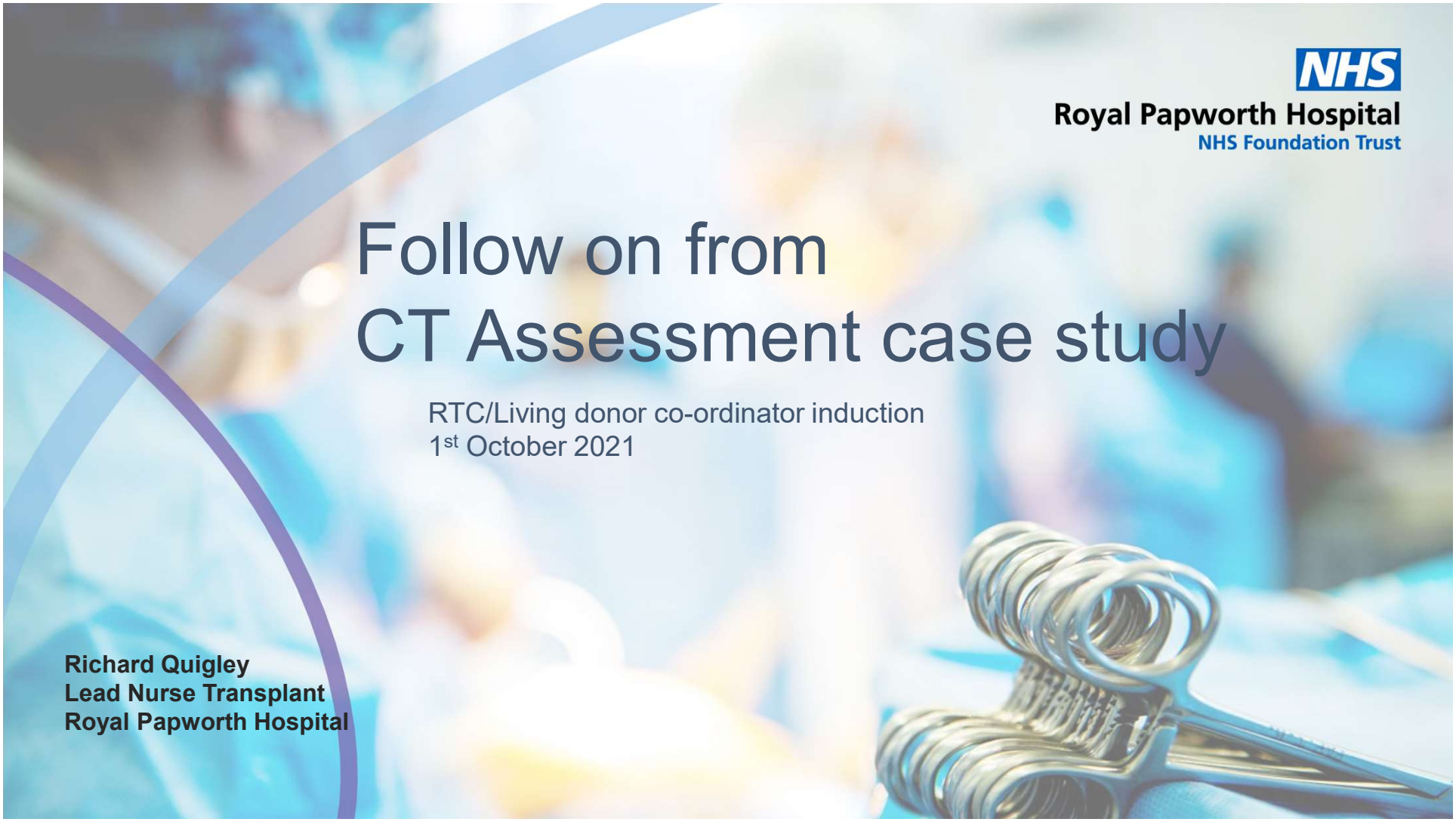

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Follow on from CT Assessment case study

RTC/Living donor co-ordinator induction
1st October 2021

Richard Quigley
Lead Nurse Transplant
Royal Papworth Hospital

Royal Papworth Hospital
NHS Foundation Trust

62 yr old Female IPF
Timeline

- 21st December – Primary assessment
- 22nd March 2 day in patient assessment
- 23rd March discussed at MDT, decision to list
- 1st April Surgical review and RTC listing talk
- 6th April RTC 1st and 2nd check
- 7th April listed on routine list for B/L transplant, also suitable for left single lung
- 10th June OP review moved to National Urgent list
- 27th July transplanted Left single lung

