

Update in Lung Transplant

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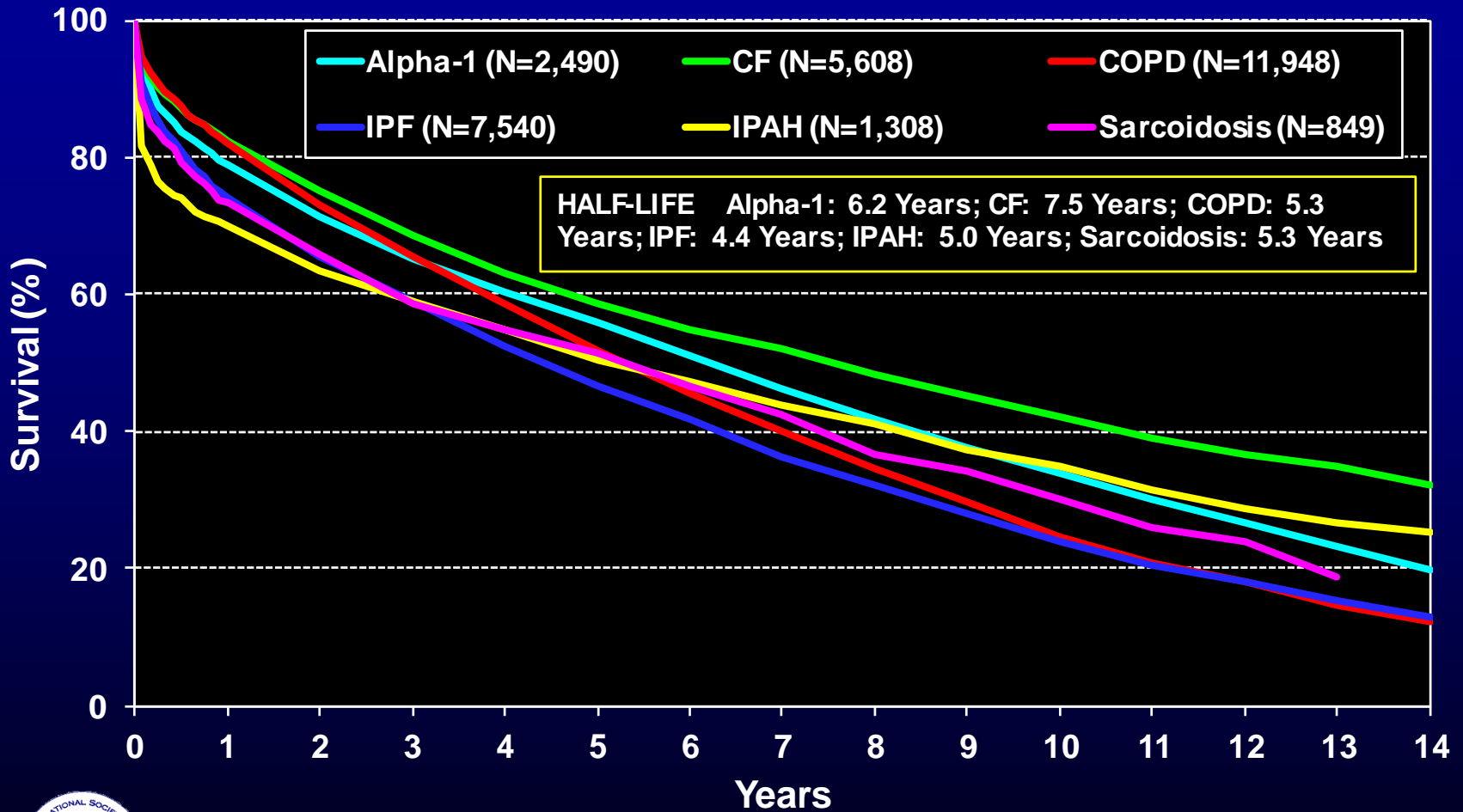
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Introduction

- 3500 lung transplants performed annually worldwide
- In 1983, UPMC performed the first lung transplant in a cystic fibrosis patient
- 3rd most common indication for bilateral lung transplant
 - 5688 performed (Jan 1995 – July 2011)
- Highest long-term survival in lung transplant

ADULT LUNG TRANSPLANTS

Kaplan-Meier Survival by Diagnosis (Transplants: January 1990-June 2010)



ISHLT

Introduction

- Advances in medical therapy have lead to a steady rise in the life expectancy in CF
- Despite therapeutic advances, respiratory failure accounts for most morbidity and mortality
- Lung transplant is the only treatment option to improve survival

Referral for Transplant

- Guideline recommendations:

