IMMAGINARE IL CUORE

Rigenerare, ricostruire, sostituire
Il sogno delle staminale, la realtà del trapianto e dell'assistenza cardiaca

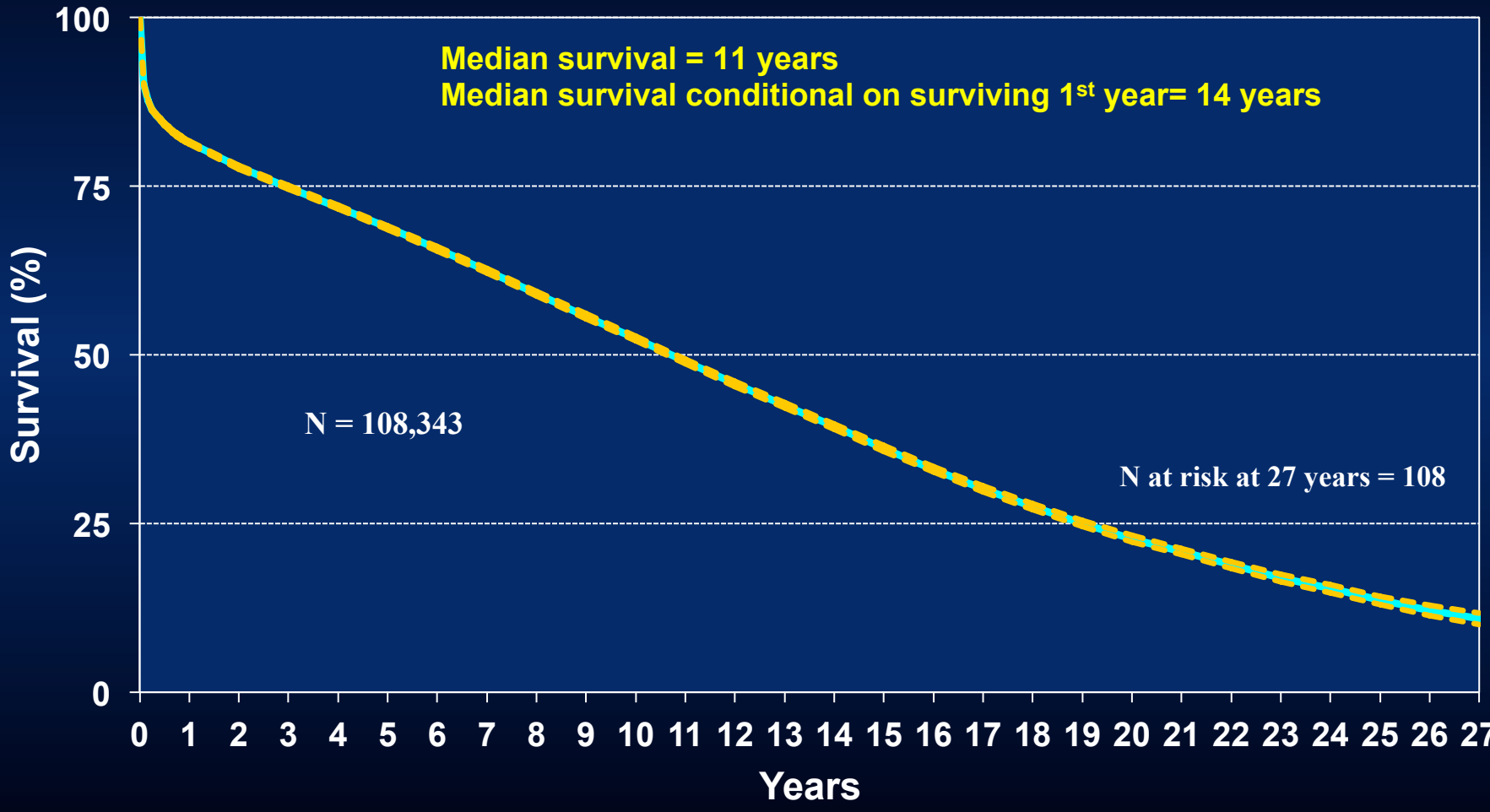
Dr. Claudio F. Russo
De Gasperis Cardio Center
Ospedale Niguarda - Milano

Advanced Heart Failure

- Europe: 10.000.000 with AHF
- USA: 400.000 new cases/year
- 34 billions $/year

Heart transplantation

Adult and Pediatric Heart Transplants
Kaplan-Meier Survival
(Transplants: January 1982 – June 2012)



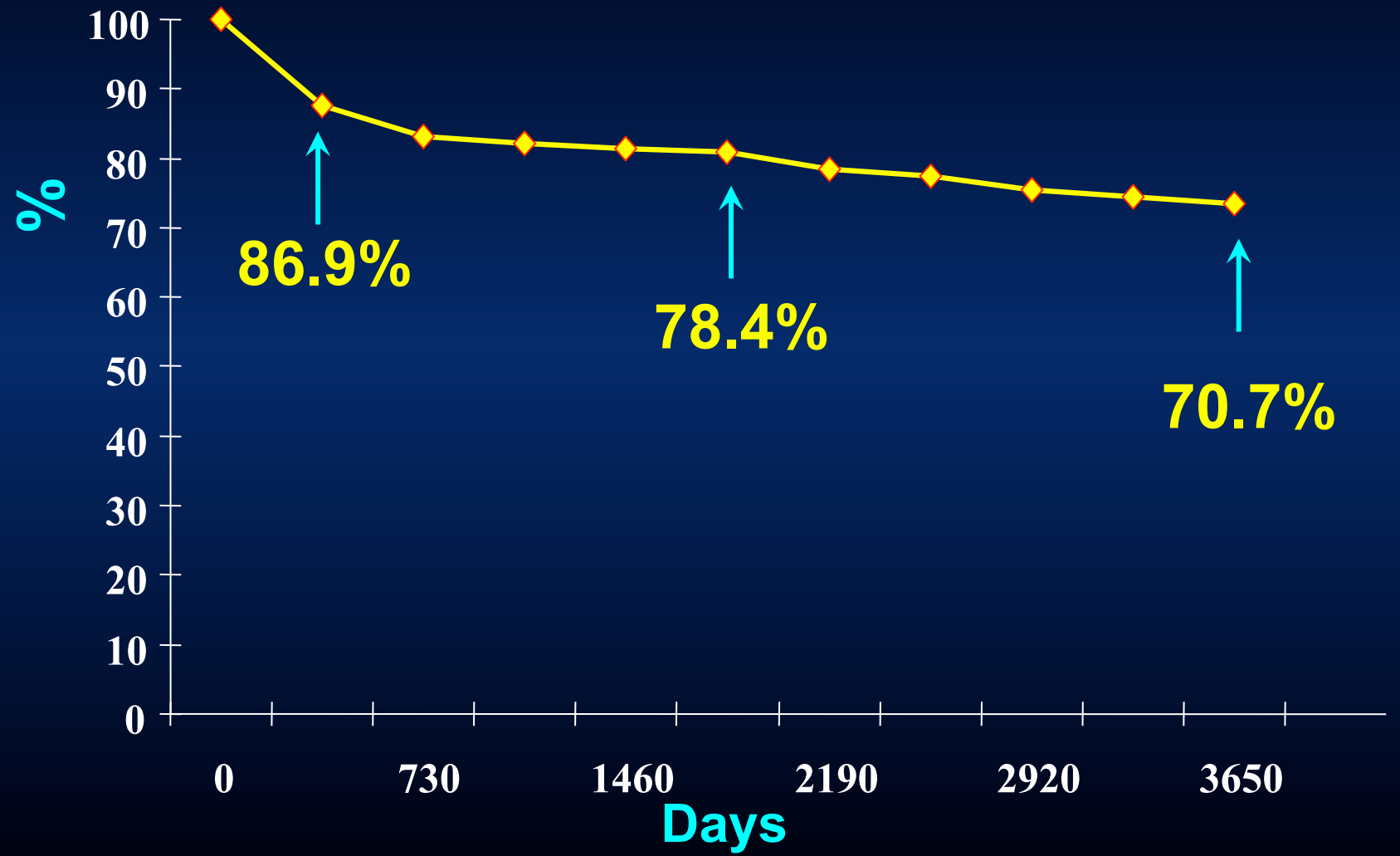
ISHLT • INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION

