What Is Best Care for Patients with End stage heart failure?

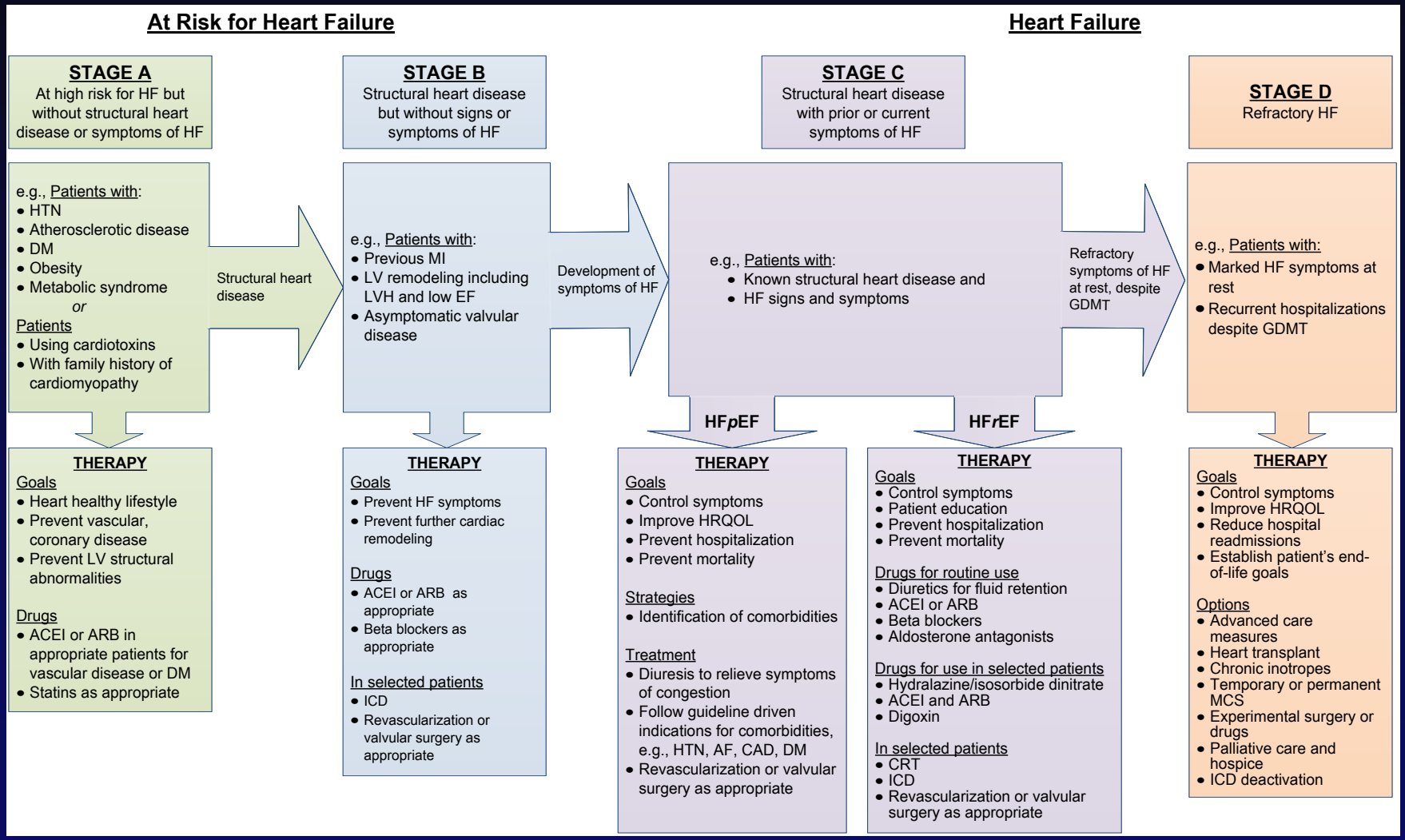
Jin Joo Park, MD

Cardiovascular Center, Department of Internal Medicine
Seoul National University Bundang Hospital

NYHA Class

Class	Patient Symptoms
I	No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea (shortness of breath).
II	Slight limitation of physical activity. Comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea (shortness of breath).
III	Marked limitation of physical activity. Comfortable at rest. Less than ordinary activity causes fatigue, palpitation, or dyspnea.
IV	Unable to carry on any physical activity without discomfort. Symptoms of heart failure at rest. If any physical activity is undertaken, discomfort increases.

Heart Failure Stages

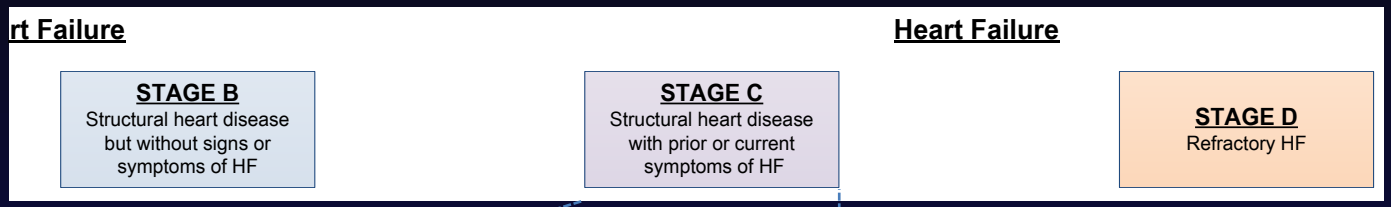


The Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS) Profiles

Scale	Definition	Explanation
1	Critical cardiogenic shock ("Crash and burn")	Life-threatening hypotension and rapidly escalating inotropic/pressor support, with critical organ hypoperfusion often confirmed by worsening acidosis and lactate levels.
2	Progressive decline ("Sliding fast" on inotropes)	"Dependent" on inotropic support but nonetheless shows signs of continuing deterioration in nutrition, renal function, fluid retention, or other major status indicator. Can also apply to a patient with refractory volume overload, perhaps with evidence of impaired perfusion, in whom inotropic infusions cannot be maintained due to tachyarrhythmias, clinical ischemia, or other intolerance.
3	Stable but inotrope dependent	Clinically stable on mild-moderate doses of intravenous inotropes (or has a temporary circulatory support device) after repeated documentation of failure to wean without symptomatic hypotension, worsening symptoms, or progressive organ dysfunction (usually renal).
4	Resting symptoms on oral therapy at home	Patient who is at home on oral therapy but frequently has symptoms of congestion at rest or with activities of daily living (dressing or bathing). He or she may have orthopnea, shortness of breath during dressing or bathing, gastrointestinal symptoms (abdominal discomfort, nausea, poor appetite), disabling ascites, or severe lower-extremity edema.
5	Exertion intolerant ("housebound")	Patient who is comfortable at rest but unable to engage in any activity, living predominantly within the house or housebound.
6	Exertion limited ("walking wounded")	Patient who is comfortable at rest without evidence of fluid overload but who is able to do some mild activity. Activities of daily living are comfortable and minor activities outside the home such as visiting friends or going to a restaurant can be performed, but fatigue results within a few minutes or with any meaningful physical exertion.
7	Advanced NYHA class III	Patient who is clinically stable with a reasonable level of comfortable activity, despite a history of previous decompensation that is not recent. This patient is usually able to walk more than a block. Any decompensation requiring intravenous diuretics or hospitalization within the previous month should make this person a Patient Profile 6 or lower.

