

# BLF22 Surgical Protocol

## Chronic Renal Cortex & Medulla Perfusion in Rats

### APPLICATION BASICS

Site: Left Kidney Cortex & Medulla  
 Species: Rat (Sprague Dawley)  
 Weight: 340-420 grams  
 Duration: Chronic

PROBE TYPE: M: monofiber

### Application

This methodology established a way for the kidney to be chronically implanted with optical fibers, thus providing an innovative tool for monitoring regional blood flow. This capability enables detection of either increases or decreases in rMBF and rCBF, independently and continuously, over periods of at least 11 days (day 6-16 post-surgical). This technique will make significant contributions in hypertension research.

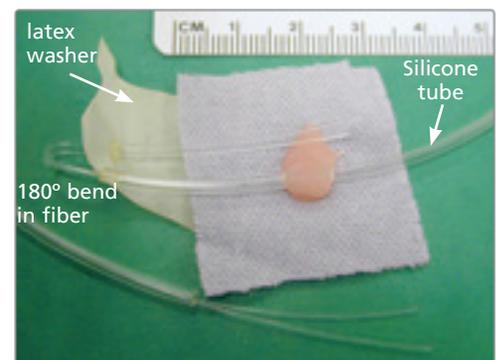
### Surgical Approach

Rats were anesthetized with a mixture of acepromazine (5mg/kg im) and ketamine (50 mg/kg im) and were maintained with 1.0% halothane. A flank incision was used to expose the left kidney and facilitate the placement of two Laser Doppler Probes. A 26 gauge needle was inserted to the desired depth in the kidney allowing insertion of the 0.5 mm plastic fiber to a depth of 2 mm for superficial regional cortical (rCBF) blood flow and 5 mm for regional medullary blood flow (rMBF).

Beforehand, a latex washer (surgical glove material) is epoxied around the optical fiber at the predetermined distance from the tip, thus insuring its precise placement in the cortex or medulla. The latex washer is also used to fix the fiber in place with cyanoacrylate glue. The Probe fiber was then sheathed in silastic tubing. The tubing was attached to muscles near the kidney and, after tunneling subcutaneously, to the rat's neck, using Dacron mesh. Finally, the fibers in the tubing were exteriorized through an incision at the midscapular region and were led through a protective spring to the top of the animal's cage.

A six-day recovery period allowed healing of the renal tissue before beginning the hypertension study. It was necessary to minimize movement so that the laser signal could measure small changes. To do this, the rats were restrained in cages. Both cortical and medullary measurements were very stable and reproducible between days six and 16.

Type M (ABLPHM) with implantable single fiber ends (AFAL1026).



### Two Fiber Implantable Assembly:

Two monofibers prepared for renal implantation: the fibers have a 180 degree bend with a latex washer to affix them at the proper depth in the kidney. They are sheathed in silastic tubing. A Dacron fiber patch is epoxied to the assembly to stabilize the position of the unit under the skin before exiting the two-fiber unit at the midscapular region and threading it through the spring tether.

## Chronic Renal Cortex & Medulla Perfusion in Rats cont.

### Perfusion Ranges Observed

Example taken from Day 10

PROBE SITE	N	MEAN BF VALUE (ANALOG OUTPUT)		
		CONTROL (VOLTS)	ANGIOTENSIN II (VOLTS)	RECOVERY (VOLTS)
Cortex	9	1.20	0.58	1.12
Medulla	8	1.04	0.64	1.03

In a typical study, rats are given 12.5ng bolus IV injection of Angiotensin II. Following this injection, the rCBF shows a sharp drop (by 50 - 75% of the baseline value) while rMBF drops by 40 - 50%.

### ACKNOWLEDGEMENT

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### REFERENCES

Lu S, Mattson DL, Roman RJ, Becker, CVG, Cowley Jr AW, "Assessment of Changes in Intrarenal Blood Flow in Conscious Rats Using Laser-Doppler Flowmetry," AJP 1993; 264: F956-F962.



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