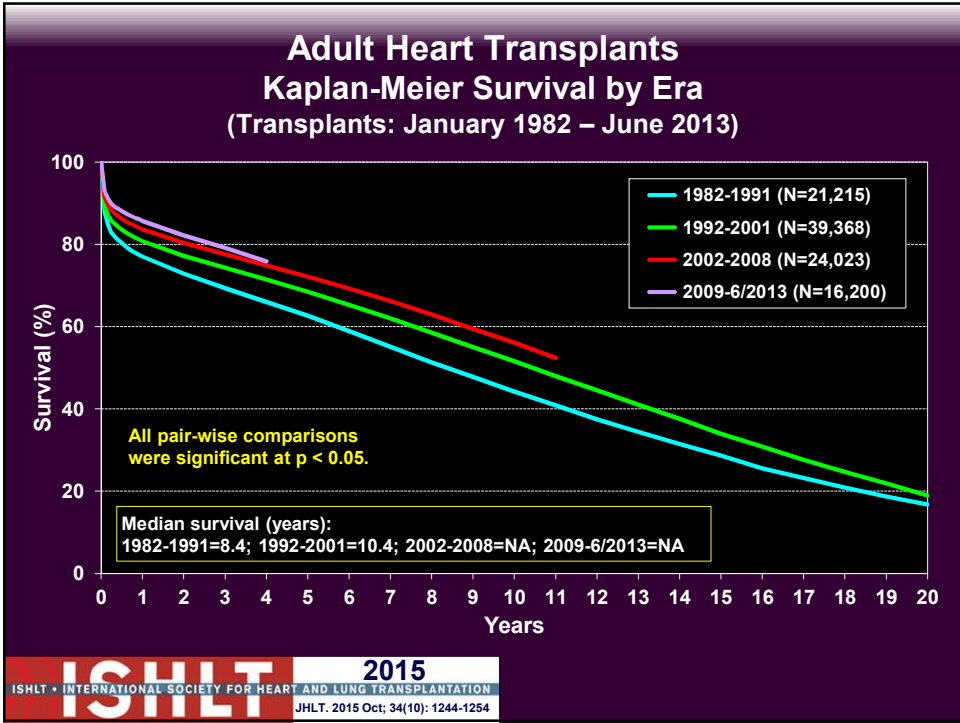
ISHLT 2015
 ISHLT • INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION
 JHLT. 2015 Oct; 34(10): 1244-1254

Adult and Pediatric Heart Transplants Kaplan-Meier Survival

(Transplants: January 1982 – June 2013)



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Heart Transplantation: Indications

Patients to consider:

- End-stage HF with severe symptoms, a poor prognosis, and no remaining alternative treatment options.
- Motivated, well informed, and emotionally stable.
- Capable of complying with the intensive treatment required postoperatively.



Who Needs a New Heart?

- **End stage heart failure**
- **Intractable ventricular arrhythmias**
 - Failure to control with medications or ablation
- **Intractable angina**
 - Angina interfering with quality of life and not amenable to revascularization or medical therapy



INTERMACS stages

Interagency Registry for Mechanically Assisted Circulatory Support

INTERMACS level	NYHA Class	Description	Device	1y survival with LVAD therapy
1. Cardiogenic shock "Crash and burn"	IV	Haemodynamic instability in spite of increasing doses of catecholamines and/or mechanical circulatory support with critical hypoperfusion of target organs (severe cardiogenic shock).	ECLS, ECMO, percutaneous support devices	52.6±5.6%
2. Progressive decline despite inotropic support "Sliding on inotropes"	IV	Intravenous inotropic support with acceptable blood pressure but rapid deterioration of renal function, nutritional state, or signs of congestion.	ECLS, ECMO, LVAD	63.1±3.1%
3. Stable but inotrope dependent "Dependent stability"	IV	Haemodynamic stability with low or intermediate doses of inotropics, but necessary due to hypotension, worsening of symptoms, or progressive renal failure.	LVAD	78.4±2.5%
4. Resting symptoms "Frequent flyer"	IV ambulatory	Temporary cessation of inotropic treatment is possible, but patient presents with frequent symptom recurrences and typically with fluid overload.	LVAD	78.7±3.0%
5. Exertion intolerant "Housebound"	IV ambulatory	Complete cessation of physical activity, stable at rest, but frequently with moderate fluid retention and some level of renal dysfunction.	LVAD	93.0±3.9%*
6. Exertion limited "Walking wounded"	III	Minor limitation on physical activity and absence of congestion while at rest. Easily fatigued by light activity.	LVAD / Discuss LVAD as option	-
7. "Placeholder"	III	Patient in NYHA Class III with no current or recent unstable fluid balance.	Discuss LVAD as option	-

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How do you define "end-stage heart failure"?