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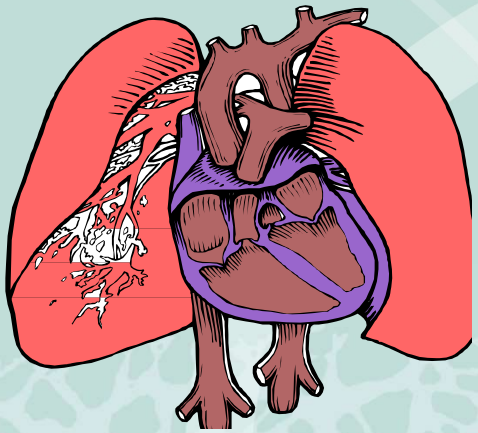
Heart/Lung Assessment Investigations

Echocardiogram

Full blood screens

Bone Densitometry

Lung Function



Blood Group

Right Heart Catheter

Sputum/Urine Micro

CPEX – exercise testing

Lung Perfusion scan

6 min walk test

Dental, smear, mammogram updates

MRI Diaphragm

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Assessment Results

- HT: 1.73 WT: 68.4kg BMI: 23
- 6MWT 563m, Sats 83% on 6L O2
- Perfusion scan RT: 63% LT: 37%
- Diaphragm screen normal
- Echo LV & RV normal size and function
- Coronary angiogram – no CAD
- Blood Group – O Pos, Virology – CMV Pos, HLA Negative
- Lung function FEV1 1.10 (40%) FVC 1.38 (39%) TLC 2.50 (pred TLC 5.63)

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Consent & Listing

Surgical plan

- Bilateral Lung = 4.0 – 4.75L
- Left single lung = 4.0 – 5.0L
- Bilateral anterior thoracotomies off pump
- Surgical consent form

Listing with RTC

- Tissue Bank
- Donor choices
- Contact details
- Calling in/false alarms
- Follow up
- Social media guidance/donor correspondence

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Transplant

- Donor offer 25th July @ 21:50
- Donor 150cm, WT 82kg BMI 36, 54yr old Female. TLC 4.11 CVA
- PO2 54 on 100%
- CMV Negative
- 22:20 B/L accepted
- KTS 26th July 04:38
- Concerns over Rt Lung – consolidation RLL
- Accept Lt single lung
- Donor X clamp 06:49
- Recipient clamp off 14:10
- Total ischemic time 441 mins

MDT Outcome

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Suitable → **Onto Waiting List – now / or in future**

Too Well → **Review/Follow up/ await Referral back**

Not suitable → **Aim to optimise/refer back to local team**

Further investigations / weight loss or gain may be needed

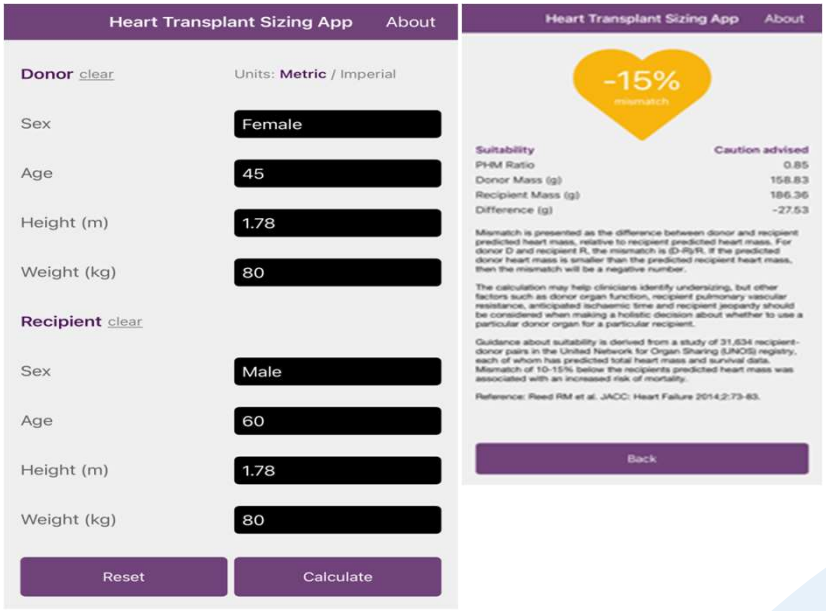
Patient Decision

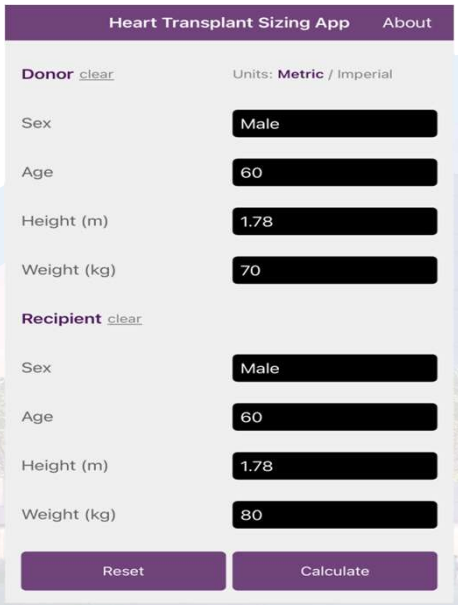
How do we Match Heart and Lung Patients to Suitable

