



A NOVEL APPROACH FOR 12 HOUR DONOR HEART PRESERVATION.

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Current donor heart preservation protocols are limited to 4hrs. They subject the hearts to periods of ischemia and reperfusion, which result in time dependent myocardial injury and coronary vasomotor dysfunction. We **hypothesized** that continuous sanguineous perfusion of the donor heart in the beating working state may prolong myocardial preservation and improve endothelial vasomotor function. Contractile, metabolic, and vasomotor functions were monitored simultaneously in an isolated pig heart model continuously perfused with autologous blood, in an apparatus developed in our laboratory. Metabolic function was assessed by myocardial tissue pH. Hearts were randomized into three Groups: I (n=5) cardioplegic arrest and 12hr storage @ 4°C using University of Wisconsin solution, followed by 2hr sanguineous reperfusion in the working state, or II (n=4) 12hr continuous perfusion in the beating working state, followed by 30min arrest and 2hr of reperfusion as above. Vasomotor function was assessed in isolated coronary ring chambers. Group III (n=5) served as coronary ring controls. **Results (m±SD):** At 2hr reperfusion LV developed pressure in Group II was higher than in I (91±7, 53±15 mmHg, $P=0.005$). Significant myocardial edema was observed in Group I vs II (79±1, 73±4 %H₂O content, $P=0.01$). Significant myocardial acidosis was noted in Group I vs II during preservation (pH6.1±0.03, 7.3±0.01, $P<0.001$) and reperfusion (pH6.8±0.05, 7.23±0.008, $P<0.001$). Coronary endothelial vasomotor function was completely preserved in Group II vs I as evidenced by the dose response relaxation of coronary rings to 10 M bradykinin (37, 55% Δ baseline, $P=0.01$).

Conclusion: Compared to current heart preservation techniques, this new method of donor heart preservation demonstrates the ability to extend the 4hr limit, avoid prolonged ischemia, and preserve both myocardial and endothelial vasomotor functions.

American Heart Association Abstracts from the 70th Scientific Sessions
Cardio-Thoracic and Vascular Surgery: Transplantation and Ventricular Assistance
Circulation 1997;96(8)Suppl:I-372