Lung Transplantation

Adriaan Myburgh

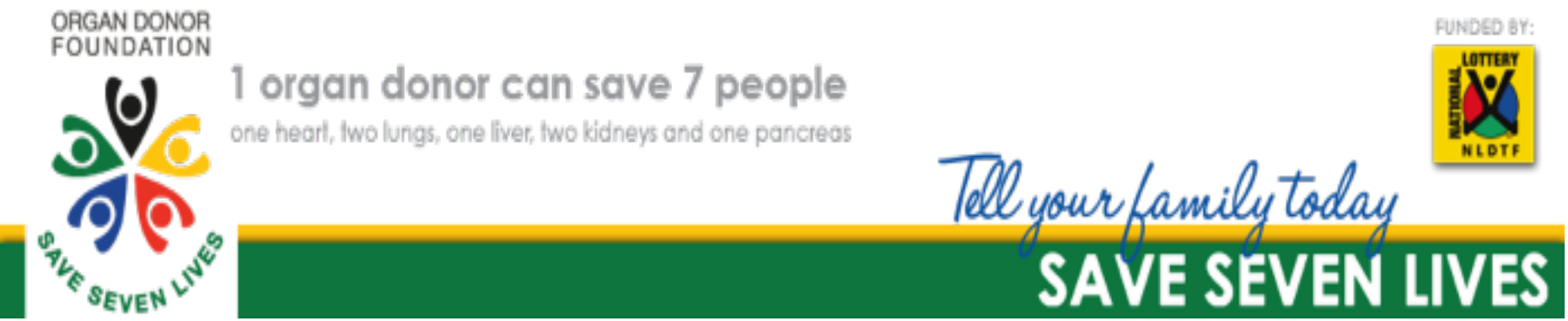
UNIVERSITY OF CAPE TOWN

Department of Anaesthesia and Perioperative Medicine

Disclosure


SOUTH AFRICA
ZA
ORGAN DONOR
ORGAN DONOR CARD
ORGAN DONOR FOUNDATION
SAVE SEVEN LIVES
Thank you for making the decision to become an organ donor. Remember to discuss your decision with your family, so that one day they may honour your wish.
www.odf.org.za
Toll Free 0800 22 66 11
Tell your family today
SAVE SEVEN LIVES

Jenna Lowe “ Get me to 21”


ORGAN DONOR
FOUNDATION
SAVE SEVEN LIVES
1 organ donor can save 7 people
one heart, two lungs, one liver, two kidneys and one pancreas
FUNDED BY:
NATIONAL LOTTERY
NLDTF
Tell your family today
SAVE SEVEN LIVES

- 4065 Donors


Donor Monthly Registrations - History
New Donor Registrations per Month
7,000
5,600
4,200
2,800
1,400
0
1,629
2,093
1,323
1,522
1,606
1,287
2,808
5,233
3,792
6,343
3,305
2,614
2,553
2,863
2,450
2,849
2,783
5,764
2014-01
2014-02
2014-03
2014-04
2014-05
2014-06
2014-07
2014-08
2014-09
2014-10
2014-11
2014-12
2015-01
2015-02
2015-03
2015-04
2015-05
2015-06
Date Joined

Phalo - URE

History

- 1947: Vladimir Demikhov performs first successful animal lung transplantation

- 1963: James Hardy performs first human lung transplantation in Jackson Mississippi

3 December 1967: First Human heart transplant Denise Darvall to Louis Washkansy

- 1986: Joel Cooper performs first successful human double lung transplantation

- 2001: Stig Steen performed first successful Non Heart Beating lung transplantation

- 2007: Stig Steen performs first ex-vivo reconditioning human lung transplantation


Erect


R
ERECT
AP

Recipients

Relative contraindications to lung transplantation
• Age > 65 years • Critical or unstable condition (eg, shock, ECMO) • Severely limited functional status • Colonization with highly resistant bacteria, fungi or mycobacteria • Severe obesity (BMI > 30 kg/m^2) • Severe osteoporosis • Mechanical ventilation • Other significant medical conditions

Orens JB et al. *J Heart Lung Transplant* 2006; 25: 745-55

Contraindications ?

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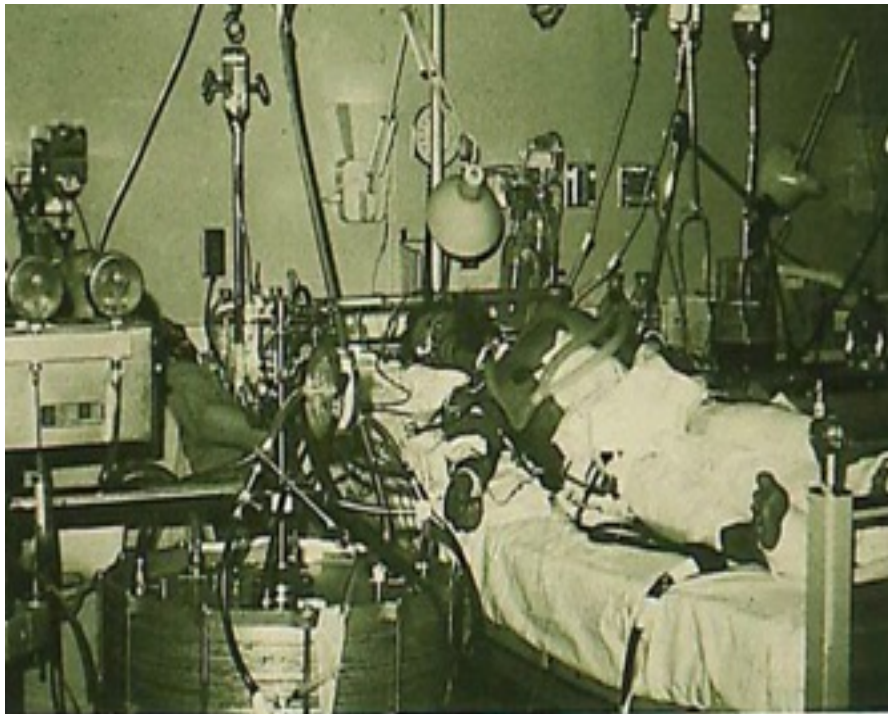
ECMO

Bridge-to-transplant

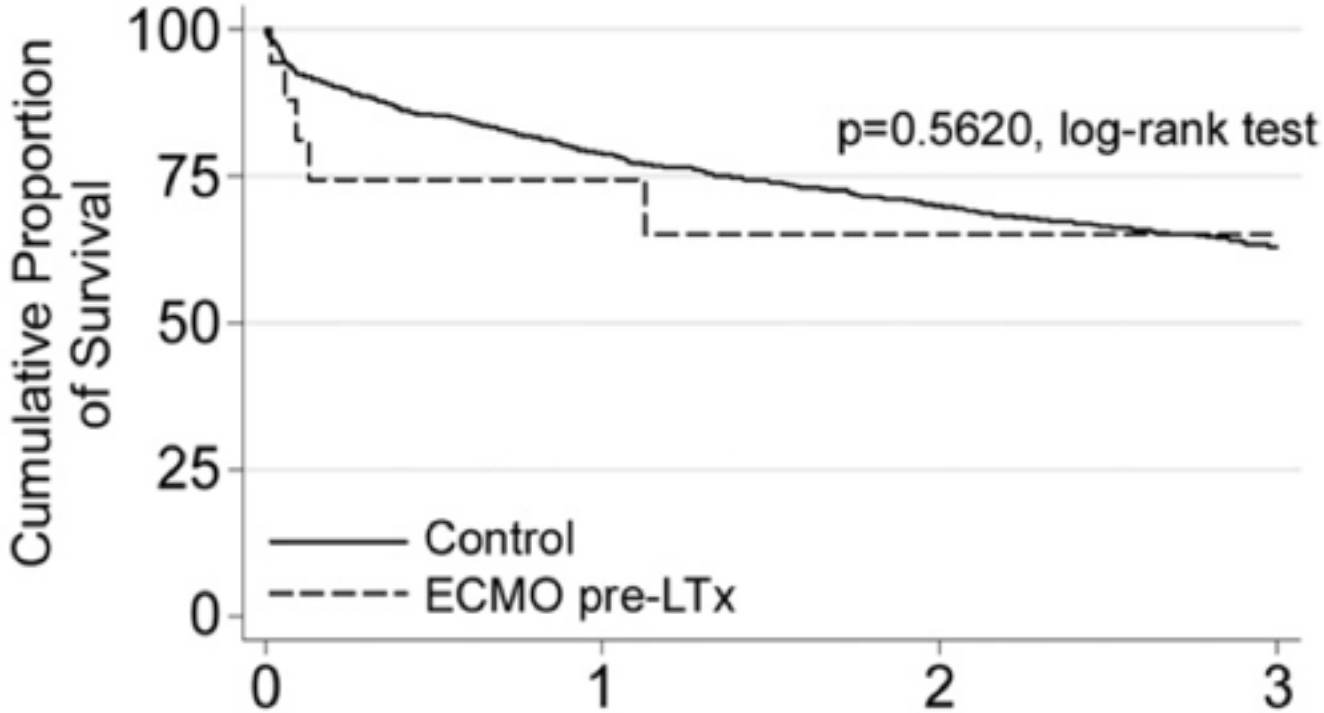
Lung assist device (Novalung®)

