Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

diagnosis. We conclude that RIS was safe although this analysis cannot prove a reduction in the incidence of PTLD in this high risk PTLD group. A prospective randomized study for EBV DNA guided RIS possibly with pre-emptive rituximab is needed.

Table 1

	Patient	High EBV Control	Control	P value
EBV				
Primary EBV infection, n (%)	8 (31)	-	1 (4)	p<0.001
Average EBV titre after transplant (Copies/ml)	18,600 [10,300-60,400]	8,600 [4,500-18,000]	260 [0-7,360]	p<0.001
Length of time EBV positive (years)	7.8 [5.4-10.2]	7.4 [4.0-9.8]	4.3 [0-7.4]	p=0.1
Survival				
Deceased, n (%)	10 (39)	8 (31)	8 (31)	
Mean survival from Transplantation (years)	12.0 [10.1-13.8]	12.6 [10.8-14.4]	12.3 [10.4-14.2]	p=0.8
Acute and chronic rejection				
Time to acute Rejection after RIS (years)	7.3 [5.4-9.2]	11.7 [9.7-13.6]	12.3 [10.1-14.5]	p=0.1
Time to CLAD from Transplantation (years)	5.4 [4.0-6.8]	9.7 [7.3-12.1]	12.1 [10.0-14.3]	p=0.04
Time to CLAD from RIS (years)	8.2 [6.6-9.7]	9.7 [7.3-12.1]	12.1 [9.8-14.4]	p=0.002
Number of patients diagnosed with CLAD after RIS, n (%)	17 (65)	10 (37)	5 (19)	
CLAD within 6 months of RIS, n (%)	1 (4)	1 (4)	-	p<0.001
CLAD within 12 months of RIS, n (%)	2 (8)	2 (8)	1 (4)	p<0.001
PTLD				
Cases of PTLD, n (%)	3 (12)	3 (12)	1 (4)	
Time to PTLD from transplantation (years)	14.1 [12.6-15.5]	14.3 [12.7-15.9]	15.2 [14.5-15.9]	p=0.5

(983)

Incidence of Post-Transplant Cytomegalovirus Viremia in Patients Receiving Lungs After Ex Vivo Lung Perfusion

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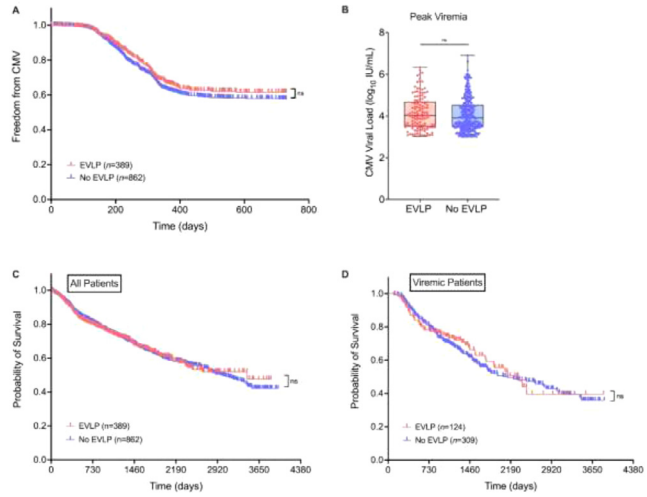
Purpose: CMV infection following lung transplant (LTx) is associated with increased morbidity and mortality. Inflammation, infection and longer ischemic times are important risk factors for CMV infection. Ex vivo lung perfusion (EVLP) has helped to successfully increase utilization of high-risk donors over the last decade. However, the impact of EVLP on post-transplant CMV infection is unknown.

Methods: Single-center, retrospective analysis of all LTx recipients from 2010 to 2020. The primary endpoint was comparison of CMV viremia in recipients that received EVLP vs. non-EVLP donor lungs. CMV viremia was defined as CMV PCR > 1000 IU/mL within two years post-transplant. Secondary endpoints were time from LTx to CMV viremia, peak CMV PCR and survival. Outcomes were also compared between the different donor (D)-recipient (R) CMV serostatus matching groups.

