



### Application Basics

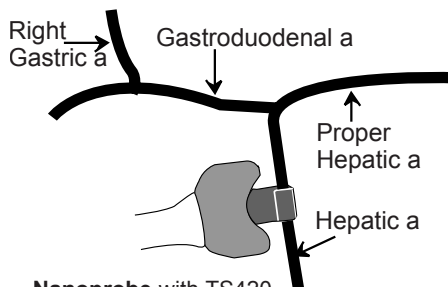
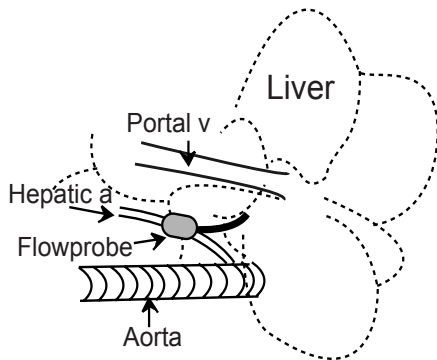
Species	<b>Rat</b>
Site	<b>Hepatic Artery</b>
Duration	<b>Acute</b>
Body Wgt.	<b>330 g</b>
Vessel Diameter:	<b>0.25 - 0.4 mm</b>
Probe Style/Flowmeter	
TS420 Module:	<b>MA0.5PSB</b>
T106/T206	<b>0.5VB -WC60-CH10-acute</b>

### Surgical Approach

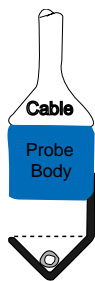
Anesthetize the rat with pentobarbital anesthesia (20 mg/kg. IP). Note that pentobarbital anesthesia may significantly depress flow when compared to flow in the conscious animal. The use of a heating pad or heat lamp is recommended as hypothermia also reduces flow. A 0.5 ml. bolus of saline placed subcutaneously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

Place 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. The hepatic artery is easily dissected from adjacent tissue at this site as there is no vein immediately adjacent. 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 the fat off the vessel for proper acoustic coupling and place the probe around it making sure that the vessel is within the lumen of the probe ultrasonic window (for V probes: nestled in the bottom of the V). For extended measurements, proper position of the flowprobe can be maintained with a micromanipulator.

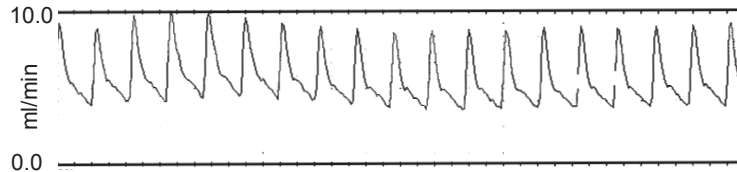
Fill the plunger of a 30 cc syringe and load the syringe with sterile HR lubricating jelly, taking care to prevent the formation of air bubbles. Place a flexible 20 ga. catheter on the tip of the syringe. Insert the catheter through the probe's acoustic window adjacent to the artery and deposit the jelly while withdrawing the syringe. The lubricating jelly acts as an acoustical couplant and must replace all air space. Press the test mode button 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 jelly or an air bubble.



**Nanoprobe** with TS420 flowmeter module:  
Vessel lies parallel to probe reflector within lumen of ultrasonic window.



**V-Series Probe** with T106/T206 flowmeters:  
Highest sensitivity lies within the deepest angle of the V.



### Flow Ranges Observed

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.

### Applications

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.

