

DOUBLE-LUNG VERSUS HEART-LUNG TRANSPLANTATION
FOR PRE-CAPILLARY PULMONARY HYPERTENSION;
a 24-year single-center experience

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INTRODUCTION

Lung transplantation (LTx) is the treatment of choice for selected patients with end-stage pulmonary hypertension (PH), defined as mean pulmonary artery pressure > 25 mm Hg at rest, refractory to medical or surgical treatment. Among all indications for LTx, PH-recipients have the lowest reported one-year survival. Both heart-lung transplantation (HLT) and double-lung transplantation (DLT) have been reported as effective methods to improve prognosis. There is, however, no consensus in the literature of what the best transplant type is for these patients.

PH Classification according to World Symposium*

- Group 1: Pulmonary arterial hypertension (PAH)
 - Group 2: Pulmonary hypertension due to left heart disease
 - Group 3: Pulmonary hypertension due to lung disease and/or hypoxia
 - Group 4: Chronic thromboembolic pulmonary hypertension (CTEPH)
 - Group 5: Pulmonary hypertension with unclear and/or multifactorial mechanisms
- * Galie N et al. Eur Heart J 2016;37:67-119

RISK FACTORS AFTER LUNG TRANSPLANTATION FOR PH

Primary Graft Dysfunction (PGD)

Acute lung injury occurring within 72 hours after transplantation presenting with severe hypoxemia, lung edema, and radiographic pulmonary infiltrates.

Chronic Lung Allograft Dysfunction (CLAD)

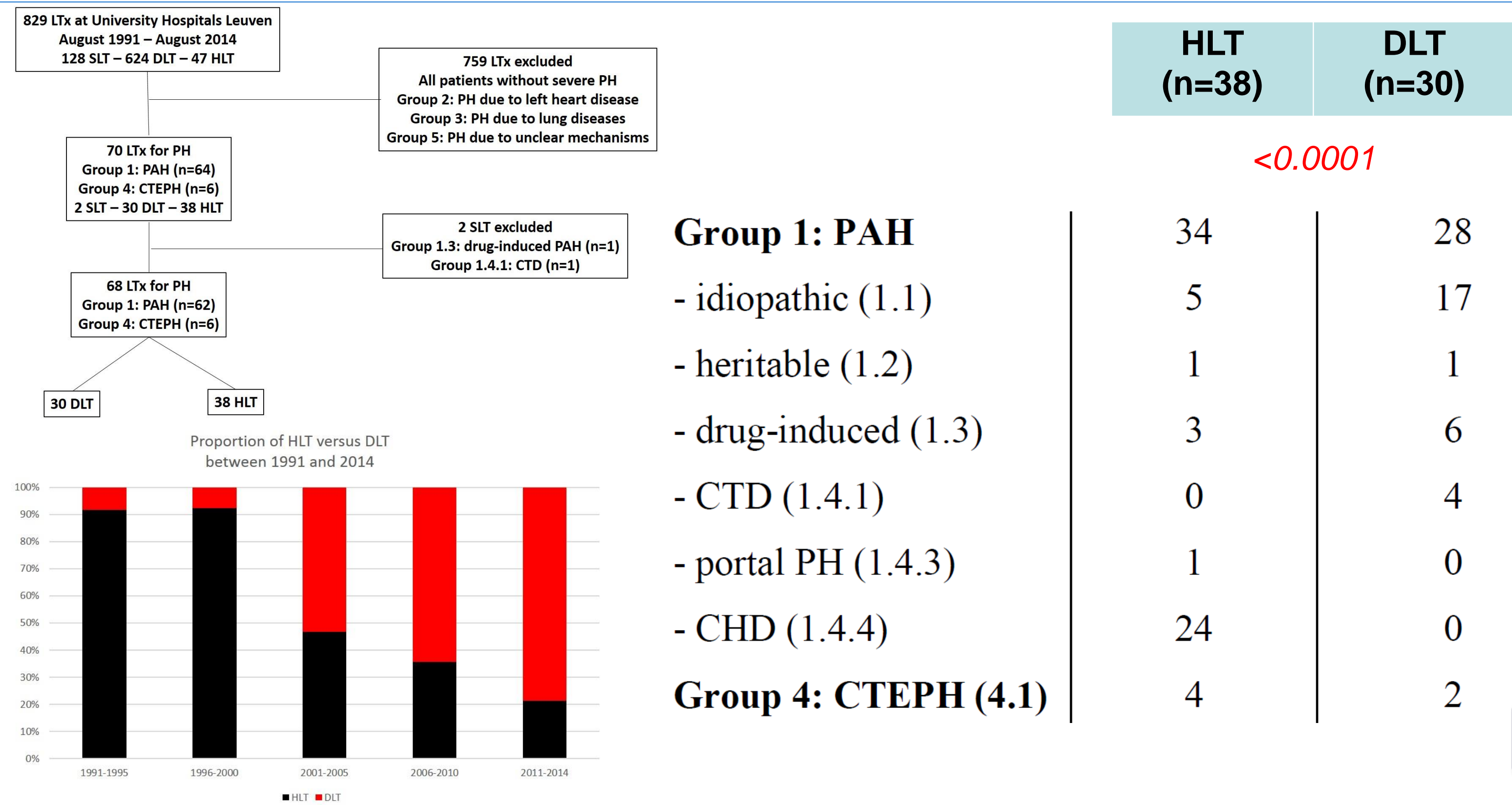
All forms of chronic dysfunction of the pulmonary allograft, with a >20% decline in FEV₁ or FVC, and for a minimum of 3 weeks.

