

# T400-Series Surgical Protocol

## Rat Common Carotid Artery: Chronic Blood Flow Measurement

### APPLICATION BASICS

Site:	Common Carotid artery
Species:	Rat
Body Weight:	280 grams
Duration:	Chronic
Vessel Diameter:	0.7 - 1.2 mm

### PROBE

Size:	1 mm
Reflector:	JS
Connector:	4-pin
Cable Orientation:	Side or Back
Cable Length:	10 cm
Catalog #:	MC-1PR(S or B)-JS-WC10-CM4S-GC

### FLOWMETER

TS420 Perivascular Module

## Application

A study investigated the effects of hypergravic stress on cerebral blood flow (CBF). Rats were chronically instrumented with a Flowprobe on the right carotid artery and biparietal EEG electrodes. Four days post surgery the rats were exposed to 5-25 +Gz exposure (head to foot inertial stress). Each centrifuge exposure was 30 seconds in duration with 15 minutes of rest between +Gz exposures. A total of nine exposures were done on each rat at 2.5 +Gz increment.

## Surgical Approach

Rats (250-350 g) were anesthetized using 3% halothane administered with medical grade oxygen via an Ohmeda vaporizer (BOC Health Care, England). The surgical sites (tracheal and scapular region) were shaven and aseptically prepared. A midline incision of the tracheal area was made. Blunt dissection exposed the common carotid with skin and muscles held open using bulldog clamps. Adherent tissues were retracted using 3-0 silk sutures anchored to a pair of hemostats. Approximately 2 cm of the common carotid artery was freed from connective tissues, the jugular vein, and vagus nerve by carefully passing a pair of serrated full curved forceps several times. The freed section of the artery was held in place using a halsted mosquito forcep (Roboz).

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## Flow Ranges Observed

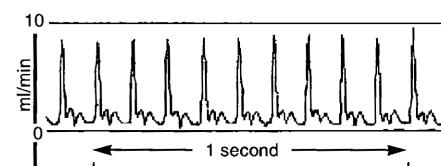


Fig. 1: Typical flow rate of a fully awake rat.

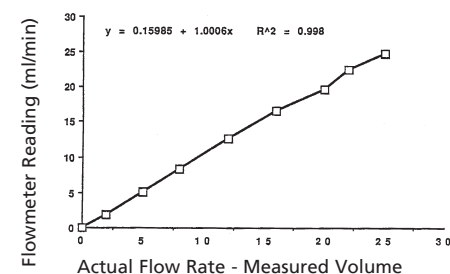
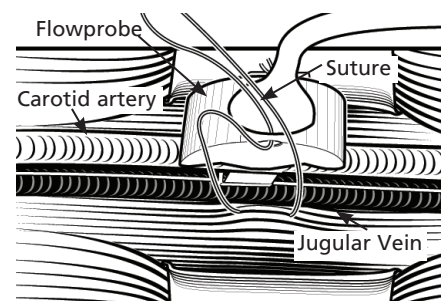


Fig. 2: Representative calibration curve of Flowmeter volume flow measurement against measured volume of flow.

**Note:** We recommend that side cable configuration be used. It can be anchored in place with a suture around the cable and a loop through the slide cover.



## Rat Common Carotid Artery: Chronic Blood Flow Measurement Cont.

### Surgical Approach cont.

A Flowprobe (1PRB) was placed around the artery. Its signal was verified and monitored prior to closure. The metal slide of the Probe's reflector was closed using a small amount of cyanoacrylate glue. The artery and the acoustic portion of the Probe was soaked with 0.9% NaCl to avoid glue contamination. The overlying muscles were then approximated and sutured. The Probe's cable was anchored subcutaneously and then passed around the neck to exit at the back of the animal just above the scapular region. The connector side of the Probe was held in place using a silicone or delrin cuff sutured to the skin. Postoperatively, the animals recovered in individual cages and were given buprenex HCl analgesia (0.1mg/Kg), subcutaneously .

### Flow Ranges Observed

The Flowprobe signal returned 48-72 hours post surgery. This signal lasted for 3-4 weeks depending on the fibrotic build-up surrounding the Probe's acoustic window. This recovery period is very advantageous because it eliminates the effect of surgery and anesthesia and allows us to obtain measurements on fully awake animals. Baseline flow in the common carotid artery of a fully awake animal is 7-10 ml/min (Fig. 1). Our protocol concentrates on cerebral blood flow and its changes under different conditions, which includes hypergravic stress, complete and incomplete ischemia. We developed a calibration procedure to verify the signal at the minimum (complete ischemia; 0 ml/min) and at the maximum (hyperemia 32 ml/min) blood flows (Fig. 2).

### ACKNOWLEDGEMENT

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### REFERENCES

Werchan PM, Echon RM, Barber JA, Galindo Jr S, Shahed JA, "Estimation of Rat Cerebral Blood Flow (CBF) during +Gz Centrifuge Exposures Leading to G-induced Loss of Consciousness (G-LOC)," Soc. of Neuroscience 1993; 19(Part 2): 1220 Abstract.

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