2014

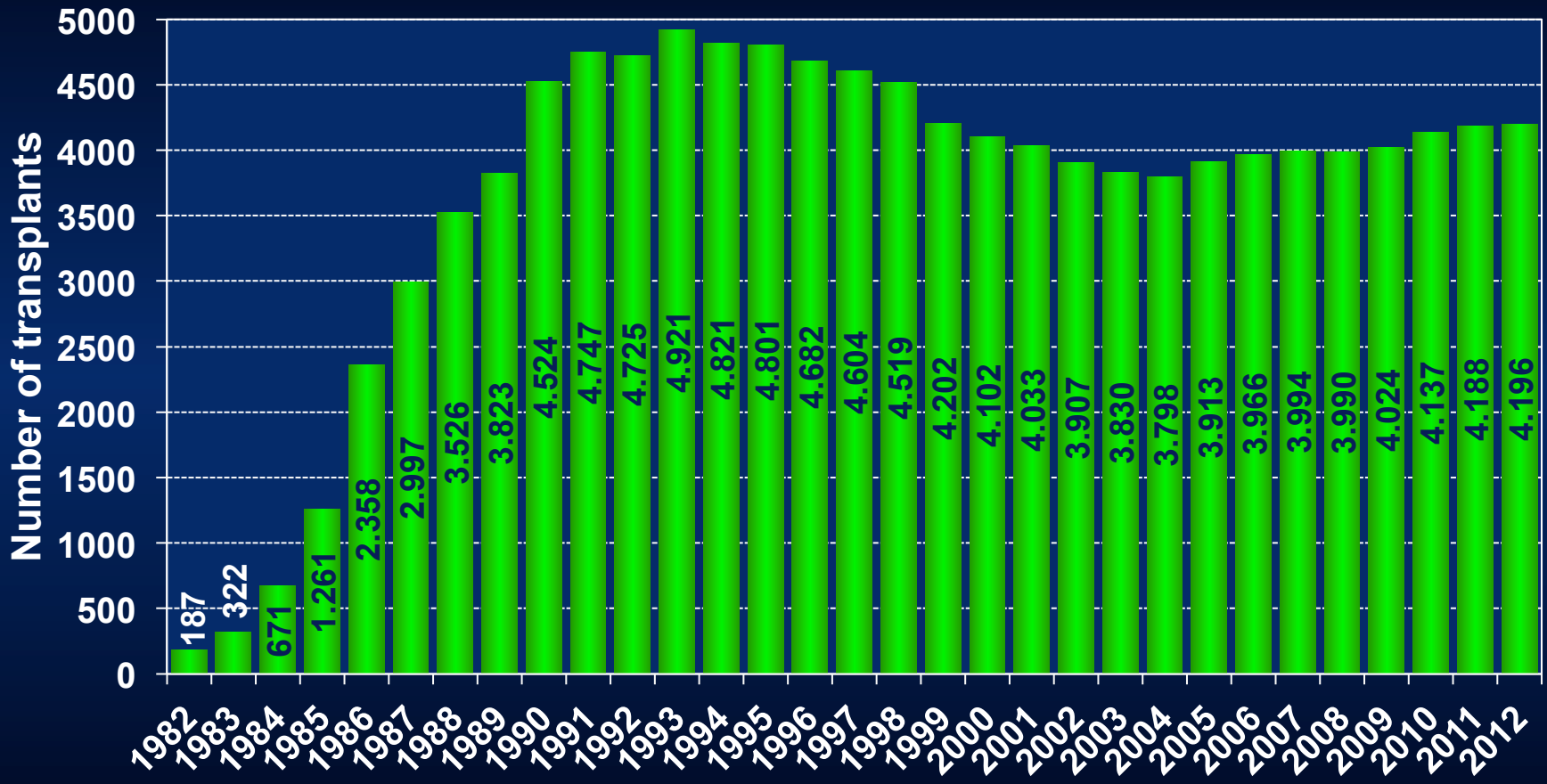
JHLT. 2014 Oct; 33(10): 996-1008

Survival after HTx

Milan Experience - 805 pts



Adult and Pediatric Heart Transplants
Number of Transplants by Year



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.