Stage, NYHA, INTERMACS

ACC/AHA Stage



NYHA Class

INTERMACS Scale

Definition of Advanced HF

A subset of patients with chronic HF will continue to progress and develop persistently severe symptoms despite maximum GDMT.

Criteria for Advanced HF

- Repeated (≥2) hospitalizations or ED visits for HF in the past year
- Progressive deterioration in renal function (e.g., rise in BUN and creatinine)
- Weight loss without other cause (e.g., cardiac cachexia)
- Intolerance to ACE inhibitors due to hypotension and/or worsening renal function
- Intolerance to beta blockers due to worsening HF or hypotension
- Frequent systolic blood pressure <90 mm Hg
- Persistent dyspnea with dressing or bathing requiring rest
- Inability to walk 1 block on the level ground due to dyspnea or fatigue
- Recent need to escalate diuretics to maintain volume status, often reaching daily furosemide equivalent dose >160 mg/d and/or use of supplemental metolazone therapy
- Progressive decline in serum sodium, usually to <133 mEq/L
- Frequent ICD shocks

Before Confirming End Stage HF

Is the diagnosis is correct?

- *Are there are no remediable etiologies or alternative explanations for advanced symptoms.*
    - *Dyspnea due to pulmonary disease*
    - *Presumed cardiac cachexia due to cancer*
- *Reversible factors such as thyroid disorders*
- *Non-compliance to medications, sodium restriction*

CONTENTS

Mechanical Circulatory Support (MCS)

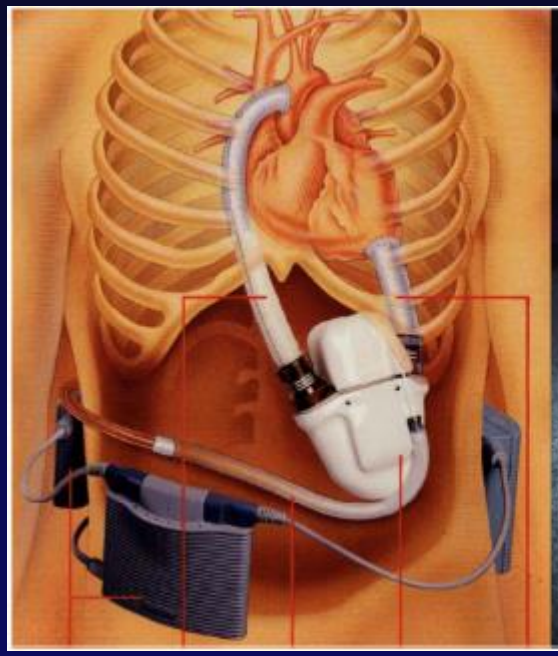
- *MCS use is beneficial in carefully selected patients with stage D HFrEF in whom definitive management (e.g., cardiac transplantation) or cardiac recovery is anticipated or planned. [II a, LOE B]*
- *Nondurable MCS, including the use of percutaneous and extracorporeal ventricular assist devices (VADs), is reasonable as a "bridge to recovery" or a "bridge to decision" for carefully selected patients with HFrEF with acute, profound hemodynamic compromise [II a, LOE B].*
- *Durable MCS is reasonable to prolong survival for carefully selected patients with stage D HFrEF [II a, LOE B].*

Different Goals of MCS

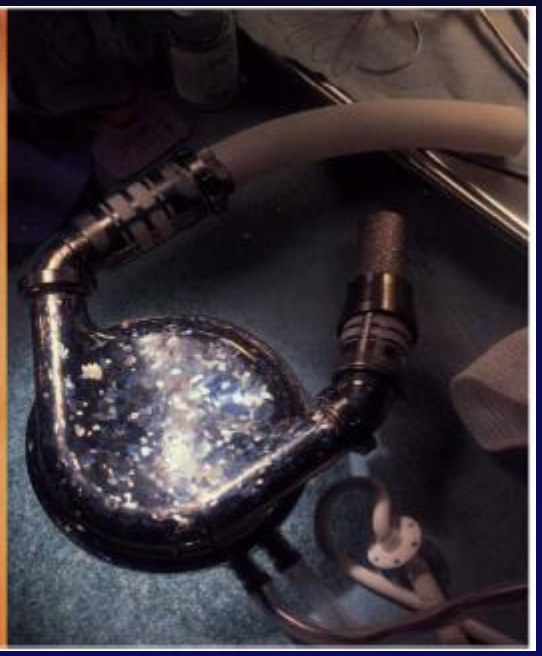
- **Bridge to transplant (BTT)**
  - allow rehab from severe CHF while awaiting donor
- **Destination therapy (DT)**
  - permanent device, instead of transplant
  - currently only in transplant-ineligible patients
- **Bridge to recovery (BTR)**
  - unload heart, allow “reverse remodeling”
- **Bridge to candidacy (BTC)/Bridge to decision (BTD)**
  - when eligibility unclear at implant
  - not true “indication” but true for many pts

