Development of a machine perfusion device for cold-to-warm machine perfusion

van Leeuwen, Otto B; Brüggenwirth, Isabel M A; Porte, Robert J; Martins, Paulo N

Published in:
HPB

DOI:
10.1016/j.hpb.2020.05.014

Publication date:
2020

LETTER TO THE EDITOR

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To the editor,

With interest we read the article by Goumard et al. on the development of a novel circuit for combined hypo- and normothermic machine perfusion.[1] The authors are to be commended for their work, and the attempt to make an inexpensive perfusion machine available to a broader public.

Cold-to-warm perfusion, even with two different perfusion solutions, has been successfully performed in various studies with a widely used and CE-marked perfusion device (Liver Assist [Organ Assist, Groningen, Netherlands]).[2,3]

There are several potential issues that are not clarified in this article. First, it appears the same perfusion pressures are used during hypothermia and normothermia. We would like to stress the importance of using lower pressures during hypothermic machine perfusion (HMP) to prevent undesired shear stress due to increased vascular resistance.[4] Most centers that have used HMP clinically over the last years, have been using pressure-guided systems at portal pressures $\leq$5 mmHg and arterial pressures $\leq$25 mmHg.[5,6]

Secondly, it remains unclear what perfusion solution is used during HMP. To the best of our knowledge, the safety of using the only CE-certified perfusion solution (Pump Protect®, Carnamedica, Poland) for HMP has not been studied nor been approved for temperatures up to 20 °C.

Lastly, in a recent study combining hypo- and normothermic machine perfusion (NMP) to assess viability of initially declined human donor livers, all grafts cleared lactate and maintained a physiological perfusate pH.[7] We hope that the authors of the present study can validate their results by showing that livers perfused with this new system can meet the viability criteria for transplantation previously described by our own group[7] and others[8] (Table 1).

Table 1 Viability criteria for liver transplantation during normothermic machine perfusion. Modified from van Leeuwen et al.[7] and Watson et al.[8]

Viability criteria after 150 min of NMP	
Perfusate lactate	<1.7 mmol/L
Perfusate pH	7.35–7.45
Bile production (cumulative)	>10 mL
Bile pH[a]	>7.45[a]
Difference between perfusate glucose and bile glucose	>10 mmol/L

[a] Especially the difference between perfusate pH and bile pH should be positive, as described earlier.[7]

Conflict of interest

None declared.

Otto B. van Leeuwen
Department of Surgery, Section of HPB Surgery & Liver Transplantation, University Medical Center Groningen, Groningen, Netherlands

Isabel M.A. Brüggenwirth
Department of Surgery, Section of HPB Surgery & Liver Transplantation, University Medical Center Groningen, Groningen, Netherlands

Division of Organ Transplantation, Department of Surgery, UMass Memorial Medical Center, University of Massachusetts, Worcester, MA, United States

Robert J. Porte
Department of Surgery, Section of HPB Surgery & Liver Transplantation, University Medical Center Groningen, Groningen, Netherlands

Paulo N. Martins
Division of Organ Transplantation, Department of Surgery, UMass Memorial Medical Center, University of Massachusetts, Worcester, MA, United States

Correspondence: Paulo N. Martins, Division of Organ Transplantation, Department of Surgery, University of Massachusetts, UMass Memorial Medical Center, University of Massachusetts, 55 Lake Avenue North, Worcester, MA, United States.
E-mail: paulo.martins@umassmemorial.org (P.N. Martins)

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