for skeletal muscle (~29 to 150 Hounsfield Units; Slice-O-Matic software). One-way ANOVA was used to assess variance across muscle CSA quartiles, with a post test for linear trend. Multivariable linear regression was applied to characterize the relationship between CSA and exercise capacity (6MWD), quadriiceps training volumes, HRQOL, and post-transplant hospital length of stay controlling for age, gender, BMI, and diagnosis.

Results: LTX candidates in the lowest CSA quartile (Q1; CSA 60 ± 9 cm²) vs. highest quartile (Q4; CSA 127 ± 15 cm²) were more likely to be female (86% vs. 5%), have lower BMI (22.4 ± 4.0 vs. 25.8 ± 3.8 kg/m²), and have COPD (60% vs. 19%), p < 0.01. 6MWD (Q1: 296 ± 113 vs. Q4: 390 ± 104 m), quadriiceps training volumes (Q1: 30 IQR [20-30] vs. Q4: 40 [30-60] reps* lbs), SF-36 physical function score (Q1: 16.7 ± 13.9 vs. Q4: 27.4 ± 18.0) and hospital length of stay post-transplant (Q1: 23 IQR [17-51] vs. Q4: 15 [14-43] days) improved linearly across quartiles, p < 0.05. A 10 cm² difference in CSA was associated with differences in 6MWD (8.2 m 95% CI 0.4-16.1), quadriiceps training volumes (2.5 lbs*rep 95% CI 0.4-4.6), SF-36 physical function score (1.6 95% CI 0.4-2.7), but no significant difference in hospital length of stay (-3 days 95% -7 to 1.5).

Conclusions: Thoracic muscle CSA can be applied as a novel measure of skeletal muscle mass, which is associated with exercise capacity, quadriiceps training volumes and HRQOL. Thoracic muscle CSA may have utility in predicting post-transplant outcomes, but requires further study.

19 Body Mass Index Impacts Short, Intermediate, and Long-Term Survival in Lung Transplantation
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Purpose: The effects of extremes of weight are poorly understood in the setting of lung transplant (LTX) with challenges in nutrition, rehabilitation, as well as preexisting co-morbidities. We sought to assess the impact of donor and recipient body mass index (BMI) on short (0-90 days), intermediate (91-365 days) and long-term (>365 days) LTX survival.

Methods: The United Network for Organ Sharing data registry was queried for first-time recipients of single or double LTX from a cadaveric donor transplanted between 1987-2013 for recipients age 18-80 years at the time of the transplant and had data on recipient and donor BMI categorized as underweight (15-18.4 kg/m²), normal weight (18.5-29.9 kg/m²), obese (30-34.9 kg/m²), or morbidly obese (35-40 kg/m²). Short- and intermediate survival was assessed using logistic regression of survival 0-90 days, as compared to >90 days post-transplant; and survival to 365 days, as compared to surviving 365 days. Multivariate Cox proportional hazards models adjusted for characteristics of the recipient, donor, and transplant.

Results: 22090 LTX recipients met inclusion criteria. Compared to recipients in the normal weight category, underweight recipients had improved short-term survival (OR=1.23, 95% CI=1.07-1.4; p=0.004) and obese recipients worse (OR=0.88, 95%CI=0.78-0.99; p= 0.03). Obese recipients were less likely than normal weight recipients to survive 1-yr (OR=0.84; 95%CI=0.75,0.94; p=0.002). Recipients from obese donors were less likely to survive to 1-yr than recipients of lungs from normal weight donors (OR=0.81; 95%CI=0.71,0.91; p<0.01). Long-term conditional survival analyzed found differences in survival by recipient BMI (p<0.001) & donor BMI categories (p=0.048). Proportional hazards models found that obese recipients had increased mortality hazard compared to normal weight recipients (HR=1.15; 95% CI =1.07-1.23; p<0.001). Multivariate Cox model demonstrated elevated mortality in underweight (HR=1.13; 95%CI=1.01,1.26; p=0.03) and obese recipients (HR=1.14; 95%CI=1.04,1.26; p=0.007).

Conclusion: In a population based analysis, BMI heavily influences LTX survival for short, intermediate, & long-term. Underweight recipients may not have the physiologic reserve necessary to obtain optimum results while those with elevated BMI have challenges that may be attributed to their obesity.
St Thomas solution (10 ml/kg) supplemented with Glycerol Trinitrate (100 mg/l) and eopetine alfa (5000 IU/l), was then initiated at a pressure of 100 mmHg. Standard pneumoplegia with topical cooling of all thoracic organs followed. The heart was excised and instrumented onto the OCS where after the lungs and liver were procured in tandem.

**Results:** Six male and two female DCD hearts from donors aged 39 ± 10 years were procured. Time from withdrawal of donor support to declaration of death and initiation of cardioplegia was 22 ± 8 min and 32 ± 9 min respectively. Time from skin incision to heart re-perfusion on the OCS system in the clinical cases was 33 ± 6 min. There was no mortality in the three transplanted DCD heart recipients. The lungs and abdominal organs were all procured without deleterious effect from the modified retrieval process.

**Conclusion:** We believe that for retrievals requiring blood drainage for priming an ex-vivo resuscitation device, the methods described have been demonstrated to be efficient, safe and reproducible.

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**Functional Assessment of the DCD Heart Within the Donor and Ex Vivo**

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**Purpose:** After almost 50 years following the first successful DCD human heart transplant, the significance of this untapped donor pool has recently been rediscovered. Unfortunately the mandatory warm ischaemic period encountered following death and its effect upon subsequent graft function still remains. In the absence of a currently available ex vivo functional assessment platform we sought to identify whether function could be assessed within the donor following reperfusion with extra corporeal membrane oxygenation (ECMO).

