

10°C Preservation of Donor Lungs

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Static Lung storage at 10°C

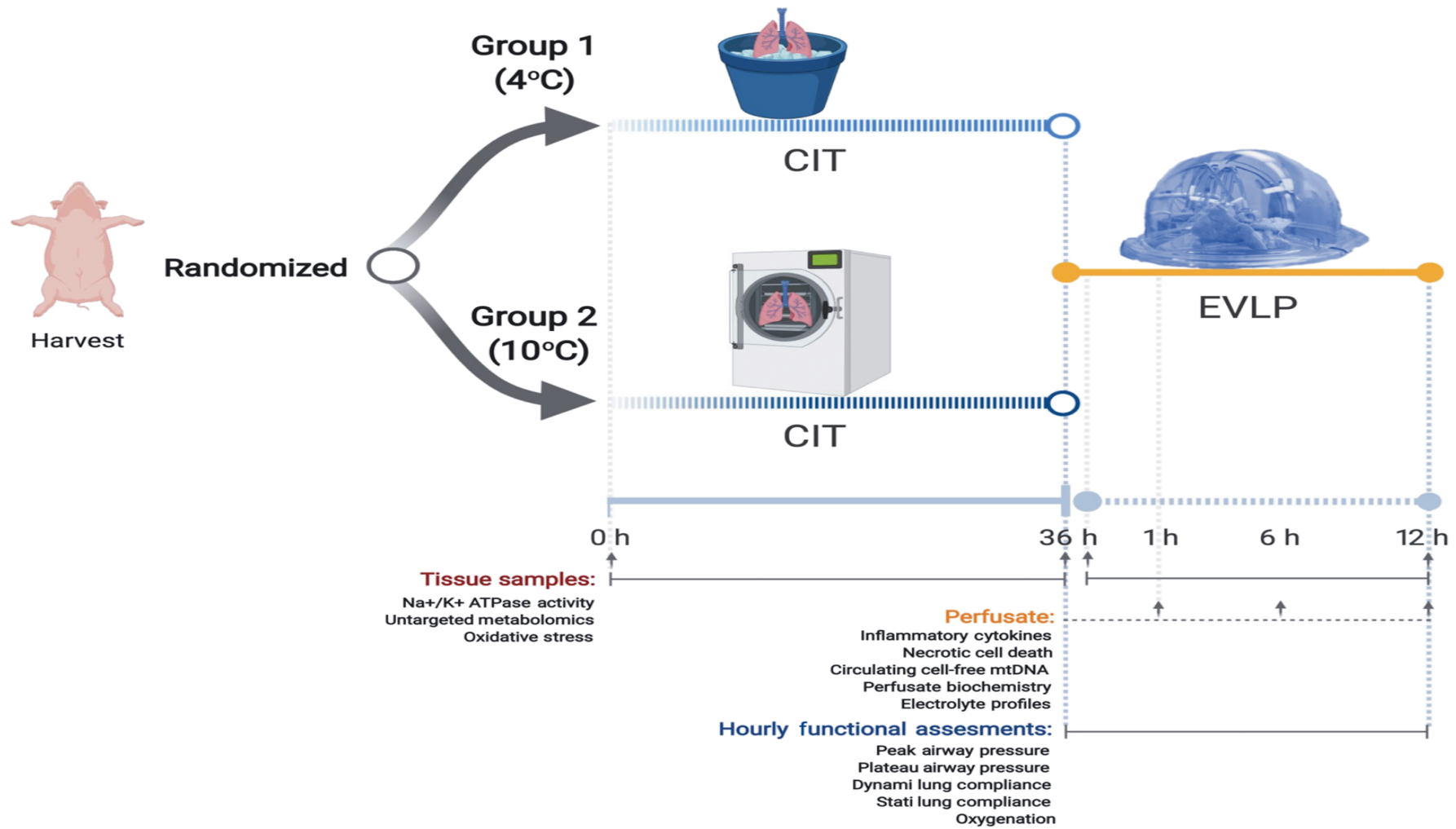
- Traditional static storage of lungs requires
 - Cold flushing of donor lungs/storage on ice
 - ISHLT registry median cold ischemic storage time of 5.5 hours
- This limits the window of usage
- Reduce cellular metabolism and improve cellular viability
- Increasing recognized that this is injurious to mitochondria
- There remains a need to extend the window of preservation
- Studies from 1980's demonstrated improved cellular kinetics in lungs stored at 10°C (1-3)

