

T400-Series Surgical Protocol

Mouse Ascending Aorta: Acute Blood Flow Measurement

APPLICATION BASICS

Site:	Ascending Aorta
Species:	Mouse
Body Weight:	20-50 grams
Duration:	Acute
Vessel Diameter:	1.2 - 1.3 mm
Length:	2.5 - 3.0 mm

PROBE

Size:	1.5 mm
Reflector:	J
Connector:	CRA10: 10-pin
Cable Length:	60 cm
Catalog #:	MA-1.5PSL

FLOWMETER

TS420 Perivascular Module

Flow Ranges Observed

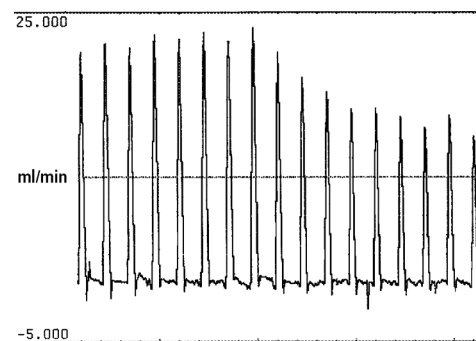


Fig. 1: Acute cardiac output measurement on ascending aorta in an anesthetized mouse.

Surgical Approach

Acute cardiac output measurements may be obtained in mice by conventional surgical techniques and ascending aorta blood flow measurements.

PREPARATION

Anesthetize the mouse with a mixture of ketamine and xylazine as mentioned in Mouse Anesthesia Guidelines (RL-67-tn). After anesthesia is attained, shave the mouse along the sternum. Place the mouse on a respirator equipped for approximately 120 breaths per minute at a very small tidal volume which is adequate to move the chest an appropriate amount for respiration. An endotracheal tube is not really necessary. Expose the trachea through a mid-line incision over the trachea. Place a 3-0 silk ligature around the trachea. Using a scalpel blade, make an incision between cartilage rings below the larynx. Pass a small polyethylene tracheal tube directly into the trachea. Connect it via silastic tubing to a rodent respirator.

STERNOTOMY

Once the animal is placed on a respirator providing positive pressure respiration, perform a median sternotomy by using scissors to cut the skin overlying the sternum. Bisect the sternum longitudinally using scissors, beginning at the manubrium and extending towards the xiphoid. Stop the incision prior to reaching the xiphoid so that the

(Continued on next side.)



Fig. 2: 1.5PSL Probe for mouse ascending aorta blood flow.



Fig. 3: Goldstein Lacrimal sac retractor modified (bottom) for rib retraction in a mouse.

Mouse Ascending Aorta: Acute Blood Flow Measurement Cont.

Surgical Approach cont.

bifurcation point of the internal mammary arteries is not bisected. Try and stay as close as possible to the mid-line of the sternum to avoid cutting the internal mammary arteries.

Once the sternum has been incised longitudinally, place a modified Goldstein lacrimal sac retractor (Fig. 3) within the incision site and retract the ribs laterally. This exposes the heart and the thymus gland of the mouse. Retract the thymus gland rostrally towards the sternum to expose the ascending aorta and pulmonary artery.

PROBE PLACEMENT

Dissect the ascending aorta free of the pulmonary artery. Position a Transonic 1.5PSL Probe perpendicular to the axis of the ascending aorta and pressed close to the origin of the aorta at the heart. This allows a long straight section of blood vessel to be illuminated with ultrasound without sampling the bend of the aortic arch. Acoustical coupling gel (Surgilube gel acoustically matches blood for the most accurate measurements and is available from Transonic®) should be placed around the aorta, completely filling the lumen of the transit-time Flowprobe. This allows acoustical coupling of the flow Probe with the aorta itself. The Probes have been calibrated using this gel.

Verify zero flow and accurate positioning on the ascending aorta with a flow waveform. During diastole the flow waveform should parallel the electrical zero tracing on a recording oscillograph.

REFERENCES

Janssen, BJA et al, "Effects of anesthetics on systemic hemodynamics in mice," Am J Physiol Heart Circ Physiol 2004; 287: 1618-1624.

Gao, XM et al. "Cardiac output in mice overexpressing beta-2-adrenoceptors or with myocardial infarct," Clin Exp Pharmacol Physiol 2001; 28(5-6): 364-70.

Varghese, P et al, " β_3 -adrenoceptor deficiency blocks nitric oxide-dependent inhibition of myocardial contractility," J Clin Invest 2002; 106(5): 697-703.



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