AIM OF THE STUDY

- 1/ Differences in outcome variables between HLT versus DLT?
- 2/ Impact of increasing experience over time on outcome?

PATIENTS AND METHODS

Study design: Retrospective single-center analysis 08/1991 till 08/2014



RECIPIENT DEMOGRAPHICS

	HLT (n=38)	DLT (n=30)	p-value
Gender (M/F)	13/25	13/17	0.45
Age (years)	37 (5-59)	47 (15-61)	0.004
NYHA class	3.42 ± 0.58	3.33 ± 0.55	0.55
CI (l/min/m ²)	2.02 ± 0.55	2.47 ± 0.76	0.035
PAP _{sys} (mm Hg)	89.6 ± 24.6	89.3 ± 27.3	0.96
6-min walk (meters)	299 ± 118	319 ± 133	0.58
Waiting time (days)	152 (4-715)	73 (4-683)	0.26
Follow up (months)	234 (70-317)	113 (41-284)	<0.0001

DONOR DEMOGRAPHICS

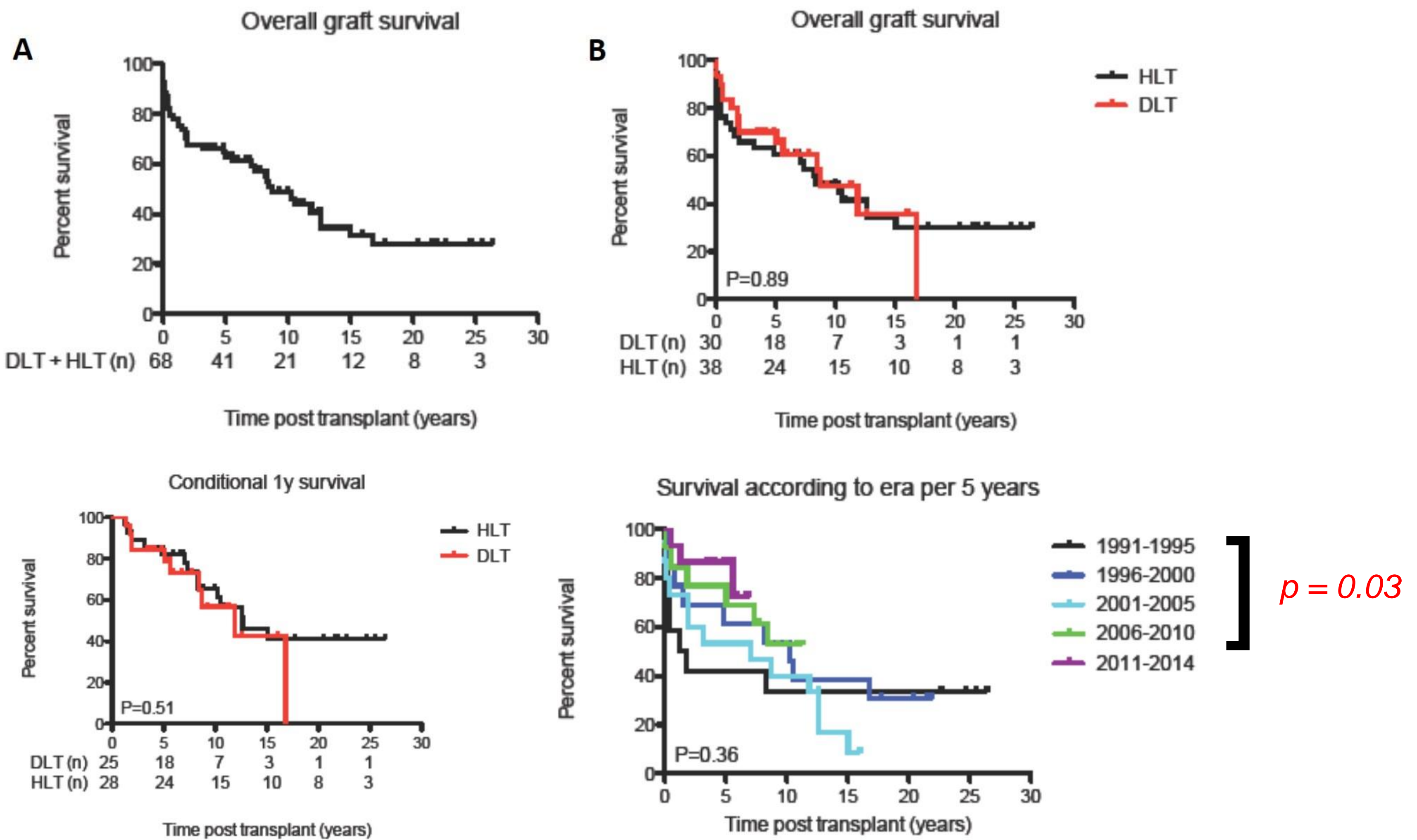
	HLT (n=38)	DLT (n=30)	p-value
Gender (M/F)	11/27	12/18	0.35
Age (years)	34 (9-61)	47 (23-63)	<0.001
PaO ₂ /FiO ₂ (mm Hg)	520 (387-697)	483.5 (218-625)	0.011