Static lung storage at 10°C maintains mitochondrial health and preserves donor organ function

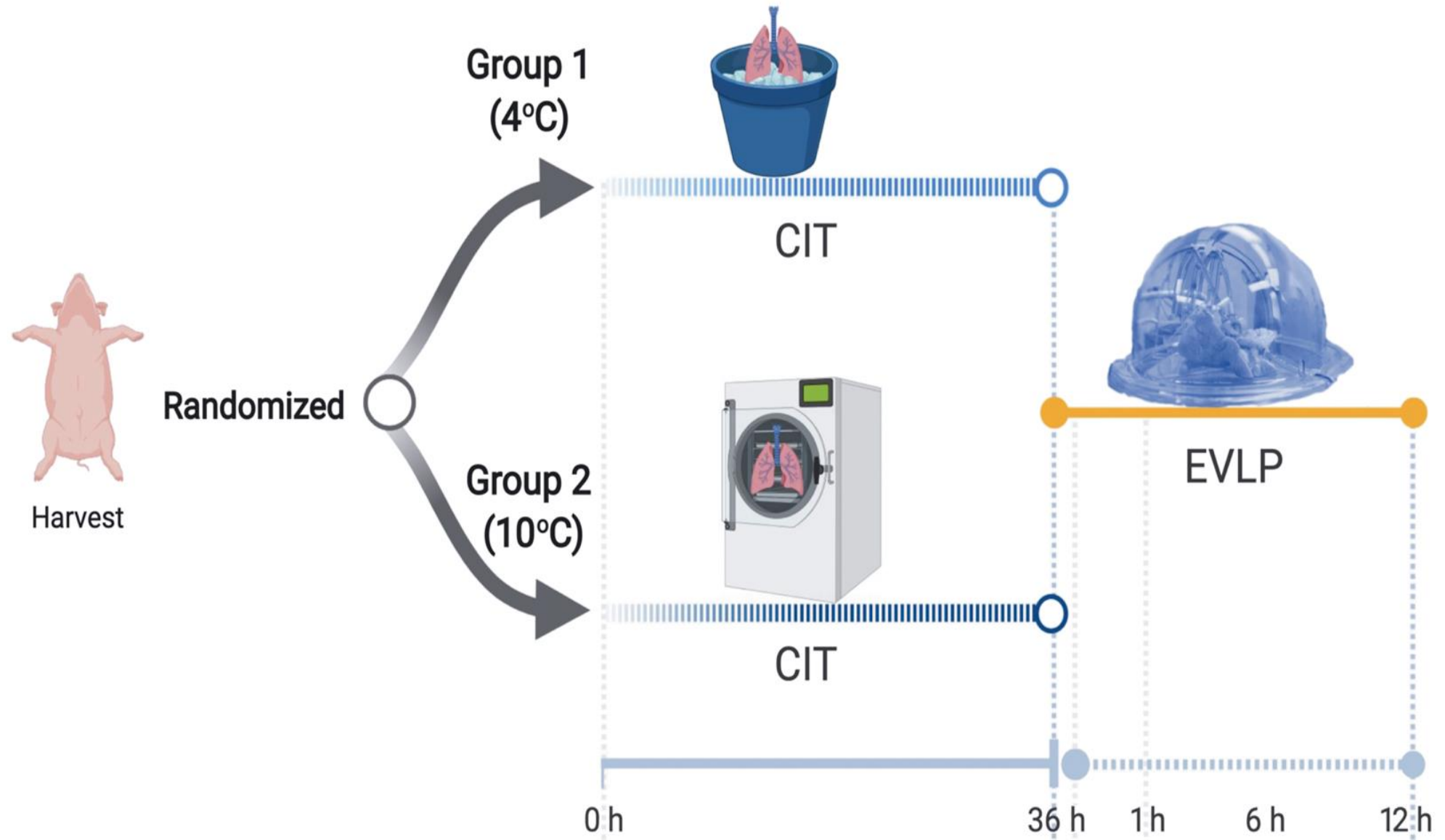
Ali et al., Sci. Transl. Med. 13, (2021)