Royal Papworth Hospital
NHS Foundation Trust

Different Centres have different feelings on how to match hearts

Lungs straightforward……if there is such a thing





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Cardiac Transplant Assessment
56yr old - ICM

172 cm 58.2kg BMI 19.6

PMH:

- VF in the context of acute coronary syndrome with angiogram confirming occluded proximal LAD with PCI to LAD, initial ejection fraction 32% with akinesis identified in his septum, anterior and all apical segments with subsequent cardiac MRI confirming ejection fraction of 16% with apical thrombus
- Family history of heart disease, High cholesterol
- COVID April 2020.

	HF risk score (mortality)			
	1 yr	2yr	3yr	5yr
SHFM	4.4%	8.8%		23%
MAGGIC	11%		26%	

6mwt: 561metres (BORG 0.5)
FEV1: 2.69 (87% pred) **FVC:** 3.93 (101% pred)
VO2 Max: 33.6 (58% pred) RER: 1.37
VE:VCO2 slope: 35.41

Blood tests	19/04/21
Haemoglobin	136
Platelets	172
Albumin	37
Bilirubin	17
Serum sodium	140
Creatinine	94
Uric Acid	512
NT Pro BNP	6882

Blood group – B Pos
HLA - awaited

ECHO – Summary

1. Severely dilated left ventricle with severely impaired systolic function. LVIDd 6.4cm.
2. Normal size right ventricle with mildly impaired systolic function.
3. Moderate TR - sPAP between 50-55mmHg. PVR estimated at 3.9WU(313 dynes).
4. Moderate "functional" mitral regurgitation.
5. Moderately dilated left atrium. Mildly dilated right atrium.
6. Trace aortic regurgitation. No obvious PFO/ASD.

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	Date 20/4/21	
BP	117/76	
RA	8	
PAP	43	
PCWP	27	
TPG	16	
SvO2	73%	
	TD	Fick
CO	2.38	3.06
CI	1.36	1.84
PVR	4.73	3.94

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Does this Patient need a Tx?

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Is she Transplantable?

Cardiac Transplant Assessment
56yr old - ICM

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Lung Sizing

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Male TLC = Ht (m) x 7.99 – 7.08			
Height (m)	TLC (L)	Height (m)	TLC (L)
1.40	4.11	1.70	6.50
1.41	4.19	1.71	6.58
1.42	4.27	1.72	6.66
1.43	4.35	1.73	6.74
1.44	4.43	1.74	6.82
1.45	4.51	1.75	6.90
1.46	4.59	1.76	6.98
1.47	4.67	1.77	7.06
1.48	4.75	1.78	7.14
1.49	4.83	1.79	7.22
1.50	4.91	1.80	7.30
1.51	4.98	1.81	7.38
1.52	5.06	1.82	7.46
1.53	5.14	1.83	7.54
1.54	5.22	1.84	7.62
1.55	5.30	1.85	7.70
1.56	5.38	1.86	7.78
1.57	5.46	1.87	7.86
1.58	5.54	1.88	7.94
1.59	5.62	1.89	8.02
1.60	5.70	1.90	8.10
1.61	5.78	1.91	8.18
1.62	5.86	1.92	8.26
1.63	5.94	1.93	8.34
1.64	6.02	1.94	8.42
1.65	6.10	1.95	8.50
1.66	6.18	1.96	8.58
1.67	6.26	1.97	8.66
1.68	6.34	1.98	8.74
1.69	6.42	1.99	8.82

Female TLC = Ht (m) x 6.6 – 5.79			
Height (m)	TLC (L)	Height (m)	TLC (L)
1.40	3.45	1.70	5.43
1.41	3.52	1.71	5.50
1.42	3.58	1.72	5.56
1.43	3.65	1.73	5.63
1.44	3.71	1.74	5.69
1.45	3.78	1.75	5.76
1.46	3.85	1.76	5.83
1.47	3.91	1.77	5.89
1.48	3.98	1.78	5.96
1.49	4.04	1.79	6.02
1.50	4.11	1.80	6.09
1.51	4.18	1.81	6.16
1.52	4.24	1.82	6.22
1.53	4.31	1.83	6.29
1.54	4.37	1.84	6.35
1.55	4.44	1.85	6.42
1.56	4.51	1.86	6.49
1.57	4.57	1.87	6.55
1.58	4.64	1.88	6.62
1.59	4.70	1.89	6.68
1.60	4.77	1.90	6.75
1.61	4.84	1.91	6.82
1.62	4.90	1.92	6.88
1.63	4.97	1.93	6.95
1.64	5.03	1.94	7.01
1.65	5.10	1.95	7.08
1.66	5.17	1.96	7.15
1.67	5.23	1.97	7.21
1.68	5.30	1.98	7.28
1.69	5.36	1.99	7.34