1. Cardiopulmonary exercise testing (CPET)
 - A. Maximal exercise: RER > 1.05
 - B. Peak oxygen consumption (peak VO₂)
 - Peak VO₂ ≤ 14 mL/kg/min (intolerant to beta-blocker)
 - Peak VO₂ ≤ 12 mL/kg/min (on beta-blocker)
 - Peak VO₂ ≤ 50% of age predicted if < 50 yo or female
2. Right heart catheterization
 - Shock with CI < 2.0 L/min/m²



Why do we need to limit transplantation to those who meet the criteria?

Shortage of donors

Mean survival post-OHT 10-15 years

Trading one set of problems to another set
(post-OHT complications)



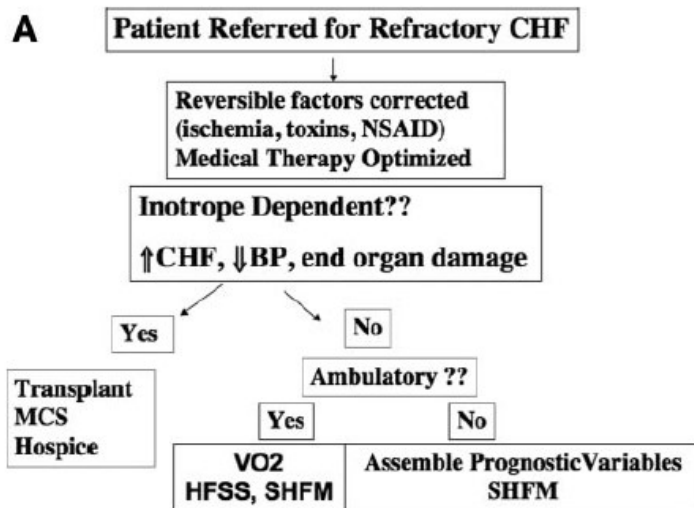
When should refer for transplant consideration?

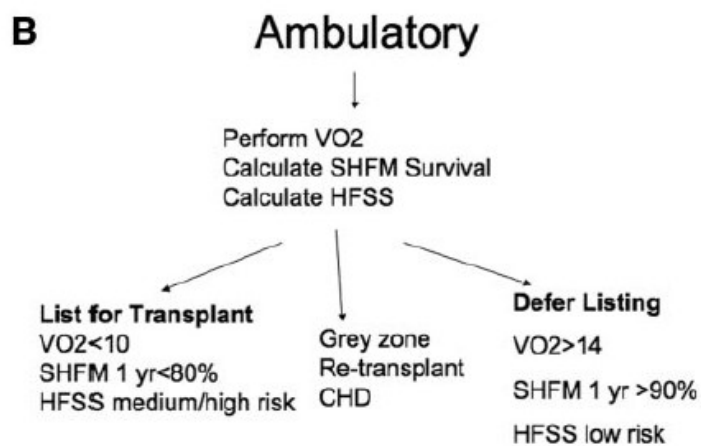
- Two or more HF admissions within the last 12 months
- Persistent overt HF after optimized medical treatment
- Echo evidence of RV dysfunction or increasing PAP on optimal treatment (aim to refer before the PASP > 50 mm Hg)
- Anemia, involuntary weight loss, liver dysfunction or hypoNa
- Deteriorating renal function
- Inability to tolerate diuretic dosages sufficient to clear congestion without change in renal function
- Significant episodes of ventricular arrhythmia despite full drug and electrophysiology/device treatment



Transplant process: Initial evaluation

1. Assessment of the severity of HF
2. Identification of any potentially reversible factors
3. Assessment of the adequacy of current medical therapy





Pre-transplant evaluation

- To screen and exclude significant comorbidities that may increase either the short-term perioperative risk or long-term survival



Pre-transplant evaluation (1)

- H&P
- Immunocompatibility
 - ABO
 - PRA and flow cytometry
- Assessment of heart failure severity
 - CPET with RER
 - Right heart catheterization
 - Echocardiogram
 - ECG