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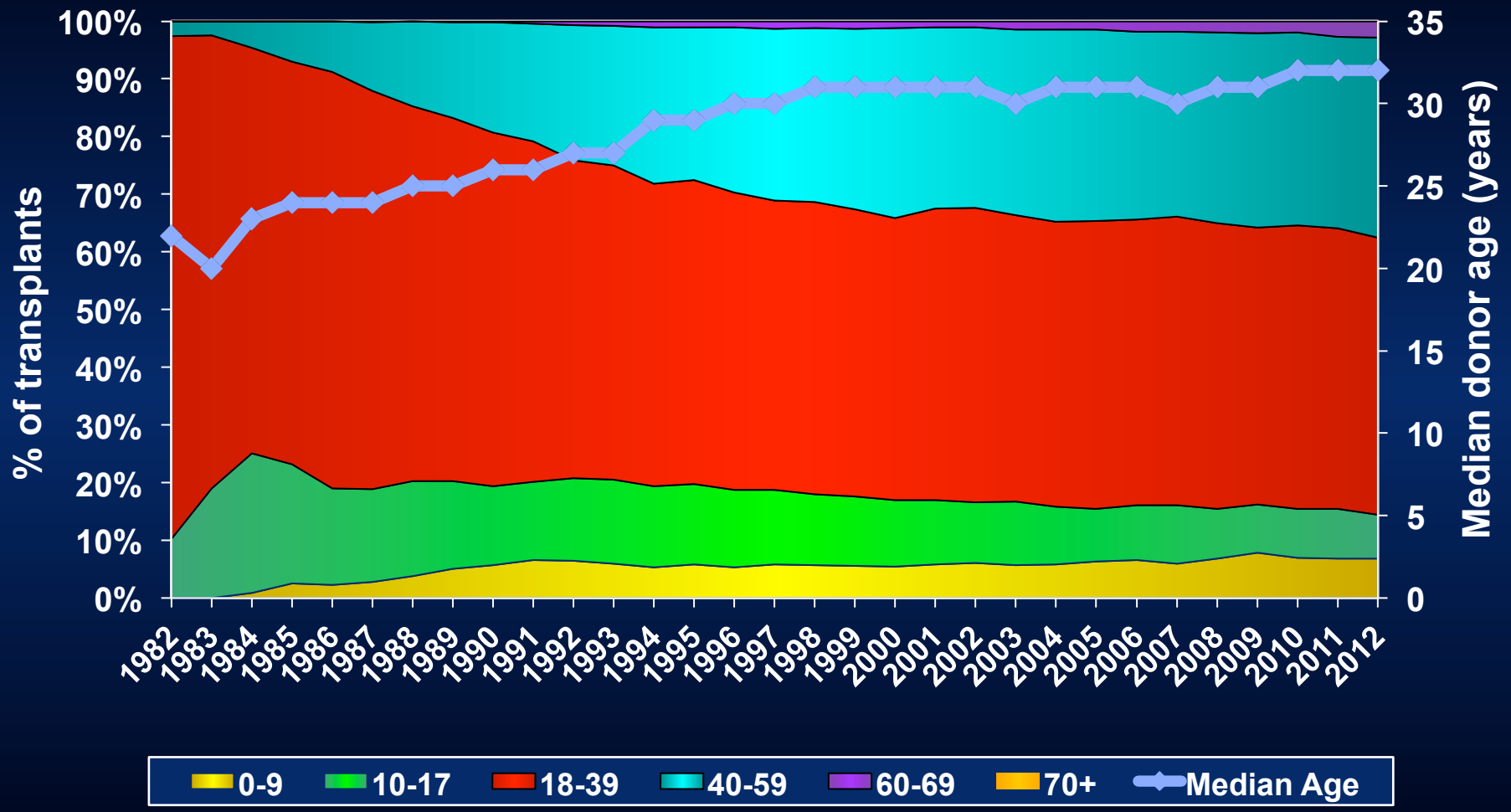
2014

JHLT. 2014 Oct; 33(10): 996-1008

Adult and Pediatric Heart Transplants
Donor Age by Year of Transplant



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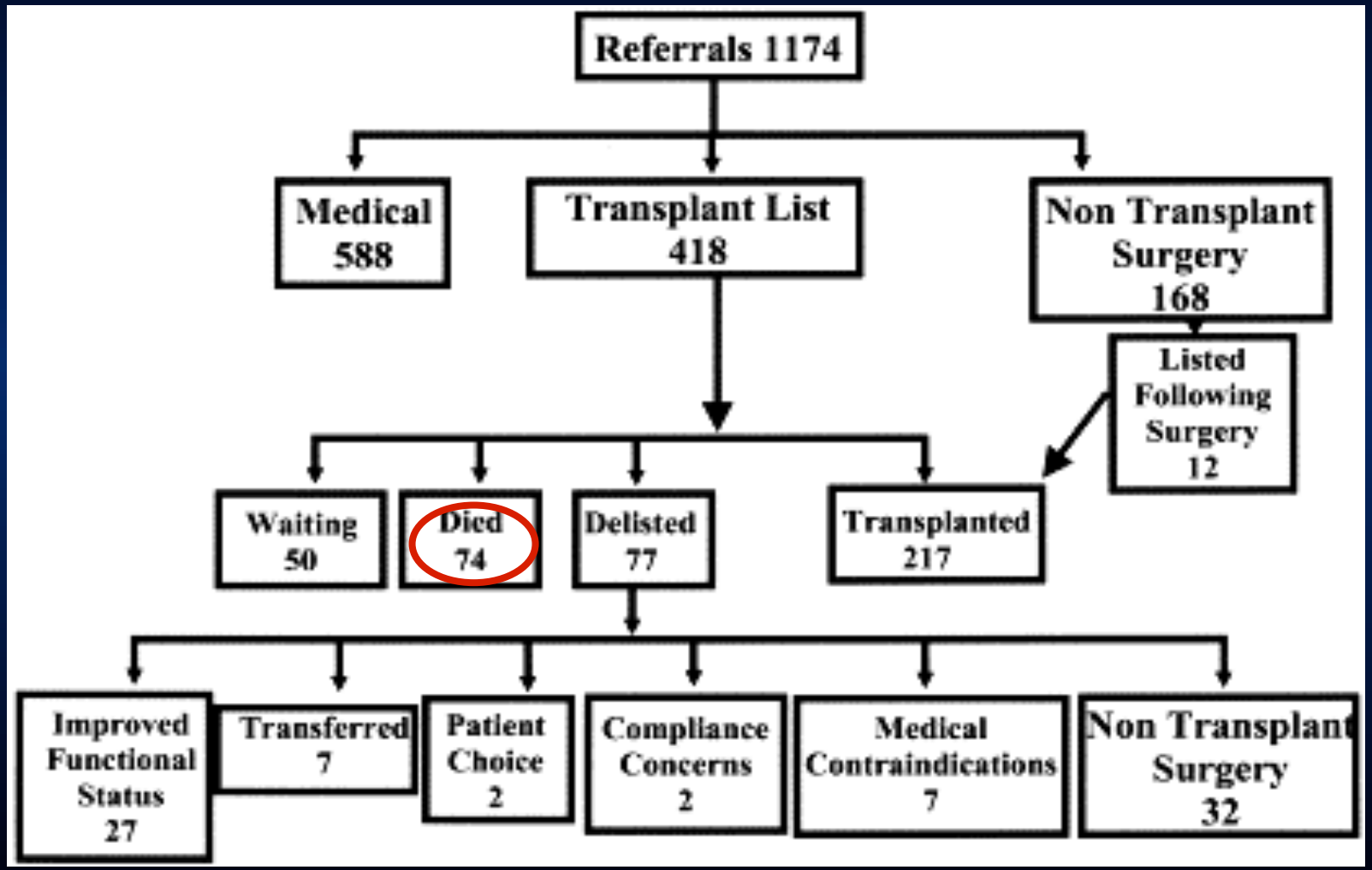
2014

JHLT. 2014 Oct; 33(10): 996-1008

Comment

- HTx excellent options in end stage cardiac failure
- The better the pre-HTx clinical status the better results
- Early and late results related to comorbidities
- Donor shortage requires proper pts selection
- Alternative surgical procedures necessary :
  - to reduce the need of HTx
  - to delay it
  - to stabilize the clinical status
  - instead of HTx

”Listing a patient for transplantation is not an immediate therapy and waiting list mortality is 18%”

