14.5-39.5 kg/m² (mean 25.9). Similarly, post tx FEV1 ranged from 29-120% (mean 69.8). Forty-two (54.5%) of our study population are currently alive; the most common cause of death included: chronic rejection (20%), and infection (17.14%).

**Conclusion:** Successful long-term survival after lung transplantation is possible. In this patient population, on average the BMI after tx remained within the acceptable range for listing criteria, within our program guidelines. This may represent an important predictor for long-term survival.

**Figure 1. Long-term Survival After Lung Transplantation**

### Abstracts

#### S311

**Combined Lung-Liver Transplantation: The United States Experience**

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**Purpose:** Combined lung-liver transplant (CLLT) is an option for patients with end-stage lung and liver disease. There remains little understanding of the characteristics and outcomes of combined lung-liver transplant recipients.

**Methods:** All CLLT recipients were identified within the Scientific Registry of Transplant Recipients (SRTR) standard analysis files from October 1987 to March 2015. Baseline clinical characteristics of CLLT recipients were analyzed. Kaplan-Meier survival analysis was used to compare unadjusted survival in CLLT and isolated lung transplant recipients.

**Results:** Since 1994, there have been 67 CLLTs with 50 of CLLLT being performed within the post-LAS era (since May 4, 2005). Cystic fibrosis is the most common indication for CLLT (65.7% of recipients). CLLT recipients are predominantly male (55.2%), have a median age of 26 (IQR 18, 49), and have a transplant LAS 41.1 (37.1, 48.9). Six centers have performed greater than 5 CLLTs with these centers compromising 59.7% of all CLLTs. Unadjusted one-year survival was 77.9% for CLLTs vs. 81.3% isolated lung transplant recipients. Unadjusted long-term survival was better in CLLT recipients (3 year-survival of 71.8% in CLLT vs. 68.0% isolated lung). The DCD group was comparable to the DBD group in terms of duration of mechanical ventilation, incidence of ECMO for severe primary graft dysfunction (PGD), intensive care unit and hospital length of stay. PGD rate and grade were not different between groups at 24 and 72 hours after LT. No differences in airway anastomotic complications, incidence and grading of rejection and freedom from BOS were recorded. Actuarial survival rate in the subgroup of bilateral LT at 1 and 5 years was 75% and 51% for the DCD group and 82% and 61% for the DBD group (p= 0.12).

**Conclusion:** Short- and medium-term outcome after DCD LT is comparable with LT from DBD donors, despite a tendency to use DCD lungs for older recipients. Therefore, DCD LT is a clinical reality that can be used safely in selected recipients to expand the lung donor pool.

#### S312

**Lung Transplantation from Donation after Circulatory Determined Dead (DCD) Donors: A Single Centre Experience**


**Purpose:** Donor organ shortage still remains the major limitation in lung transplantation (LT). The Donation after Circulatory determined Dead (DCD) donor has been successfully adopted as a source of additional donor lungs worldwide. However, concerns about organ quality and ischemia-reperfusion injury have limited the application. The aim of this study is to analyze the 6 year experience of our transplant unit in LT from controlled Maastricht category III donors and to compare early and mid-term outcome with standard donation after brain dead (DBD) donor.

**Methods:** Data was entered prospectively into a dedicated transplant database. Analysis was performed retrospectively for the period between March 2009 and March 2015. Continuous variables were tested with Mann-Whitney’s test; categorical variables with Fisher’s test.

**Results:** During this period 186 LT were performed: 147 bilateral LT (79%) and 39 single LT (21%). Of these, 23 recipients received organs retrieved from DCD donors (12.4%). No differences were found between the 2 groups of donors regarding age, gender, history of smoking, mechanical ventilation time, cause of death, and total mean cold ischaemic time. In the DCD group, the mean time from withdrawal to declaration of death was 14.9±6.9 min and the mean warm ischaemic time from death to pneumoplegia was 20.5±6.8 min. There were no differences in recipient characteristics except for age (58.1±7.4 for DCD compared with 50.4±13.7 in the DBD group, p= 0.009) and cystic fibrosis as underlying disease (19.6% for DCD compared with 50.4±13.7 in the DBD group, p= 0.12). The DCD group was comparable to the DBD group in terms of duration of mechanical ventilation, incidence of ECMO for severe primary graft dysfunction (PGD), intensive care unit and hospital length of stay. PGD rate and grade were not different between groups at 24 and 72 hours after LT. No differences in airway anastomotic complications, incidence and grading of rejection and freedom from BOS were recorded. Actuarial survival rate in the subgroup of bilateral LT at 1 and 5 years was 75% and 51% for the DCD group and 82% and 61% for the DBD group (p= 0.12).