Transplant Assessment
54yrs Female – Hypersensitive Pneumonitis

Royal Papworth Hospital
NHS Foundation Trust

159cm, 73.4kg, BMI 24

PMH:

- ILD (fibrotic HP with UIP pattern)
- Minimal movement of right diaphragm on USS
- Minor coronary atheroma
- Pulmonary Hypertension (mPAP) 36mmHG with dilated RV on ECHO.
- Vit D deficiency

Blood tests	10/05/21
Haemoglobin	181
Platelets	305
Albumin	36
Bilirubin	11
ALP	83
Creatinine	75

Blood group A Pos

HLA- CRF 89% MFI > 2000

RHC 15/12/20

PAP	36 (60/19)
TPG	33
CO (Fick)	4.98
CI (Fick)	2.58
PVR (Fick)	6.63

Respiratory Function

FEV1	1.60 (43%)
FVC	1.73 (36%)
PEF	9.36
KCO	0.78
TLCO	1.84
RV	0.91
TLC	2.67
Pred TLC	6.42

ECHO 15/12/2020

1. Dimensionally normal LV with overall good systolic function. LVEF 65%. Grade I diastolic function
2. Dilated RV with impaired function – FAC 26%
3. No significant valve disease. At least probability of PHT likely underestimated suggest correlation with RHC.

Transplant Assessment 58yrs Male - ILD

Royal Papworth Hospital NHS Foundation Trust

177cm 86.8kg BMI 27.7

PMH-

Interstitial Lung Disease (with possible connective tissue features)
Pulmonary Hypertension
Previous Hypertension
Hypercholesterolaemia
Diabetes

Perfusion Scan - Right 53% Left 47%

MRI: Normal excursion of the right and left hemidiaphragms

6mwt – 90meters, min Sats 89% on 5L O_2

Blood tests

Haemoglobin	159
Platelets	192
Albumin	40
Bilirubin	15
ALP	95
Creatinine	126

Blood group – O pos

HLA- cRf 15% MFI > 5000

Respiratory Function

FEV1	2.23 (64%)
FVC	2.70 (60%)
PEF	466
KCO	0.57 (40%)
TLCO	1.76 (20%)
RV	1.24
TLC	3.80
Pred TLC	7.06

ECHO 08/03/21

1. Severely dilated right ventricle size, mild RVH with overall moderate to severely impaired systolic function.
2. Moderate to severe TR. sPAP estimated at 108 to 113 mmHg. Mild to Moderate PR. mPAP estimated at 67 to 72mmHg.
3. Severely dilated right atrium. Dilated main pulmonary artery and IVC.
4. Small/underfill left ventricle size, wall thickness and systolic function. Significant septal flattening was consistent with right ventricular pressure and volume overload. No RWMAs noted.
5. Normal left atrium size.
6. Small to moderate posterior pericardial effusion noted with no hemodynamic compromise

