Ex-Situ Normothermic Split Liver Machine Perfusion: Protocol for Robust Comparative Controls in Liver Function Assessment suitable for the evaluation of novel therapeutic interventions in the pre-clinical setting.

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Abstract

Background: Ex-situ donor liver machine perfusion is a promising tool to assess organ viability prior to transplantation and a platform to investigate novel therapeutic interventions. However, the wide variability in donor and graft characteristics between individual donor livers limits the comparability of results. We investigated the hypothesis that the development of a split liver ex-situ machine perfusion protocol provides the ideal comparative controls in the investigation of machine perfusion techniques and therapeutic interventions, thus leading to more comparable results. Methods: Four discarded human donor livers were surgically split following identification and separation of right and left inflow and outflow vessels. Each lobe, on separate perfusion machines, was subjected to normothermic perfusion using an artificial haemoglobin-based oxygen carrier solution for six hours. Metabolic parameters as well as hepatic artery and portal vein perfusion parameters monitored. Results: Trends in hepatic and portal vein flows showed a general increase in both lobes throughout each perfusion experiment, even when normalised for tissue weight. Progressive decreases in perfusate lactate and glucose levels exhibited comparable trends in between lobes. Conclusion: Our results demonstrate comparability between right and left lobes when simultaneously subjected to normothermic machine perfusion. In the pre-clinical setting, this model provides the ideal comparative controls in the investigation of therapeutic interventions for GMP cellular therapies.

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