ECMO



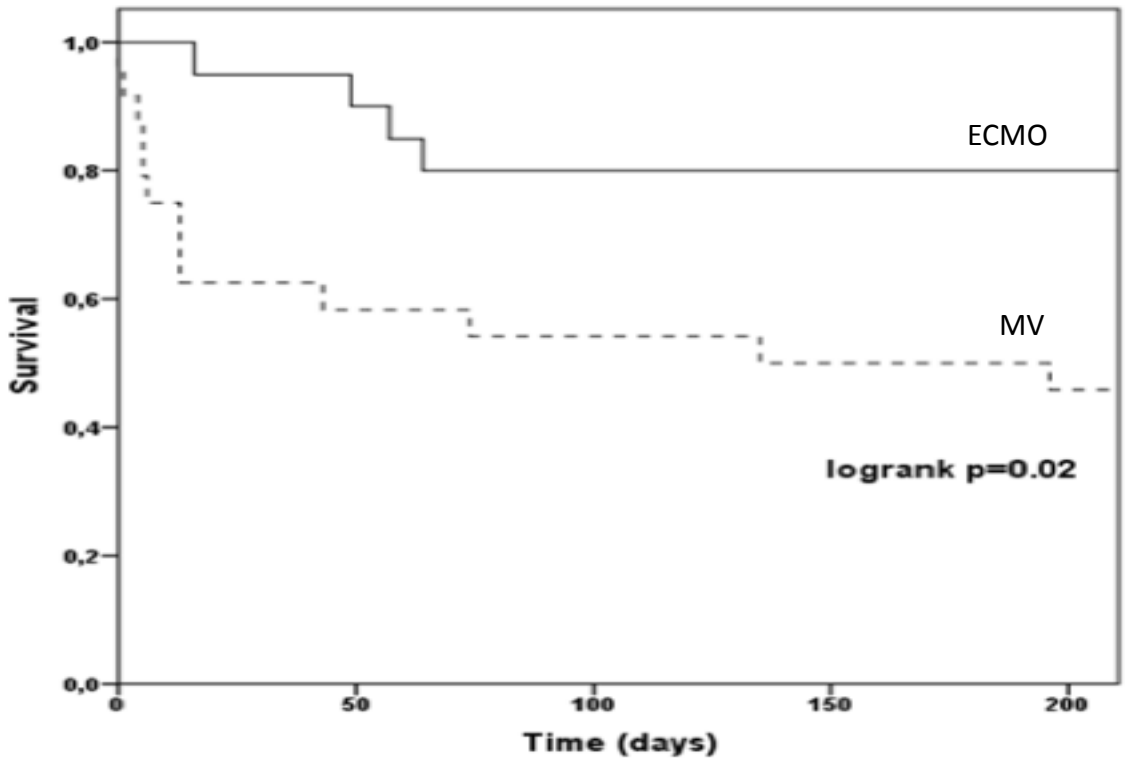
Strueber M. Curr Opin Organ Transplant 2011; 16: 458-61

Outcomes – ECMO vrs no ECMO



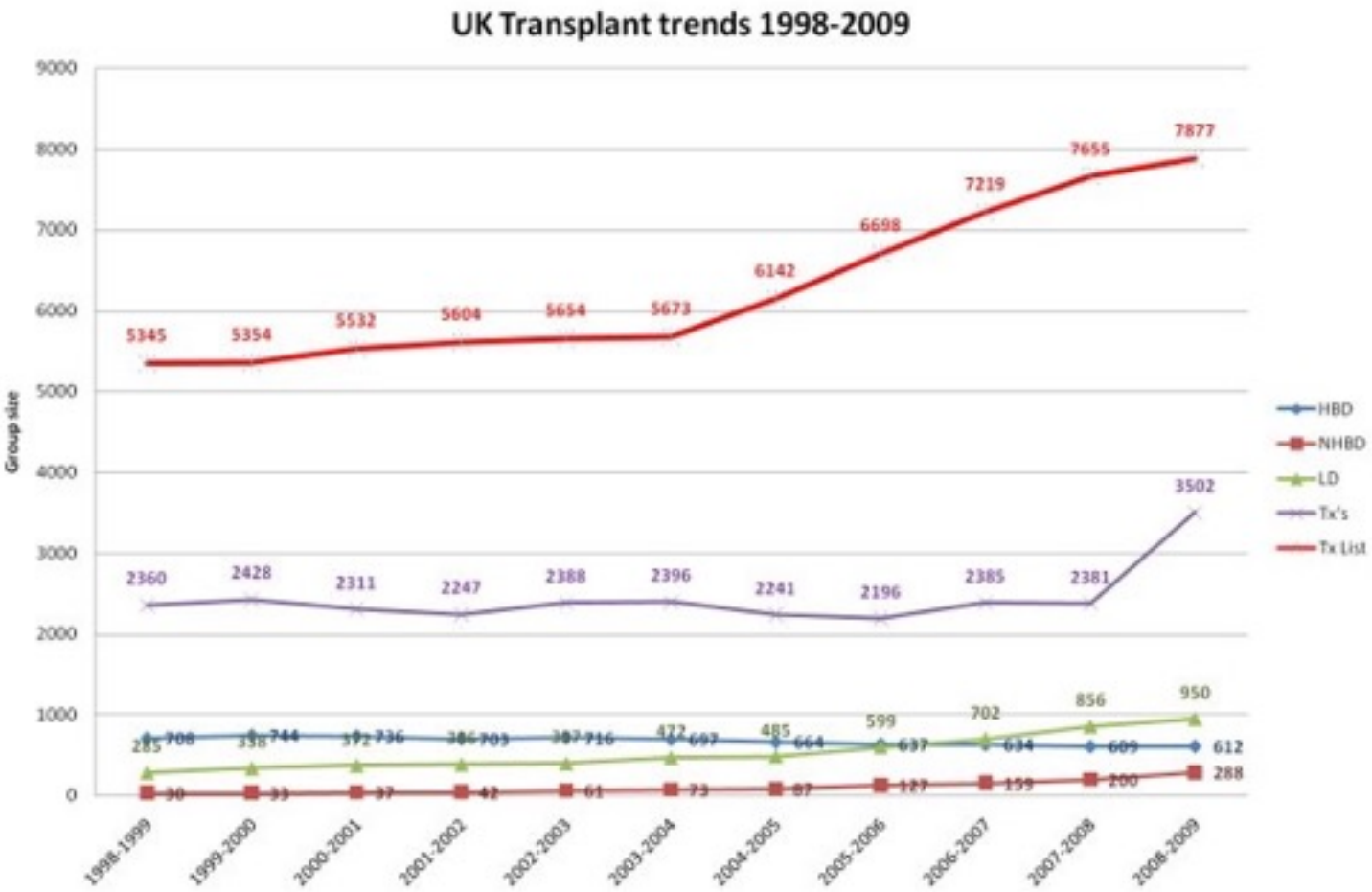
Bermudez CA et al. Ann Thorac Surg 2011;92: 1226-32

Outcomes – ECMO vrs. Mech. Ventilation



Fuehner T et al. Am J Resp Crit Care Med 2012; Epub Jan 20

Donor organ shortfall



Increasing the donor pool

- Donation after cardiac death (DCD)
- Ex-vivo lung perfusion (EVLP)
- Graft volume reduction surgery (GVR)

Donation after cardiac death

- Maastricht classification (1995):

  I: brought in dead

  II: unsuccessful resuscitation

  III: awaiting cardiac arrest

  IV: cardiac arrest after brain-stem death

  V: cardiac arrest in a hospital in-patient

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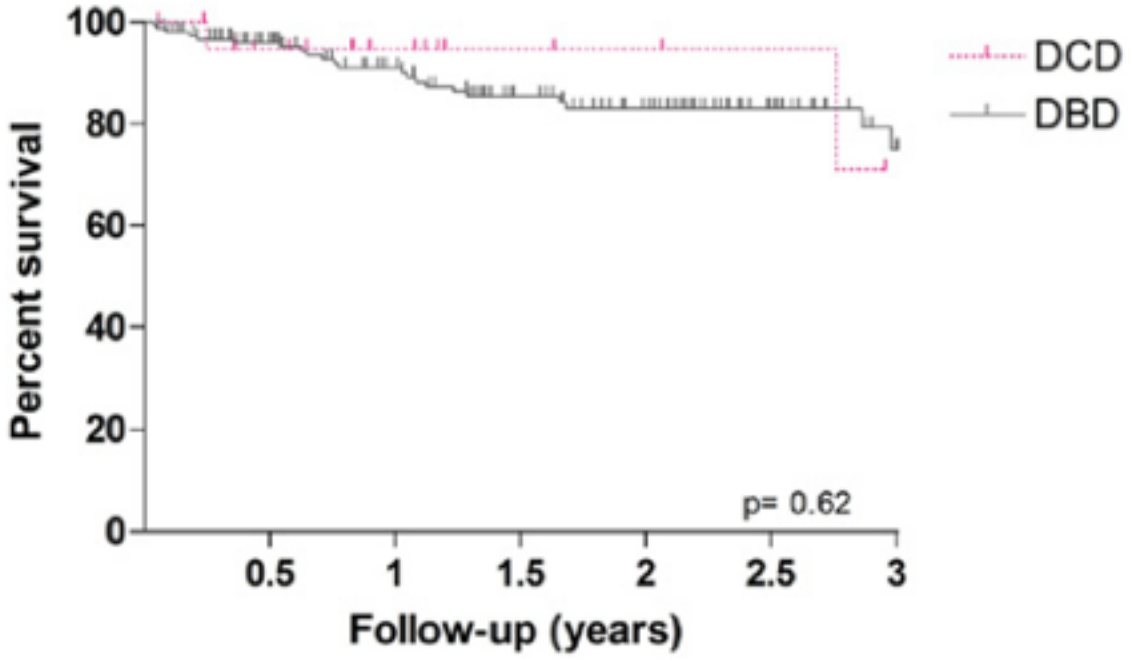
DCD outcomes