Transplant Assessment
60yrs - COPD

Royal Papworth Hospital
NHS Foundation Trust

181cm 73.3 kg BMI 22

PMH-

COPD

Diverticulosis

6mwt –

68meters, min Sats 95% on 5L02

Blood tests

Haemoglobin	152
Platelets	226
Albumin	40
Bilirubin	9
ALP	52
Creatinine	60

Blood group A POS

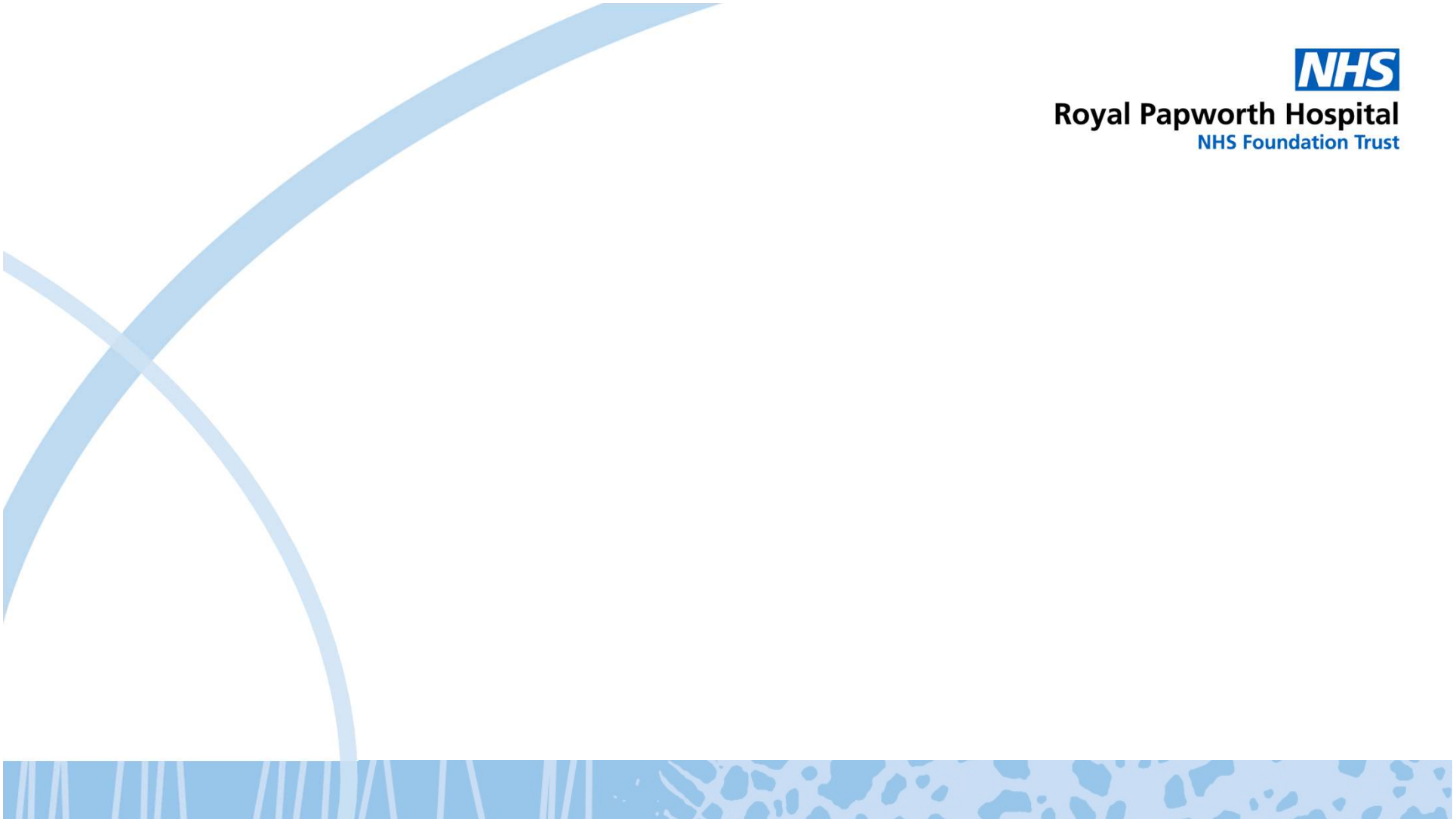
HLA- No HLA Antibodies

Respiratory Function

FEV1	0.33 (9%)
FVC	1.80 (37%)
PEF	210
KCO	0.64 (45%)
TLCO	2.14
RV	--
TLC	13.71 (186%)
Pred TLC	7.38

ECHO 08/02/21

1. Normal size left ventricle with visually normal systolic function. Flattening of the IVS consistent with right ventricle pressure overload.
2. Unable to measure right ventricle. RV appears to be normal size in parasternal short axis views with mildly impaired systolic function at most. RV hypertrophy noted.
3. sPAP estimated at 57mmHg + RAP.
4. Unable to measure right atrium. Normal size left atrium.



