

Oral Presentation

Ex Vivo Normothermic Perfusion: a Novel Method to Assess Pancreases after Preservation

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Introduction

Static cold storage (SCS) of pancreases remains the current standard method for preservation prior to transplantation. Pulsatile hypothermic machine perfusion (HMP) is an emerging method that could potentially improve the preservation of pancreases to enhance graft function. This is based on personal extensive experience with HMP of pancreases in human (J. Branchereau 2017¹, 2018²), porcine allotransplantation (manuscript submitted) and large non-human primate models. All models consistently showed preservation of pancreatic parenchyma on histological assessment for up to 24 hours.

To provide reassurance of organ viability prior to transplantation further investigations are necessary. We propose that normothermic perfusion (NMP) of pancreases after cold preservation allows necessary functional and physiological assessments.

Method

Porcine pancreases (3) were retrieved from the slaughterhouse after 30 minutes of warm ischaemia and were flushed. After 3 hours of cold ischaemia two pancreases were perfused by HMP (Wave machine; Waters

Medical Systems) for 6 hours followed by 1 hour of NMP.

One pancreas after 3 hours of CIT was placed on NMP for 2.5 hours, this was the first pancreas NMP to assess feasibility of this technique. NMP was achieved by modification of the kidney assist device (figure 1). Oxygenation was with 21% oxygen. The pancreases were cannulated via the aorta with free drainage of perfusate from the portal vein.

NMP parameters for all pancreases were a pressure of 40 mmHg and temperature of 37°C. Perfusate was composed of red blood cells, plasma to provide a haematocrit of 25%, with additives of co-amoxiclav and 25,000 IU of heparin. During the perfusions we collected serial perfusate samples for blood gas analysis and for insulin enzyme-linked immunosorbent assay (ELISA).

Results

The macroscopic appearance of the pancreases and the attached duodenum at the end of NMP appeared viable (figure 2). Average resistance index during NMP was 0.62 ru (range 0.30 to 0.90 ru). Average flow rate was 77 ml/min (range 53 to 100 ml/min).

Throughout, the duration of NMP in the two



Figure 1. Normothermic organ perfusion circuit.

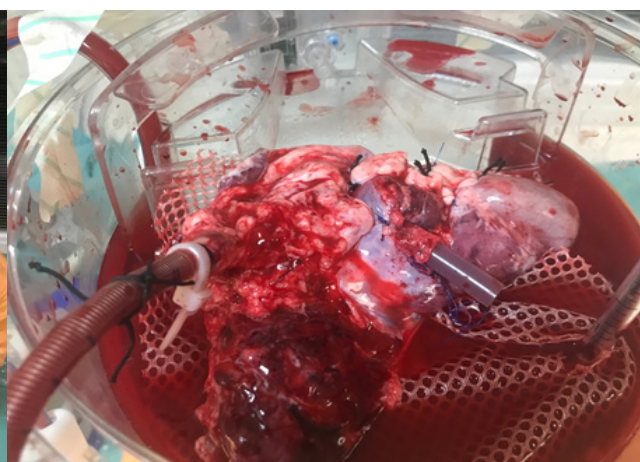


Figure 2. Normothermic perfused porcine pancreas.

pancreases perfused for one-hour lactate remain stable with no increase from baseline. In the one pancreas perfused for 2.5hours lactate was also stable in the first hour then increased by 50% during the last 1.5hours of perfusion.

ELISA confirmed the presence of insulin in the perfusate for all three perfusions.

Conclusion

Normothermic perfusion is a feasible method to allow physiological and functional assessment of pancreases after cold preservation techniques encouraging us to further develop this model.

Conflicts of interest

None.

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None.

References

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