

T400-Series Surgical Protocol

Rat In Situ Autoperfused Kidney: Acute Renal Blood Flow Measurement

APPLICATION BASICS

Site:	Autoperfused Kidney Abdominal Aorta
Species:	Rat
Body Weight:	300 - 375 grams
Duration:	Acute
Vessel Diameter:	1.5 - 2.0 mm

PROBE

Size:	1 or 1.5 mm
Reflector:	JS
Connector:	CRA10: 10-pin
Cable Length:	60 cm
Catalog #:	MA-1PRB or MA-1.5PRB

FLOWMETER	TS420 Perivascular Module
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Surgical Approach

Male Sprague Dawley rats are anesthetized with Inactin (100 mg/kg, ip). Following anesthesia induction, an incision is made in the ventral cervical region of the neck. The trachea is cannulated with a 3 cm length of PE 240 tubing. The left jugular vein is cannulated with PE 10 tubing and the carotid artery is cannulated with a short length of PE 90 tubing (2.0 cm) attached to a Y connector, one arm of which is used for BP measurements and the other used to complete the extracorporeal perfusion circuit.

A midline incision is then made in the abdomen. The abdominal aorta, between the right renal artery and the posterior aortic bifurcation, is exposed and isolated from the vena cava. The left renal artery is also exposed and isolated. The animal is then heparinized with 175 units of heparin. The aorta is clamped distal to the left renal artery. The tubing from the carotid artery is allowed to fill with blood and is then inserted proximally into the aorta and secured. Renal perfusion is not interrupted during the introduction of the extracorporeal circuit. When the circuit is completed and opened, blood flows both naturally and through the extracorporeal circuit to perfuse the kidneys. The aorta is then ligated between the left and right renal arteries, so that the right kidney is perfused naturally, and the left kidney is perfused with blood from the carotid artery.

To measure blood flow, a 1PRB Flowprobe is placed on the aorta, proximal to the left renal artery. The Probe is secured in position by wrapping the aorta and Probe with a small piece of silastic sheeting (0.010 thickness) and securing with two silk sutures. Connect Probe to a Transonic® Flowmeter. Renal blood flow, systemic arterial blood pressure and heart rate are all recorded on a Grass Model 79D polygraph.

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Dose Ranges Observed

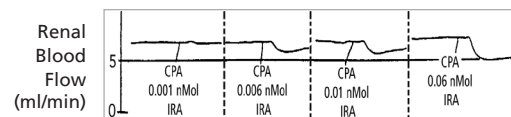


Fig. 1: Dose response effect of CPA on renal blood flow in the in-situ autoperfused kidney of an inactin anesthetized rat.

ACKNOWLEDGEMENT

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REFERENCES

Barrett RJ, Droppleman DA, "Interactions of Adenosine A1 Receptor-Mediated Renal Vasoconstriction with Endogenous Nitric Oxide and ANG II," AJP 1993; 265: F651-F659.

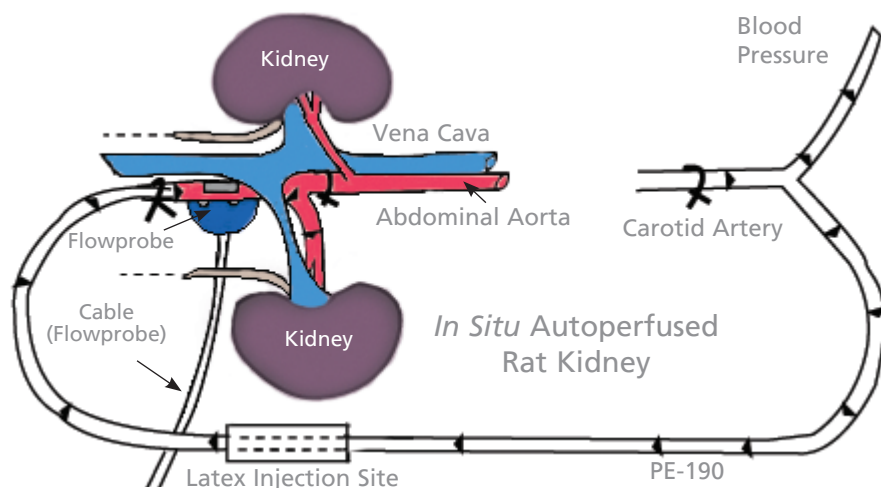
Fink GD, Brody MJ, "Continuous Measurement of Renal Blood Flow Changes to Renal Nerve Stimulation and Intra-Arterial Drug Administration in the Rat," AJP 1978; 234(2): H219-H222 or Am J Physiol Heart Circ Physiol 1978; 3(2): H219-H222.

Rat In Situ Autoperfused Kidney: Acute Renal Blood Flow Measurement Cont.

Note:

The researchers initially placed the Probe around the renal artery. However, they moved the Probe to the aortic site after they found that they had to keep repositioning the Probe at the renal site and had to keep reapplying gel around the Probe. Nalco superabsorbent powder may be used to thicken coupling gel to stabilize ultrasonic coupling. Using a smaller 0.7PS Probe (not available at the time of this protocol) could alleviate the difficulties with ultrasonic coupling on smaller diameter renal arteries. In a chronic application, the renal artery site would be suitable because connective tissue would grow around the Probe and stabilize it.

At first, after moving the Probe to the aortic site, the researchers were concerned about the 1 mm Probe's tight fit on the aorta, but their results were excellent and the preparation worked well. To assess the result of the 1 mm Probe's tight fit on the aorta, flow was monitored with both a 1mm PRB Probe and a 2mm PSB Probe in 3-4 preparations. No significant differences in flow were seen. The more stable readings came from the 1PRB Probe because of its snug fit. In fact, they found that it was not even necessary to apply acoustic gel around the Probe on the aorta. A squirt of gel can be applied, however, before the silastic sheeting is sutured in place.



For Anesthesia: check what is currently available and allowed with your Institutional Animal Care & Animal Use Committee and know what affects the drugs will have on the parameters you are interested in studying. See Anesthetic Guidelines RL-67-tn for more information.



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