- $FEV_1 < 30\%$ of predicted

or

- Rapidly progressive respiratory deterioration with $FEV_1 > 30\%$

- Increasing frequency of exacerbation requiring IV antibiotic
 - Recurrent hemoptysis
 - Refractory/recurrent pneumothorax

Evaluation

- Pulmonary
 - CXR/CT chest
 - Pulmonary Function Test
 - Six-minute walk
- Cardiac
 - Echocardiogram
 - RHC (\pm LHC)
- Renal
 - Cr Cl (> 50 mL/min)
- Infection
 - HIV, Hepatitis, EBV, CMV
 - **Colonized Organisms**
- GI
 - CT Abd/Pelvis
 - Liver
 - GERD evaluation
 - Esophagram
- Psychosocial evaluation

Transplant Listing

- Oxygen-dependent
- Hypercapnia (chronic)
- Pulmonary hypertension

- Mechanically ventilated CF patients

Venuta et al. Pulmonary hemodynamics contribute to indicate priority for lung transplantation in patients with cystic fibrosis. J. Thorac Cardiovasc Surg. 2000

Bartz et al. Pre-transplant Mechanical Ventilation and Outcome in Patients With Cystic Fibrosis. J Heart Lung Transpl. 2004

Lung Allocation Score

- In 2005, the Lung Allocation Score was implemented by the Organ Procurement and Transplantation Network
- Derived from a prediction of benefit (expected 1-year post-transplant survival days and expected 1-year waiting list time survival days)

Factors used to calculate Lung Allocation Score

Factors used to predict waiting list survival...

- FVC (% predicted)
- PA systolic pressure
- Oxygen required at rest (L)
- Age
- BMI
- NYHA functional status
- Diagnosis
- Six-minute walk distance
- Continuous mechanical ventilation
- Diabetes

Factors used to predict post-transplant survival...

- FVC (% predicted)
- PCW mean pressure
(≥ 20 mmHg)
- Continuous mechanical ventilation
- Age
- Serum creatinine (mg/dL)
- NYHA functional status
- Diagnosis

Lung Allocation Score

- UNOS registry identified 704 adult CF patients on waiting list from 2005-2009
- Lung transplant is associated with a 69% reduction in risk of death

Infections

- *Pseudomonas aeruginosa*
 - Mucoid and non-mucoid organisms
 - Multi-drug resistant

- *Aspergillus species* (20%)
 - Increased risk for developing bronchiolitis obliterans syndrome and airway complications (e.g. bronchial anastomotic infection)

Infections

- *Burkholderia cepacia complex* (3-5%)
 - *B.cenocepacia* (formly “genomovar III”)
 - Associated with increased 1 year post-transplant mortality
- Non-tuberculous mycobacterium (10-15%)
 - *Mycobacterium Avium Complex* (most common)
 - *Mycobacterium abscessus*

Diabetes

- CF related diabetes affects approximately 19% of adolescents and 40% of adults (> 40 years) with increased likelihood to develop in females
- Post-transplant: No association with mortality

GI

- **Gastro-esophageal Reflux Disease**
- **Malnutrition**
- Pancreatic Insufficiency
- **Liver Disease** (e.g. Cholelithiasis, biliary cirrhosis, cirrhosis)
- Distal Intestinal Obstruction Syndrome

GERD

- Prevalence of 75-90% in post-transplant CF
 - Increased risk for developing Chronic Rejection

- Nissen Fundoplication (laparoscopic antireflux surgery) superior medical therapy (PPI)

Malnutrition

- Underweight < 18.5 kg/m²
- Hypoalbuminemia
- CF and hypoalbuminemia are association with significantly reduced 1 year and overall survival

Liver Disease

- 4 - 10% of CF patients develop cirrhosis and portal hypertension resulting in synthetic dysfunction
- If significant liver disease is evident, patients may be evaluated for combined liver and lung transplant

Sinus Disease

- Although, sinuses harbor organisms amongst all CF patients, it does not affect the post-transplant outcomes in CF patients

Malignancy

CF Non-transplanted

- 172 observed vs
153.5 expected
(SIR 1.1)

Digestive Tract Cancers

- 45 observed vs
12.8 expected
(SIR 3.5)

CF Transplanted

- 26 observed vs
9.6 expected
(SIR 2.7)

Digestive Tract Cancers

- 19 observed vs
1.1 expected
(SIR 17.3)

Conclusion

- Lung transplant remains to be an option for CF patients with end-stage lung disease
- Long term outcomes remains superior to those for patients with other lung diseases amenable to transplant

Conclusion

- Possible areas for future research to improve transplant outcomes include:
 - Surgical technique
 - Organ procurement and preservation
 - Post-operative management in the ICU