Pulsatile flow VAD

Novacor

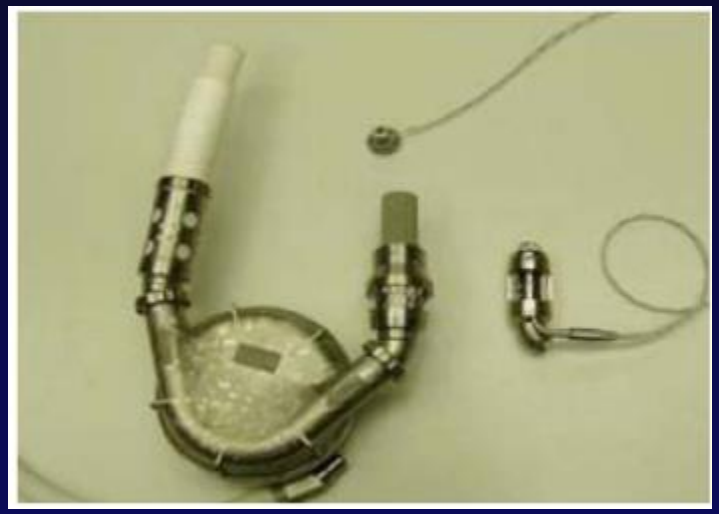


HeartMate I XVE

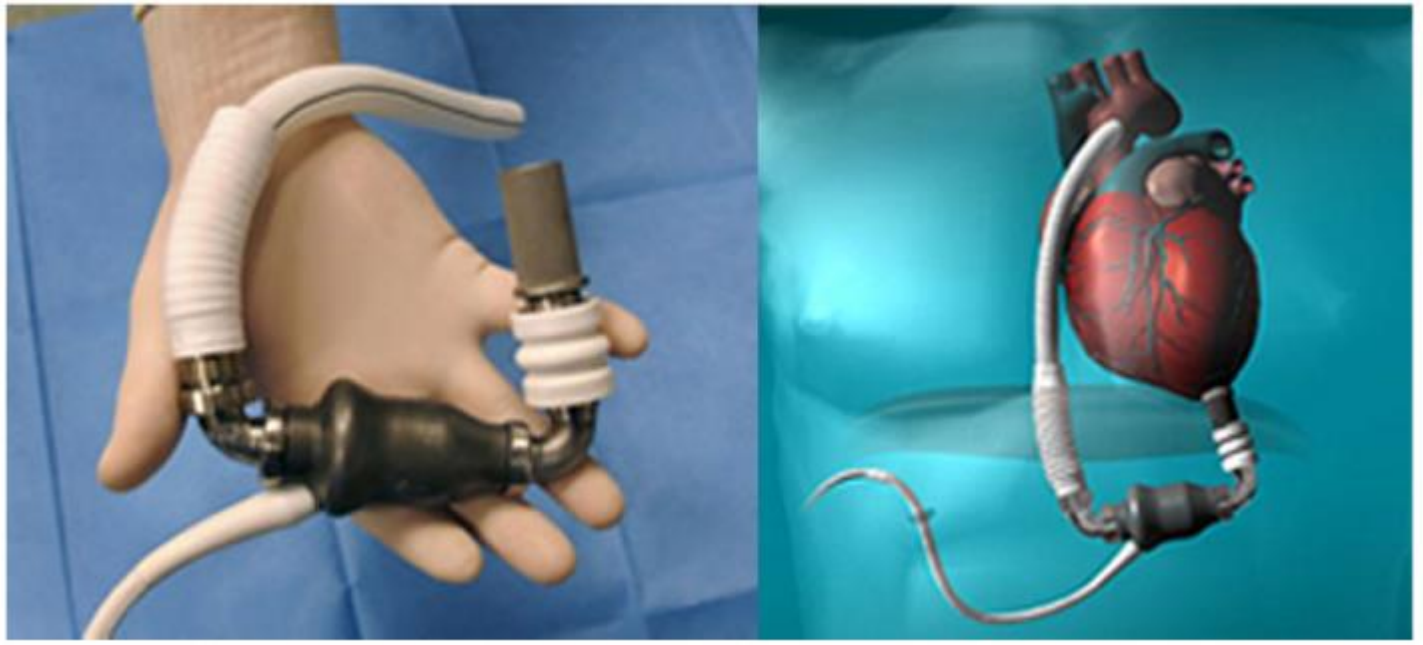


Size reduction

Pulsatile-flow vs continuous-flow VAD

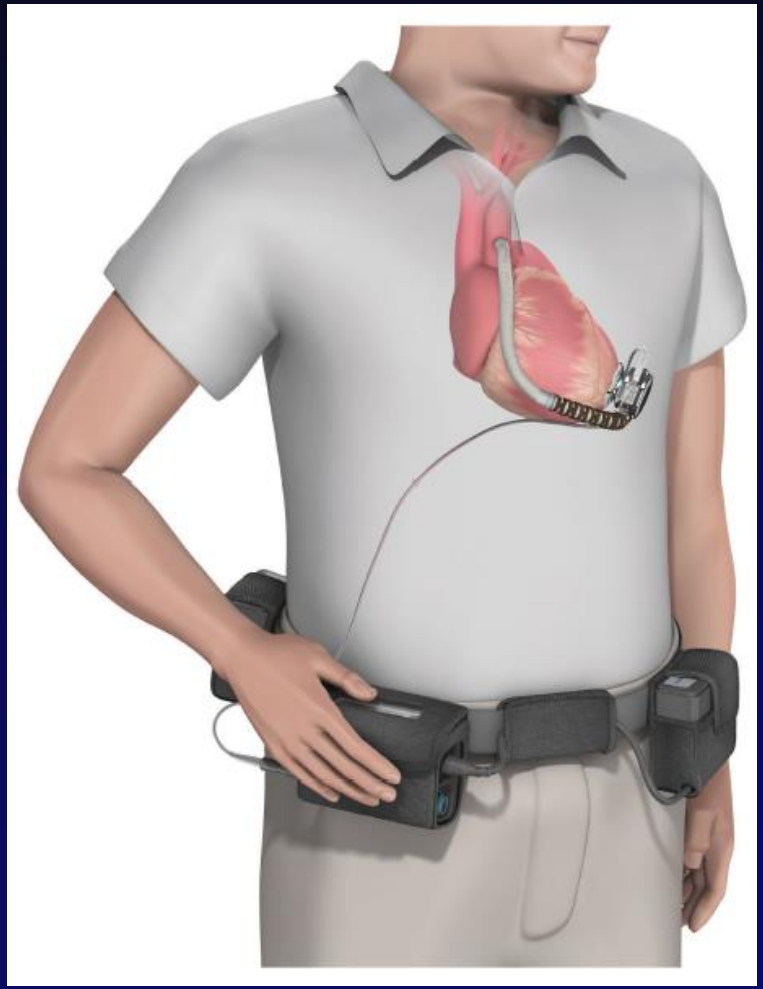


HeartMate II



Jarvik 2000 Flowmaker

The HVAD (HeartWare Corp.)



