



First experience of a New Ex-Situ Perfusion Device in donors after circulatory death (DCD) pig livers.



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Background

The use of ex-situ hypothermic (HMP) and normothermic machine perfusion (NMP) represents a growing strategy to mitigate liver damage before transplantation.

In this study, we evaluated a new ex situ machine perfusion device, PerLife® system (Aferetica, Bologna, Italy), using model of donors after circulatory death (DCD) liver grafts from slaughterhouse pigs.

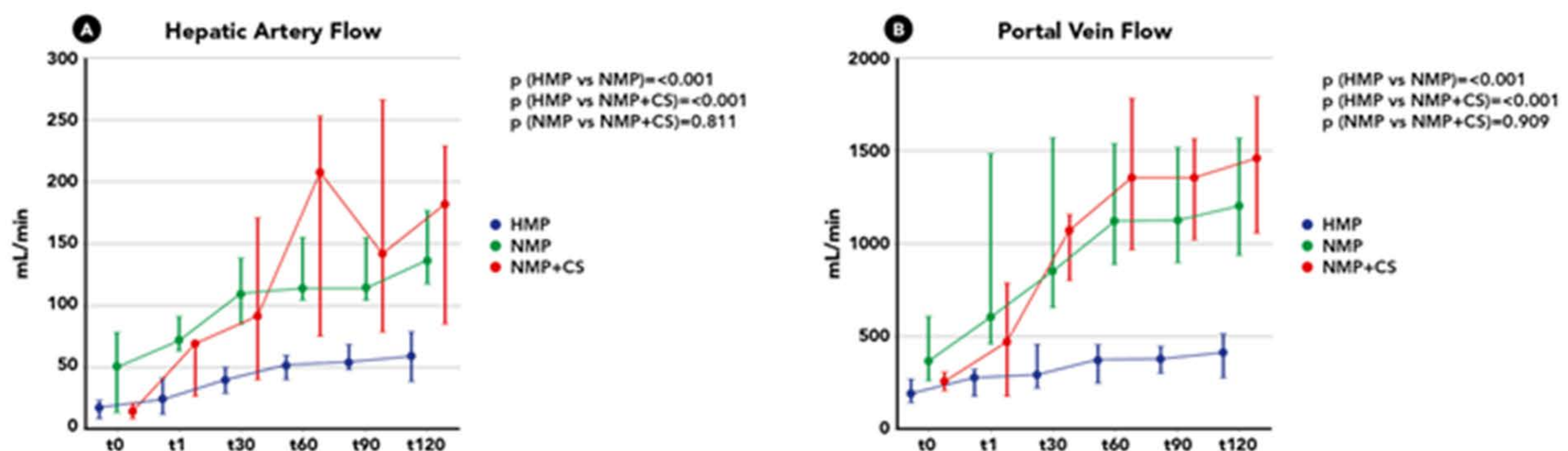
Materials and Methods

14 pig liver grafts underwent 2h ex-situ perfusion with PerLife® in PerLiver operational mode: 6 grafts were perfused in hypothermic and 8 in normothermic conditions. 3 of NMP perfusions were performed including a cytokine adsorption device (NMP+CS). Perfusate and bile sampling allowed livers' metabolism assessment and the evaluation of Interleukine 6 (IL-6) release ratio and remodulation in NMP+CS group. Perfusate samples were collected at the start of perfusion and after 10, 30, 60, 90 and 120 minutes. Perfusion parameters (pressure, flow, vascular resistance, temperature) were continuously monitored.

