

SUCROSE-PHOSPHATE COLD FLUSH SOLUTION OFFERS IMPROVED
PRESERVATION OF PROXIMAL TUBULE COMPARED WITH THE TWO SOLUTIONS
COMMONLY USED IN KIDNEY TRANSPLANTATION

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Acute tubular necrosis (ATN) remains a serious problem in approximately 50% of early transplanted kidneys and is the most common cause of immediate non-function. The incidence of ATN varies with duration of cold storage of the donor kidney between removal and implantation (Marshall, 1984). There is very little information on the direct effect of cold storage preservation on subsequent tubular function as measured with modern microtechniques. In this study we used the technique of *in vitro* microperfusion of kidney tubules to investigate the effects of differing periods of cold storage following intra-arterial flush with 3 different solutions: Collins C₂, Euro-Collins (E-C) and PBsuc140 (NaH₂PO₄ 13, Na₂HPO₄ 56, sucrose 140 mmol/l).

Male, SPF grade IV, New Zealand white rabbits (1.5-2.0 kg) were anaesthetised with pentobarbitone (35 mg/kg i.v.). Kidneys were either removed directly and not flushed (NF) or flushed through the renal artery with 20 ml of one of the above solutions at 17°C. NF kidneys were stored in physiological saline (Pirie & Potts, 1983), whilst flushed kidneys were stored in their flush solution for up to 48 hr at 4°C. Segments of proximal convoluted tubule were dissected from the mid-cortex and set up for microperfusion at 37°C. Measurements were made of fluid reabsorption rate (Jv), and lumen to bath leak of ¹²⁵I-iothalamate (a measure of tubule integrity) as described by Pirie and Potts (1983).

Tubules from kidneys flushed with PBsuc 140 and cold stored for up to 48 hr were similar to NF tubules in that they appeared to be in excellent condition during microperfusion and had similarly low iothalamate leaks. In contrast, tubules from kidneys preserved with either C₂ or E-C often appeared to be damaged structurally and in over 50% of these tubules iothalamate leak was excessively high. Values for Jv (nl/mm/min) are tabulated below for tubules that had an undamaged appearance and an iothalamate leak of <5% of the perfused rate.

Table 1. Fluid reabsorption rate (Jv, nl.mm⁻¹.min⁻¹ ± se)

Hr. stored	NF	PBsuc140	E-C	C ₂
0-4	0.96 ± 0.14 (6)	0.84 ± 0.05 (10)	0.92 ± 0.14 (7)	0.46 ± 0.05 (4)
24	-	0.93 ± 0.09 (8)	0.85 ± 0.12 (5)	0.36 ± 0.09 (4)
48	-	0.41 ± 0.04 (6)	0.36 ± 0.11 (4)	0.11 ± 0.15 (4)

Values are means ± s.e.m.s. Numbers in brackets refer to no. of tubules.

Jv was significantly lower in all groups of tubules after cold storage for 48 hr (P<0.01). Additionally, tubules from kidneys flushed with C₂ exhibited significantly lower Jv.s for all storage periods (P<0.01).

Coffey and Andrews (1983) have previously reported excellent preservation of tubule morphology in kidneys flushed with PBsuc. The present observations of tubule integrity and fluid reabsorption rate, taken together, suggest that PBsuc 140 preserves proximal convoluted tubules more effectively than either Euro-Collins or Collins C₂.

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