- Tested in a large animal model (porcine transplant)
- Donor lungs ($n = 5$ per group) were randomized to storage
 - 10°C in a thermoelectric cooler
 - 4°C in a walk-in cooler
- After 36 hours of cold static preservation
- 12 hours of assessment in the normothermic EVLP
- Functional and biological differences between the groups

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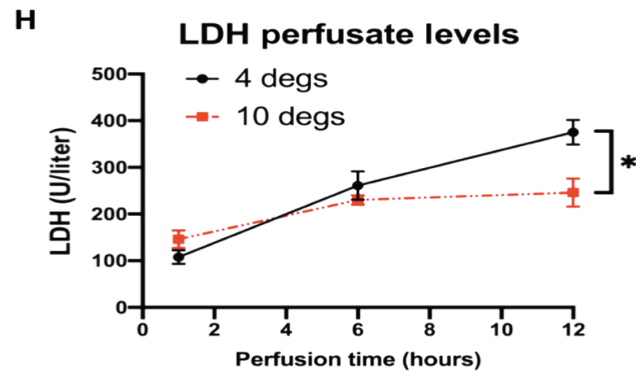
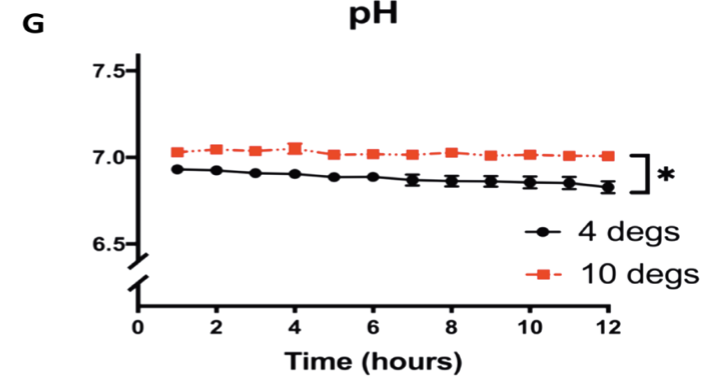
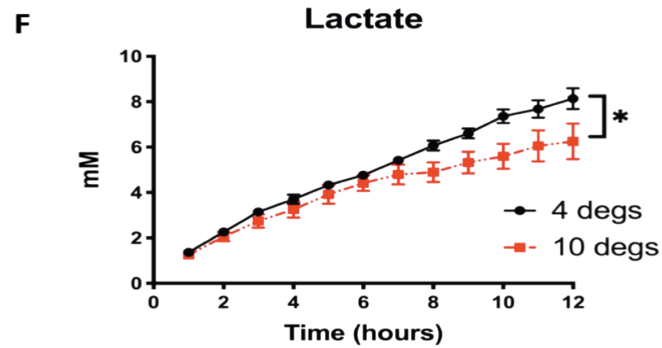
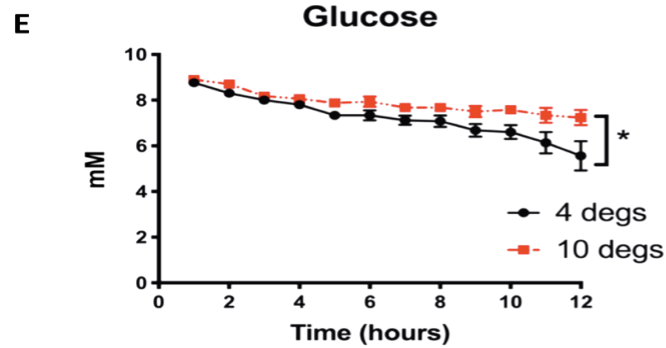
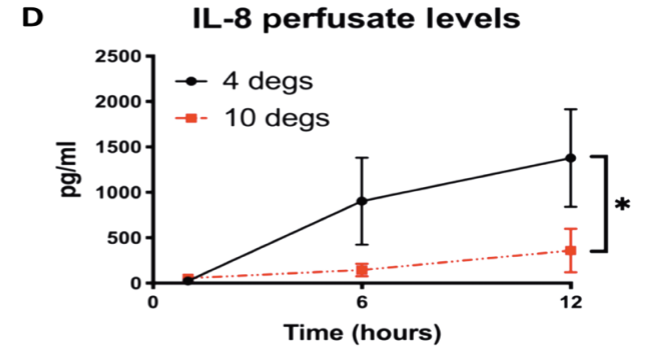
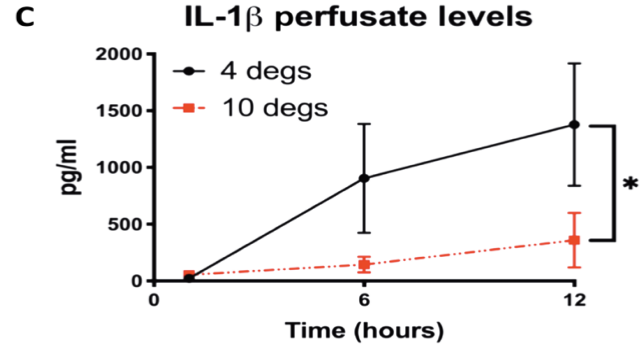
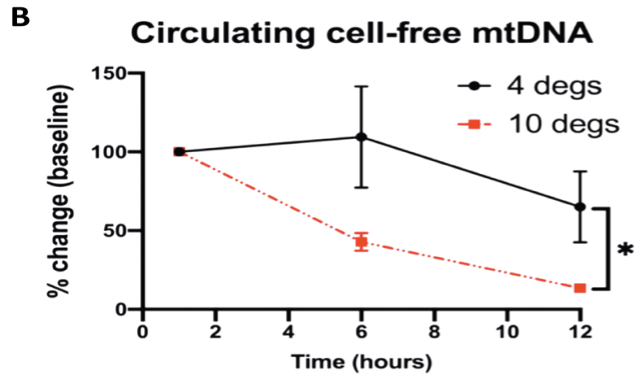
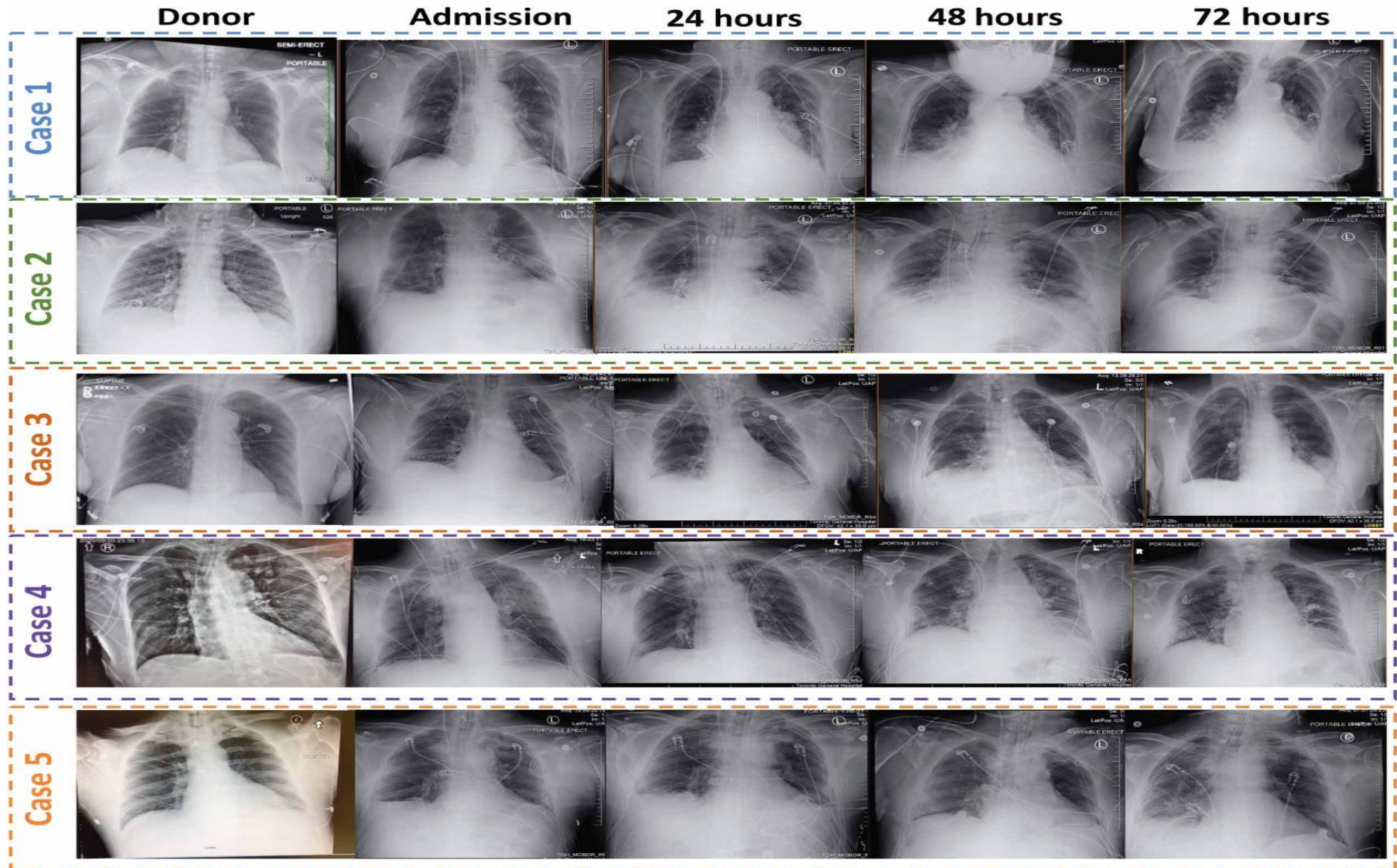