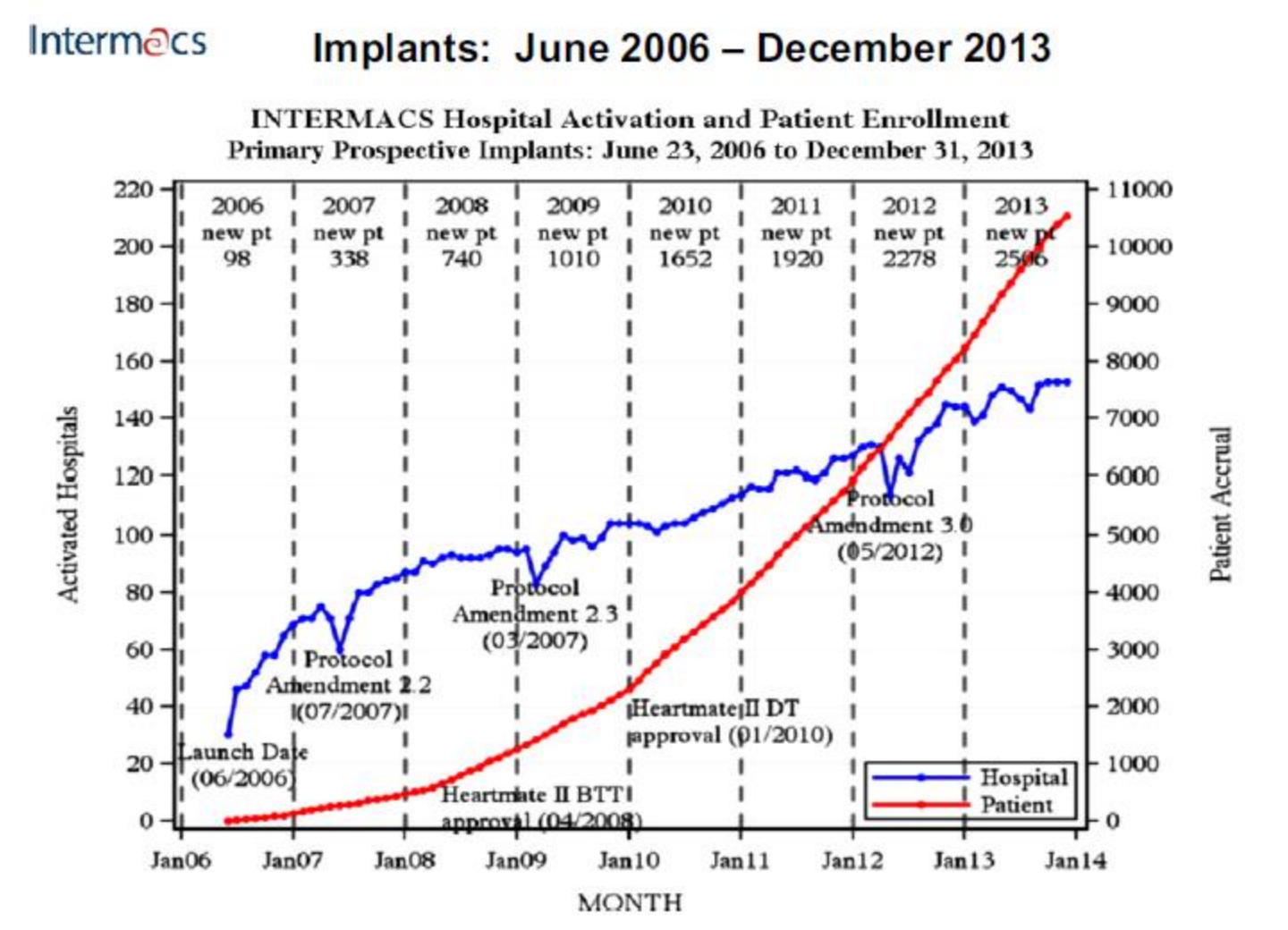
Berlin Heart Incor

Issues with cardio-circulatory assist devices

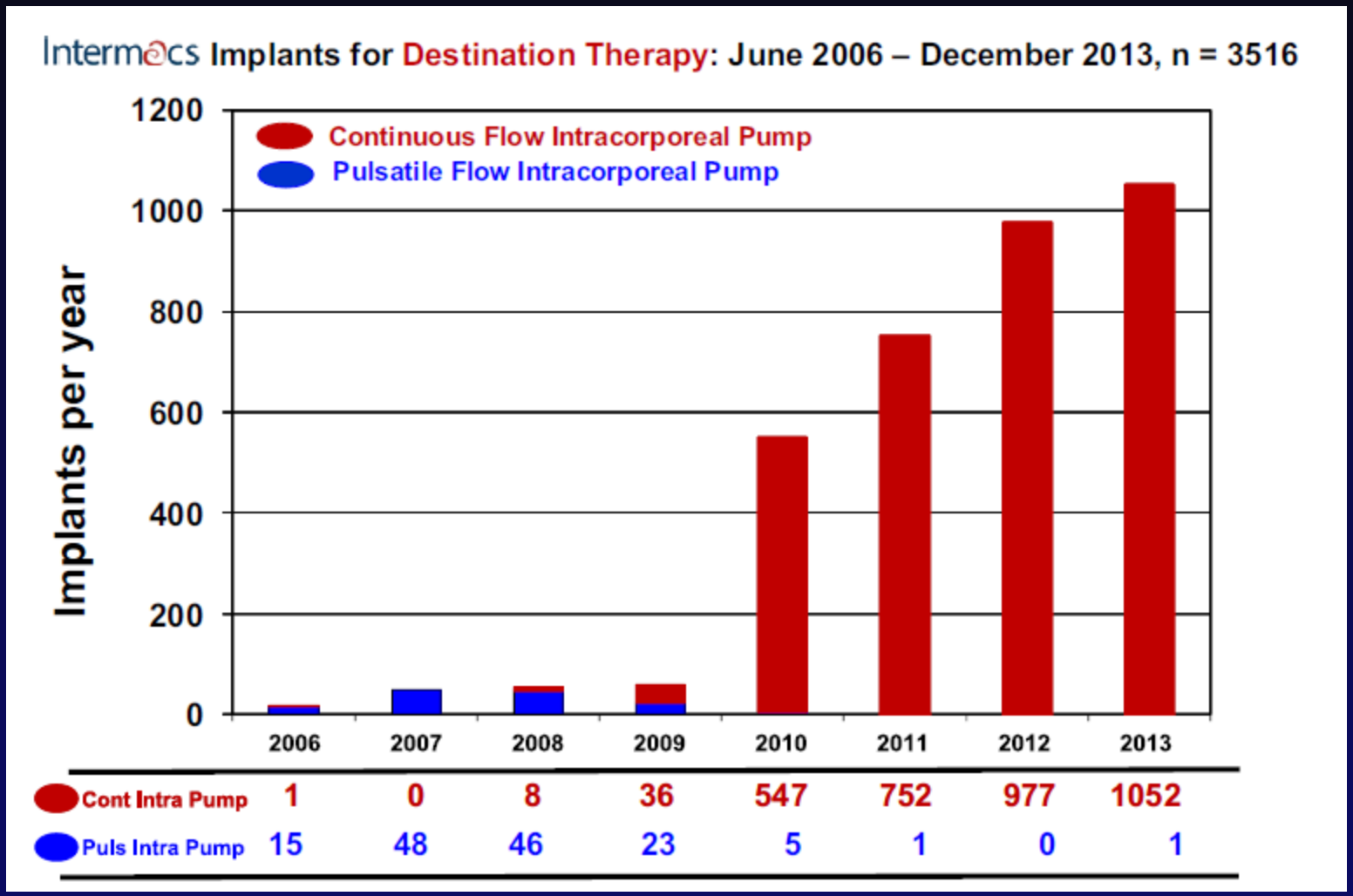
- The energy source, consisting of very large and heavy compressors
- Bulky and short life batteries
- The thrombogenicity of the contact surface with circulating blood
- The size of the device, too big to consider for long-term intra-thoracic implantation
- The need for extensive connectivity measures with the exterior in order to connect the device to the energy source and to the controller
- The high rate of bleeding complications and infectious diseases

Who has an LVAD?

