

T400-Series Surgical Protocol

Rat Hepatic Artery: Acute Blood Flow Measurement

APPLICATION BASICS

Site:	Hepatic artery
Species:	Rat
Body Weight:	430 grams
Duration:	Acute
Vessel Diameter:	0.25 - 0.4 mm

PROBE

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

FLOWMETER	TS420 Perivascular Module
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Application

In other species, measurement of hepatic arterial blood flow is often combined with portal vein flow for studies on nutrition, septicemia and toxicology. Since the net flux of a metabolite is the product of its arteriovenous or portovenous concentration difference and blood flow, the net hepatic uptake (or secretion) of any metabolite may be determined with three sampling catheters and two Flowprobes.

Hepatic arterial flow is also an important parameter in several models of liver transplant. In one study in pigs, hepatic arterial flow increased at the expense of portal vein flow following liver denervation. In humans, the routine intraoperative measurement of hepatic arterial flow in pediatric liver transplants has been advocated as a means of predicting early hepatic arterial thrombosis.

Surgical Approach

Anesthetize the rat with pentobarbital anesthesia (20 mg/kg IP). Note that pentobarbital anesthesia may significantly depress flow when compared to flow in the conscious animal (See Anesthetic Guidelines RL-67-tn for more information). The use of a heating pad or heat lamp is recommended as hypothermia also reduces flow. A 0.5 ml bolus of saline placed subcutaneously every half hour is also recommended.

Place the rat in dorsal recumbency and make a ventral midline abdominal skin incision. Extend the abdominal incision through the linea alba into the abdominal cavity. Retract the lobes of the liver cranially to locate the splanchnic vessels. Locate the pulsing hepatic artery where it branches from the short celiac artery.

(Continued on next side.)

Flow Ranges Observed

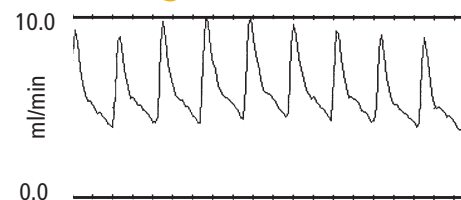


Fig. 1: Instantaneous flow in this anesthetized 330 gm rat ranged from 5 to 10 ml/min. The pulse rate was approximately 380 bpm. This measurement was made directly on the hepatic artery and includes the flow components going to the gastroduodenal and right gastric arteries.

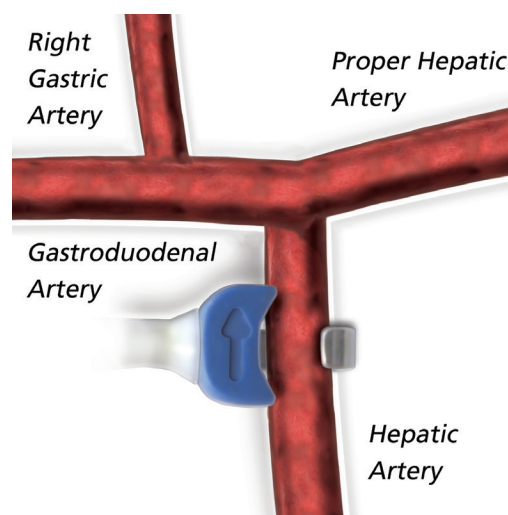


Fig. 2: Schematic of Flowprobe on a rat hepatic artery.

Rat Hepatic Artery Acute Blood Flow Measurement Cont.

Surgical Approach cont.

The hepatic artery is easily dissected from adjacent tissue at this site as there is no immediately adjacent vein. However, at this site the hepatic artery does have flow components destined for the stomach and small intestine. For a more accurate assessment of hepatic flow, it may be necessary to trace and dissect the proper hepatic artery from the portal vein or ligate the right gastric and gastroduodenal branches. Clean off the fat on the vessel for proper acoustic coupling and place the Probe around the vessel making sure that the vessel is within the lumen of the Probe ultrasonic window. For extended measurements, a micromanipulator can be used to maintain proper position of the Flowprobe.

Fill the plunger of a 30 cc syringe and load the syringe with sterile Surgilube acoustic gel, taking care to prevent the formation of air bubbles. Place a flexible 20 gauge catheter on the tip of the syringe. Insert the catheter through the Probe's acoustic window adjacent to the artery and deposit the gel while withdrawing the syringe. The Surgilube gel acts as an acoustical couplant and must replace all air space. Check the signal bar indicator on the meter to verify that signal amplitude is close to 1 Volt. A low signal or an acoustic error can usually be traced to an insufficient amount of lubricating gel or to an air bubble.



Transonic Systems Inc. is a global manufacturer of innovative biomedical measurement equipment. Founded in 1983, Transonic sells "gold standard" transit-time ultrasound flowmeters and monitors for surgical, hemodialysis, pediatric critical care, perfusion, interventional radiology and research applications. In addition, Transonic provides pressure and pressure volume systems, laser Doppler flowmeters and telemetry systems.

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