Lung Transplantation: Overview and the MUSC Program

Timothy P.M. Whelan MD
Associate Professor of Medicine
Medical Director of Lung Transplantation
History of Lung Transplant

1963
James Hardy
Univ of Mississippi

≈ 40 Attempts
1963 - 1981

1981
Bruce Reitz
Stanford University

255 Lung & Heart Lung Tx Performed 1990*

1983
Joel Cooper
Toronto General Hospital

2015
2057 Lung & Heart/Lung Tx Performed

*http://optn.transplant.hrsa.gov/latestData/rptD
Lung Transplant Outcomes
The Challenge of Organ Transplantation

- The immune system recognizes the new lung as foreign
- The result is an immune response:
  - Acute Rejection
  - Chronic Rejection
Medical Treatment

Due to high rates of acute rejection and the association of acute rejection with chronic rejection:

- Tacrolimus
- Mycophenolate mofetil
- Prednisone
Side Effects

Increased risk for:

- Infection
- Hypertension
- Diabetes
- Chronic Kidney Disease
- Osteoporosis
- Malignancy
Adult Lung Transplants
Kaplan-Meier Survival by Gender
(Transplants: January 1990 – June 2013)

Median survival (years):
Male=5.4; Female=5.9

p < 0.0001

N at risk = 21

N at risk = 15

JHLT. 2015 Oct; 34(10): 1264-1277
Adult Lung Transplants
Kaplan-Meier Survival by Era
(Transplants: January 1990 – June 2013)

Median survival (years):
1990-1998: 4.2; Conditional=7.1
1999-2008: 6.0; Conditional=8.3
2009-6/2013: NA; Conditional=NA

All pair-wise comparisons were significant at p <0.001 except 1999-2008 vs. 2009-6/2013 (p=0.1211)
Adult Lung Transplants
Kaplan-Meier Survival by Transplant Type and Diagnosis Conditional on Survival to 3 Months (Transplants: January 1990 – June 2013)

No pair-wise comparisons between transplant types within each diagnosis except CF and between diagnoses for retransplants were significant at p < 0.05. All pair-wise comparisons between diagnoses for primary transplants were significant at p <0.05.

Median survival (years):
Primary: CF=10.0; COPD=6.3; IPF=5.8
Retransplant: CF=7.5; COPD=5.9; IPF=5.4
Factors Affect Outcome

Donor
- Age
- Ischemia Time
- Function at recovery

Recipient
- Age
- Diagnosis
- Level of illness at transplant
Adult Lung Transplants
Functional Status of Surviving Recipients
(Follow-ups: January 2009 – June 2014)

1 Year (N=8,010)
2 Years (N=6,567)
3 Years (N=5,446)
Adult Lung Transplants
Employment Status of Surviving Recipients
(Follow-ups: January 2009 – June 2014)

1 Year (N=5,408)
20%
40%
60%
80%
100%
Working (FT/PT Status unknown)
Working Part Time
Working Full Time
Retired
Not Working

3 Years (N=3,650)

5 Years (N=2,535)

JHLT. 2015 Oct; 34(10): 1264-1277
Adult Lung Transplants
Rehospitalization Post Transplant of Surviving Recipients
(Follow-ups: January 2009 – June 2014)

1 Year (N=8,972)
3 Years (N=6,021)
5 Years (N=4,199)

Hospitalized, Rejection + Infection
Hospitalized, Infection Only
Hospitalized, Rejection Only
Hospitalized, Not Rejection/Not Infection
No Hospitalization
Which of these people had a heart-lung transplant in 1986?
Which of these people had a heart-lung transplant in 1986?
Who is the right candidate?
Balance the Risks/Benefits

- Individual Benefit:
  - High risk of death over two years
  - Poor quality of life precluding independent ADLs
  - Medical and psychosocial status that will ensure the best chance of a good outcome
A Limited Resource

Organ allocation:

- Limit wait list deaths
- Provide the best long term outcomes
Transplant Evaluation

- Referral to the transplant Center

- Initial clinic visit:
  - Review of all previous medical records
  - Obtain full history and physical exam
  - Discussion
    - What do we do now?
    - Begin education about transplant assessment
Transplant Evaluation

Evaluation Week

• 4-5 Full days of testing
  – Blood work
  – Imaging
  – Pulmonary and exercise
  – Organ specific testing

• Consultations
Selection Committee

Full Transplant Team Participates
  • All data reviewed
  • Decision:
    – List
    – Further work to do
    – Not a candidate

Communication with Candidate
Why South Carolina?

- Citizens of SC were forced to seek healthcare out of state
  - Effectively limits health care options for many
- SC residents did not receive “in state” organ allocation benefit
Lung Allocation

- Donor organs are allocated based on need
  - LAS score
- Donor organs are offered:
  - In state
  - 500 mile radius
  - 1000 mile radius
  - 1500 mile radius
Lungs Recovered from SC

<table>
<thead>
<tr>
<th>Year</th>
<th>Lungs Recovered</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>51</td>
</tr>
<tr>
<td>2006</td>
<td>67</td>
</tr>
<tr>
<td>2007</td>
<td>65</td>
</tr>
<tr>
<td>2008</td>
<td>62</td>
</tr>
<tr>
<td>2009</td>
<td>61</td>
</tr>
<tr>
<td>2010</td>
<td>68</td>
</tr>
<tr>
<td>2011</td>
<td>78</td>
</tr>
<tr>
<td>2012</td>
<td>47</td>
</tr>
<tr>
<td>2013</td>
<td>59</td>
</tr>
<tr>
<td>2014</td>
<td>66</td>
</tr>
<tr>
<td>2015</td>
<td>56</td>
</tr>
</tbody>
</table>
Why MUSC?

- Pulmonary Medicine:
  - Cystic Fibrosis Center
  - COPD clinical trials
  - IPF Center of Excellence

- Cardiovascular and Thoracic Surgery

- Transplant Center for South Carolina
Cabo San Lucas,
March 2011

With my wife Lizzy, three months before my transplant.

I held off for four years because I was told it was too early for a transplant.

Even 60 days prior, I was considered too healthy for the procedure.

In the end, it happened that I was almost too sick for a transplant.
Acute Exacerbation
The morning things got bad, it was a surprise. I had been doing fine the day before on my oxygen at home.

I had only been on the transplant recipient list for 14 days when I was admitted to the ICU at MUSC with Acute Exacerbation of UIP (usual interstitial pneumonia) consistent with Acute Exacerbation of IPF (idiopathic pulmonary fibrosis). I was on the list, but there were no donors known.
Current
110 days post-transplant, hiking Cadillac Mountain in Maine

I am thankful every day not just for the things I can do now that I wasn’t able to do before, but also for the second chance I was given.
A Second Chance