Ventilation (hours)	33 (10-214)	54 (15-321)	0.007
Ischemic time (min)	259 (112-399)	427 (279-799)	<0.0001

POSTOPERATIVE OUTCOME

POSTOPERATIVE VARIABLE	HLT (n=38)	DLT (n=30)	p-value
Mechanical ventilation (days)	10 (3-52)	10 (2-157)	0.60
ICU stay (days)	16 (7-89)	16 (3-158)	0.74
Hospital stay (days)	38 (14-132)	34 (17-325)	0.64
Medical* morbidity, yes/no (%)	13/17 (43.3%)	16/14 (53.3%)	0.45
Early surgical complication, yes/no (%)	17/21 (44.7%)	10/20 (33.3%)	0.35
- Hemorrhage	11	5	
- Phrenic nerve paralysis	4	1	
- Hydrothorax – Pneumothorax	2	2	
- Wound problem	0	2	
Surgical re-intervention for bleeding, yes/no (%)	10/28 (26.3%)	2/28 (6.7%)	0.035
PGD grade 2-3 @T0-T72, yes/no (%)	5/16 (23.8%)	23/7 (76.7%)	<0.0001
Postoperative ECMO support for PGD, yes/no (%)	0/25 (0%)	3/27 (10%)	0.10
In-hospital mortality, yes/no (%)	9/29 (23.7%)	4/26 (13.3%)	0.29