10,542 patients received VAD until 2013

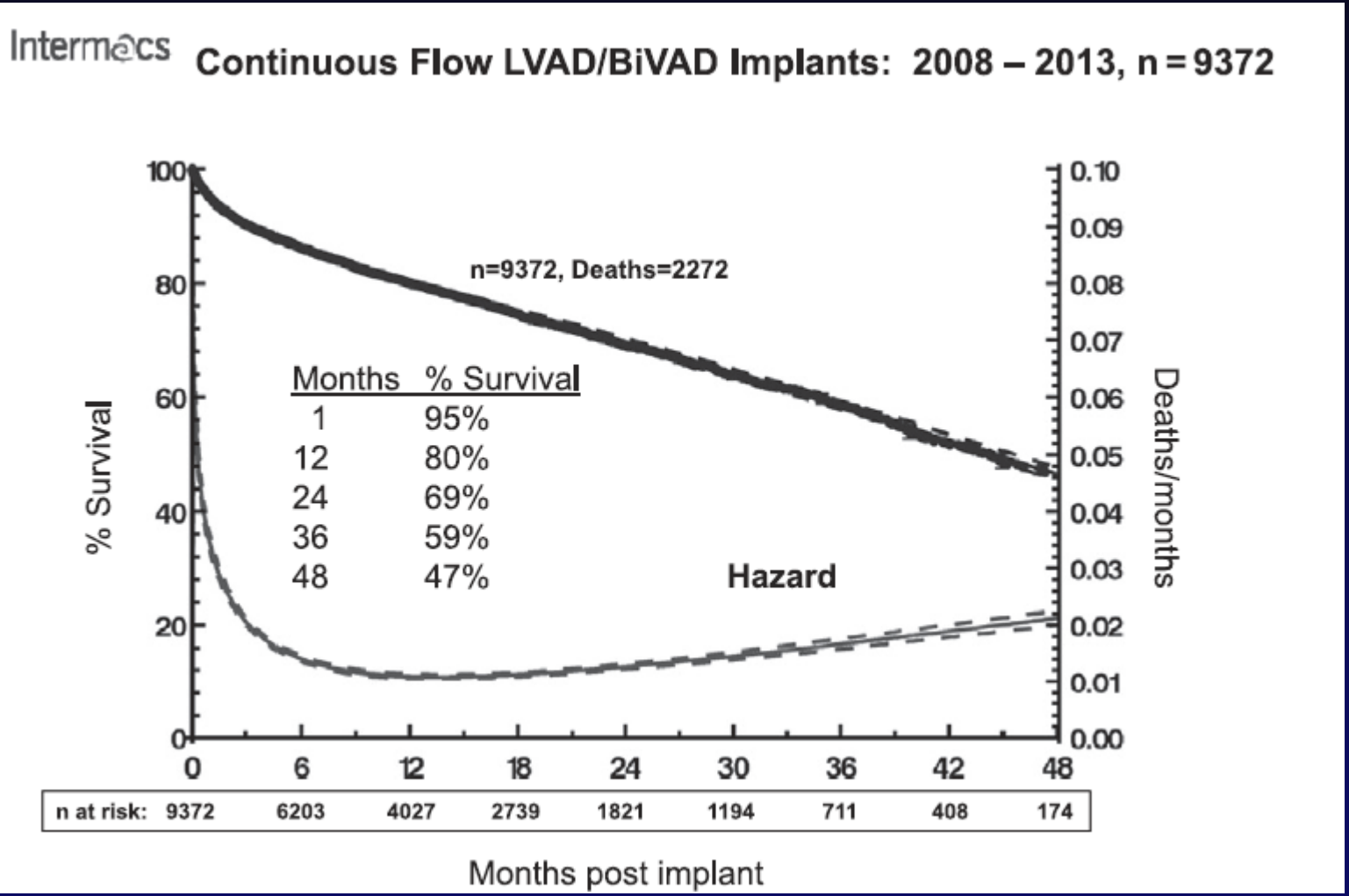


VAD as Destination Therapy



Continuous-flow LVAD

1YS: 80%, 2YR: 70% without change in the recent era



Device strategy at the time of implant

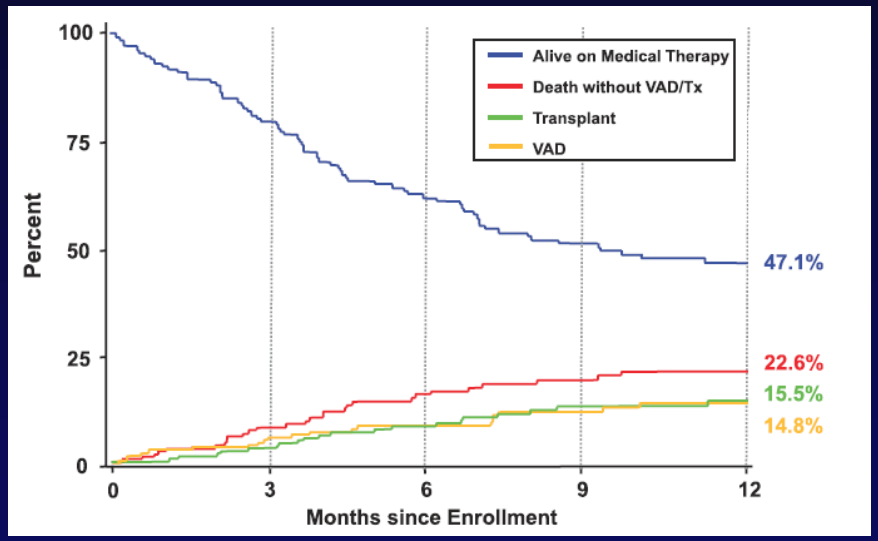
Table 4 Implants: June 2006 to December 2013 ($N = 10,542$)

	Implant date era							
	2006–2007		2008–2010		2011–2013		Total	
Device strategy at time of implant	*n*	%	*n*	%	*n*	%	*n*	%
BTT listed	185	42.4%	1,335	39.2%	1,453	21.7%	2,973	28.2%
BTT likely	85	19.5%	884	26.0%	1,474	22.0%	2,443	23.2%
BTT moderate	49	11.2%	337	9.9%	677	10.1%	1,063	10.1%
BTT unlikely	28	6.4%	104	3.1%	222	3.3%	354	3.4%
DT	64	14.7%	666	19.6%	2,786	41.6%	3,516	33.4%
BTR	17	3.9%	38	1.1%	38	1.0%	93	0.9%
Rescue therapy	8	1.8%	24	1.0%	28	0.4%	60	0.6%
Other	0	0.0%	14	0.4%	26	0.4%	40	0.4%
Total	436	100.0%	3,402	100.0%	6,704	100.0%	10,542	100.0%

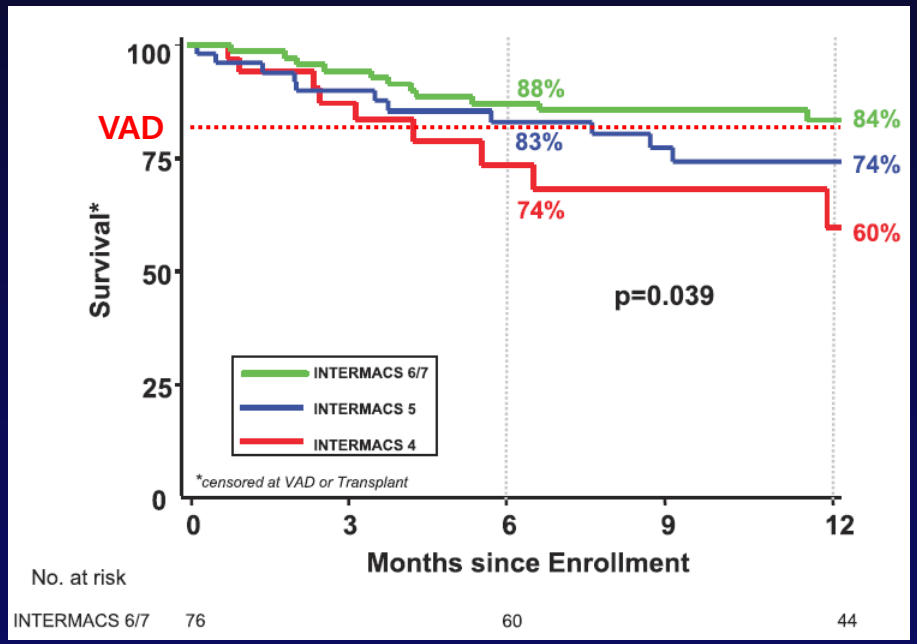
Outcomes according to INTERMACS scales

Patient: Hospitalized HF patients, n= 166, NYHA III-IV, EF≤30%
Outcomes: Death, MCS, HT

