Heart Donation after Circulatory Determination of Death: The Impact of Fatty Acids on Hemodynamic Recovery and a Future Outlook

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Background: Donation after circulatory determination of death (DCD) could improve donor heart availability, which currently limits transplantation. However, reluctance to this approach arises from injury related to the inevitable warm ischemia, which could impair graft function. High levels of circulating fat are expected in DCD prior to organ procurement and may affect graft function. Therefore, we aimed to: i) determine the impact of acute, pre-ischemic exposure to high circulating fatty acids on heart recovery in an isolated rat heart model of DCD, and ii) investigate the potential for DCD heart transplantation by conducting expert interviews. Methods & results: Isolated hearts of male Wistar rats underwent 20 min. aerobic perfusion with glucose (11 mM) and either high fat (1.2 mM palmitate; HF) or no fat (NF), followed by 27 min. global ischemia (37°C), and 60 min. reperfusion. Hemodynamics, lactate release and tissue glycogen content were monitored. Percent hemodynamic recovery after ischemia, measured as heart rate-pressure product, was significantly lower in HF (30%) than NF (67%; $p < 0.015$, $n= 7 + 5$). Early reperfusion increases in lactate release in HF vs NF suggest that reduced glucose oxidation may underlie lower hemodynamic recovery in HF. Expectations were obtained from six experts, all of which indicated a positive response towards DCD heart transplantation. Conclusion: High circulating fat levels in DCD lower post-ischemic graft function and should be considered in the development of therapeutic approaches for organ preservation. Expert responses consistently indicated a promising future for DCD as a complementary source of donor hearts.

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