De Vleeschauwer SI et al. J Heart Lung Transplant 2011; 30: 975-81

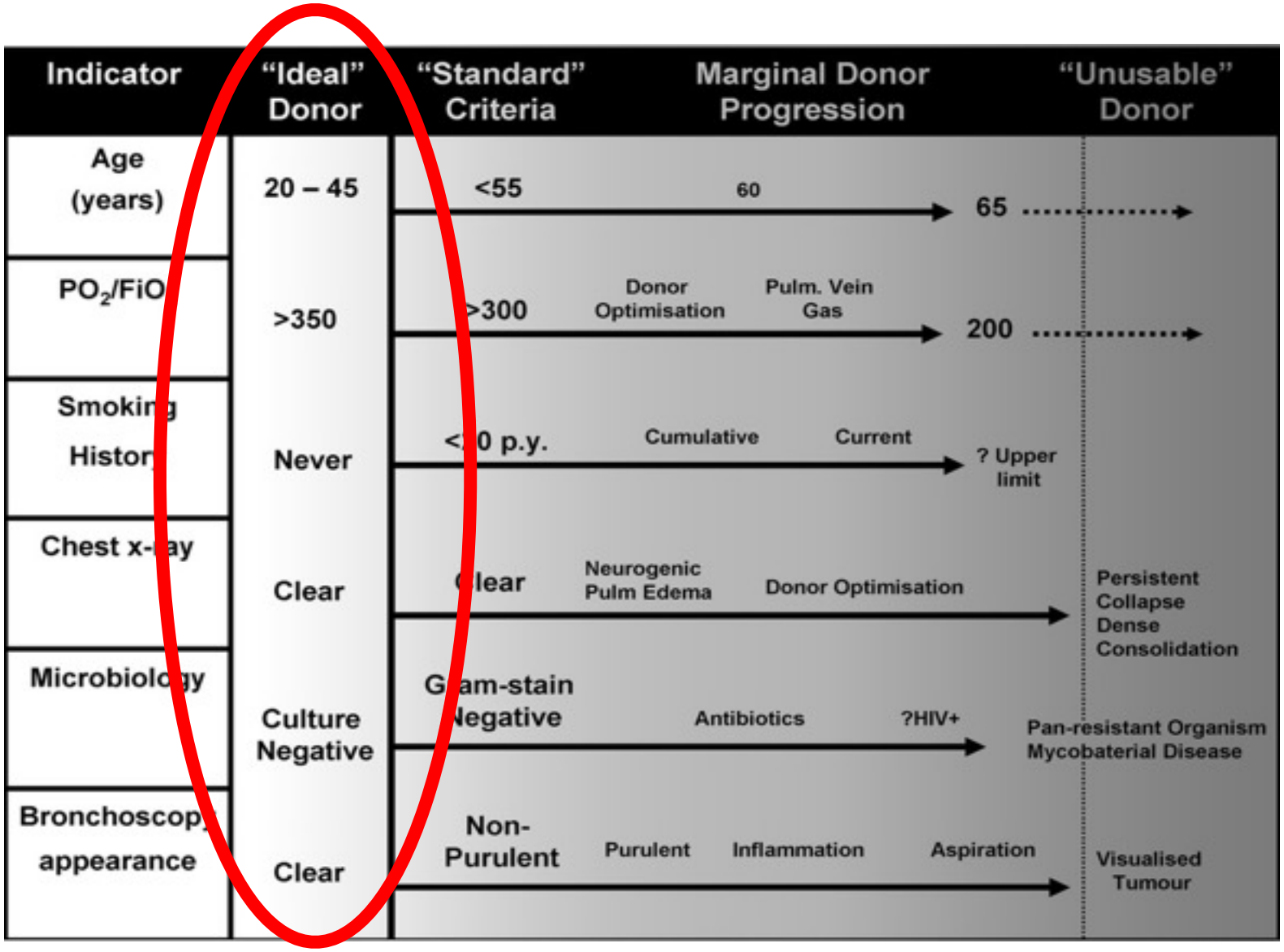
Ex-vivo lung perfusion

Steen S et al. Ann Thorac Surg 2007; 83: 191-4

Donor assessment

Indicator	"Ideal" Donor	"Standard" Criteria	Marginal Donor Progression	"Unusable" Donor
Age (years)	20 – 45	<55	60 → 65	
PO_2/FiO_2	>350	>300	Donor Optimisation, Pulm. Vein Gas → 200	
Smoking History	Never	<20 p.y.	Cumulative, Current → ? Upper limit	
Chest x-ray	Clear	Clear	Neurogenic Pulm Edema, Donor Optimisation	Persistent Collapse, Dense Consolidation
Microbiology	Culture Negative	Gram-stain Negative	Antibiotics, ?HIV+	Pan-resistant Organism, Mycobaterial Disease
Bronchoscopy appearance	Clear	Non-Purulent	Purulent, Inflammation, Aspiration	Visualised Tumour

Ideal donor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Bronchoscopy appearance
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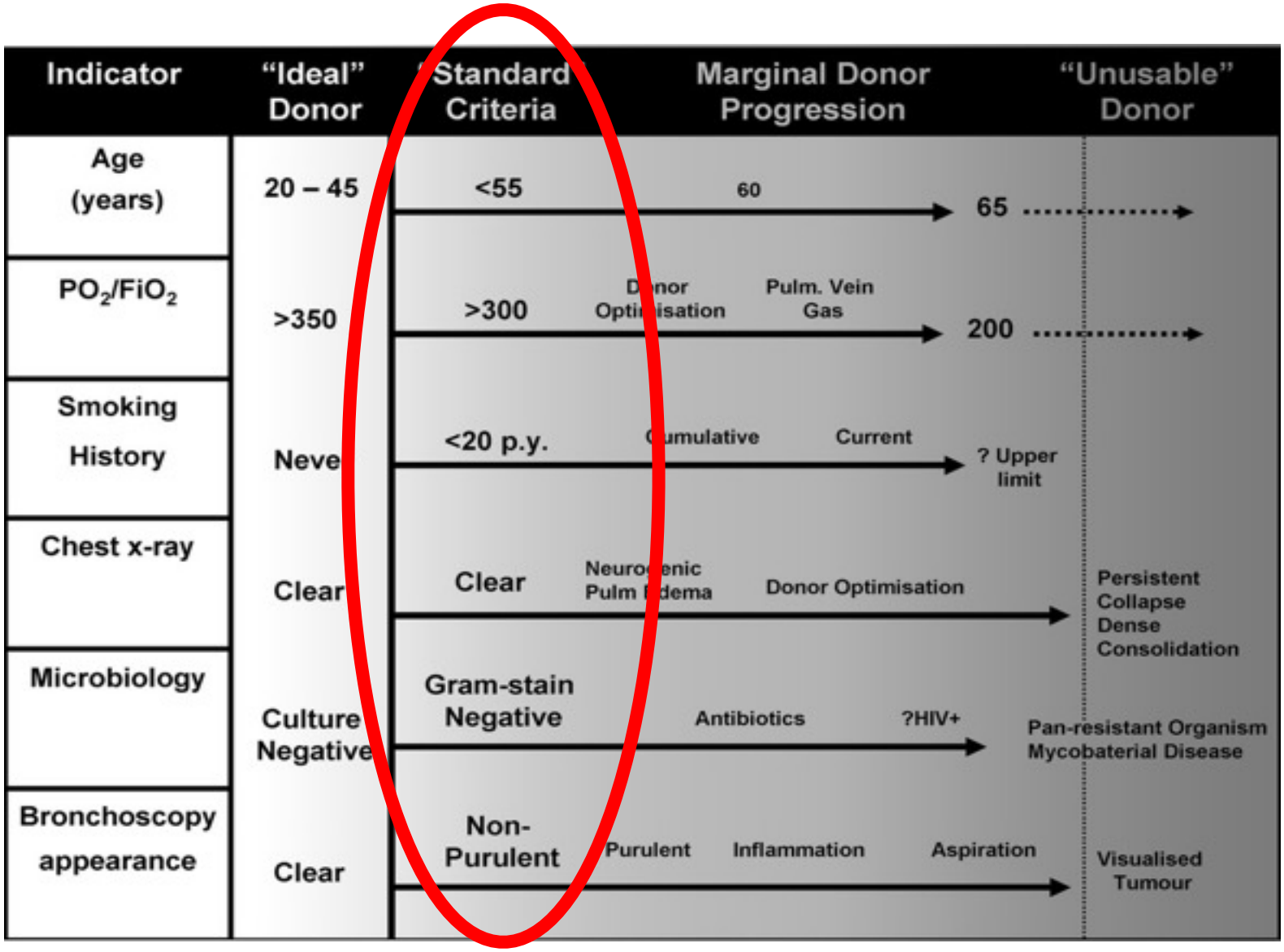
Purulent
Inflammation
Aspiration
Visualised Tumour

Acceptable donor



Marginal donor

Indicator	"Ideal" Donor	"Standard" Criteria	Marginal Donor Progression	"Unusable" Donor
Age (years)	20 – 45	<55	60 → 65	
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Microbiology	Culture Negative	Gram-stain Negative	Antibiotics, ?HIV+	Pan-resistant Organism, Mycobaterial Disease
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? Unacceptable donor