Competing events



Survival according to INTERMACS



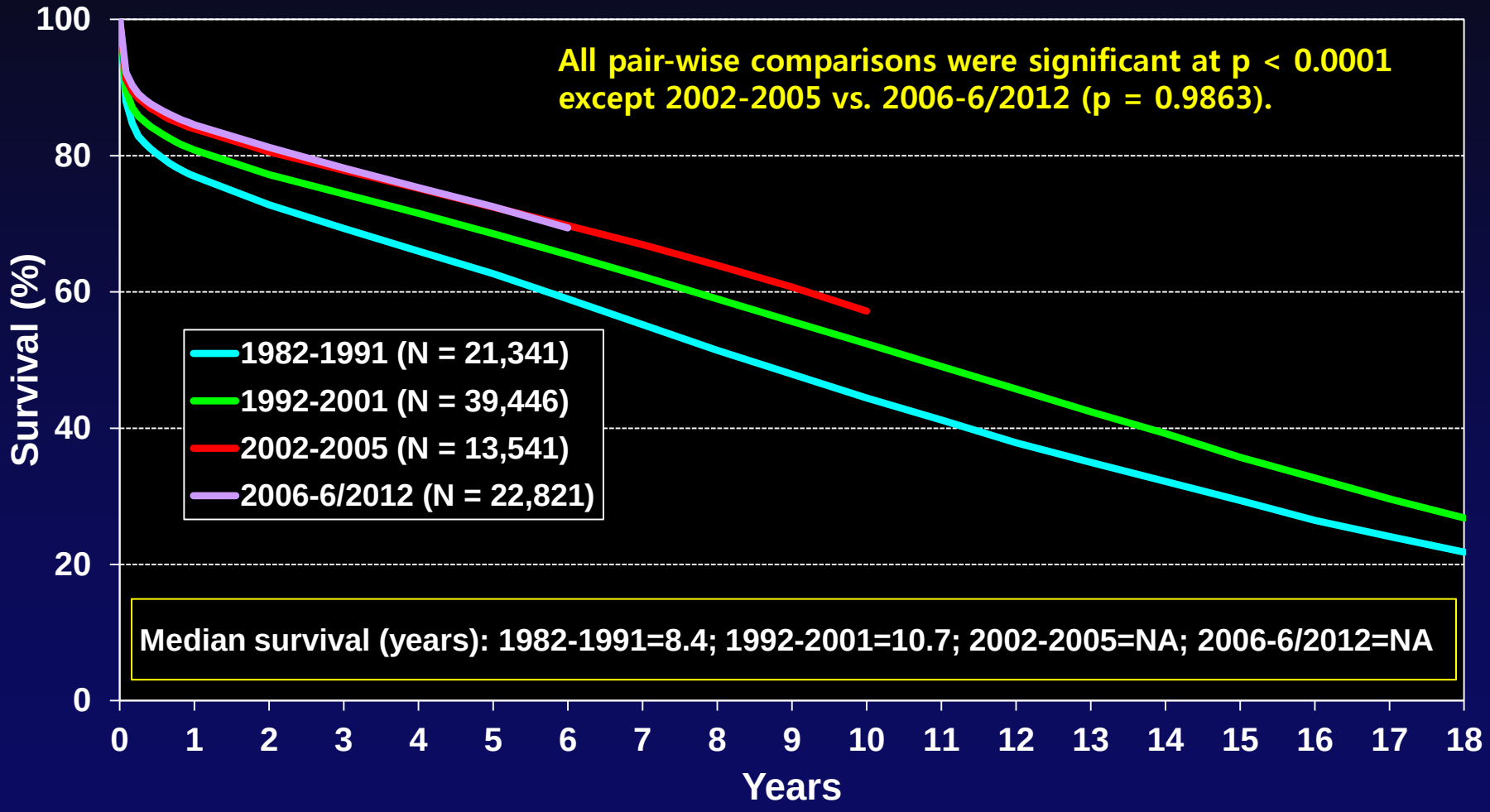
Stewart et al. Circ Heart Fail 2016

CONTENTS

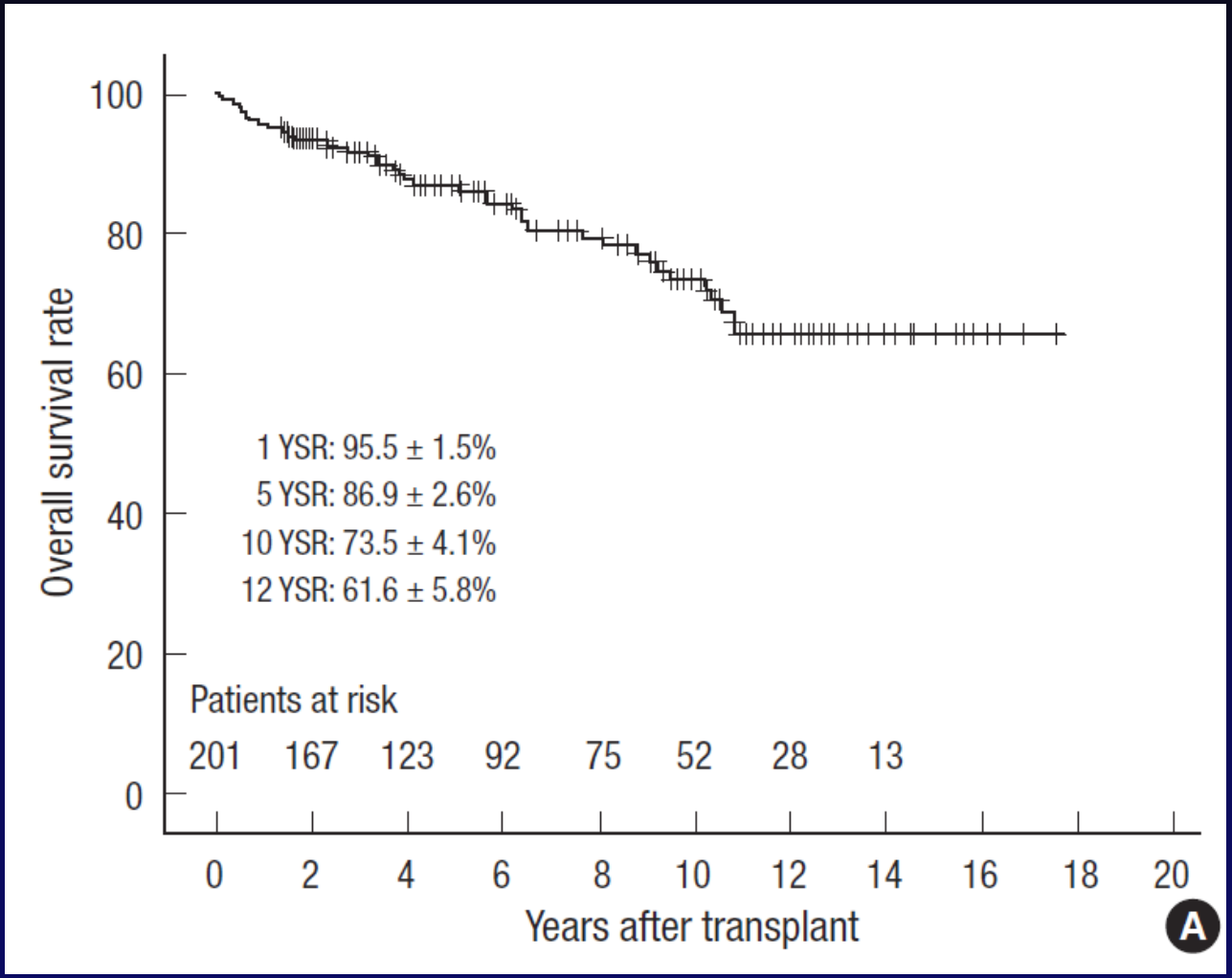
Heart transplantation

- *Evaluation for cardiac transplantation is indicated for carefully selected patients with stage D HF despite GDMT, device, and surgical management [I, LOE C]*

Adult Heart Transplants Kaplan-Meier Survival by Era
(Transplants: January 1982 – June 2012)



HT survival in Korea



Survival Comparisons

	INTERMACS			MCS	HT
	7/6	5	4		
1 year	84%	74%	60%	80%	90-95%
2 year				69%	80-90%

CONTENTS

Transition to end-of-life care

- A patient with advanced HF who
  - Is failing oral therapies
  - Is not a transplantation candidate
  - Is not a mechanical circulatory support candidate

- Decision making for
  - emergency situations (SCD)
  - clinical situations that can be reasonably anticipated

Palliative care

- *'palliare', latin means 'to cloak'* [~을(~에)가리다]

- *treatment for the relief of pain and other uncomfortable symptoms through the appropriate coordination of all aspects of care needed to maximize personal comfort and relieve distress*

Fed Regist. 2008;73(109):32088–32220

Palliative care in stage D

- *Advanced HF patients are more likely to die of pump failure than SCD; thus they have greater symptoms.*

- *The amount of suffering that occurs in advanced HF is underestimated by many health care providers and remains inadequately treated.*

Water restriction

- Water Restriction (II a, LOE C)