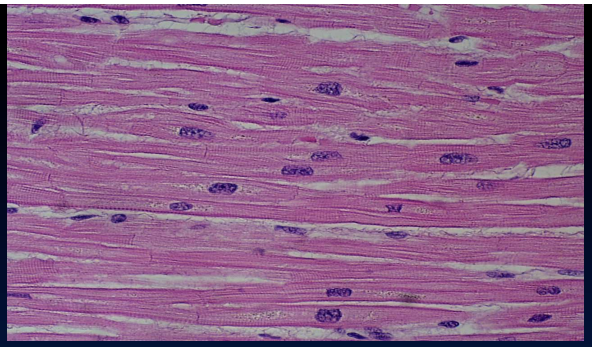


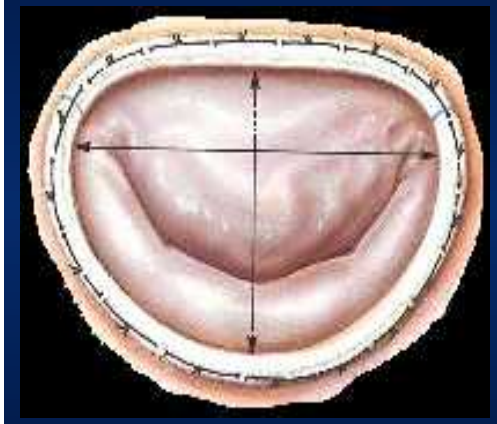
Mahon NG, J Cardiac Fail August 2004

The advantages of the “alternative procedures” vs. HTx

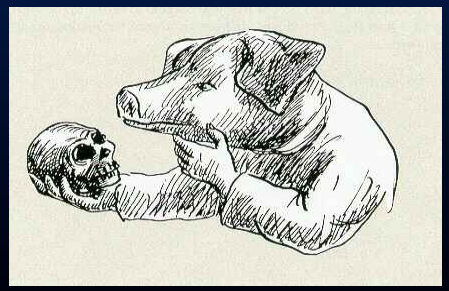
- Availability*
- Pre - and perioperative “tune-up” feasible
- Standard post-op management
- No immunosuppression-related risks
- “Bridge” to HTx

* *HTx candidacy is not a therapy*





alternative to transplant



“Conventional” Alternatives to Transplant

“Riparare il cuore”

risk
- operation
- reoperation

risk
- Waiting list
- transplant

“Conventional” Alternatives to Transplant

- Better patients selection
- Pre-postoperative treatment improvements
- Safer surgical technique
- *“postcardiotomy”* mechanical support

LOWER OPERATIVE RISK

Severe Ischemic CMP (FE < 20-30%)

"Estreme" CABG Surgery

- technical improvements
- better myocardial protection
- appropriate patient selection

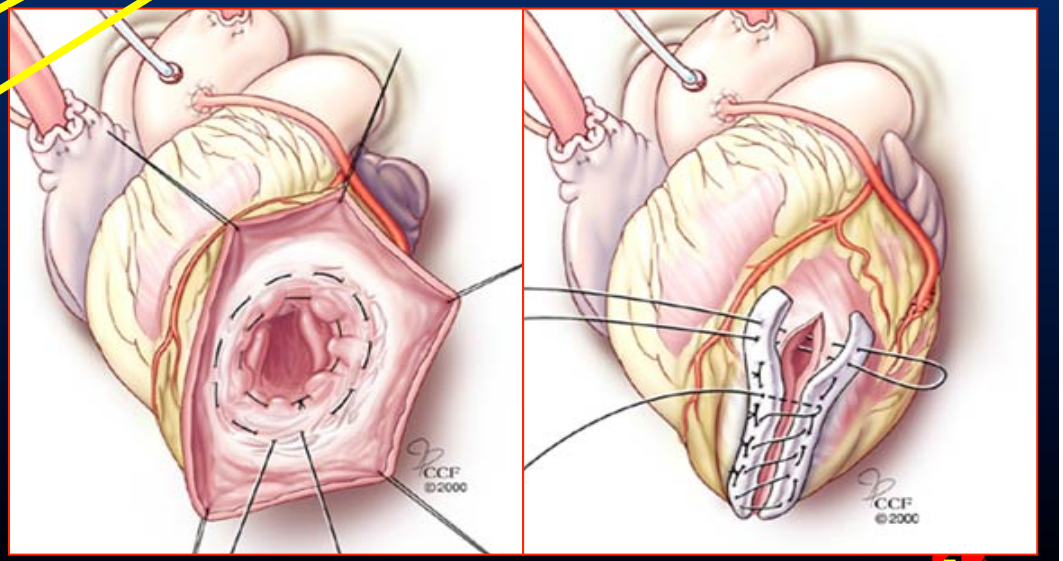
• **Hospital mortality**	**1,7-11%**
• **5 years survival**	**57-75%**

Severe Ischemic MCP
"Left Ventricular Restoration" (Dor)

Goals

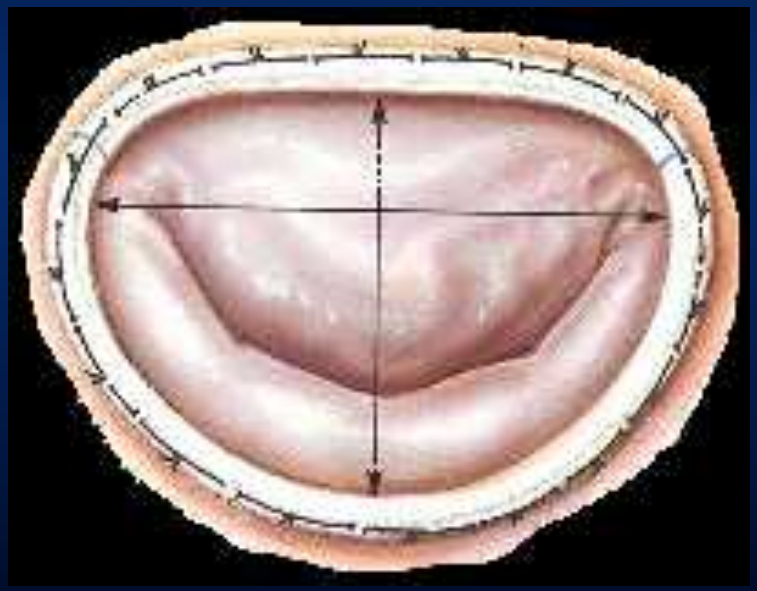
- ✓ functional infarcted area exclusion
- ✓ volume reduction
- ✓ LV reshaping

remodelling



Functional MR in ischemic or primitive dilatative cardiomyophaty

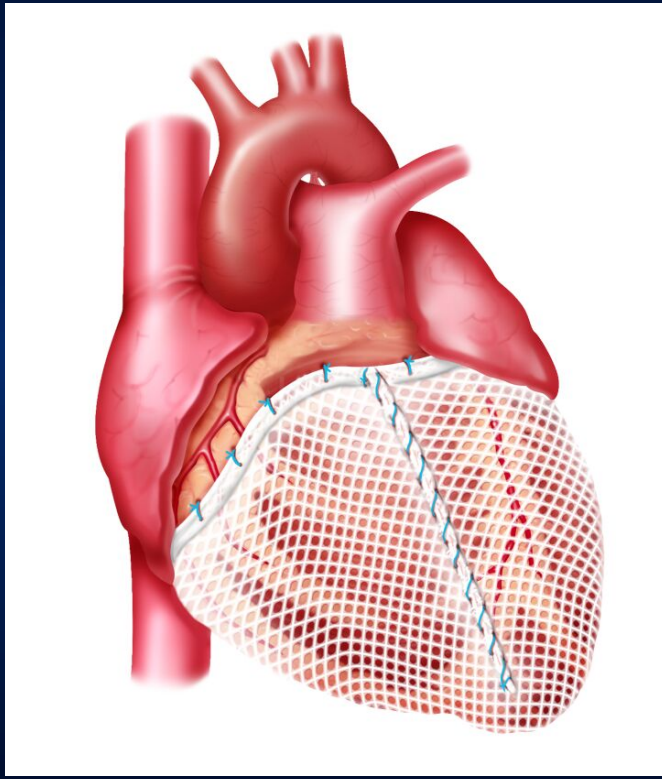
Undersizing Annuloplasty



Mitral valve reconstruction for the correction of secondary MR in patients with end-stage dilated cardiomyopathy and refractory CHF has an acceptable l-year mortality and results in improved symptomatic status accompanied by evidence of improvement in left ventricular shape and performance.

