

A Randomized Comparison of T3 vs. T4 for Management of Hemodynamically Unstable Brain-Dead Organ Donors

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INTRODUCTION

- Majority of brain-dead (BD) organ donors exhibit hemodynamic instability
- Many have concomitant cardiac dysfunction that limits hearts transplanted even in young donors
- Retrospective studies suggest that thyroid hormone replacement may stabilize hemodynamics and enhance recovery from myocardial stunning
- T4 is most frequently used for donor management but some studies suggested T3 may be superior

OBJECTIVES

To perform a randomized, comparative-effectiveness trial of T3 vs. T4 infusion for hemodynamically unstable BD organ donors

METHODS

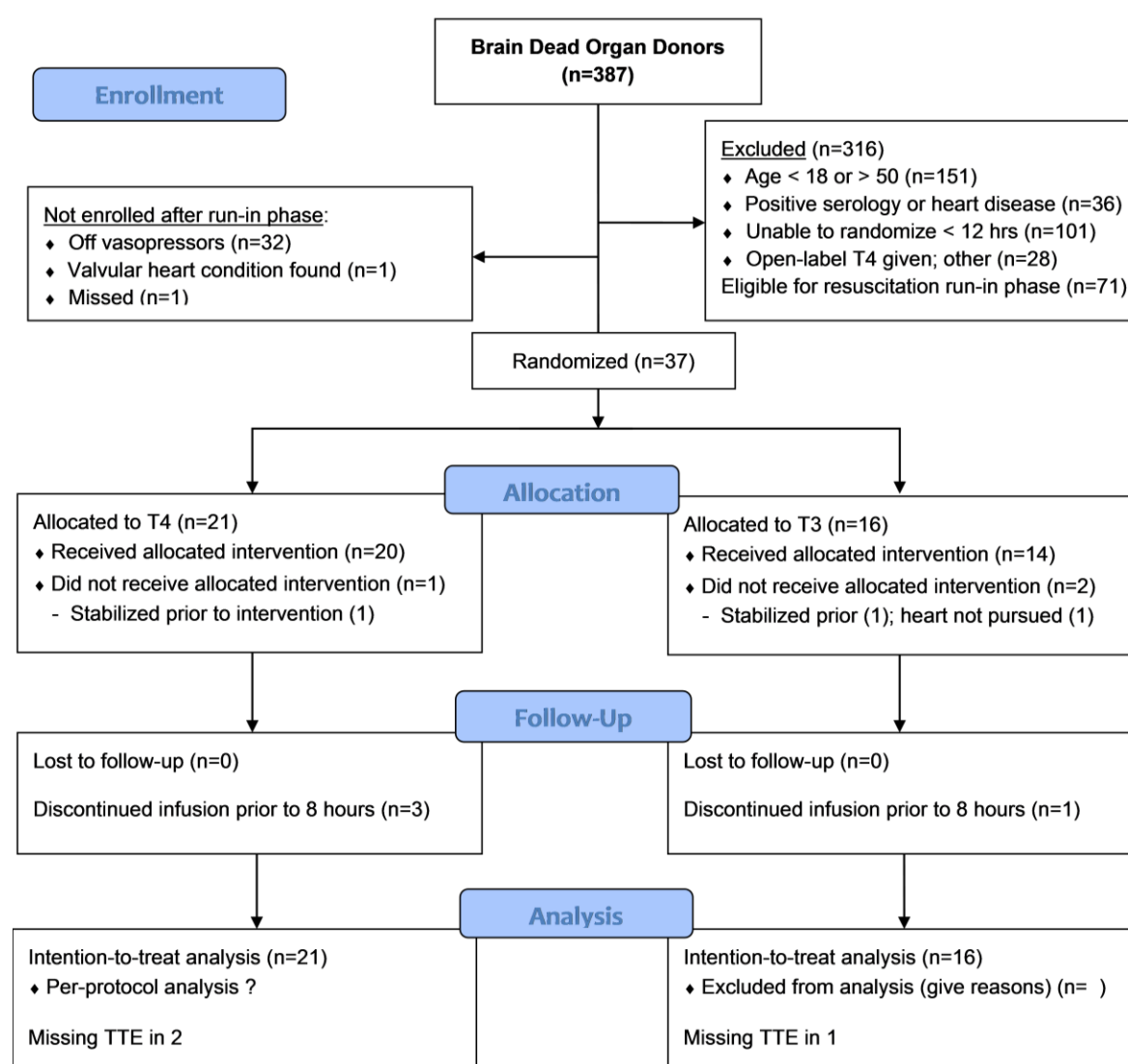
All heart-eligible organ donors managed a single OPO between 2015 and 2017