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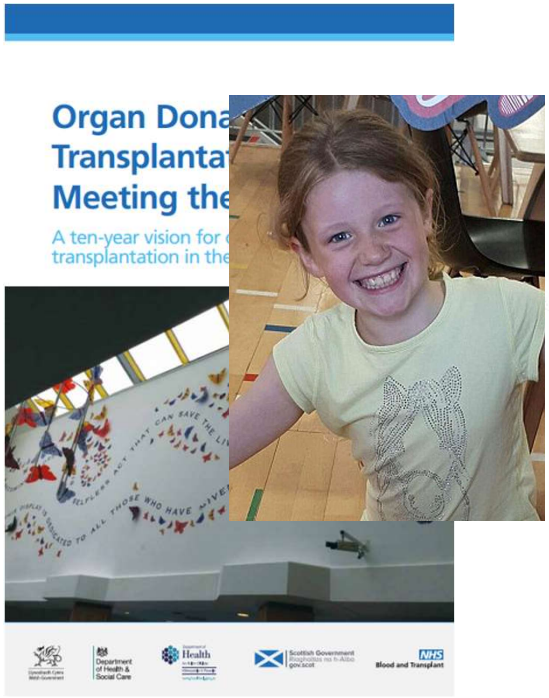
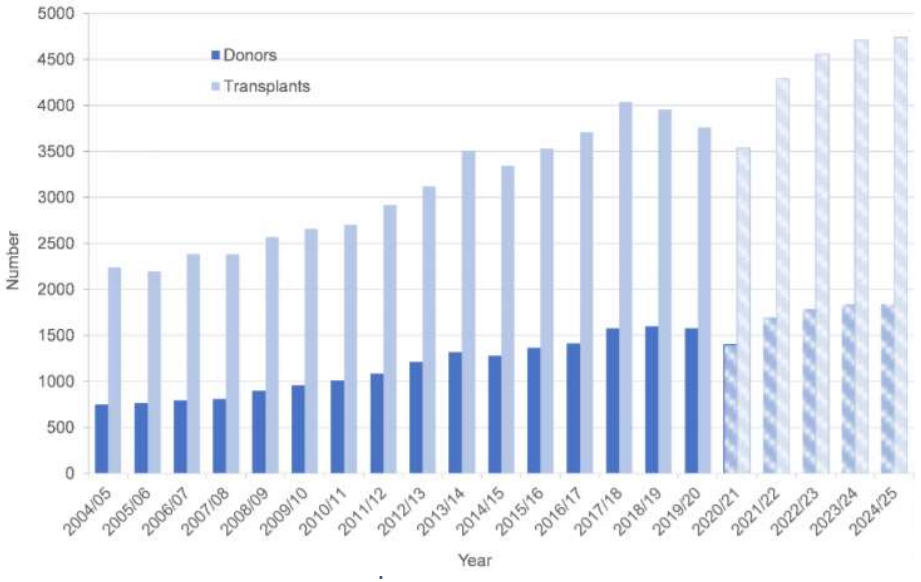
The Future


Organ Dona
Transplanta
Meeting the
A ten-year vision for
transplantation in the
Department of Health & Social Care
Health
NHS
Blood and Transplant


Donors
Transplants
Number
Year
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
2004/05
2005/06
2006/07
2007/08
2008/09
2009/10
2010/11
2011/12
2012/13
2013/14
2014/15
2015/16
2016/17
2017/18
2018/19
2019/20
2020/21
2021/22
2022/23
2023/24
2024/25

DCD Donation

Royal Papworth H
NHS

	US	Portugal
II	14	21
III	2323	0
IV	35	0

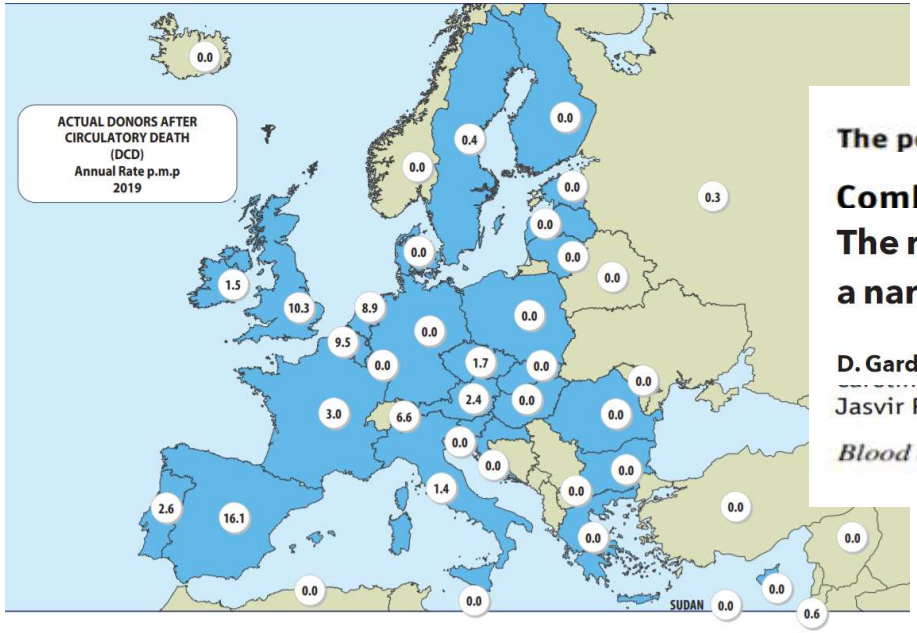
DISCUSSION

An uncontrolled DCD organ donation programme in the RIE might be able to enrol around four patients per year potentially allowing up to eight extra renal transplants per annum. With a steady rise of people on the ODR[5] it is not unreasonable to anticipate that these numbers may increase in the future. Such programmes have been proven to be beneficial and sustainable in the long run. Spain for example, has been doing Category II DCD for years, and consistently reports success.[6–8]

There are many ethical, legal and clinical challenges to setting up such an uncontrolled DCD organ donation programme; however, with the publication of two important Academy of Medical Royal Colleges documents,[9 10] there is now some much needed UK guidance in the area of the diagnosis of death and DCD organ donation. The ethical, legal and clinical challenges of uncontrolled DCD will continually need to be reviewed as practices change and new interventions in the field of cardiac