Bolling SF Am J Cardiol 1996

Cardiac Support Device (ACORN)



Goal

- LV passive end diastolic support reducing wall stress and mlocardial *stretch*
- *reverse remodelling*
- recovery of cardiac function and functional capacity

ACORN CorCap

Randomized Multicentric Study

300 pts - LVEF 27%, LVEDV 72

Status	treated	not treated
better	38%	27%
worse	37%	45%

Improvements of quality of life, cardiac volumes and sfericity index.

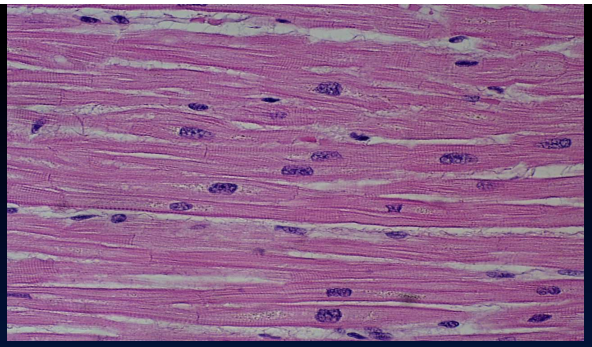
No improvements of survival, NYHA class, LV EF

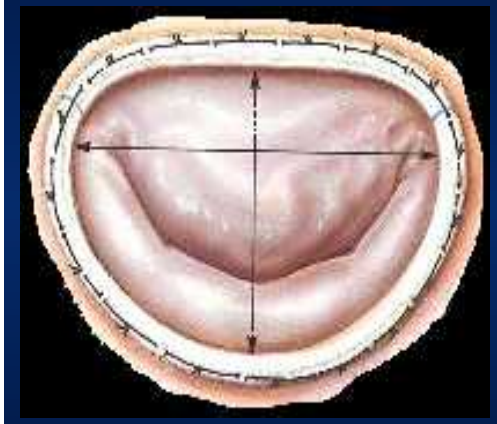
“Conservative” Surgery

In very sick pts not alternative to HTx

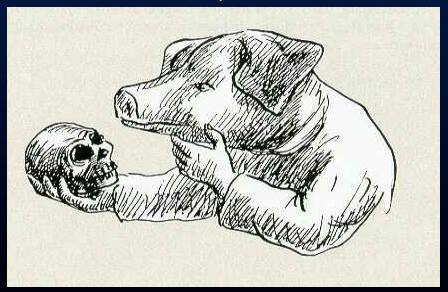
- mitral annuloplasty
- diastolic support passive device
- LV surgical “Reshaping”
- “estreme” CABG

results related to severity of disease





alternative
to
transplant



Stem cells therapy
“Rigenerare il cuore”

Goal

- Regeneration of cardiac myocites
- neovascularization in infarcted area

Delivery

- intracoronary
- Transmiocardial
- bone marrow mobilization

Results

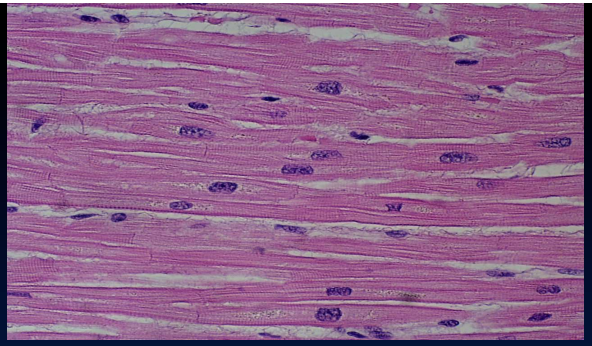
- Partial improvements
- Risk

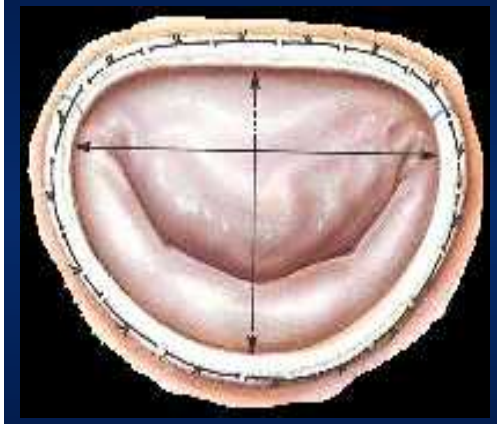
NOT AVAILABLE

Problems:

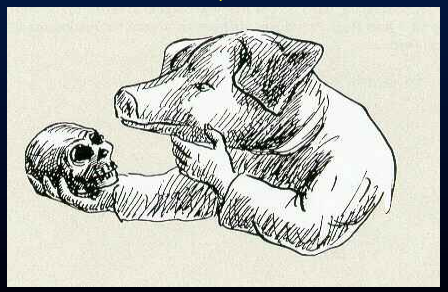
Type of cells/delivery

Patient selection





alternative
to
transplant



Xenotransplant

Pros

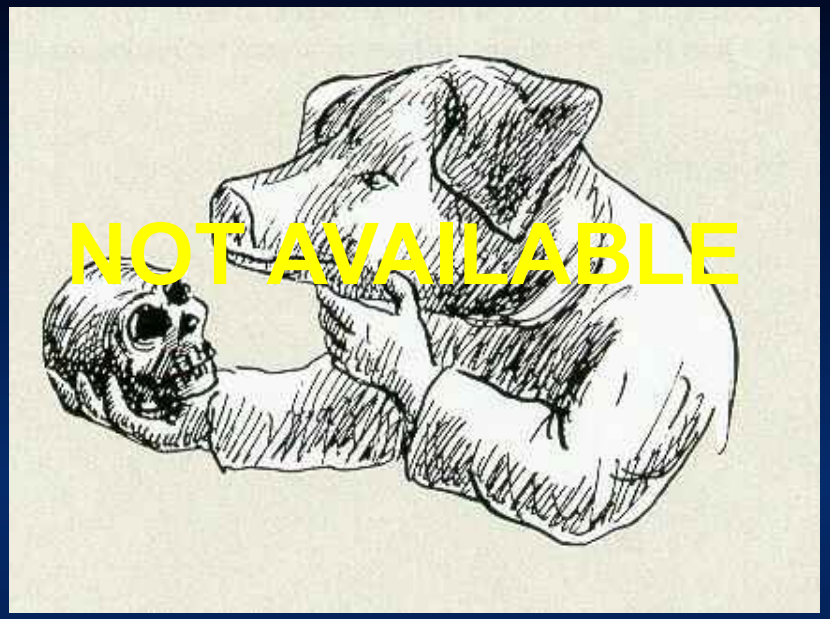
- Availability

Cons

- Anatomic problems
- Immunological aspects
- Infections (retrovirus)
- Ethics issues