**Conclusion:** Short- and medium-term outcome after DCD LT is comparable with LT from DBD donors, despite a tendency to use DCD lungs for older recipients. Therefore, DCD LT is a clinical reality that can be used safely in selected recipients to expand the lung donor pool.

#### S313

**Risk Factors for De Novo Malignancy Following Lung Transplantation**

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**Purpose:** Transplant patients are known to be at increased risk for malignancy. Risk factors for de novo malignancy (DNM) after lung transplantation have yet to be identified.

**Methods:** We queried the United Network for Organ Sharing (UNOS) database for all adult lung transplant patients between 1989 and 2012. Follow-up data on cancer status was merged to the master database, and standardized incidence ratios (SIR) were computed by comparing the data to the National Cancer Institute’s Surveillance, Epidemiology, and End Results Program (SEER) data except examining squamous and basal cell carcinomas. Kaplan-Meier analysis was used to estimate the incidence of DNM following orthotopic lung transplantation. Cox proportional hazards modelling was used to identify independent predictors of developing a DNM, as well as to assess the impact of DNM on long-term survival.

**Results:** 18,039 adult lung transplant patients were identified; median followup was 1086 days (IQR 436-2070). DNMs occurred in 2876 patients, with an incidence of 17.0% at five years and 38.7% at ten years. The overall cancer incidence was elevated compared to the general U.S. population (SIR 4.50, 95% CI 4.23-4.76). The most common cancer types were skin (squamous cell carcinoma, 46.2% of all cancers; basal cell carcinoma, 15.3%); melanoma, 1.5%; SIR 2.74, 95% CI 1.92-3.57), lung (12.6%,
SIR 7.71, 6.92-8.51), lymphoproliferative disease (9.7%, SIR 16.74, 14.77-18.70), and colorectal (2.9%, SIR 2.47, 1.94-3.00). On multivariable analysis of both patient- and donor-specific covariates, significant predictors of DNM following lung transplant were age (HR 1.05, 95% CI 1.04-1.05, p < 0.001), male gender (HR 1.48, 1.32-1.67, p < 0.001), and white race (HR 1.78, 1.40-2.25, p < 0.001). Treatment for an episode of acute rejection predicted a reduced hazard of DNM (HR 0.72, 0.63-0.81, p < 0.001). Neither donor nor recipient smoking history was significantly associated with DNM. Additionally, on multivariable survival analysis, development of a DNM was not associated with mortality (HR 0.60, 0.55-0.66, p < 0.001). Weigt, X. Wang, V. Pachucki, N. Patel, A. DerHovanessian, M.Y. Shiino, D. Sayah, A.L. Gregson, J.P. Lynch III, R. Saggar, D.J. Ross, A. Ardehali, D. Elkahhoff, J.A. Belpiero, UCLA, Los Angeles, CA.

Methods: Patients with A1ATD and non-A1ATD COPD who underwent lung transplant between 1988 and 2015 were identified in our institutional database. Complications were categorized into non-infectious GI complications, including bleeding, hepatobiliary, and mechanical complications, and reoperation for bleeding. Kaplan-Meier curves and Cox proportional hazards models were used to evaluate survival and complication-free survival. Adjusted analyses included recipient age and sex, donor age, and laterality.

Results: A total of 385 lung transplants were performed for COPD on 376 patients (103 A1ATD). For A1ATD 40.8% underwent bilateral transplantation versus 17.4% for non-A1ATD COPD. No meaningful differences were noted in recipient age, sex, or ethnicity. Overall survival analyses suggest A1ATD has worse survival at 90 days (adjusted HR 2.75, P = 0.085) and 1 year (HR 2.02, P = 0.008) but better long term survival at 10 years (HR 0.83, P = 0.344). There was no significant difference in the rates of reoperation for bleeding. A1ATD had significantly worse non-infectious GI complication-free survival at 90 days (HR 2.39, P = 0.015) and 1 year (HR 2.04, P = 0.010). Predictors of mortality at 10 years following transplantation in this cohort included recipient age (HR 1.28, P = 0.046) and single lung transplant (HR 1.52, P = 0.027).