**Methods:** A porcine DCD model was created (n=3) following hypoxic cardiac arrest after cessation of mechanical ventilation. Hearts were then left undisturbed at 37°C for 15 minutes following mechanical asystole. ECMO perfusion was then established and cardiac function restored. After 60 minutes, hearts were weaned from ECMO before functional assessment was undertaken using cardiac output measurements and load independent indices derived from pressure-volume (PV) loops. Hearts were then explanted onto the TransMedics Organ Care System before functional assessment in working mode. DCD heart performance was compared against normal controls (n=4) both within the donor and upon the OCS.

**Results:** All results are expressed as a mean +/− SD. DCD hearts required dopamine to be successfully weaned from ECMO. On 10 μg/kg.min of dopamine support cardiac output, mixed venous saturations and PRSW values trended back to pre withdrawal function. In control hearts cardiac output upon the OCS was 3 fold less than that within the donor. When assessing DCD hearts on the OCS, cardiac output and PRSW were almost half in comparison to controls. Following an inotropic challenge upon the OCS, DCD hearts again trended back toward baseline revealing inotropic reserve.

**Conclusion:** Cardiac function can be successfully assessed within the donor following reperfusion upon ECMO. DCD hearts subjected to 15 mins of warm ischemia following death reveal significant impairment but still retain inotropic reserve.

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**Shorter Cold Ischemic Time in Older Donors Post-Heart Transplant Appears to Be Protective**


**Purpose:** The use of older donors in heart transplant (≥50 years old) has been reported to have less good outcome compared to younger donors (<50 years old). These older donors may have preexisting coronary artery disease, and have risk factors including hypertension, diabetes and hyperlipidemia. It has been postulated that the use of older donors with relatively short cold ischemic times may have improved outcomes. Therefore, we sought to answer this question by evaluating our older donors and cold ischemic time.

**Methods:** Between 1994 and 2010, we evaluated 748 heart transplant patients and divided them into those who received donor hearts ≥50 years old and <50 years old. Patients were further divided into those who had a cold ischemic time of <120 minutes (short), 120-140 minutes (medium), and 240 minutes (long). Endpoints included 5-year actuarial graft survival, freedom from cardiac allograft vasculopathy (CAV), freedom from non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, new congestive heart failure, percutaneous coronary intervention/angioplasty, pacemaker/ICD insertion and stroke) and freedom from 1-year treated rejection.

**Results:** Patients who received older donor hearts with short ischemic times appeared to have comparable long-term outcomes to patients who received a younger donor heart with short ischemic times. Patients who received an older donor heart with a cold ischemic time of 120-240 minutes and >240 minutes had poorer outcomes compared to patients who received a younger donor heart in each time group (see table).

**Conclusion:** A shortened cold ischemic time appears to confer better long-term graft survival in heart transplant patients with older donors. This will be of value in selection of older donors.

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Table: Functional Values of DCD and Control Hearts Within the Donor and Ex Vivo

<table>
<thead>
<tr>
<th></th>
<th>Control Heart</th>
<th>DCD Heart</th>
<th>Control Heart OCS</th>
<th>DCD Heart OCS</th>
<th>DCD Heart Ex Vivo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Rate (bpm)</td>
<td>115 ± 14</td>
<td>115 ± 14</td>
<td>117 ± 12</td>
<td>107 ± 13</td>
<td>125 ± 18</td>
</tr>
<tr>
<td>Cardiac Output (L/min)</td>
<td>8.9 ± 1.8</td>
<td>5.2 ± 0.3</td>
<td>2.3 ± 0.5</td>
<td>1.3 ± 0.3</td>
<td>1.7 ± 0.4</td>
</tr>
<tr>
<td>Cardiac Index</td>
<td>4.1 ± 0.9</td>
<td>3.2 ± 0.4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mixed Venous</td>
<td>55 ± 6</td>
<td>60 ± 6</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Saturations (%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>dp/dt Max (mmHg/s)</td>
<td>1286 (128)</td>
<td>1612 (432)</td>
<td>849 (198)</td>
<td>1035 (53)</td>
<td>1628 (156)</td>
</tr>
<tr>
<td>dp/dt Min (mmHg/s)</td>
<td>-949 (-312)</td>
<td>-1116 (-291)</td>
<td>-754 (208)</td>
<td>-558 (169)</td>
<td>449 (272)</td>
</tr>
<tr>
<td>PRSW</td>
<td>52 (9)</td>
<td>58 (18)</td>
<td>82 (25)</td>
<td>43 (21)</td>
<td>62 (5)</td>
</tr>
</tbody>
</table>

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**Donor Under Sizing Results in Worse Post-Transplant Survival in LVAD Patients: A UNOS Database Analysis**

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**Purpose:** Donor to recipient undersizing can result in diminished graft and recipient survival. This study examines post-transplant survival in patients with a size (BMI) mismatch of ≥ 20% with and without a continuous flow LVAD.

**Methods:** The United Network of Organ Sharing database was retrospectively queried from January 2008 to December 2013 to identify adult patients who underwent heart transplantation. This population was divided into 2 groups: donor:recipient BMI ratio ≤ 0.8 (BMI undersize group) and > 0.8. The BMI undersize group was further subdivided into those who had a continuous flow LVAD at the time of transplant and those who did not. Kaplan-Meier analysis was used to compare survival between groups.

**Results:** A total of 10,524 patients received a heart transplant during this time period of which 1666 (15.8%) received a donor heart with a BMI ratio ≤ 0.8. Of the BMI undersize group, 595 (35.7%) had an LVAD at transplant and 1071 (64.3%) did not. Characteristics for all groups are shown in Table 1.