INTRODUCTION: Fetal and neonatal lung-directed gene therapy has the potential to cure a number of monogenic lung diseases. We optimized a methodology to generate precision-cut lung slices (PCLS) from excess tissue from neonatal lung lobectomies and animal necropsies. PCLS retain the cellular composition and 3D architecture of the lung, thus offering a more robust discovery platform than cell culture. In this screening study, we examined the transduction efficiency of gene therapy vectors in neonatal human and fetal sheep, pig, and mouse PCLS.

METHODS: Eight-week old human neonatal lobectomy specimens were sealed and instilled with low-melt agarose (LMA). For fetal animal studies, the tracheobronchial trees of gestational day (E) 20 C57/B6 mice, E107 sheep, or E105 pigs were instilled with LMA. Left lower lobes were sectioned at 300um thickness using a comprostome. After acclimation, slices were incubated with adenovirus, adeno-associated virus (AAV) 1, 6, and 9, or nanoparticles (NP) expressing GFP plasmid or mRNA. After 96h, PCLS were assessed for GFP transduction.

RESULTS: GFP expression was detectable via fluorescence microscopy or flow cytometry in up to 31 of 33 conditions. The most robust transduction (10-20% of total lung cells) across species was observed in adenovirus, AAV6, and NP-GFP mRNA (NP-mR). Notably, NP encapsulating plasmid DNA (NP-Pl) yielded positive cells.

CONCLUSION: PCLS from human surgical specimens or whole animal lungs are a powerful platform to assess vector delivery for gene therapy. A similar approach may be used for assessment of gene and drug therapies to cure disease.

Use of Continuous Glucose Monitoring (cgm) to Improve Identification of Hypoglycemia Pre- and Postoperatively for Patients Undergoing Total Pancreatectomy with Autologous Islet Transplant (tpt)
Jennifer S Vonderau, MMS, PA-C, Britney Williams, MD, Marilyn Hanson, RN, Harlan Hanson, BS, Chirag Desai, MBBS, FACS
University of North Carolina, Chapel Hill, NC
WITHDRAWN

3D Segmentation and Virtual Reality Visualization Facilitates Complex Live Donor Renal Transplant
Dennis I Sonnier, Jr, MD
Ochsner Health System, New Orleans, LA

INTRODUCTION: We present a case in which 3D segmentation of donor kidney anatomy and viewing with virtual reality (VR) platform facilitated selection of the appropriate kidney for transplantation. Our donor candidate was a 35 year old wanting to donate a kidney to his brother. Initially he was declined by the selection committee due to complex early bifurcation of multiple renal arteries and size discrepancy based on gross CT measurements. The patient was motivated to donate thus we reconsidered with the aid of 3D segmentation and VR visualization.

METHODS: Contrast CT imaging of the abdomen was obtained. 3D Slicer was used to segment DICOM data and create a 3D stereolithography (STL) object. Physicians viewed STLs in VR using an internally developed application and commercially available head-mounted displays.

RESULTS: The resulting data showed similar kidney volumes and clearly delineated vascular anatomy. The right kidney was confirmed to have a prohibitively short vein and two arteries, each bifurcating posterior to the IVC. The left kidney had a normal vein and two arteries, each bifurcating at an acceptable distance away from the aorta, allowing for safe donation. The donor was approved by the committee and underwent left donor nephrectomy. A side-to-side reconstruction of the two renal arteries was performed during the transplant.

CONCLUSION: The use of 3D segmentation and VR visualization provided precise understanding of a complex patient anatomy, enabling a life-saving transplant. While not needed routinely, this technology was instrumental here and should be considered for cases requiring discreet appreciation of complex anatomy.

Qualitative Systematic Review of the Role of Extracorporeal Membrane Oxygenation in Adult Recipients of Abdominal Organ Transplants
Ian M Kratzke, MD, Trista S Reid, MD, MPH, FACS, Lauren Raff, MD, FACS, Aman Kumar, MD, Diana Dayal, BS, Alex Zenndl, MD, Pablo Serrano Rodriguez, MD, Rebecca Carlson, MLS, Chirag S Desai, MD, FACS
University of North Carolina, Chapel Hill, NC

INTRODUCTION: Advances in Extracorporeal Membrane Oxygenation (ECMO) have made it an important adjunct in the management of some critically ill patients; however, there is limited evidence regarding the use of ECMO in abdominal transplantation recipients. The purpose of this study was to perform a systematic review of outcomes in adult patients undergoing ECMO support post-abdominal organ transplantation.

METHODS: PubMed, Embase, Scopus, Web of Science, the Cochrane Library, and ClinicalTrials.gov databases were searched for all publications from Jan 1, 1989 to April 24, 2020 of all adult solid abdominal organ transplant recipients who underwent Veno-arterial (V-A) or Veno-venous (V-V) ECMO cannulation. Mortality was the primary outcome, with complications as secondary outcomes.

RESULTS: 32 articles were identified, with 27 (84%) being case reports. 80 liver recipients were placed on ECMO, with 69 (86.3%) cannulated postoperatively and infection the most