DCD Donation

Royal Papworth H
NHS F



The potential of heart transplantation

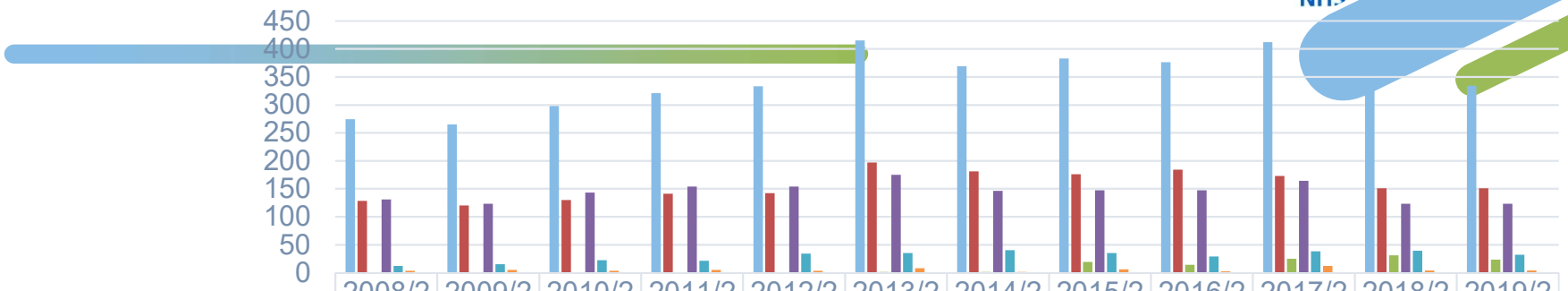
Combined heart—lung transplantation from a

The rise of organ donation after circulatory death: a narrative review

D. Gardiner,[1] **M. Charlesworth**,[2] **A. Rubino**[3] and **S. Madden**[4]
Jasvir Parmar, PhD, and Pedro Catarino, FRCS

Blood and Transplant, Bristol, United Kingdom.

Cardiothoracic Organs Transplanted in the UK



	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020
Total Cardiothoracic Organs	274	265	298	321	333	415	369	383	376	412	348	334
DBD Heart	128	120	130	141	142	197	181	176	184	173	151	151
DCD Heart	0	0	0	0	0	1	1	19	14	25	31	23
DBD Lung	131	123	143	154	154	175	146	147	147	164	123	123
DCD Lung	12	15	22	21	34	35	40	35	29	38	39	32
DBD Heart/Lung	3	5	3	5	3	8	1	6	2	12	4	4
DCD Heart/Lung	0	0	0	0	0	0	0	0	0	0	0	1

Total Cardiothoracic Organs DBD Heart DCD Heart
DBD Lung DCD Lung DBD Heart/Lung
DCD Heart/Lung

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Organ Care System

reperfusion injury that follows.

In a study in humans comparing the outcome after HTx from DCD and DBD donors,[30] EVHP was used for normothermic preservation, transport, and biochemical assessment in all DCD hearts. DCD heart retrieval used one of two differing techniques: normothermic regional perfusion (NRP) or direct procurement and perfusion (DPP). NRP describes a technique whereby perfusion is restored to the arrested heart while still in situ (with exclusion of the cerebral circulation). This approach enables post–warm-ischemia functional assessment of the heart in the donor by pulmonary artery catheter measurements and transesophageal echocardiography. This technique, however, is limited in numerous countries by ethical objection to the restoration of circulation in a deceased donor. The alternative to NRP is DPP, whereby the heart is removed directly after flush with a cold cardioplegia solution and installed and reperfused on EVHP. In DPP, functional assessment of the DCD heart is not possible and, therefore, levels of biomarkers in the EVHP perfusate are used to reflect allograft viability. The study was a single-center observational matched heart study to compare patients who received transplants of DCD donor hearts with matched recipients who received transplants of DBD donor hearts. Twenty-eight DCD heart transplants were performed with almost equal numbers of DCD hearts procured by either NRP or DPP. Survival at 90 days (DCD 92%, DBD 96%, $P = 1.0$), hospital length of stay, allograft function, and 1-year survival (DCD 86%, DBD 88%, $P = .98$) were comparable between groups. The retrieval method (NRP vs DPP) was not associated with a difference in outcome. Early cardiac output was, however, better in the DCD group (2.5 vs 2.1 L/min/m^2, $P = .04$), possibly explained by the avoidance of myocardial injury caused by the catecholamine storm during brain death in DBD donors and/or a possible effect of ischemic preconditioning after WLST in DCD donors.