Indicator	"Ideal" Donor	"Standard" Criteria	Marginal Donor Progression	"Unusable" Donor
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Microbiology	Culture Negative	Gram-stain Negative	Antibiotics; ?HIV	Pan-resistant Organism; Mycobaterial Disease
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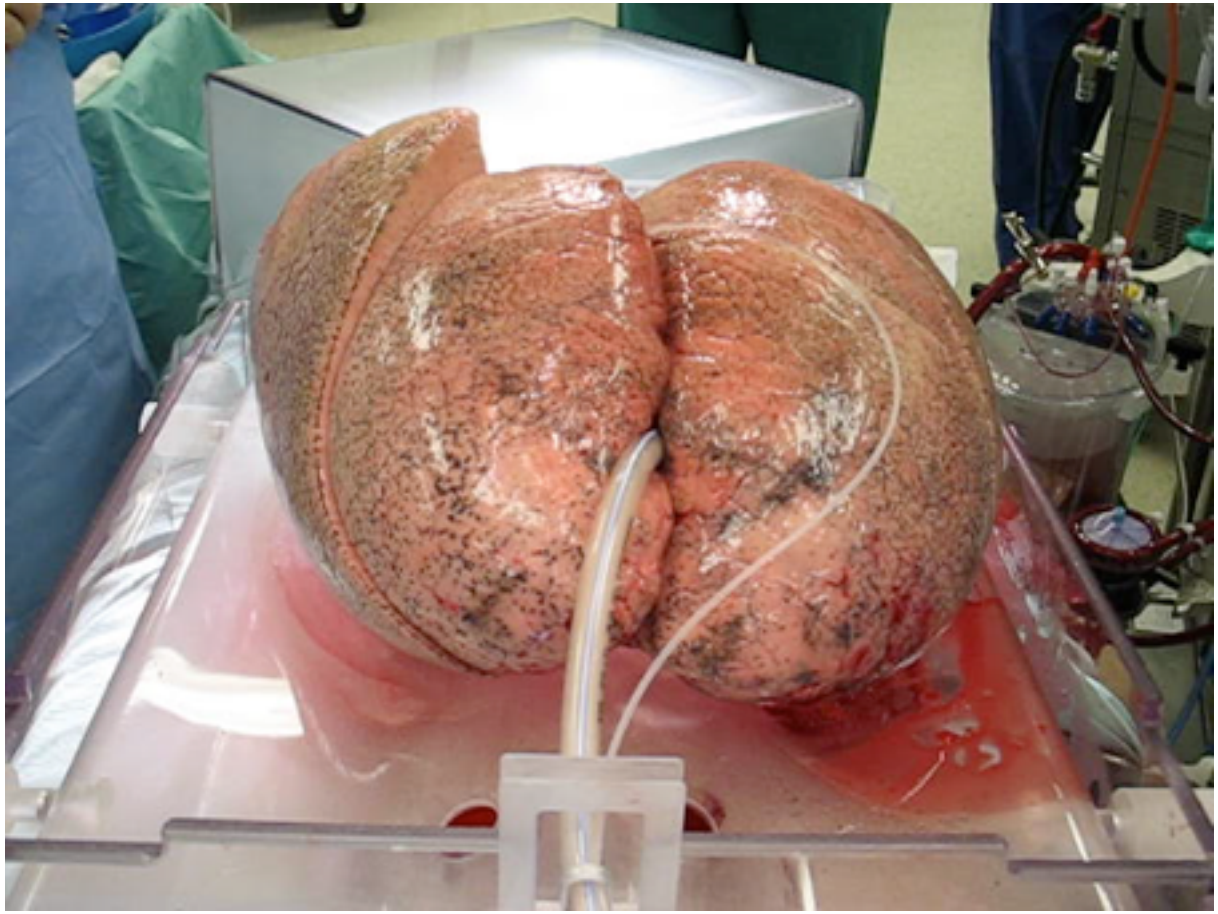
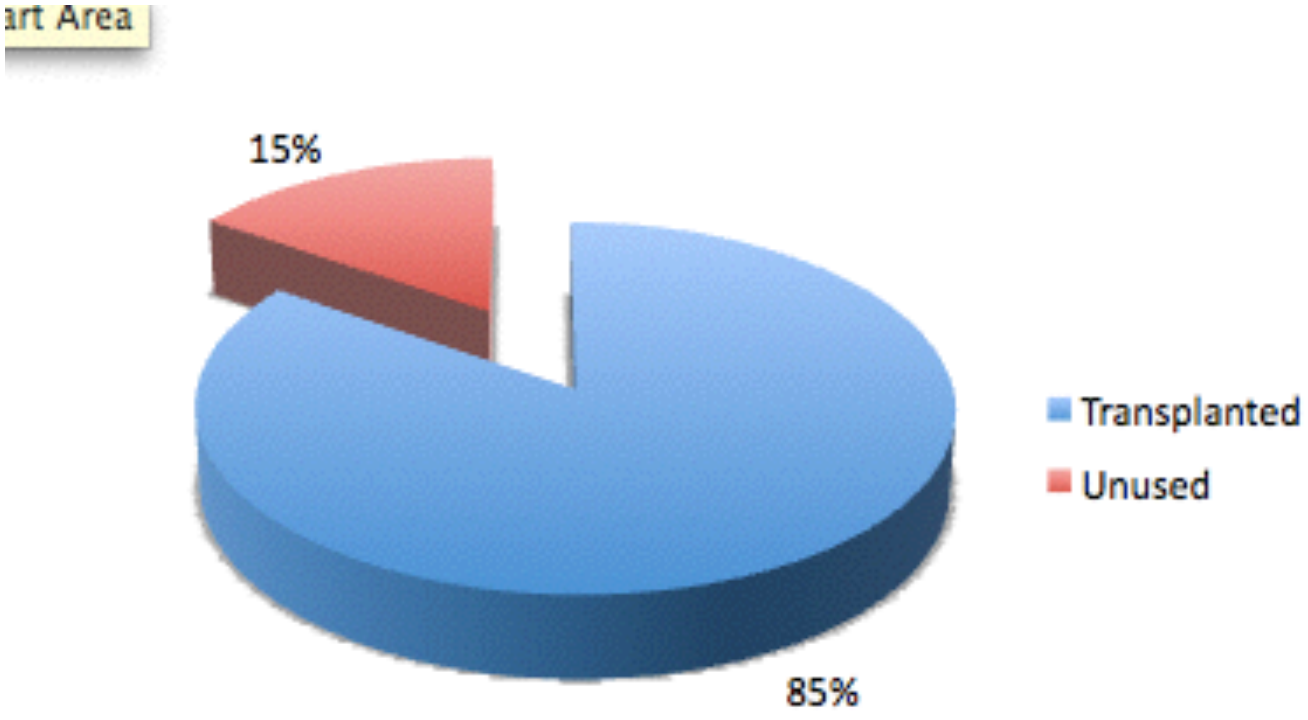
Reconditioning



EVLP conversion rates

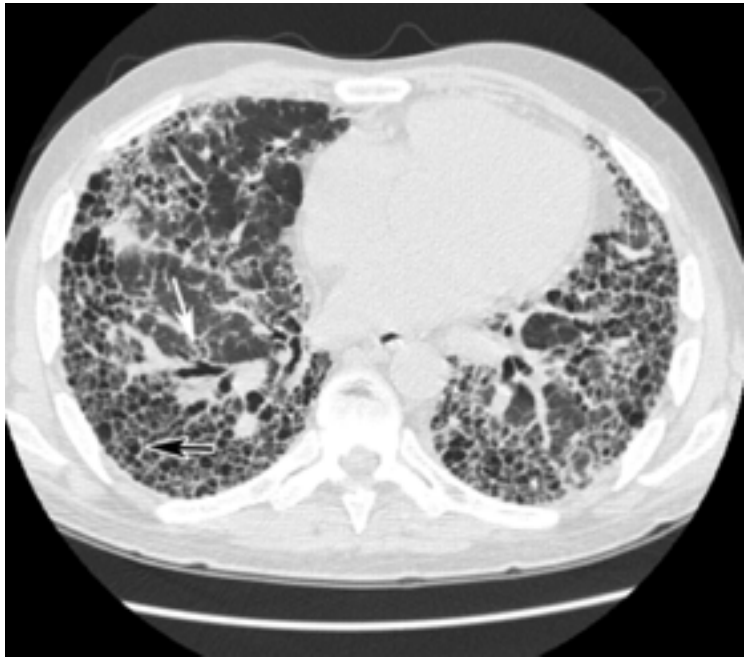


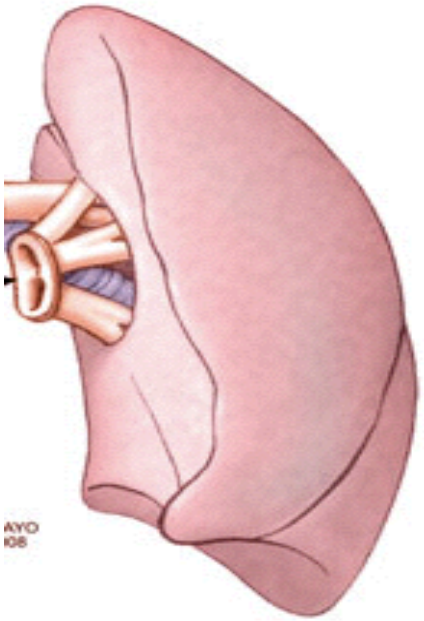
EVLP research

- Donor Ex-vivo Lung Perfusion in UK (DEVELOP-UK)
- Urokinase
- Steroid therapy
- iNO / CO
- Surfactant lavage
- IL-10 tissue expression
- Adenosine agonists
- “Immunotolerated” lungs