Right heart catheterization in transplant evaluation

1. RHC should be performed on all transplant candidates
2. RHC every 3-6 months in listed patients, esp. in reversible PH or worsening of HF
3. Vasodilator challenge when $PASP \geq 50$ mm Hg and either $TPG \geq 15$ or $PVR \geq 3$ WU while $SBP \geq 85$ mm Hg
4. When acute test is unsuccessful, hospitalization with continuous hemodynamic monitoring should be performed with diuretics, inotropes and vasodilators e.g. inhaled NO



RHC: Contraindications

Relative contraindication:

- PVR > 5 WU or TPG > 15 mmHg
- If PAP > 60 mmHg with PVR > 5 WU or TPG > 15, then high risk of post-OHT RV failure and death
- If PVR < 2.5 WU with vasodilators but SBP < 85 mmHg, the patient remains at high risk
- Fixed/irreversible PH



Pre-transplant evaluation (1)

- H&P
- Immunocompatibility
 - ABO
 - PRA and flow cytometry
- Assessment of heart failure severity
 - CPET with RER
 - Right heart catheterization
 - Echocardiogram
 - ECG
- Evaluation of multi-organ
 - Labs (BMP, CBC, LFT)
 - INR
 - UA and calculated GFR
 - CXR and PFT with ABG
 - Abdominal US
 - Carotid Doppler (if > 50 yo)
 - ABI (if > 50 yo)
 - DEXA scan (if > 50 yo)
 - Fundoscopic exam if diabetic



Pre-transplant evaluation (2)

- Consultants
 - Social worker
 - Psychiatry
 - Financial
- Preventive and malignancy
 - Stool for occult blood
 - Colonoscopy if > 50 yo
 - Mammogram if > 40 yo
 - Gyne/PAP
 - PSA/rectal exam if > 50 yo
- ID serology and vaccines
 - HBV, HCV
 - HIV
 - Syphilis
 - HSV IgG
 - CMV IgG
 - Toxoplasmosis IgG
 - EBV IgG
 - Varicella IgG
 - Flu shot annually
 - Pneumococcal vaccine q 5 years
 - Hepatitis B immunization



Comorbidities/Contraindications (1)

Class I:

- Eligible if age ≤ 70 yo
- Cancer free ≥ 5 yr or if oncologist deems no met and likelihood of recurrence is low
- Class IIa:
 - BMI ≤ 35 kg/m²
- Class IIb:
 - > 70 yo if carefully selected



Comorbidities/Contraindications (2)

- Class IIa: (relative contraindication)
 - DM with end-organ damage other than non-proliferative DR
 - Poor glycemic control (HbA1c >7.5%)
 - eGFR < 30 mL/min/ 1.73 m²
- Class IIb: (relative contraindication)
 - Severe symptomatic CVA
 - Severe PVD not amenable to revascularization



Comorbidities/Contraindications (3)

- Class I:
 - Tobacco cessation education
- Class IIa:
 - Active tobacco use within 6 mo (relative contraindication)
- Class IIb:
 - Rehabilitation program for substance abuse < 24 mo
- Class III:
 - Contraindicated to list patient with active substance use



Comorbidities/Contraindications (4)

- Class I:
 - Psychosocial evaluation
- Class IIa: (relative contraindication)
 - Mental retardation or dementia
 - Social supports are deemed insufficient to achieve compliant care
- Class III:
 - Poor medical compliance



Listing patient for heart transplant

- UNOS status 1A
- UNOS status 1B
- UNOS status 2
- Exception
- Urgent
- Non-urgent



ELSEVIER

The Journal of
Heart and Lung
Transplantation

<http://www.jhltonline.org>

ISHLT GUIDELINE

The 2016 International Society for Heart Lung Transplantation listing criteria for heart transplantation: A 10-year update



Mandeep R. Mehra, MD (Chair), Charles E. Canter, MD, Margaret M. Hannan, MD, Marc J. Semigran, MD, Patricia A. Uber, PharmD, David A. Baran, MD, Lara Danziger-Isakov, MD, MPH, James K. Kirklin, MD, Richard Kirk, MD, Sudhir S. Kushwaha, MD, Lars H. Lund, MD, PhD, Luciano Potena, MD, PhD, Heather J. Ross, MD, David O. Taylor, MD, Erik A.M. Verschuuren, MD, PhD, Andreas Zuckermann, MD and on behalf of the International Society for Heart Lung Transplantation (ISHLT) Infectious Diseases, Pediatric and Heart Failure and Transplantation Councils

Siriraj Heart Failure Conference

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Thank you for
your kind
attention

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