- First underwent standardized fluid resuscitation phase
- If remained on vasopressors then underwent:

- Echocardiography (read by blinded transplant cardiologist)
- Randomized to T3 or T4 infusion for eight hours

Outcomes Measures

- Reduction in vasopressor dose
- Improvement in EF on FU TTE
- Hearts transplanted
- Improvement in T3/T4 levels

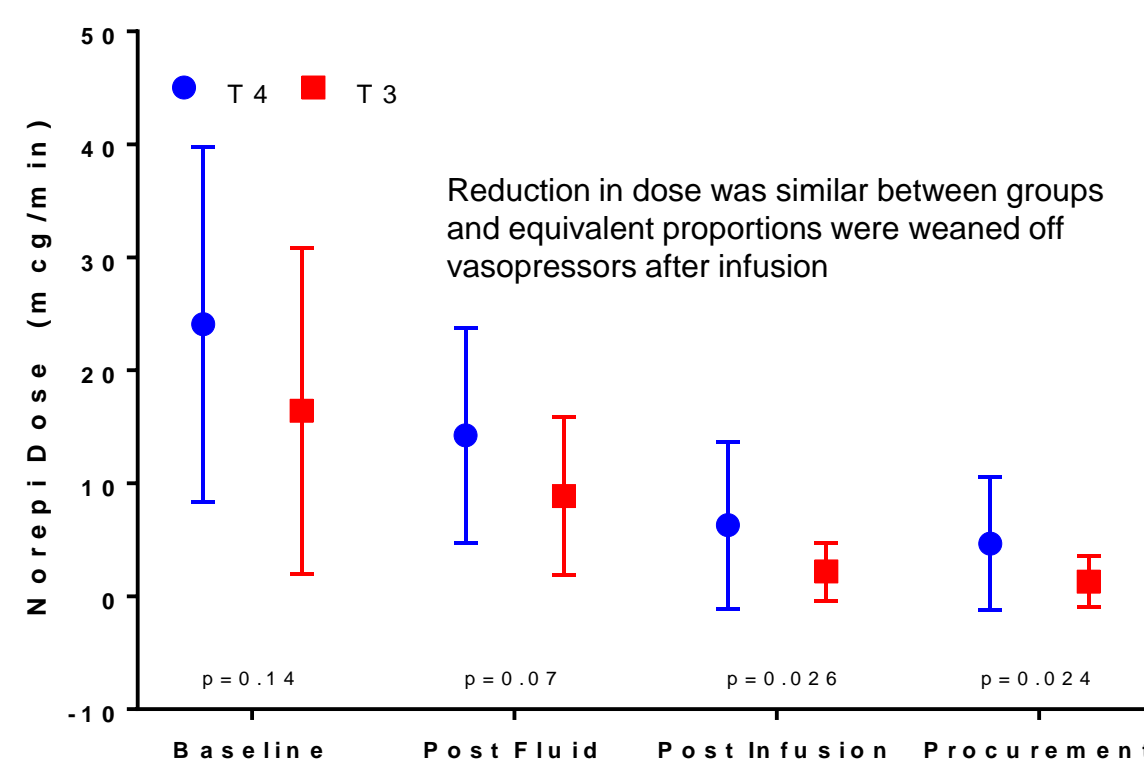


STUDY GROUPS

Variable	T4 Group (n=21)	T3 Group (n=16)
Age	32.6±9.2	27.9±7.4*
Gender, male	13 (62%)	13 (81%)
Race, African-American	6 (29%)	3 (19%)
Blood type: O	6 (29%)	11 (69%)
A	11 (52%)	4 (25%)†
Body Mass Index	28.1±10.8	27.1±5.0
High-Risk Characteristics	7 (33%)	7 (44%)
History of Hypertension	4 (19%)	4 (25%)
Baseline PaO2:FiO2 ratio	284±155	388±142†
BNP	98 (31-321)	62 (22-210)
Troponin	0.78 (0.10-2.02)	0.96 (0.25-2.15)
Baseline Creatinine	1.54±1.06	1.71±0.91
Baseline Cardiac Index	4.2±2.2	3.7±1.0
Stroke volume variation (%)	11±7	14±8
Norepinephrine dose, µg/min	22 (11-38)	10 (5-25) ‡
Expected hearts transplanted	0.61 (0.28-0.64)	0.65 (0.46-0.80)¶