Results: Included were 862 recipients of non-EVLP lungs and 389 recipients of EVLP lungs. There was no significant difference in the distribution of the CMV serostatus matching groups. 35.8% of patients in the non-EVLP group developed CMV viremia vs. 31.9% in the EVLP group (p=0.18). Median time to CMV viremia was 234 days [IQR, 179-318] in non-EVLP and 249 days [IQR, 186-313] in EVLP group (p=0.5). The mean±SD peak viremia was 4.1±0.8 $\log_{10}$ IU/mL in the non-EVLP group and 4.2±0.8 $\log_{10}$ IU/mL in the EVLP group (p=0.4). There was also no difference in survival of the viremic patients between the groups (log-rank p=0.8). All outcomes were similar when comparing non-EVLP and EVLP patients within each serostatus matching group (Fig.1).

Conclusion: Lung transplant activities have significantly increased with the use of high-risk donor lungs evaluated on EVLP. The practice of utilizing more injured donor organs via EVLP has not affected CMV viremia rates and severity in lung transplant recipients. EVLP could further provide the opportunity to pre-treat donor lungs prior to implantation, perhaps decreasing incidence of post-transplant CMV infection.



(984)

Immunologic Monitoring of a Breakthrough Infection in a Heart and Kidney Transplant Recipient

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Introduction: Solid organ transplant recipients (SOTR) have lower SARS-CoV-2 spike seroconversion than healthy subjects (HS) following vaccination. A breakthrough (BT) infection is defined as the detection of SARS-CoV-2 in a respiratory specimen after a person is ≥14 days after completing the recommended doses for a vaccine. We report a case of SARS-CoV-2 BT infection in a SOTR who was immunologically followed longitudinally following vaccination.

Case Report: A 44-year-old man with a history of non-ischemic cardiomyopathy (NICM) and end stage renal disease had undergone heart and kidney transplantation in December 2017 with thymoglobulin induction. His NICM was secondary to radiation for non-Hodgkin's lymphoma treated with autologous bone marrow transplant in 2001. Maintenance immunosuppression consisted of sirolimus 2mg daily, tacrolimus 2mg twice daily (BID), and prednisone 5mg daily at his 1st Moderna vaccine in April 2021. In anticipation of surgery, sirolimus was stopped and mycophenolate mofetil (MMF) 500mg BID was started. He was on this regimen at the time of his 2nd Moderna vaccine. Sirolimus was restarted in July and increased to 1mg daily while continuing MMF 500mg BID, tacrolimus, and prednisone. At the end of July, the patient was exposed to several family members with COVID-19. He tested positive 89 days after his 2nd Moderna vaccine (cycle threshold of 33.5). He was asymptomatic at the time, but later developed fever, myalgias, headache, and loss of taste and smell and was treated with casirivimab and imdevimab monoclonal antibody (mAb) infusion. We assessed the patient's immunologic response 14 days post 2nd Moderna vaccination and at BT infection prior to mAb infusion and compared this to HS. The patient developed SARS-CoV-2 spike-specific $CD4^+$ T cells at 14 days post 2nd mRNA vaccine at a frequency below the average frequency for HS. At BT infection, the patient did not have SARS-CoV-2 spike-specific $CD4^+$ T cells, partly due to virus induced lymphopenia. The patient did not develop spike-specific $CD8^+$ T cells, spike IgG or neutralizing antibodies at 14 days post 2nd Moderna vaccination or at BT infection.

Summary: The patient developed SARS-CoV-2-specific $CD4^+$ T cells following vaccination. His uneventful recovery may be secondary to these SARS-CoV-2 specific $CD4^+$ T cells post vaccination as well as receiving mAb therapy 8 days post infection.