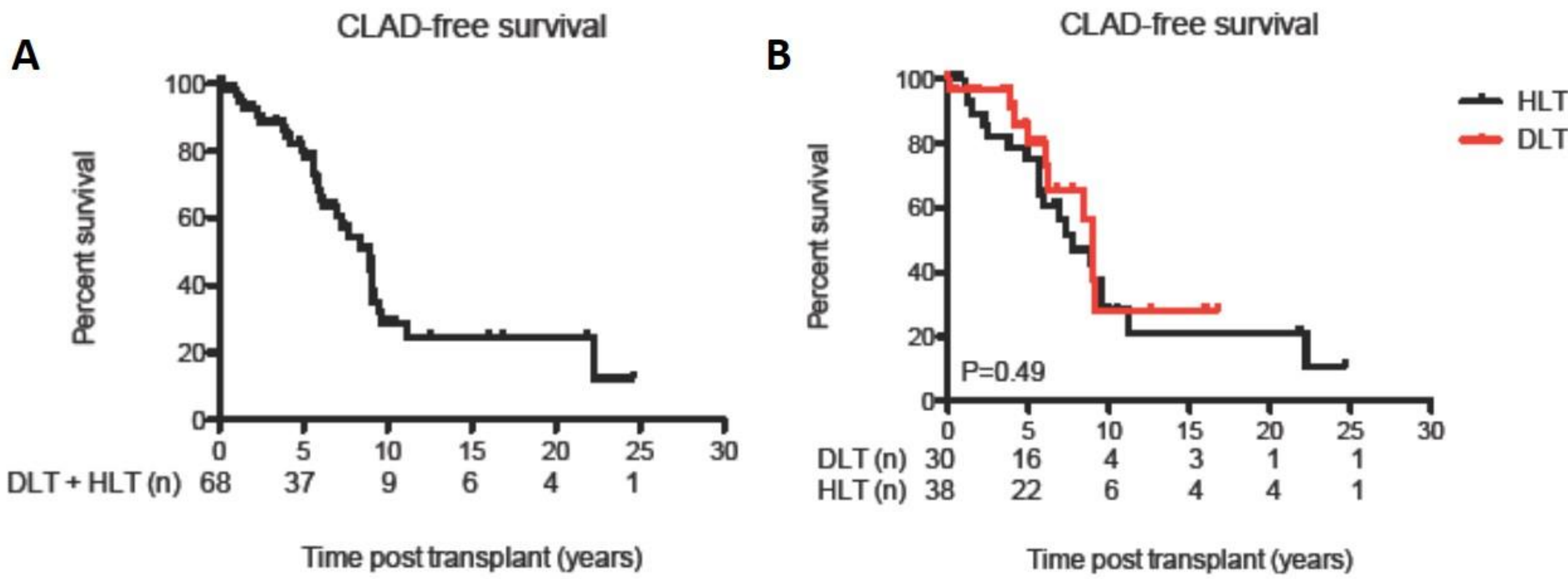
* Including kidney failure, liver failure, heart failure, critical illness neuropathy, pneumonia, sepsis, cardiac arrhythmia, acute rejection.

GRAFT SURVIVAL *



* Survival free from death or retransplantation

CLAD-free SURVIVAL



CONCLUSIONS

- 1. PGD occurred more frequently after DLT, but manageable
- 2. More re-intervention for bleeding after HLT
- 3. Early mortality, graft and CLAD-free survival comparable for HLT vs DLT
- 4. Graft survival improved over time with growing experience in LTx for PH

CURRENT STRATEGY AT UNIVERSITY HOSPITALS LEUVEN

DLT: for PAH, CTEPH, and CHD with a correctable cardiac defect & potential for right ventricular remodeling
HLT: for CHD with a more complex cardiac defect