Future options

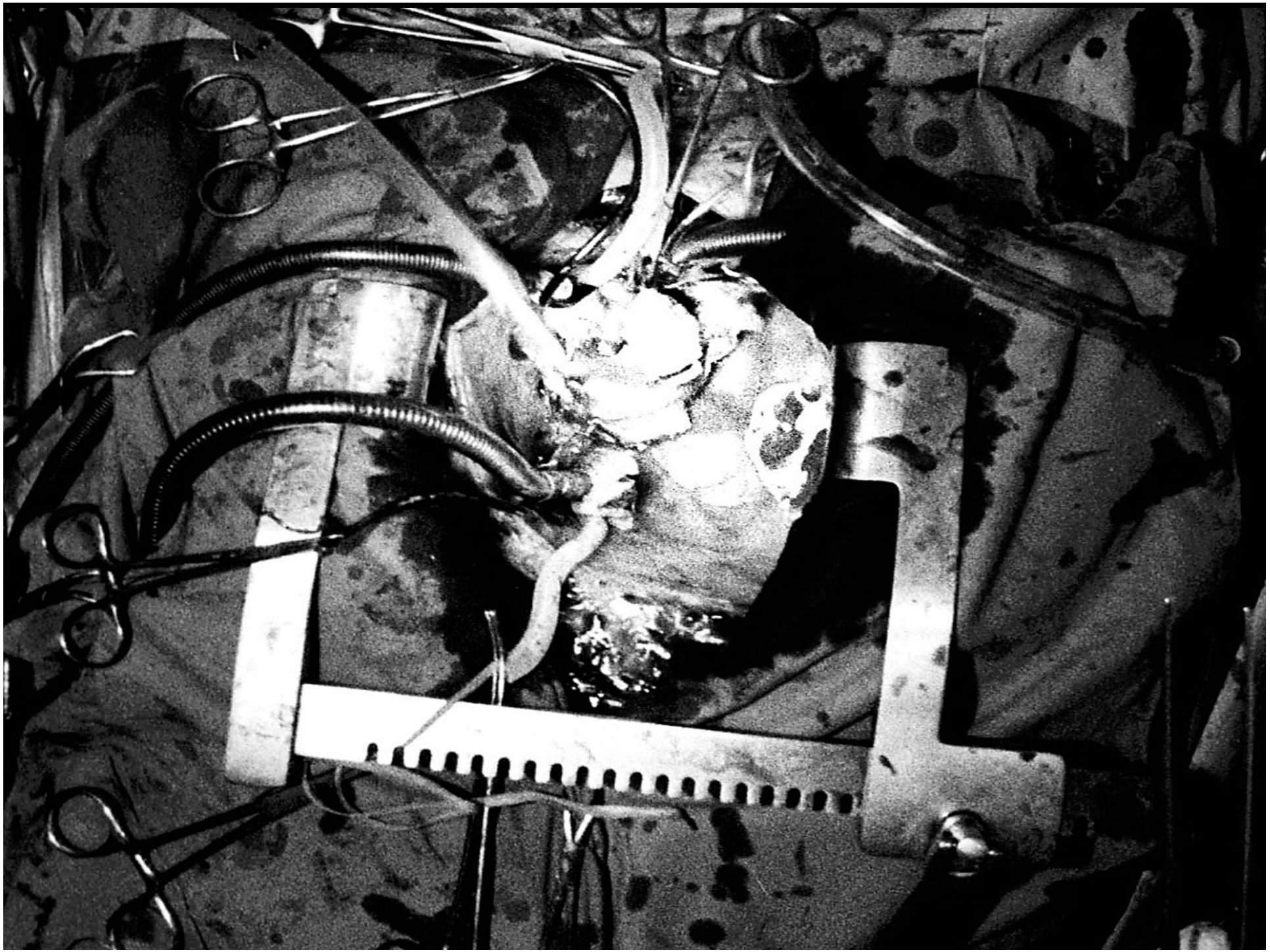
- Transgenic animals
- Immunosuppresion

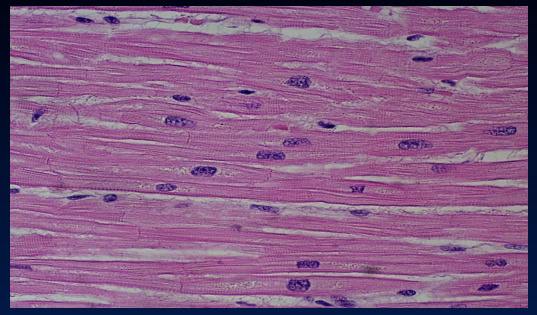


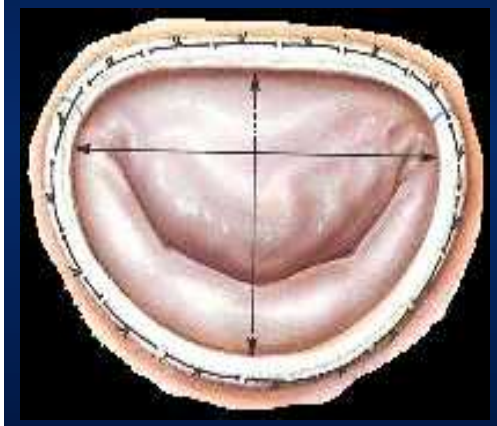
Hypothetical Indications:

bridge to recovery/Tx

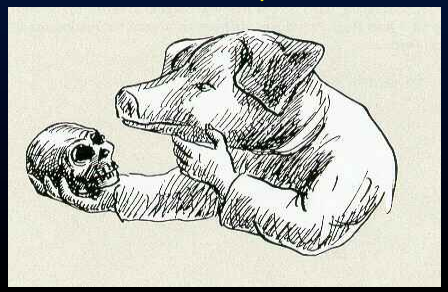
contraindications to VAD

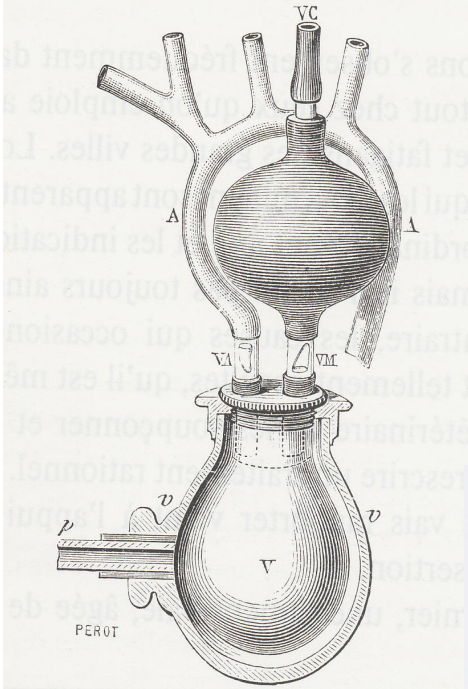






alternative
to
transplant





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Journal of Medicine

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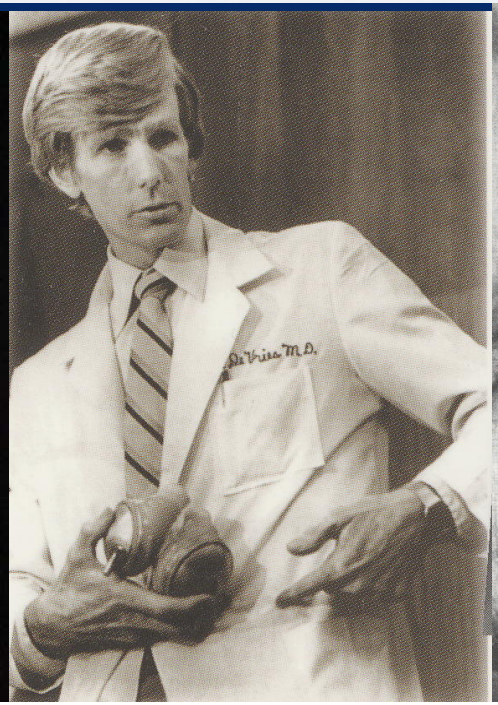
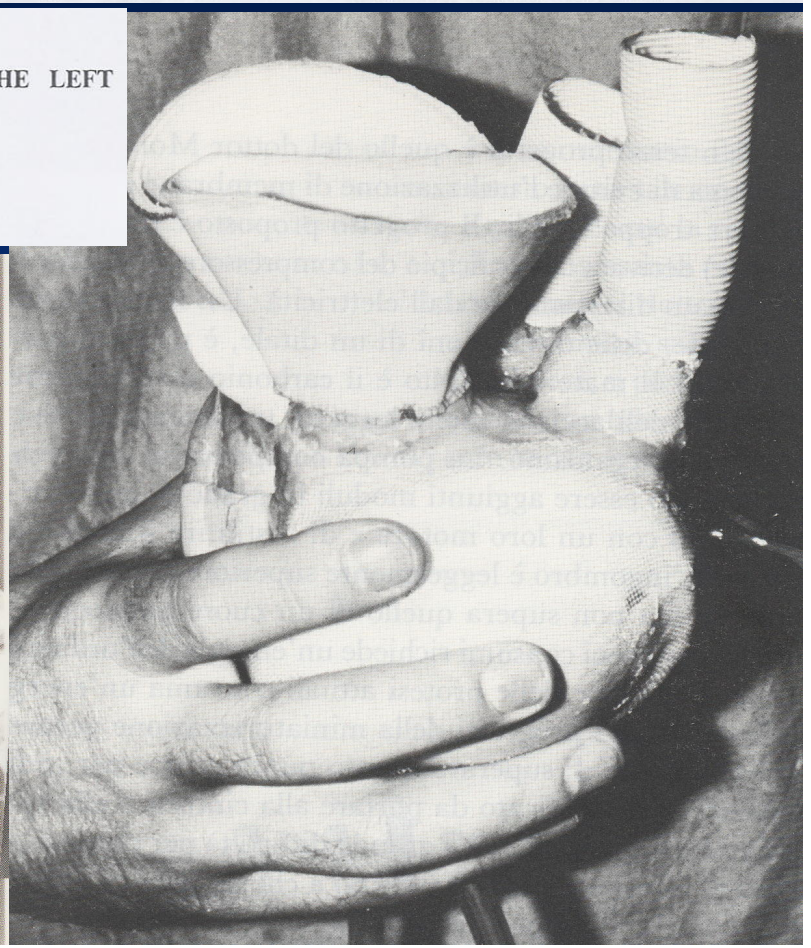
CLINICAL USE OF THE TOTAL ARTIFICIAL HEART

William C. DeVries, M.D., Jeffrey L. Anderson, M.D., Lyle D. Joyce, M.D., Fred L. Anderson, M.D., Elizabeth H. Hammond, M.D., Robert K. Jarvik, M.D., and Willem J. Kolff, M.D., Ph.D.

TEMPORARY MECHANICAL SUBSTITUTE FOR THE LEFT VENTRICLE IN MAN

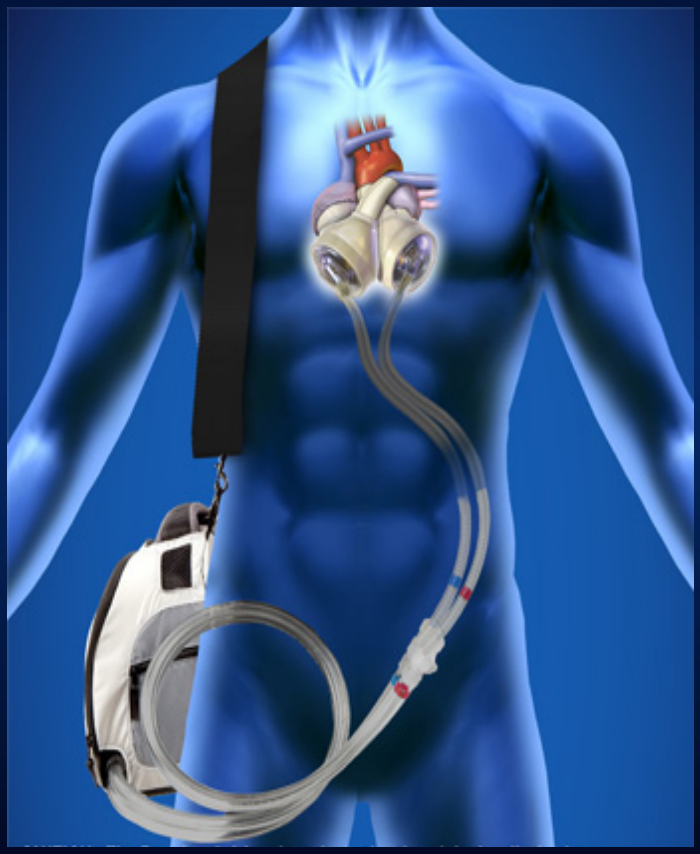
Forest D. Dodrill, M.D., Edward Hill, M.D.
and
Robert A. Gerisch, M.D., Detroit





Total Artificial Heart (TAH)