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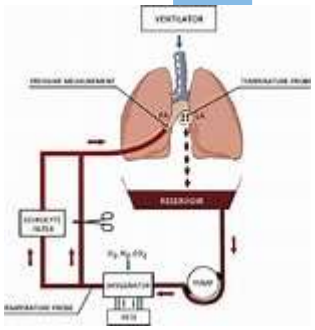
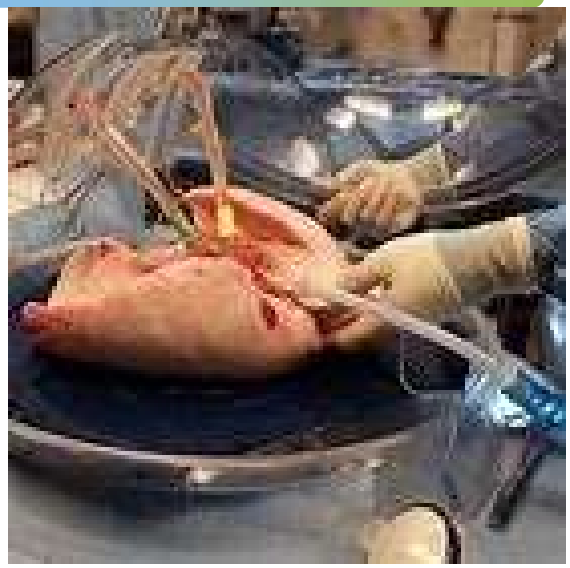
Assessment and Recovery Centres





Novel Techniques and Technologies

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NHS F

Transplant team win
Royal Papworth Hospital's organ retriev
Retrieval' award alc
DCD heart transpla

25 February 2021
The organ retrieval team a
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Mr Pradeep Kaul, Consult
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Tomasz Kłosiewicz[1,2]
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Donor Simvastatin Treatment in Heart Transplantation

A Randomized and Blinded Clinical Trial

Editorial, see p 641

Antti I. Nykänen, MD, PhD
Emil J. Holmström, MD
Raimo Tuuminen, MD, PhD
Rainer Krebs, MSc, PhD
Kishor Dhaygude, MSc
Matti Kankainen, MSc, PhD
Janne J. Jokinen, MD, PhD
Jyri Lommi, MD, PhD
Ilkka Helanterä, MD, PhD
Anne Räisänen-Sokolowski, MD, PhD
Simo O. Syrjälä, MD, PhD
Karl B. Lemström, MD, PhD

BACKGROUND: Ischemia-reperfusion injury may compromise the short-term and long-term prognosis after heart transplantation. Experimental studies show that simvastatin administered to the organ donor is vasculoprotective and inhibits cardiac allograft ischemia-reperfusion injury.

METHODS: Eighty-four multiorgan donors were randomly assigned to receive 80 mg of simvastatin (42 donors) via nasogastric tube after declaration of brain death and upon acceptance as a cardiac donor, or to receive no simvastatin (42 donors). The primary efficacy end point was postoperative plasma troponin T and I levels during the first 24 hours after heart transplantation. Secondary end points included postoperative hemodynamics, inflammation, allograft function, rejections and rejection treatments, and mortality.

RESULTS: Organ donor simvastatin treatment significantly reduced the heart recipient plasma levels of troponin T by 34% (14 900 ± 12 100 ng/L to 9800 ± 7900 ng/L, P=0.047), and troponin I by 40% (171 000 ± 151 000 ng/L to 103 000 ± 109 000 ng/L, P=0.023) at 6 hours after reperfusion, the levels of NT-proBNP (N-terminal pro-B-type natriuretic peptide) by 36% (32 800 ± 24 300 ng/L to 20 900 ± 15 900 ng/L; P=0.011) at 1 week, and the number of rejection treatments with hemodynamic compromise by 53% within the first 30 days (P=0.046). Donor simvastatin treatment did not affect donor lipid levels but was associated with a specific transplant myocardial biopsy gene expression profile, and a decrease in recipient postoperative plasma levels of CXCL10 (C-X-C motif chemokine 10), interleukin-1α, placental growth factor, and platelet-derived growth factor-BB. Postoperative hemodynamics, biopsy-proven acute rejections, and mortality were similar. No adverse effects were seen in recipients receiving noncardiac solid organ transplants from simvastatin-treated donors.

CONCLUSIONS: Donor simvastatin treatment reduces biomarkers of myocardial injury after heart transplantation, and—also considering its documented general safety profile—may be used as a novel, safe, and inexpensive adjunct therapy in multiorgan donation.

Key Words: heart transplantation ■ ischemia ■ reperfusion ■ statins

Sources of Funding, see page 639

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rski[2,5], Maciej Sip[1,2],

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ethics committee, preferably in conjunction with the BTS ethics committee.

Thank you

Royal Papworth Hospital
NHS Foundation Trust

Organ Donor Register

0300 123 23 23
www.uktransplant.org.uk

richardquigley@nhs.net