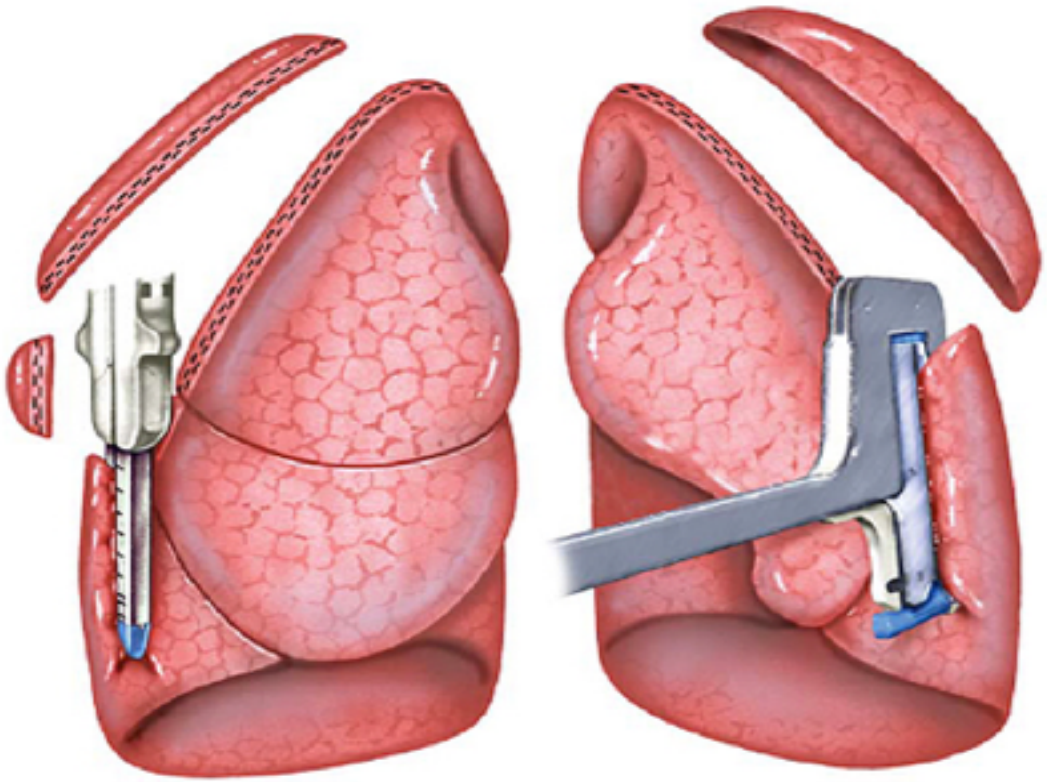
Sanchez PG et al. J Heart Lung Transplant 2012; 31: 339-48

Oversized donor lungs?

