

# T400-Series Surgical Protocol

## Fetal Sheep Umbilical Artery (Dorsal Approach): Chronic Blood Flow Measurement

### APPLICATION BASICS

Site:	Umbilical artery
Species:	Fetal Sheep
Stage of Gestation:	124 days
Duration:	Chronic, 15 days
Vessel Diameter:	4 mm

### PROBE

Size:	4 mm (side exit)
Reflector:	L with sliding cover
Connector:	4-pin
Cable Length:	60 cm
Catalog #:	MC-4PSS-LS-WC60-CM4S-GC

### FLOWMETER

TS420 Perivascular Module

### Flow Ranges Observed

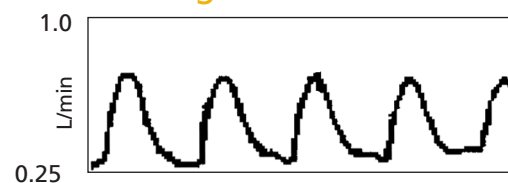


Fig. 1: Fetal sheep: 124 day gestation. Instantaneous blood flow was 400 ml/min to 900 ml/min. Mean flow was 620 ml/min.

### Application

Umbilical arterial blood flow is used extensively in pregnancy research. Some investigators use blood flow in combination with pressure to measure changes in vascular resistance induced by pharmaceutical agents. Others look for diurnal patterns associated with parturition.

### Surgical Approach

Premedicate with 0.4 g glycopyrrolate IM, induce with 1 g ketamine IM and maintain anesthesia on 1.5% - 2% halothane.

Place anesthetized sheep in dorsal recumbency and make a ventral paramedian incision from the umbilicus to a point 2 cm cranial to the udder. The skin incision is made 1 cm off midline to avoid the median subcutaneous vein. Retract the skin and associated vascular structures and continue the incision through midline of the abdominal wall. Identify and exteriorize the umbilical horn containing the fetus. Palpate the fetus to identify the orientation and to locate the sacral crest. The ideal orientation is with the head of the fetus cranially located with respect to ewe and the dorsum of the fetus along midline incision.

Make a transverse incision in the uterus to allow access to the surgical site cranial to the fetal sacral crest. Once the fetus is exposed make a longitudinal skin incision just cranial to the sacral crest and slightly left of the spine. Use electro-cautery to incise through the epaxial muscles until the aorta is accessible. Take care not to damage the vena cava situated to the right of the aorta.

Preposition the slide so that the bracket hole is near the body of the Probe. Identify the umbilical artery and position the Probe as shown in Fig. 3. Close and secure the slide and suture the Probe to epaxial muscle taking care not to damage the adjacent vena cava. Close the epaxial musculature and the fetal skin in separate layers with 2-0 simple continuous sutures. Secure the Probe cable to fetal skin with a 2-0 simple

*(Continued on next page.)*

## Fetal Sheep Umbilical Artery (Dorsal Approach): Chronic Blood Flow Measurement Cont.

### Surgical Approach cont.

interrupted suture. Close the uterus with a continuous Cushing pattern oversewn with a continuous Lembert, the Probe cable is exteriorized through this incision. Extend the Lembert pattern slightly to oversee the cable for 2 cm.

Use a trocar to puncture the abdominal wall in the paralumbar fossa. Enlarge the incision by scalpel to allow passage of Probe connector. Close the body wall and skin routinely. Suture the cable to the skin of the ewe near the exit site.

### ACKNOWLEDGEMENT

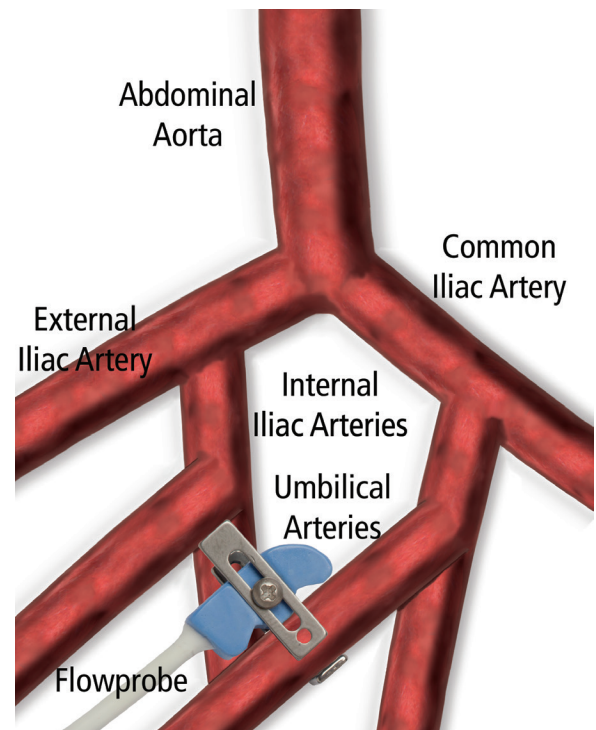
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### REFERENCES

Transonic Systems' 1989 FASEB Tutorial Video "Blood Volume Flow Measurement in the Fetus" with P. Nathanielsz, J. Dunn and R. Wilkening

Akagi K, Endo C, Saito J, Onodera M, Tanigwara S, Okamura K, Yajima A, Sato A, "Ultrasonic Transit-Time Measurement of Blood Flow in the Animal Chronic Preparation Model", Jpn. J. Med Ultrasonics 1987; 14(2): 26-32.

Rudolph AM and Heymann MA 1980. Methods for studying the circulation of the fetus in utero. In: Monographs in Fetal Physiology: Animal Models in Fetal Medicine (I). Nathanielsz, P.W., editor. Pub. Perinatology Press, Ithaca, NY. pp. 1-58.



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