# T400-Series Surgical Protocol

## Rat Mesenteric Branches: Acute Blood Flow Measurement

### Application Basics

<table>
<thead>
<tr>
<th>Site:</th>
<th>Mesenteric branches: jejunal &amp; ileal arcades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species:</td>
<td>Rat</td>
</tr>
<tr>
<td>Body Weight:</td>
<td>400 grams</td>
</tr>
<tr>
<td>Duration:</td>
<td>Acute</td>
</tr>
<tr>
<td>Vessel Diameter:</td>
<td>270 µm</td>
</tr>
</tbody>
</table>

### Probe

| Size:         | 0.5 mm                                      |
| Reflector:    | J                                           |
| Connector:    | CRA10: 10-pin                               |
| Cable Length: | 60 cm                                       |
| Catalog #:    | MA-0.5PSB                                   |

### Flowmeter

TS420 Perivascular Module

### Application

The combination of this model and the new microcirculation transit-time Probe, allowed us to make the first measurements of true flows in the microcirculation. These were until now estimated from diameters and velocity measurements; this method lacked precision and prevented any appreciation of the instantaneous dynamic of flow. This allowed us to examine the instantaneous dynamic and to observe the cyclic variation of flow caused by the periodic contractions of the bowel.

### Surgical Approach

Note: This protocol is for mesenteric branches, jejunal and ileal arcades. The superior mesenteric artery (0.7 - 0.9 mm diameter) is larger than the branches and requires 1 mm Probes for full ultrasonic illumination.

Male Sprague-Dawley rats weighing approximately 400 gm were anesthetized with 0.1 ml / 100 gm pentobarital (6%) i.p. Anesthesia was maintained by additional i.p. injections of diluted pentobarital. The right jugular vein was cannulated with polyethylene tubing for the administration of drugs.

After a small abdominal incision, a section of the ileum was pulled out and spread over the transparent stage. Fat and connective tissues surrounding the mesenteric arteries (internal artery diameters were approximately 270 µm) were carefully removed under a dissecting microscope.

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**Flow Ranges Observed**

![Image of Flow Ranges](image1)

**Fig. 1:** Mean flow over 90 seconds was 0.494 ± 0.276 and 0.527 ± 0.233 ml/min, respectively. After treatment with isoprenaline and superfusion of the preparations with papaverine, mean flow increased to 0.666 ± 0.379 ml/min.

![Image of Surgery](image2)

**Fig. 2:** Transit-time ultrasound Flowprobe on mesenteric (jejunal) branch (center); Laser Doppler Probe on mucosa on the right.

Surgical Approach cont.

The preparation was mounted under a biological binocular microscope (Leitz) connected to a color video recording system. The surface of the mesenteric artery was covered with a Saran film. Warm Krebs’ solution was superfused on the artery at a rate of 2 ml/min. The microscope magnification was 145 fold. The stainless steel handle of the Probe was connected to a micromanipulator in order to allow positioning of the Probe around the vessel near the objective. The vessel was positioned in the lumen of the Probe, making sure the reflector bracket was not tugging on the vessel wall to reduce the flow. Zero flow reading was obtained by transient clamping of the arteriole under investigation.

Basal flow measurements were done at a few minute intervals, the mean flows over 90 seconds were $0.494 \pm 0.276$ ml/min and $0.527 \pm 0.233$ ml/min respectively. The reproducibility seems excellent despite the elevated standard deviation due to the physiological periodic reduction of flow provoked by intestinal peristalsis.

After treatment of the animals with isoprenaline and superfusion of the preparations with papaverine, the mean measured flow increased to $0.666 \pm 0.379$ ml/min.

REFERENCES


Superior Mesenteric Blood Flow

Kost C K et al, “Vascular Reactivity to Angiotensin II is Selectively Enhanced in the Kidneys of Spontaneously Hypertensive Rats,” J Pharmacol & Expe Therap 1994; 269(1) 82-8. (426A)