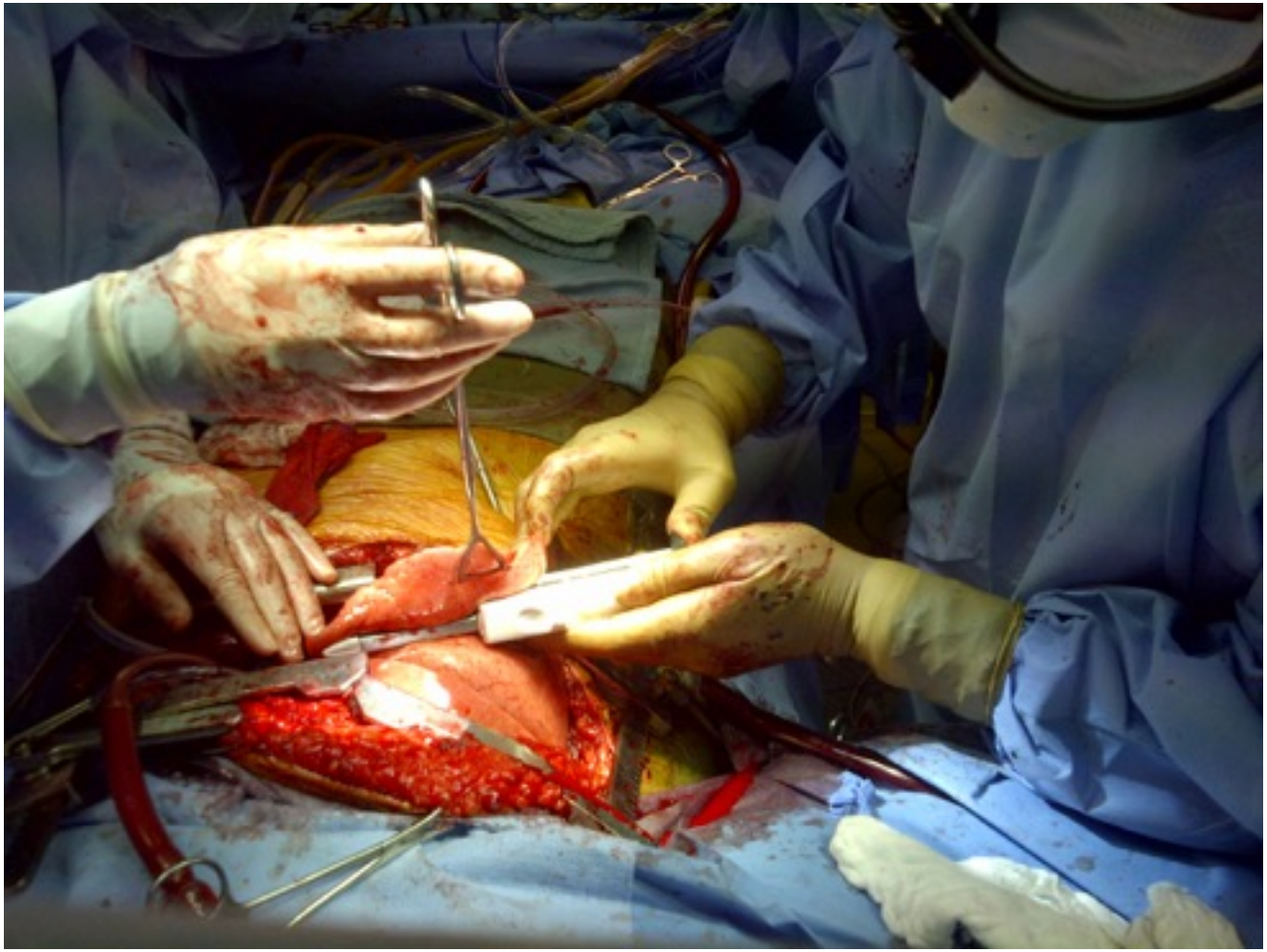




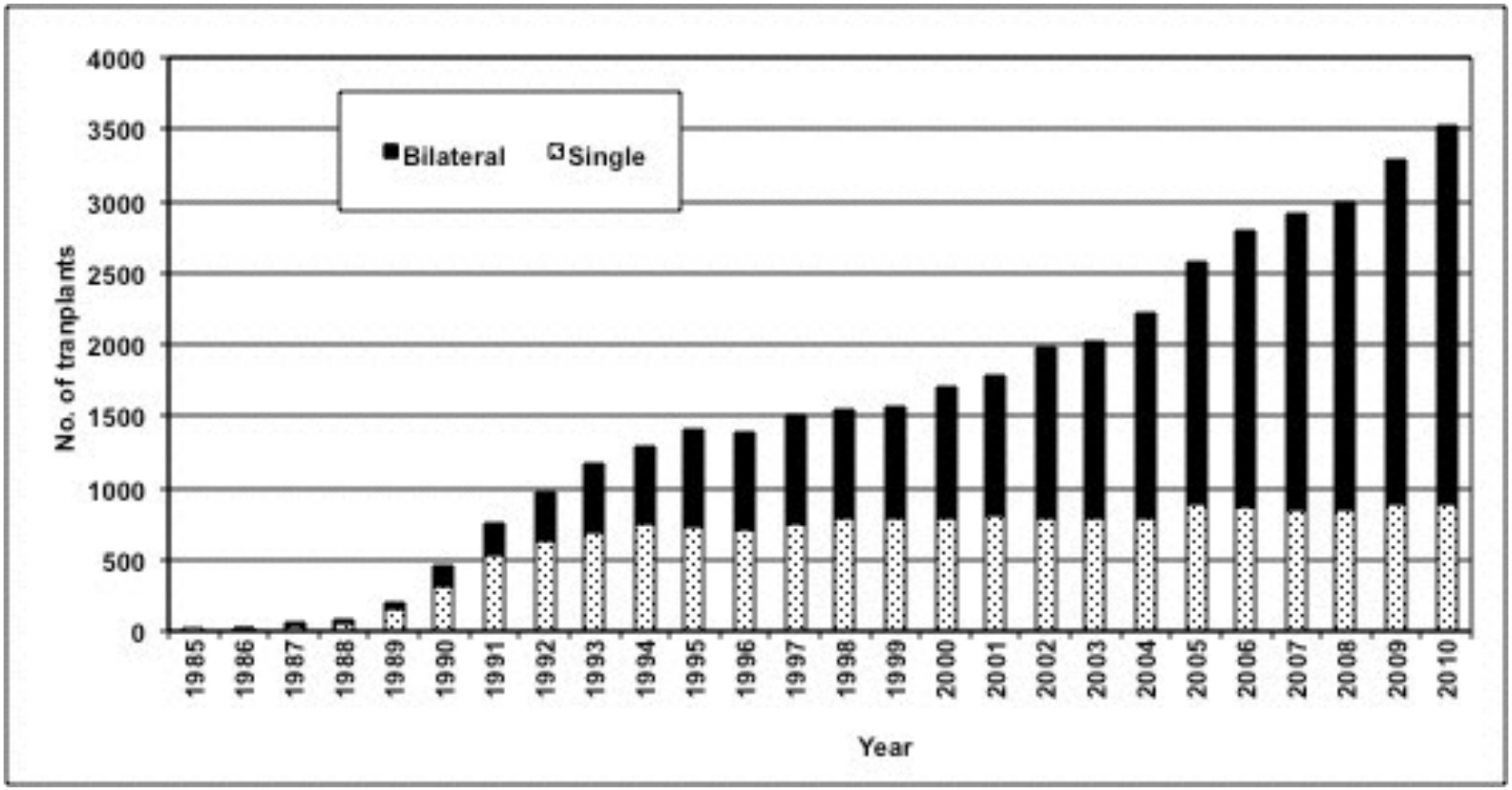
Graft volume reduction surgery



Shigemura N et al. J Heart Lung Transplant 2009; 28: 130-4

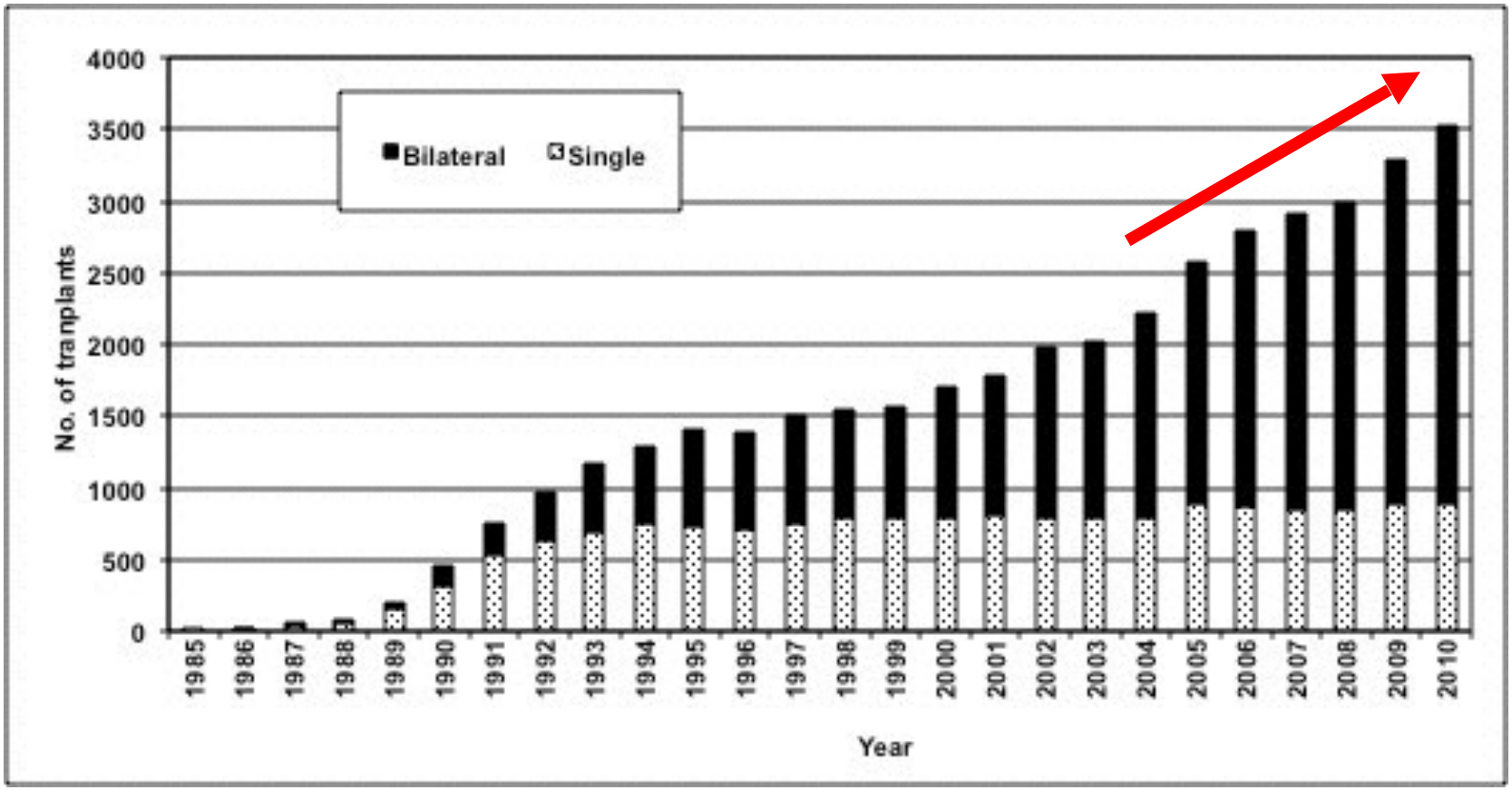


Worldwide lung transplants



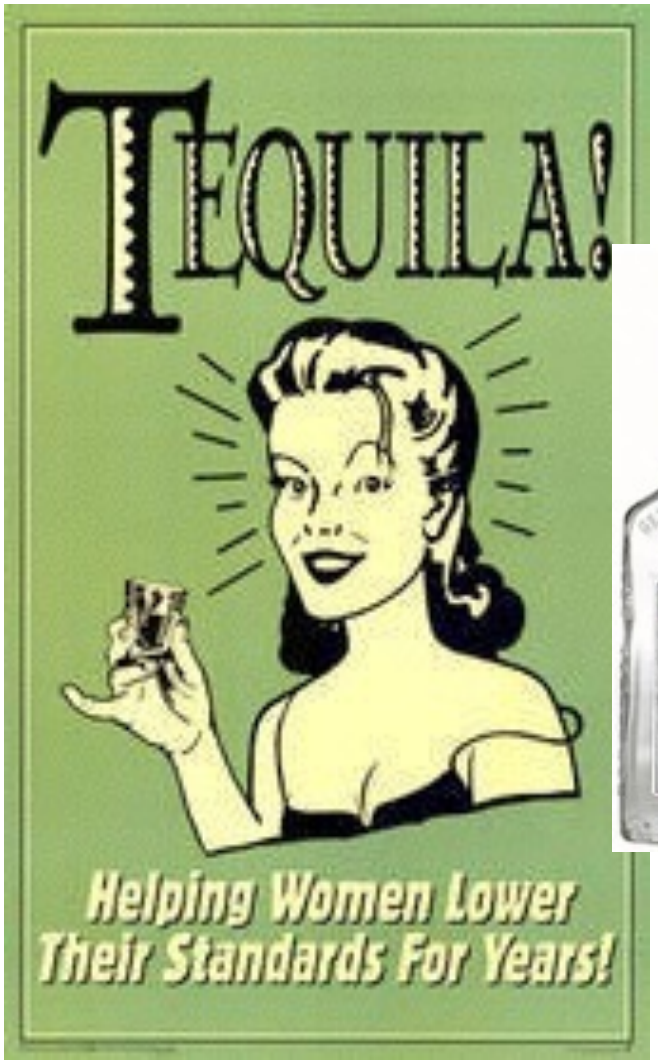
J Heart Lung Transplant 2012; 31: 1045-95