  - Fluid restriction (1.5 to 2 L/d) is reasonable in stage D, especially in patients with hyponatremia, to reduce congestive symptoms.

Inotropic support (I)

- Until definitive therapy (e.g., coronary revascularization, MCS, heart transplantation) or resolution of the acute precipitating problem, patients with cardiogenic shock should receive temporary intravenous inotropic support to maintain systemic perfusion and preserve end-organ performance. [II b, LOE B]
- Long-term, continuous intravenous inotropic support may be considered as palliative therapy for symptom control in select patients with stage D despite optimal GDMT and device therapy who are not eligible for either MCS or cardiac transplantation. (II b, LOE B)

Inotropic support (II)

- Long-term use of either continuous or intermittent, intravenous parenteral positive inotropic agents, in the absence of specific indications or for reasons other than palliative care, is potentially harmful in the patient with HF (III, LOE B)

M/84

ADHF

1st adm 2015.12 57.4kg → 57.5kg (신장내과 -> 호흡기내과)
2nd adm 2016.01 66.4 → 65.4kg (d/t influenza 호흡기내과)
3rd adm 2016.12 64.7 >→ 61kg (순환기내과, ICD insertion)
4th adm 2017.01 59kg → 56kg(d/t pneumonia)
5th adm 2017.03

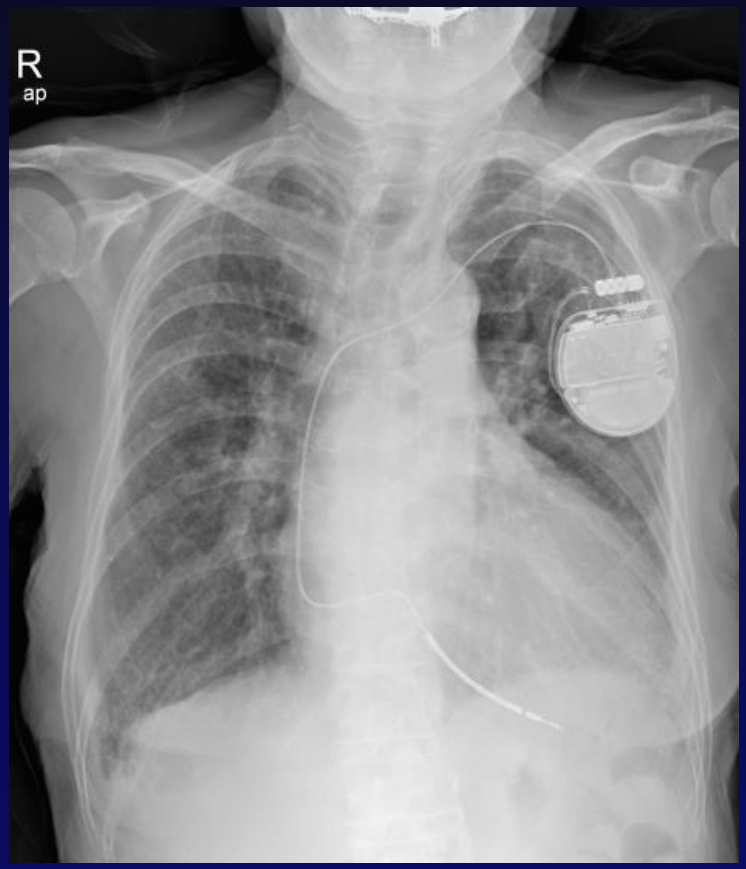
HFrEF

2015-12 CAG: insignicant
2015-12 Echo: EDD 61, EF 38%, RCA (+); sev fMR, mod ecc AR
2016-12 CAG: insignificant
2016-12 Echo: EDD 64mm, **EF 32%;** sev fMR, mod ecc AR, new RV akinesia
2016-12 ICD implantation, sev fMR, E/e' = 29.51
2017-01 Echo: EDD 60mm, **EF 38%**