Conclusion: A1ATD lung transplant recipients in this single center experience had worse short term complication-free survival but potentially improved long term survival compared to non-A1ATD COPD patients. Close perioperative monitoring of A1ATD patients is warranted with timely evaluation and treatment of GI complications.

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Gene Expression Profiling of Bronchoalveolar Lavage Cells during Aspergillus Colonization of the Lung Allograft


Purpose: Aspergillus colonization after lung transplant is associated with an increased risk of chronic lung allograft dysfunction (CLAD). We hypothesized that immune responses during Aspergillus colonization could provide clues to novel mechanisms of CLAD pathogenesis.

Methods: We examined transcriptional profiles in 6-month surveillance bronchoalveolar lavage fluid (BALF) cell pellets from recipients colonized with A. fumigatus (n = 12) compared to those without microbial colonization (n = 10). Among the A. fumigatus colonized recipients, we also explored profiles in those who progressed to CLAD (n = 6) compared to those who remained CLAD free (n = 6). Transcription profiles in the BALF cell pellets were assayed with the HG-U133 Plus 2.0 microarray (Affymetrix). Differentially expressed gene candidates were selected based upon an absolute fold difference in expression of at least 1.5, and an unadjusted P-value < 0.05. The list of differentially expressed genes was submitted for functional analyses using NIH DAVID.

Results: Differential gene expression analysis comparing A. fumigatus colonized to non-colonized patients generated a candidate list containing 80 differentially expressed probe sets (76 up-regulated, 4 down-regulated). This list was significantly enriched for the KEGG pathway “cytokine-cytokine receptor interactions”. Selected genes in this pathway that were upregulated during A. fumigatus colonization included IL-1β, IL-1 receptor type II, IL-8, IL-8 receptor, CXCL-1, CXCL-6, and CXCR-4. None of these genes was differentially expressed in A. fumigatus colonized patients who progressed to CLAD compared to those who remained CLAD free. For this comparison, there were only 8 differentially expressed probe sets (7 up-regulated, 1 down-regulated). Among this list, it is noteworthy that CHI3L1 and CCL18 were upregulated in patients who progressed to CLAD.

Conclusion: The BALF cell pellet may be a useful way to monitor allograft biology. A. fumigatus colonization is associated with predictable cytokine and chemokine interactions. CHI3L1 and CCL18 may play a role in the link between Aspergillus colonization and CLAD.

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Outcomes in Lung Transplant Recipients with COPD with and without Alpha-1-Antitrypsin Deficiency: Single Center Experience Over Four Decades

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Purpose: Alpha-1-antitrypsin deficiency (A1ATD) is a rare connective tissue disorder with accelerated degradation of native lung function. We sought to examine our experience with lung transplant for COPD with and without A1ATD to determine differences in rates of perioperative complications and long term outcomes.

Methods: We retrospectively reviewed a single-center lung transplant database from 2007 to 2015 to identify patients with A1ATD and non-A1ATD COPD. Complications were defined as any event occurring in the first 90 days after transplant. Descriptive statistics were used to compare demographics and postoperative outcomes between the two groups. Multivariable analyses were used to assess the independent associations between A1ATD and adverse outcomes.

Results: Of the 155 patients included in the study, 40% had A1ATD and 60% had non-A1ATD COPD. There were no differences in demographic characteristics between the two groups. However, patients with A1ATD were more likely to have undergone bilateral transplantation (p = 0.015), and there was a trend towards higher rates of reoperation for bleeding (p = 0.085) and reoperation for non-infectious GI complications (p = 0.010) in the A1ATD group. After controlling for potential confounders, patients with A1ATD were more likely to experience reoperation for bleeding (HR 2.39, 95% CI 1.06-5.38, p = 0.037) and non-infectious GI complications (HR 2.04, 95% CI 1.04-3.99, p = 0.039) compared to patients with non-A1ATD COPD. There were no significant differences in overall survival or survival free of DNM between the two groups.

Conclusion: Patients with A1ATD have higher rates of reoperation for bleeding and non-infectious GI complications compared to patients with non-A1ATD COPD. Further studies are needed to determine the underlying mechanisms and potential interventions to improve outcomes in this patient population.