Worldwide lung transplants

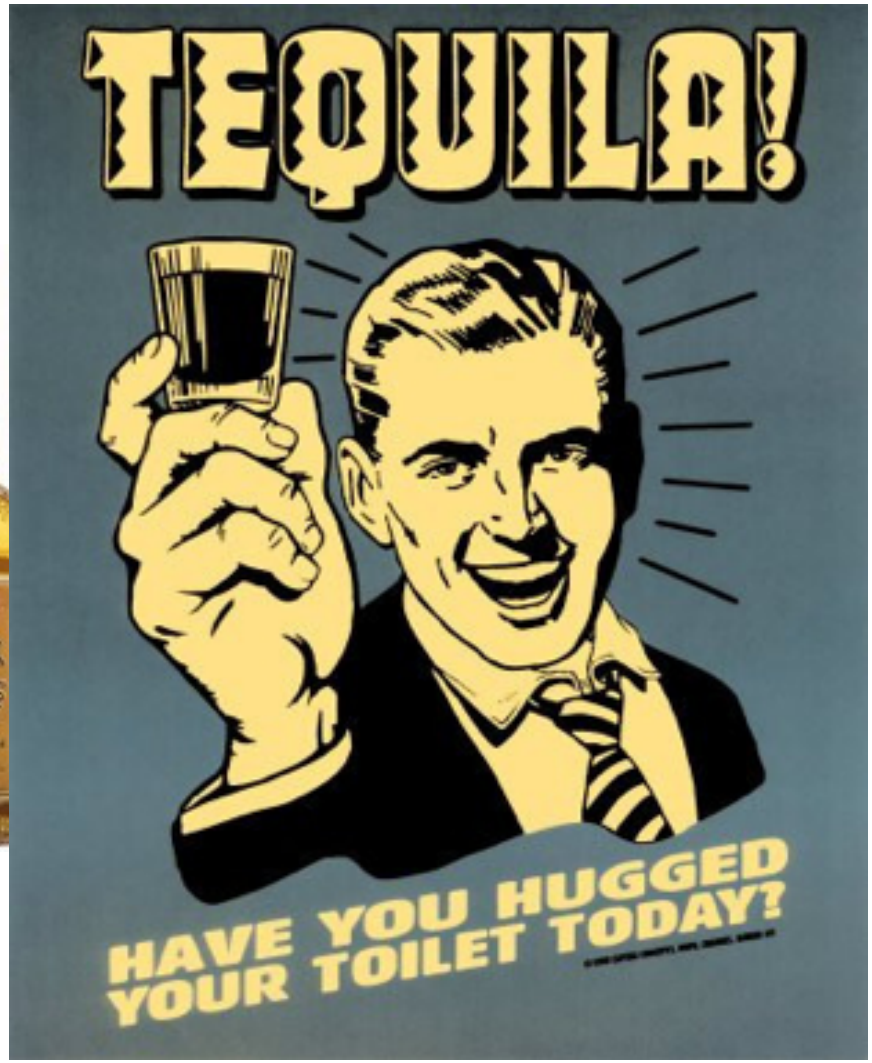


J Heart Lung Transplant 2012; 31: 1045-95

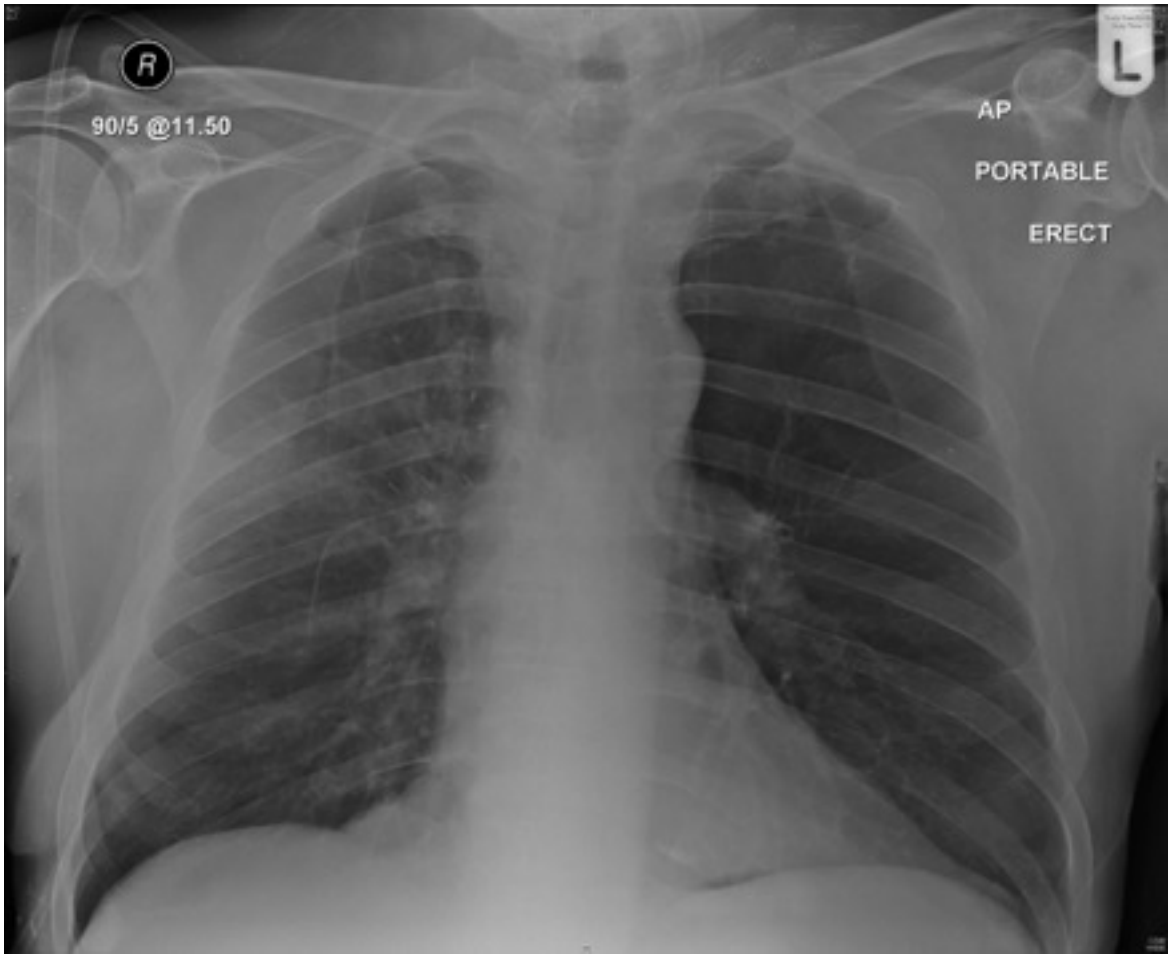
Emphysema – single LTx ?


TEQUILA!
Helping Women Lower
Their Standards For Years!

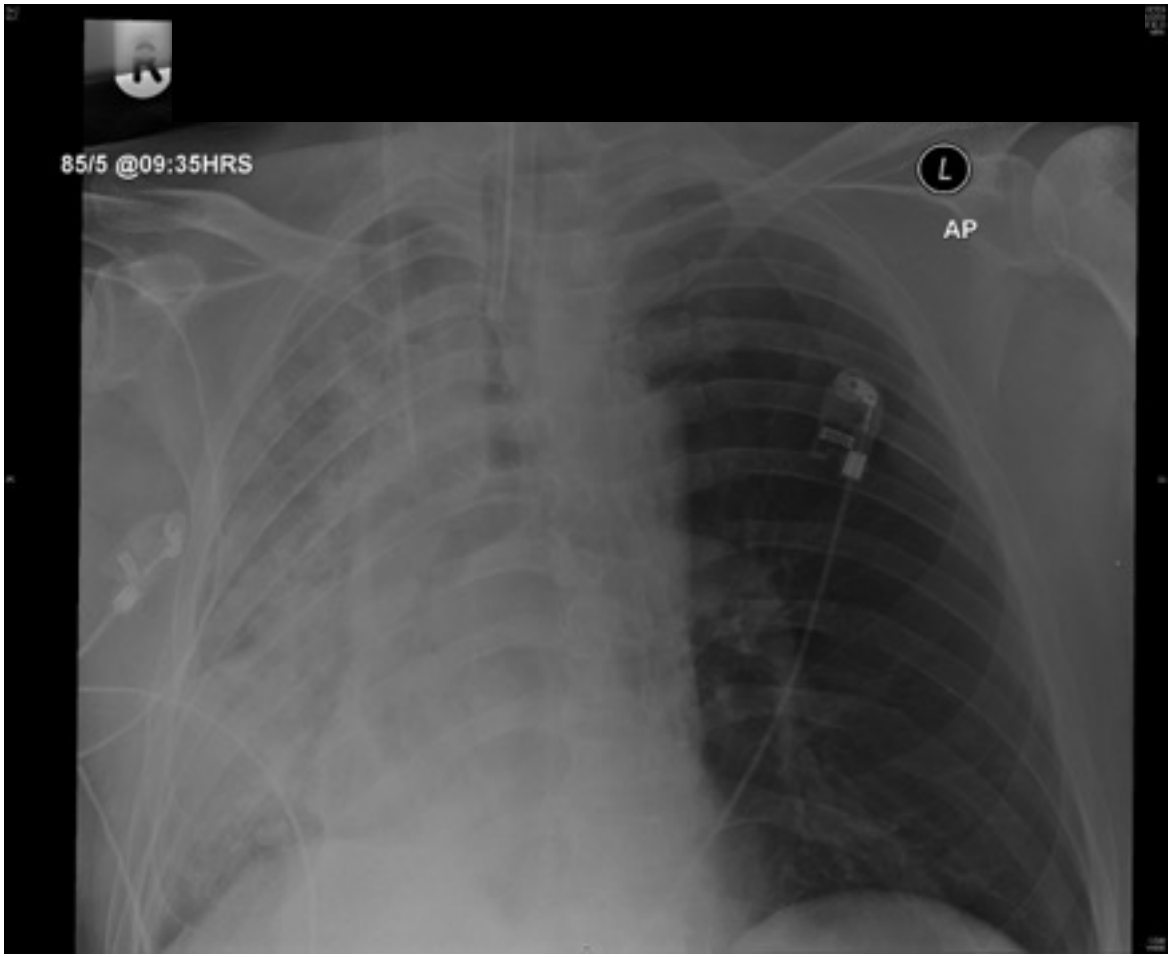

TEQUILA
TRES SOMBREROS
TEQUILA
TRES SOMBREROS


TEQUILA!
HAVE YOU HUGGED
YOUR TOILET TODAY?