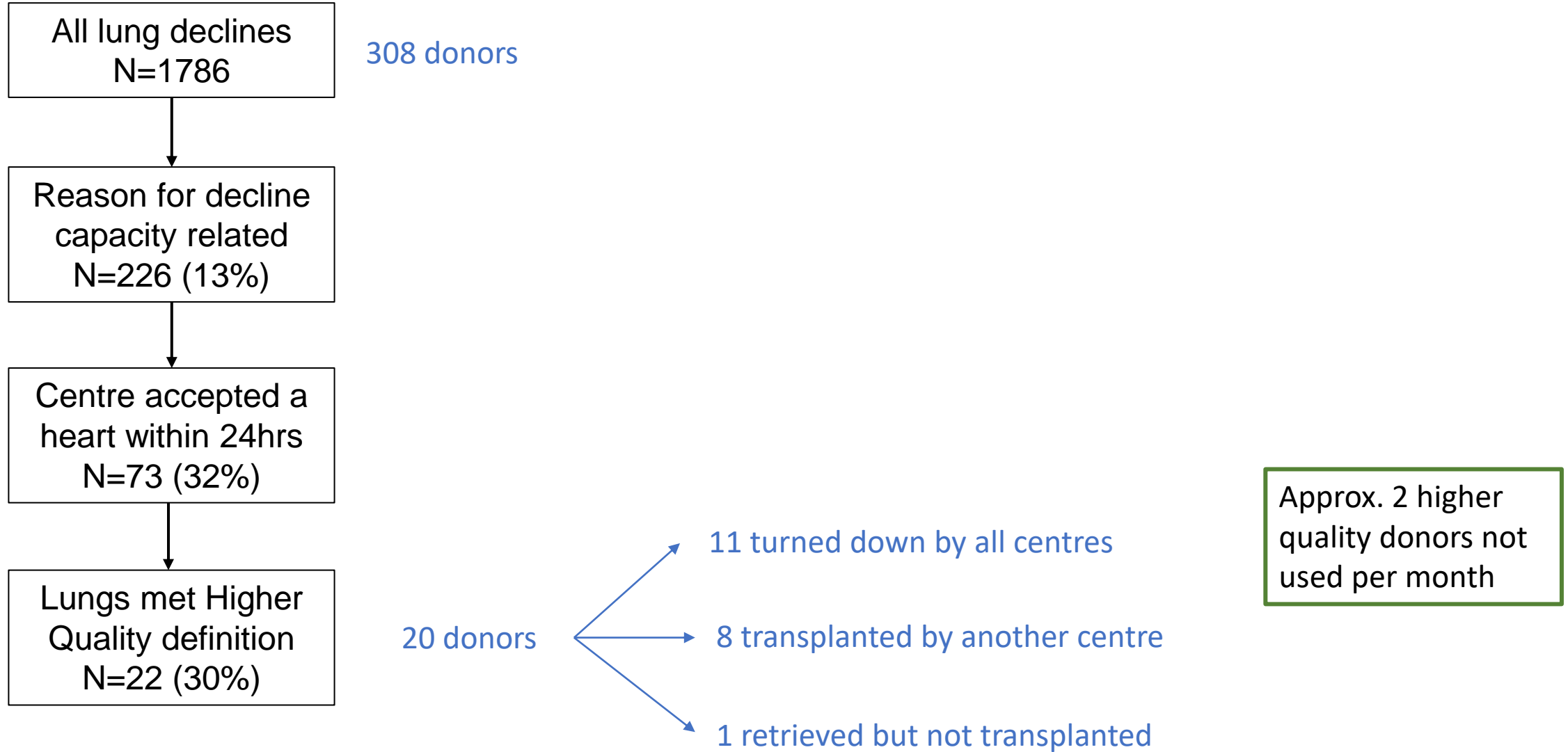
Table 2. Donor and recipient information and outcomes of patients receiving lung transplants in clinical pilot study. DBD, donation after brain death; DCD, donation after cardiac death; LTx, lung transplantation; PGD, primary graft dysfunction; LOS, length of stay; ICU, intensive care unit; NO, nitric oxide; ECMO, extracorporeal membrane oxygenation; COPD, chronic obstructive pulmonary disease; IPF, idiopathic pulmonary fibrosis, n/a, not applicable.