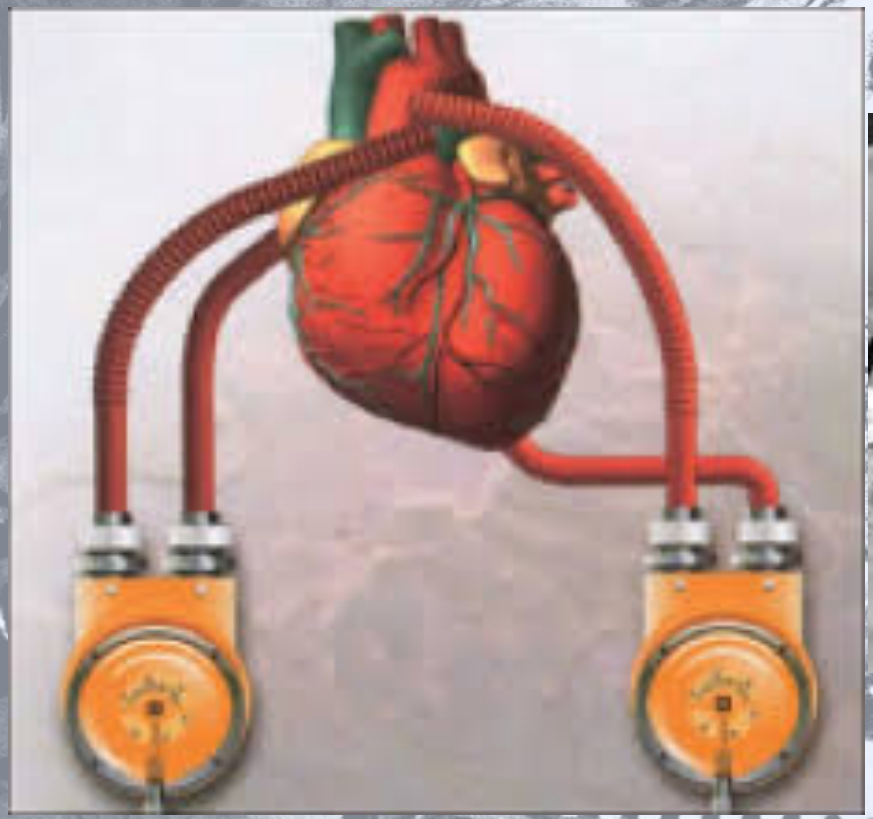
- totally implantable
- replacing native heart
- biventricular support
- thromboembolism
- short-medium term supp.
- bulky system
- costs

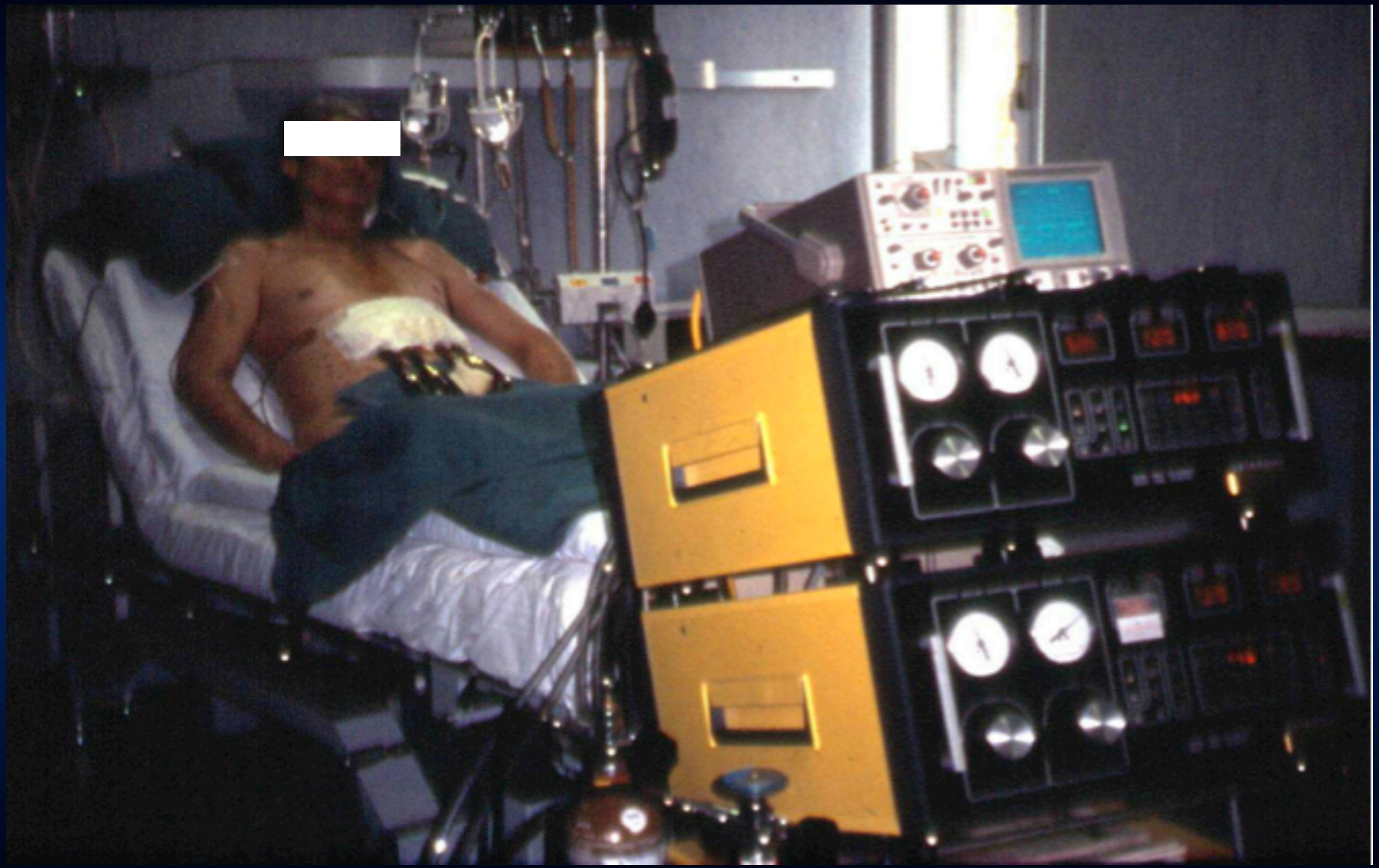


Ventricular Assist Device (VAD)

Mechanical system supporting a failing heart to optimize hemodynamic status and end-organs perfusion:

- pump
- inflow and outflow cannulas
- control panel
- power source





Indications to VAD

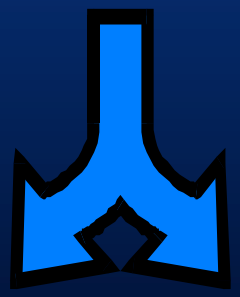
chronic heart failure

Bridge to HTx

Recovery

Destination

acute heart failure



Recovery

Bridge to HTx

Destination Therapy

- Not HTx eligible
- No contraindications to VAD
- Class IIIB o IV CHF (No cardiogenic shock)
- Inotropes dependent
- Maximal medical therapy with VO_2<10 ml/kg min
- No comorbidities whit life expectancy < 2 yy
- No neurological impairment
- No psychosocial problems

…..beyond the imagination

VAD instead of Transplant

Small dimensions ⟶ *Easy to implant*

Length of support ⟶ *Years* ⟶ *destination*

Biocompatibility ⟶ *No anticoagulation*

Totally Implantable ⟶ *No transcut. cable*

Associated Therapy ⟶ ***Genetic or stem cells***


TransMedics
TransMedics
AO
LA
PA

Conclusions

- HTx still the gold standard for severe CHF
- in selected patients, “conventional” surgery effective in replace or delay HTx
- stem cells are not a reality so far
- increasing role of mechanical support as “bridge” to Htx or as “destination therapy” or as tools for domnor irgan retrievement .

The surgeon that think to operate the heart is not worthy of respect by his Collegues

T. Billroth - 1875