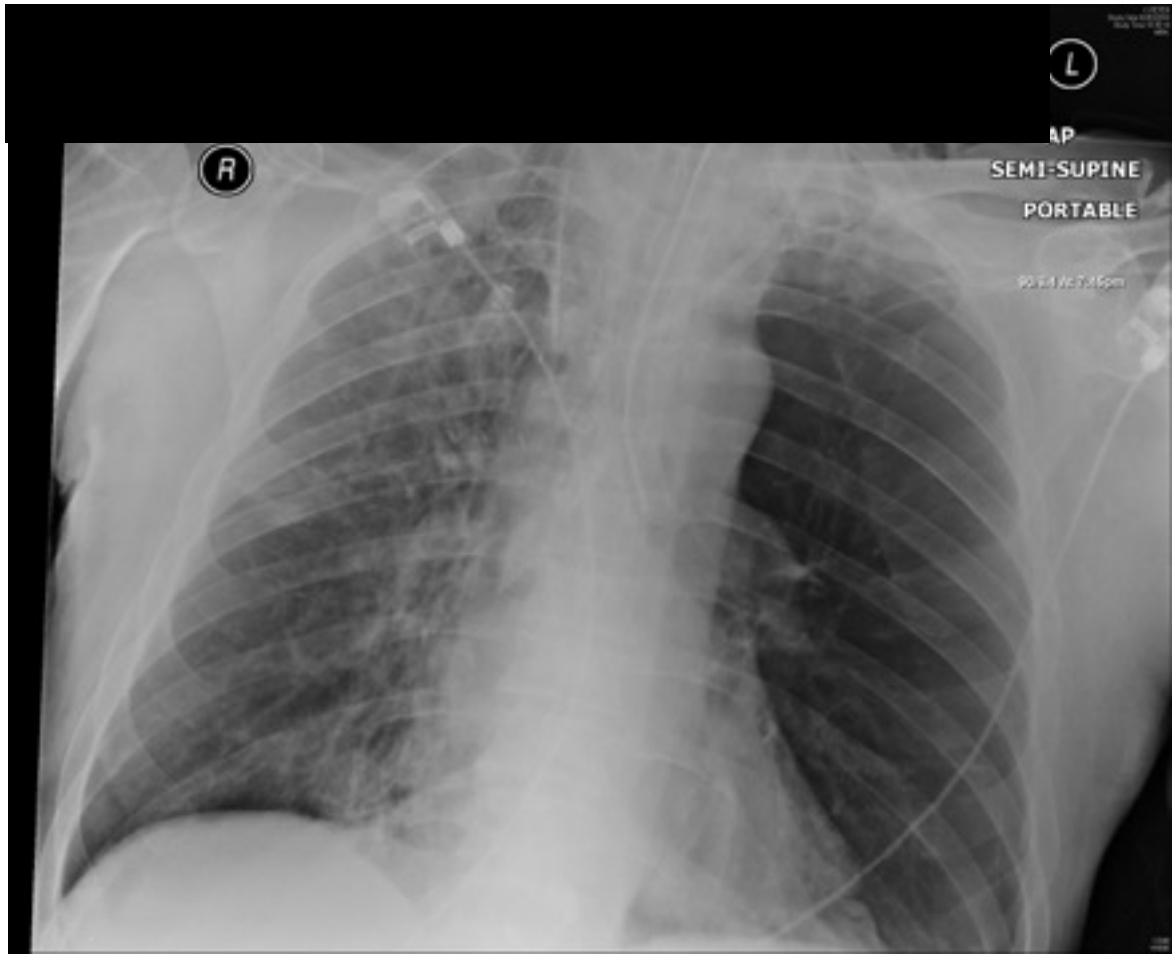
Post-op SLTx



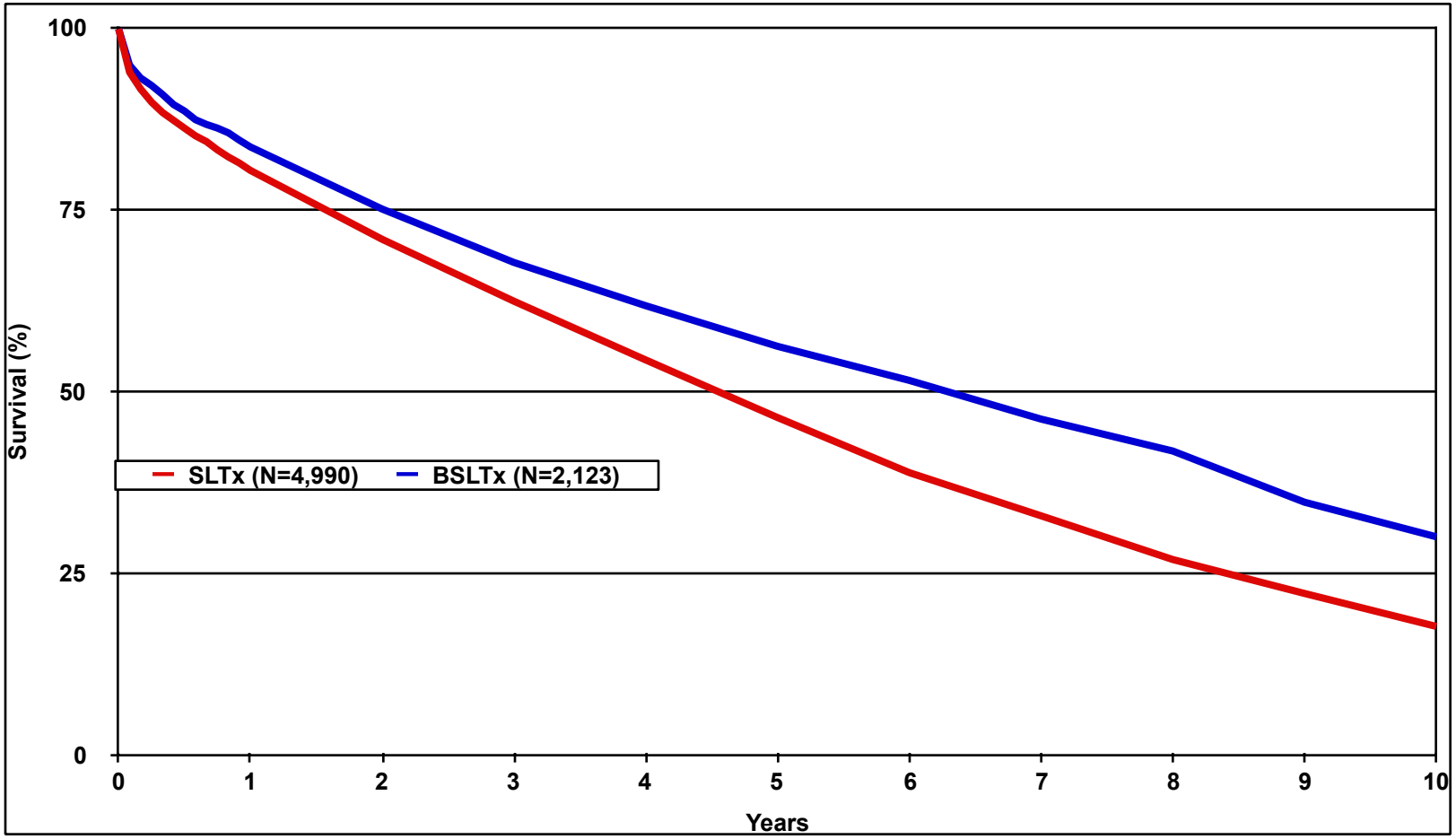
Dynamic hyperinflation



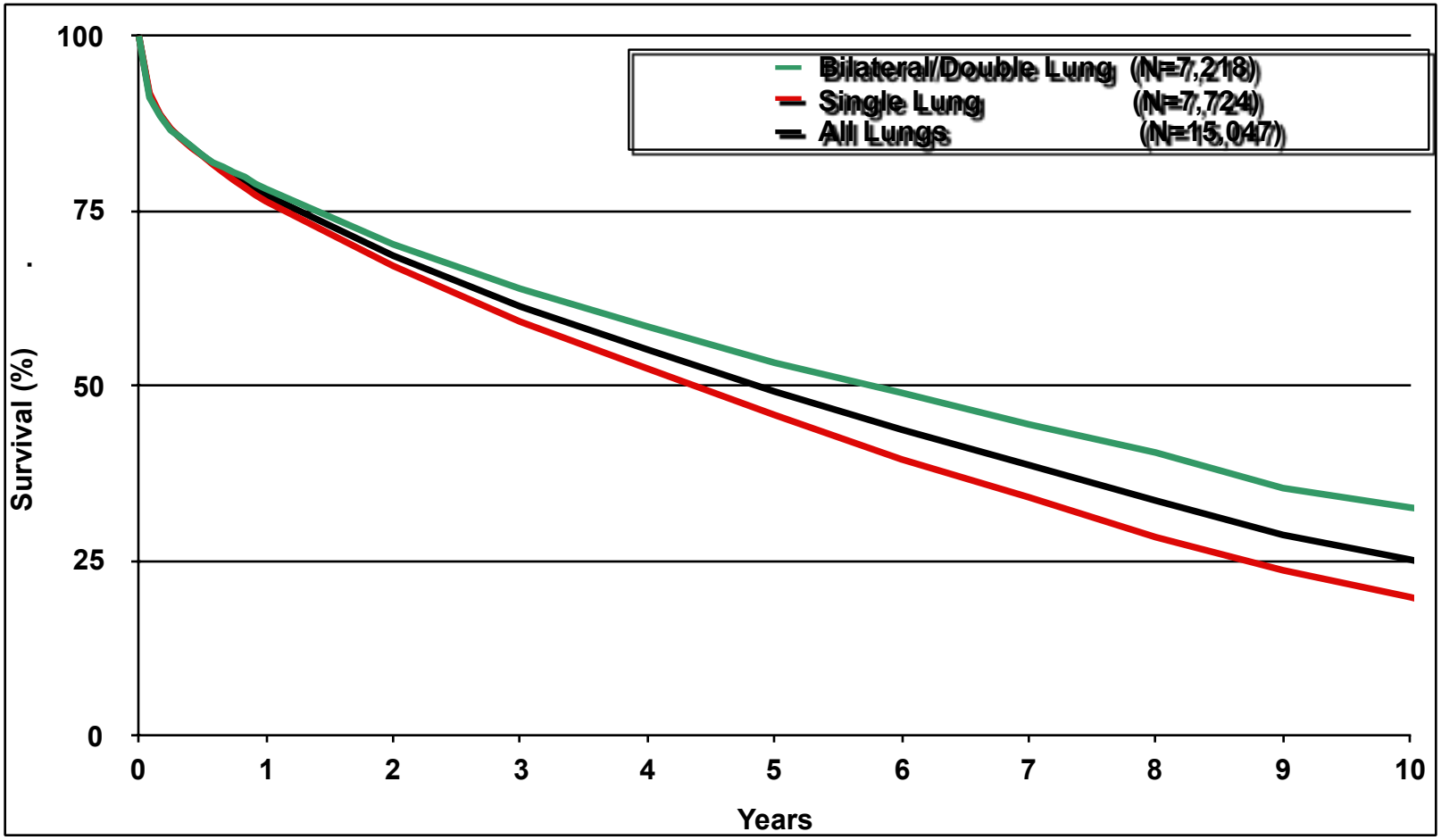
Differential lung ventilation



Emphysema – survival



Survival


Bilateral/Double Lung (N=7,218)
Single Lung (N=7,724)
All Lungs (N=15,047)
Survival (%)
100
75
50
25
0
0
1
2
3
4
5
6
7
8
9
10
Years

Where are we at GSH?

Pulmonology to lead.
(After care is key)
Willing surgeons
ECMO program on track

Anaesthesia for lung transplant

No Bypass DLT/ Bronchial blocker

E-Z blocker

Fem fem Bypass/ ECMO

Full Cardio pulmonary Bypass: Depending on surgical approach

Usually only need one ventilator

NO in theatre (20ppb)

Postcard from the top of the Matterhorn

Thank you

DEPARTMENT OF
ANAESTHESIA
UNIVERSITY OF CAPE TOWN

THANK YOU