

## Audit Trial Report II: AQIX® RS-I solution

- (i) *A comparison of a novel phosphate-free preservation solution and a standard hypothermic method in porcine renal allografts.*

### Objective

The detrimental effect of hypothermic conditions in conjunction with warm ischaemia is well documented in non-heart beating donor kidneys; the aim of this study was to assess renal function after an ex vivo warm flush with a novel non-phosphate buffered preservation solution AQIX® RS-I.

### Method

Porcine kidneys were flushed with either AQIX® RS-I at 30°C or a hyperosmolar citrate preservation solution at 4°C at a pressure of 100mmHg after 5 -10 minutes warm ischaemic time, followed by cold storage for 2 hours ( N = 4 per group). An assessment of renal function was made by perfusing the organs with autologous blood at 37°C, with an initial circulating serum creatinine concentration of 1000µmol/L on an isolated organ perfusion system. Physiological and biochemical parameters were measured throughout the 6 hour perfusion period.

### Results

The AQIX® RS-I group flushed significantly faster than the hyperosmolar citrate group,  $8 \pm 1.15$  vs  $12.6 \pm 2.5$ min respectively ( $p= 0.0159$ ). Creatinine clearance, renal blood flow and resistance were all significantly better in the AQIX® RS-I group over 6 hours. Oxygen consumption, urine output and acid base balance were all improved in the AQIX® RS-I group. The RS-I flushed kidneys also gained less weight after the perfusion period  $8.7 \pm 8.9$  vs  $21.8 \pm 8.5$ g respectively. All values are mean  $\pm$  SD.

Functional Parameters	AQIX® RS-I 30°C	Hyperosmolar citrate 4°C	P Value
% creatinine fall	$83 \pm 12.1$	$72.4 \pm 12.8$	0.41
CrCl ml/min/100g	$4.14 \pm 2.2$	$1.9 \pm 0.9$	<b>0.037</b>
O <sub>2</sub> consumption ml/min/g	$50 \pm 14.5$	$30.8 \pm 6.9$	0.0635
RBF ml/min/100g	$67.4 \pm 17.9$	$43.4 \pm 9.6$	<b>0.017</b>
RVR mmHg/ml/min	$0.57 \pm 0.28$	$0.76 \pm 0.5$	<b>0.017</b>
Bicarbonate mmol/l	$21.5 \pm 8.8$	$14.2 \pm 3.1$	0.285

### Conclusion

The potential beneficial effects of normothermic preservation have been previously highlighted. However, there is little evidence of the use of an initial normothermic flush. In this study a normothermic flush using AQIX® RS-I, a non-phosphate buffered solution was superior to a conventional cold flush. It is hoped that this will broaden the applicability of warm preservation.

Investigators: M.D Kay, S.A Hosgood, S.J.F Harper, \*D. Rees, M.L. Nicholson; Renal Transplant Unit, Leicester General Hospital, England, UK. \* Aqix Ltd, Imperial College London, UK (January, 2005)

(ii) *Static normothermic preservation of renal allografts using a novel non-phosphate pH buffered preservation solution.*

## Objective

There has been renewed and growing interest in the role of normothermic preservation in transplant allografts. The aim of this study was to assess the viability and function of renal allografts under normothermic conditions using a novel non-phosphate buffered preservation solution, AQIX<sup>®</sup>RS-I

## Methods

Porcine kidneys were flushed at 30°C with AQIX<sup>®</sup>RS-I at 100mmhg pressure after 5-10 minutes warm ischaemic time, and stored statically at either 4°C or 30°C for 2 hours (N= 4 per group). An assessment of renal function by physiological and biochemical parameters was performed by perfusing the organs with autologous blood at 37°C, with an initial circulating serum creatinine concentration of 1000µmol/l on an isolated organ perfusion system for 6 hours.

## Results

Although the hypothermic group demonstrated overall superior renal function, the normothermic stored kidneys displayed a statistically comparable acid-base balance. Furthermore renal function was still evident after 6 hours perfusion with increasing oxygen consumption, renal blood flow and reduced renal vascular resistance.

Values are mean ± SD

Functional parameters After 6 hours perfusion	AQIX <sup>®</sup> RS-I 4°C Storage	AQIX <sup>®</sup> RS-I 30°C Storage	P Value
pH	7.4 ± 0.2	7.3 ± 0.1	0.484
Bicarbonate mmol/L	21.5 ± 8.8	16.6 ± 2.63	0.484
O <sub>2</sub> consumption ml/min/g	50 ± 14.5	26 ± 4.4	0.02
% Creatinine fall	83 ± 12.1	54 ± 3.2	0.0286
GFR ml/min/100g	1.2 ± 1.1	0.5 ± 0.3	0.343
Total urine output ml	733 ± 230	204 ± 11	0.0286
RBF ml/min	84 ± 20.7	45 ± 8.4	0.022
RVR mmHg/ml/min	0.4 ± 0.11	0.8 ± 0.17	0.393

## Conclusions

The effectiveness and versatility of AQIX<sup>®</sup>RS-I as a preservation solution under both normothermic and hypothermic conditions has been demonstrated. Renal viability was maintained after 2 hours static normothermic storage. This study provides a foundation for further analysis utilising normothermic preservation, AQIX<sup>®</sup>RS-I, and the possible elimination of hypothermic conditions.

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