Results

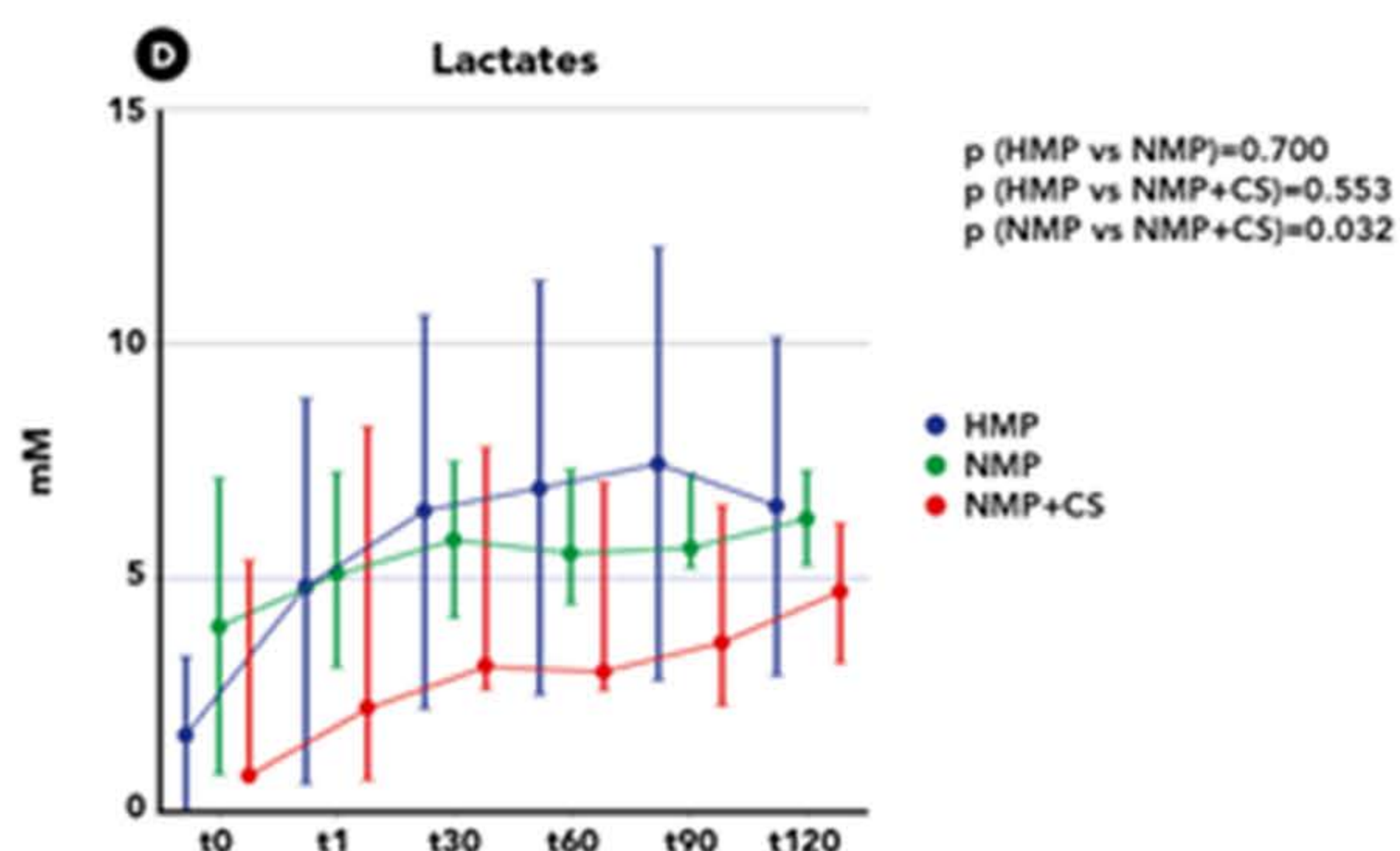
Temperature was 8,5 (7,8-9,6 °C) during HMP and 36,9 (36,2-37,4) C° during NMP and remain stable. An increase of portal vein and hepatic artery flow was observed. Lactate levels were statistically lower in NMP+CS (p=0.032). ALT was statistically higher during NMP with no differences between NMP vs NMP+CS. Bile pH was higher in the NMP+CS group 7,21 (7,11-7,21) vs 7,35 (7,07-7,63) at 120 minutes and characterized by higher glucose and bicarbonate concentration. NMP and NMP+CS grafts showed similar IL-6 release ratios. In the period t 90- t 120 CS removed a median of 493,106 pg of IL-6.

