

# Heart Transplant 101

## Indication

- Orthotopic heart transplantation (OHT) is the gold-standard treatment for end-stage heart disease, which is a common final pathway of various heart conditions.
- In a highly selected patient, OHT can improve survival and QoL.
- 1967, 1<sup>st</sup> case in the world. 1987, 1<sup>st</sup> case in Thailand (Chula)
- 4000 cases/year worldwide. 20 cases/y in Thailand.

## Patient selection “very sick but not too sick”

- OHT is considered when it offers an important survival advantage over alternative management options or natural history of the disease

### From cardiac standpoint:

- Poor prognosis
  - low 1-year survival (< 50-80%).
  - Peak VO<sub>2</sub> < 10-14 mL/kg/min (Circ 1991;83:778-86. Circ 2005;111:2313-8)
- No reversible cause, no better alternative treatment (med, surgery, device, experiment)

### From non-cardiac standpoint:

- Candidacy?
- No contraindication, no irreversible end-organ. (see box, Circ. 2010;122:173-183)

## Patient evaluation

- Multidisciplinary team approach eg. cardiologist, CVT, nurse coordinator, social worker (if needed: ID, pulm, dietician, etc).
- Medical: Comprehensive cardiac eval, end-organ eval, immunology (% PRA = % anti HLA antigen), infectious serology.
- Surgical: Especially in previous cardiac surgery, congenital heart disease.
- Psychosocial: Finance, behavior, patient education.

## Waiting list and matching

- Severity (active, urgent in Thailand), (1a, 1b, 2, 7 in the USA)
- Blood type
- Size (height, weight, chest circumference)
- Immunologic compatibility (may need virtual/ retrospective crossmatch)
- Mean waiting time in Thailand = 80 days

Donor	Recipient
O	A, B, AB, O
A	A, AB
B	B, AB
AB	AB

## Operation

- Orthotopic = Remove the recipient heart, replace with the donor graft.
  - Atrial anastomosis: suture at atrium level both LA and RA.
  - Bicaval anastomosis: suture at atrium level on the left side, at SVC and IVC for the right side
- Heterotopic = Place the donor graft side by side the recipient heart. Rarely done nowadays.
- Ischemic time should be < 4 hours.

### Contraindication to OHT

- Other illness with a life expectancy < 2 y despite OHT (eg. cancer, AIDS, SLE, amyloidosis)
- Irreversible ESRD, cirrhosis (except multiple organ transplant)
- Obst. pulm disease (FEV1 < 1 L/min)
- Fixed pulm HT (PASP > 60 mmHg, TPG > 15 mmHg, PVR > 6 wU)

### Relative contraindications

Age < 65 y, active infection, poor control DM/HT, severe PAD, CVA, peptic ulcer disease, BMI >35, BMI < 18, Cr > 2.5, GFR < 25, bilirubin > 2.5, INR > 1.5, recent PE, active mental illness or psychosocial instability, drug, tobacco, or alcohol abuse within 6 mo, HIT

## Outcome

- 1-yr survival = 90%. Median life survival (50% death occurs at) 13.3 years (ISHLT 2014).
- Chula: 1-yr survival 84.5%, 4-yr 78.4%.
- Pre-transplant risk factor for 1-yr mortality: MCS support, congenital, dialysis, ventilator, previous transplant, prior transfusion, ↑donor age, ↑recipient age, ↑BMI, ↓BMI, ↑ischemic time, ↑PRA, ↑Cr, ↑Bilirubin, ↑PA.

## Post transplant care

- Routine post cardiac surgery: Ventilator, inotrope, bleeding, drain, early ambulation.
- RV failure
- Bradycardia (isoproterenol, thyophyline, PM). Later tachycardia (denervated heart)
- Infection prevention: Bactrim, -azole, CMV
- 10-yr long term comorbidity: 97% HTN, 38% CKD (5% dialysis), 93% DL, 38% DM, CA (skin, PTLT), osteoporosis.

CAUSE OF DEATH	30 d	31d-1y	3-5y	5-10y
CAV	1.7%	4.2%	14.5%	14.4%
Acute Rejection	5.4%	10.4%	5.0%	1.9%
Malignancy	0.0%	2.4%	18.5%	20.3%
Non-CMV Infection	13.4%	30.4%	9.5%	10.6%
Graft Failure	37.2%	16.6%	21.3%	17.4%
MultOrgan Failure	17.5%	14.0%	6.1%	6.9%
CVA	8.0%	4.7%	3.7%	4.5%

## Immunosuppressive

- Induction:
  - Thymoglobulin, basiliximab, or ATGAM
- Maintenance: (3-drug regimen)
  1. Calcineurin inhibitors: Cyclosporine or tacrolimus (prograft)
  2. Cell cycle antagonists: Mycophenolate (myfortic or cellcept) or azathioprine
  3. Glucocorticoids: Prednisolone
- Anti-rejection:

## Rejection

- Hyper acute rejection:
  - Rare (0.4%). Mins to hours after transplant.
  - Rx by pulse steroid, IVIG, plasmapheresis, VAD and re-transplant
- Acute cellular rejection – ACR:
  - Very common. 1st year: 2R = 25%, treated rejection =13%
  - Nonspecific symptoms, surveillance by endomyocardial biopsy (grade 0, 1R, 2R, 3R)
  - Rx by high dose glucocorticoid, thymoglobulin
- Antibody-mediated rejection or humoral rejection – AMR:
  - Less understood, recent standard nomenclature (JHLT 2013;32:1147-62)
- Chronic allograft vasculopathy – CAV:
  - 7% at 1 yr, 30% at 5 yr, 50% at 10 yr (JHLT 2010;29:717-27).
  - Rx: pravastatin (NEJM 1995;333:621-7), m-tor inh, re-transplant

## Suggested Readings

- Guidelines for the care of heart transplant recipients (JHLT 2010;29:914-56)
- ISHLT registry slides ([www.ishlt.org/registries/slides.asp?slides=heartLungRegistry](http://www.ishlt.org/registries/slides.asp?slides=heartLungRegistry))
- Review. Hunt SA. JACC 2008;52:587-98.