† p=0.04; ‡ p=0.07; * p=0.10; ¶ p=0.19

VASOPRESSOR DOSE



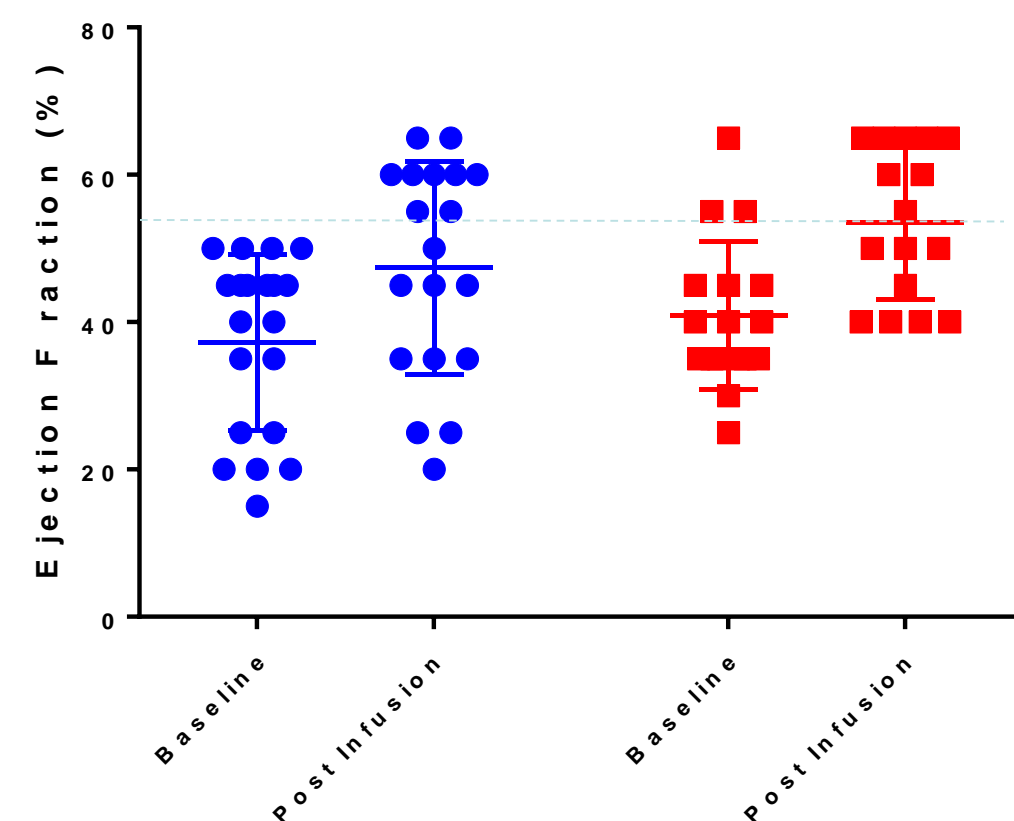
RESULTS

Variable	T4 (n=21)		T3 (n=16)	
	Pre	Post	Pre	Post
On vasopressors	100%	14 (67%)	100%	10 (63%)
NE dose, mcg/min	12 (5-20)	5 (0-8)	6 (4-12)	2 (0-3)
SBP	124±11	122±20	124±21	125±16
Heart Rate	99±15	106±16	104±13	105±15
Stroke Volume	77±32	58±33	70±21	76±25
LVEF (%)	43 (25-45)	50 (35-60)	38 (35-45)	50 (40-65)
EF ≥ 55%	0	10 (50%)	3 (19%)	8 (50%)
ftT3 level	1.68±0.88	1.74±0.65	2.37±1.28	3.42±1.59‡
ftT4 level	0.89±0.39	1.23±0.39	1.16±0.51	1.04±0.52
Final PaO2:FiO2	346±104		415±130†	
Final NE dose	4 (0-7)		0 (0-2)	
Hearts tx	6 (29%)		10 (63%)*	
Lungs tx	5 (24%)		11 (69%)‡	
Organs tx	3.0 (3-4)		5.0 (3.25-5.75)¶	

† p=0.08; ‡ p=0.006; * p=0.04; ¶ p=0.01; change in stroke volumes p=0.007
Normal ranges: ftT3 2-4.4; ftT4 0.9-1.7

EJECTION FRACTION

Improvement in EF by median 10% (IQR 5-15) with T4 compared to 15% (9-20) with T3, p=0.26



CONCLUSIONS

- BD donors who remain on vasopressors despite fluid resuscitation likely to have myocardial dysfunction
- EF improves over 8 hours, with half normalizing; many still transplanted
- T3 does not appear to promote hemodynamic stabilization or reversal of myocardial stunning more than T4
- Baseline imbalances likely account for more organs transplanted in T3 group