Perfusions Dynamics Assesment



Arterial and Portal Flows increases and progressive reductions of vascular resistances were observed

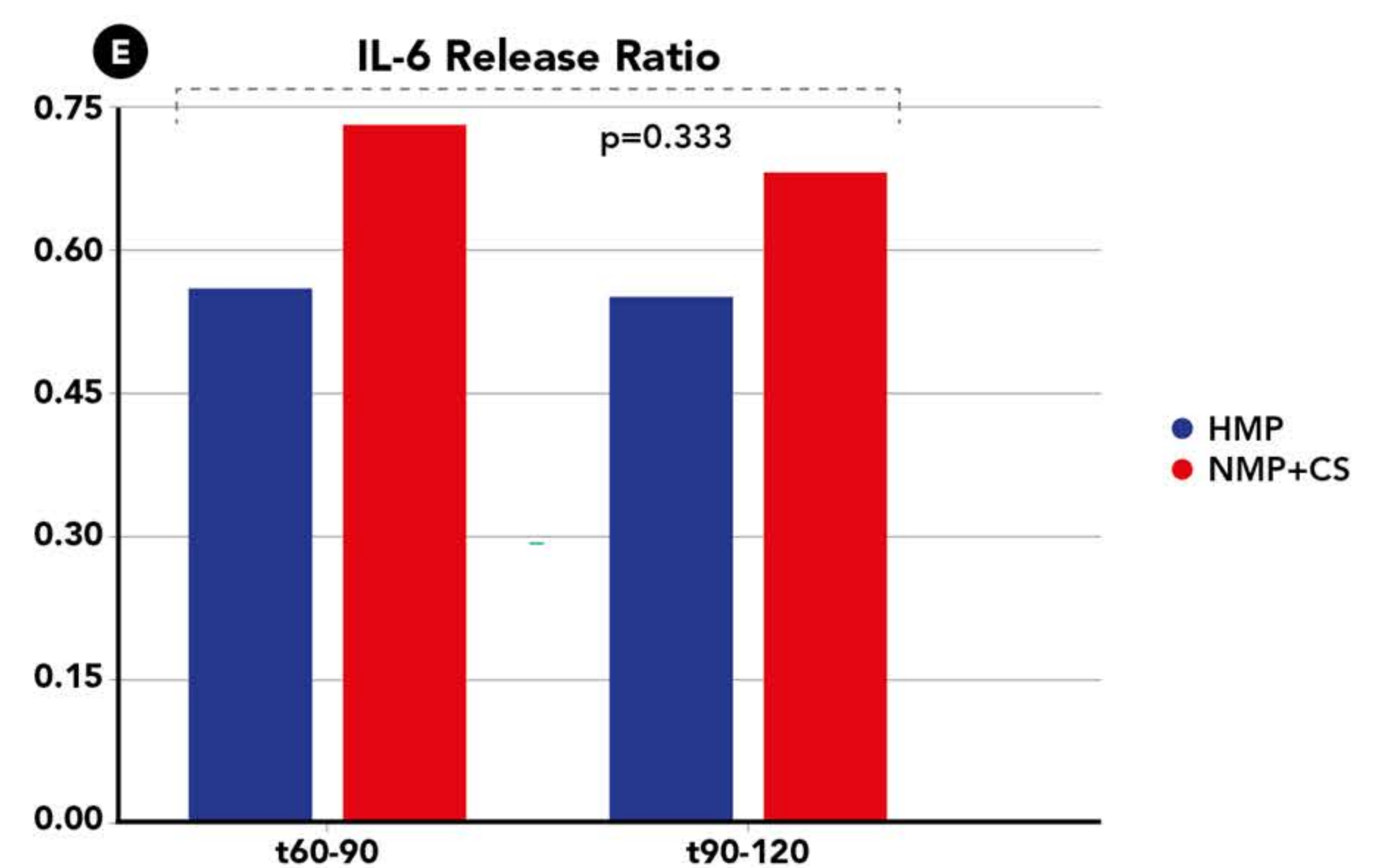
Metabolism Assessment



Lactates were significantly lower in NMP+CS compared to NMP. ALT progressively increased in all treatments.

All grafts produced bile. Bile pH was higher in NMP+CS group and had higher glucose and bicarbonate concentrations

IL-6 Evaluation



In the period t90-t120, adsorption allowed to remove 493.106,00 pg of IL-6

Conclusions

Even if this is a preliminary experience, we could affirm that PerLife® represent a new efficient and safe device. The combined use of perfusion and CytoSorb® cytokines' and inflammatory mediators' adsorption could be an effective therapeutic tool to improve grafts quality before transplantation.

References

Ghinolfi D, Melandro F, Patrono D, Lai Q, Carlis RD, Camagni S, A new ex-situ machine perfusion device. A preliminary evaluation using a model of donors after circulatory death pig livers. Artif Organs. 2022;00:1-7.