	Case 1	Case 2	Case 3	Case 4	Case 5
Donor					
Type	DBD	DBD	DCD	DBD	DCD
Lungs donated	Double	Double	Double	Double	Double
Age	53	37	67	71	53
Sex	F	M	F	M	M
Time to arrest (min)	n/a	n/a	19	n/a	65
Warm ischemic time (min)	n/a	n/a	20	n/a	25
Preservation					
Total 10°C storage time (hours)	3.47	5.62	9.58	5.27	9.57
First lung total ischemic time (hours)	9.92	8.77	14.32	10.40	14.77
Second lung total ischemic time (hours)	11.83	10.92	16.32	12.13	16.5
Recipient					
LTx indication	COPD	IPF	IPF	IPF	IPF
Age	74	65	70	69	70
Sex	F	M	M	M	M
PGD grade admission	1	3	1	1	2
PGD grade 24 hours	1	2	1	1	2
PGD grade 48 hours	1	1	1	1	2
PGD grade 72 hours	1	1	2	1	2
Hospital LOS (days)	26	14	25	16	18
ICU LOS (days)	1	4	7	2	9
Post-transplant days of mechanical ventilation (Exact)	0.24	1.73	2.13	0.91	6.17
Post-transplant NO used?	No	No	No	No	No
Post-transplant ECMO required?	No	No	No	No	No
Currently alive?	Yes	Yes	Yes	Yes	Yes

Post-transplant



Results



How could this work in the UK

- Given the number of S/U and Urgent hearts
- Always going to be a heart in ICU that needs transplantation
- Most centres can't run two theatres
- Allows both organs to be accepted
- Lungs preserved in 10°C fridge for up to 6-10 hours
- Allows utilization of both organs
- Reduces lung transplant waiting list mortality



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* 115V with US plug. For 230V (EU plug), please add (-E)

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References:

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