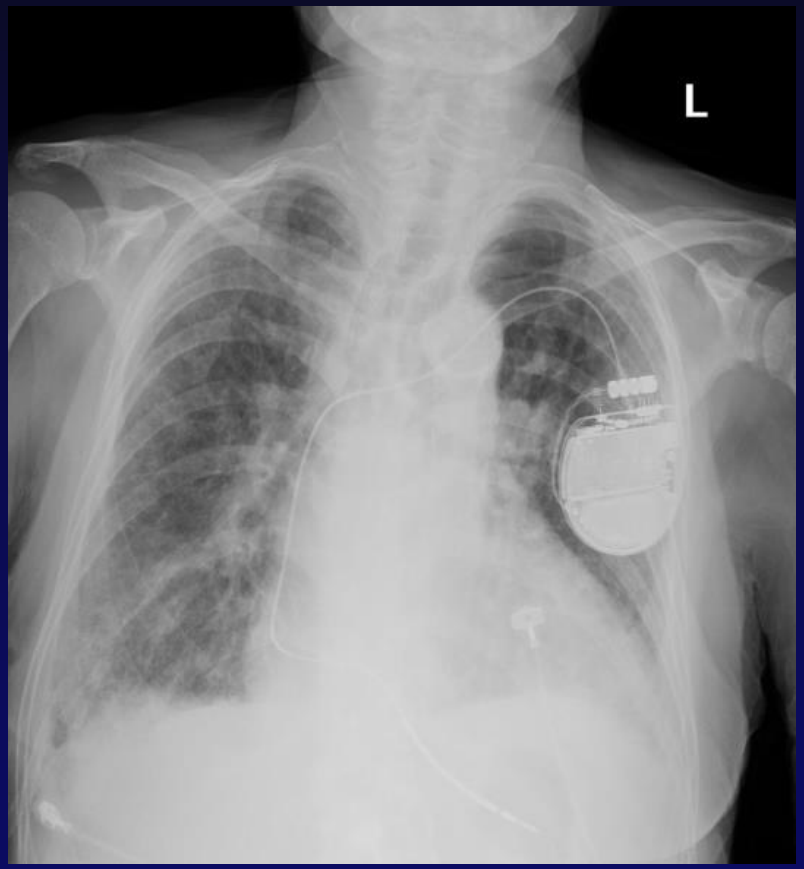
AF on NOAC
DM, HT
Bronchial Asthma; r/o BOOP
- s/p Steroid (mPd 30mg qd 16/1/8-1/12, Pd 30mg qd 16/1/13. 16/4)

M/84

2017-02-24



2017-03-15



Refractory dyspnea

- low-dose opiates are the mainstay of therapy
- benzodiazepines as second-line or third-line agents (only drowsiness, adverse effects)
- oxygen is only beneficial in reducing dyspnea in hypoxic patients, but not for those without hypoxia

Cochrane Database Syst Rev. 2010 CD007354.

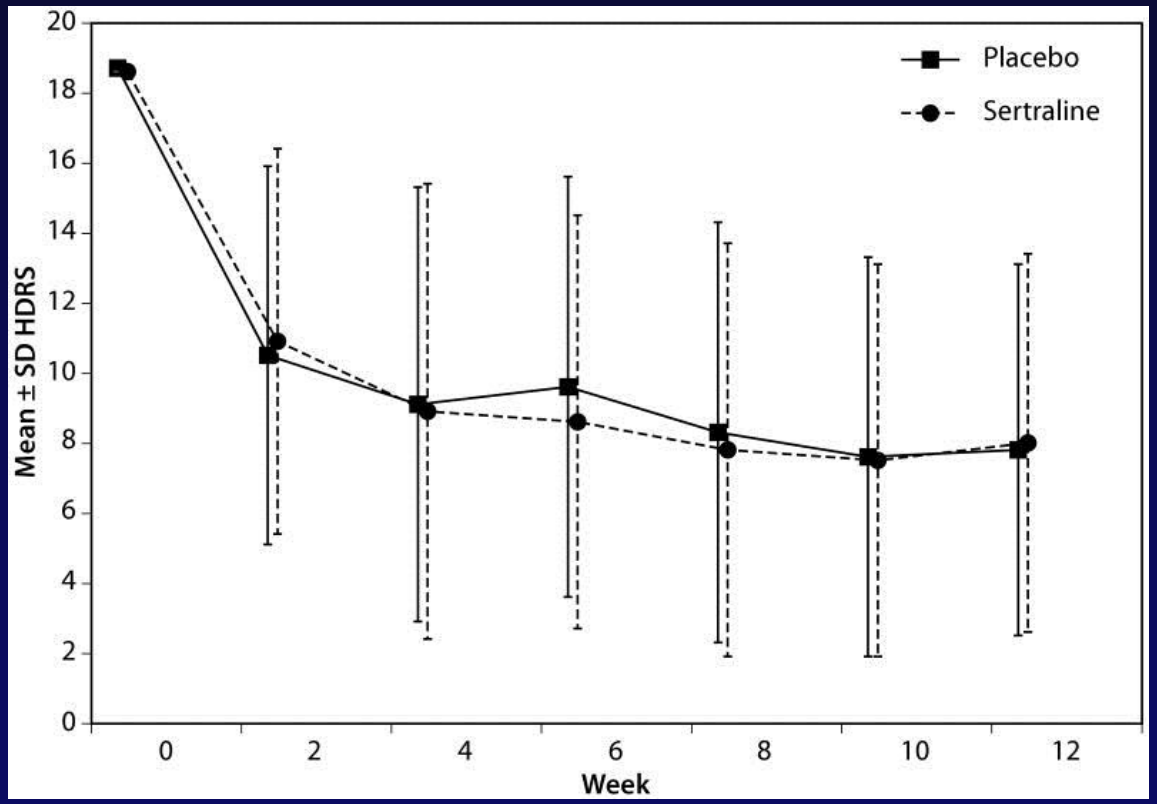
Depression

- 20% patients with HF meets criteria for major depressive disorder
- SSRI still considered first-line therapy for depression in patients with advanced HF.
  - extrapolation from studies in other settings
  - a lack of other proven options
- TCA has limited role in HF
  - QTc prolongation
  - anticholinergic effects (dry mouth), orthostatic hypotension

Sertraline for Depression (SADHART-CHF) Trial

Patient:	HF ≤45%, NYHA II-IV, clinical depression
Intervention:	Sertraline 50-200mg/d for 12 weeks (n=234)
Comparison:	Placebo (N=235)
Outcomes:	change in depression severity & CV status at 12 weeks

Hamilton Depression Rating Scale [HDRS



O'Connor et al. J Am Coll Cardiol. 2010

Pain

- 2/3 of all patients with HF reported some form of pain
  - NYHA III : 69%; NYHA IV : 89%
- The Pain Assessment, Incidence & Nature in Heart Failure (PAIN-HF) study has identified medical comorbidities most highly associated with pain in patients with advanced HF, including degenerative joint disease, chronic back pain, anxiety, and depression.
- Opiates usage: 22% in advanced HF vs. 50% in cancer
- NSAIDS may cause Na^+/fluid retention and exacerbate HF.

CONTENTS

Take Home massage

- ***Stage D heart failure***
  - *Triage of candidates (MCS, HT or palliation)*
  - *Palliative care includes amelioration of dyspnea, depression, pain*
  - *Advanced directives both emergent and anticipated situations should be discussed.*
- ***Communication** to address sources of discomfort and to ensure adequate patient understanding of their disease process and prognosis is integral to the care of these patients.*
- ***Improved use of palliative measures** may improve patient comfort and satisfaction with the death and dying process.*

Thank You For Your Attention!

Seoul National University Bundang Hospital