Real-time Cardiac Output

Ascending Aorta & Pulmonary Artery
Direct Cardiac Output Measurements
for Acute & Chronic Applications
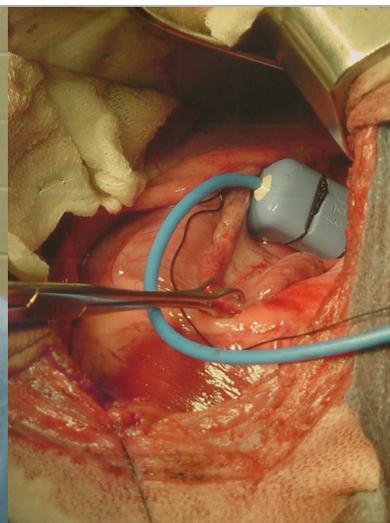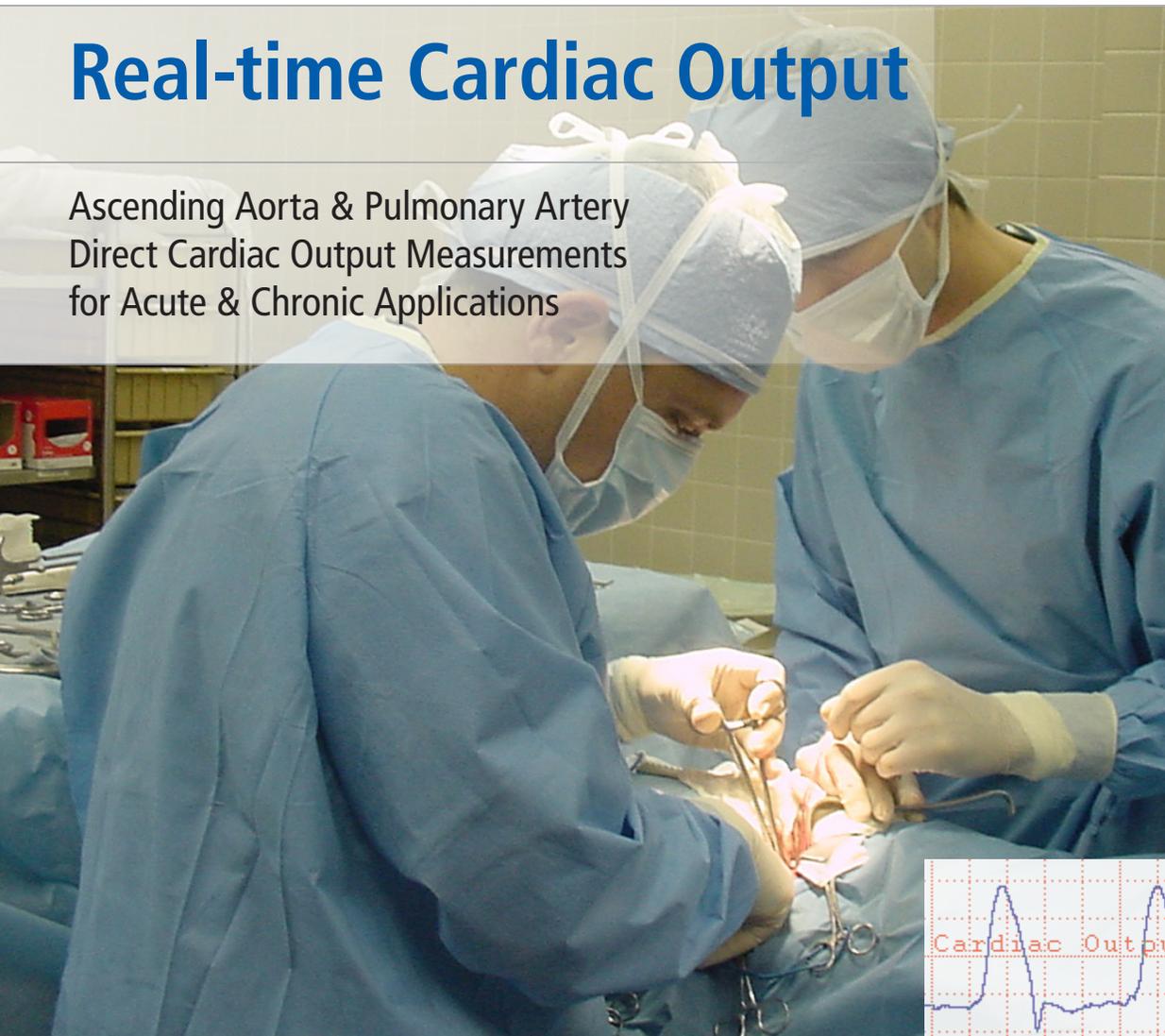
Cardiac Output

Accurate   Repeatable   Validated

Instantaneous flow waveforms are used for calculating average cardiac output, stroke volume, peak flow, aortic input impedance, systemic vascular resistance and heart rate. Flow measurements with pressure data are used to determine pressure volume relations in cardiac function for large and small animal models.

- Cardiovascular Physiology
  - Heart Failure Modeling
  - Ventricular Function & Cardiac Assist
  - Exercise Physiology
  - Efficacy of New Cardiac Surgery Techniques

- Ultrasound Transit-time Technology
  - Non-constrictive Flowprobes
  - Probe Sizes for Mice to Calves

The *in vivo* measurement standard for continuous cardiac output against which all other technologies are compared. Visit **www.transonic.com** for application specific references.

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THE MEASURE OF   BETTER RESULTS.

Application Recommendations for Large & Small Animals

DOG, PIG, SHEEP & CALF MODELS USE PAU-SERIES

COnfidence Flowprobes® (PAU) obtain a high level of accuracy using X-pattern, full flow illumination which allows uniform sensing of turbulent flow. Ultrafit liners cushion the vessel and minimize need for acoustic gel.

RABBIT, RAT & MOUSE MODELS USE PS-SERIES

Little isolation between the ascending aorta and PA is required to encircle the vessel with the Probe's reflector. The Probe transducer housing fits easily in the thoracic cavity.

ACUTE OPEN-CHEST

- Choose close fitting Probes for ease in maintaining acoustic coupling
- Use Transonic® approved coupling gel for signal transmission
- Avoid placing PS-Series Probes directly on the curvature of the aorta

CHRONIC IMPLANT

- Choose loose fitting Probes so that vessel fills 75%-85% of the Probe
- PS-Series: Choose cable configuration (side, lateral or back) for preferred surgical approach
- Choose connector & cable length
- Select vessel protection method:
  - PAU-Series: Ultrafit liners pad the vessel from the Probe edges
  - PS-Series: silicone shield (4 & 6 mm) & silicone paint for Probe reflector edge (2, 2.5 & 3 mm)
- Allow 3-5 days for fibrotic tissue growth to provide good coupling

ASCENDING AORTA / PULMONARY ARTERY FLOWPROBE RECOMMENDATIONS						
APPLICATION	WEIGHT	PROBE SIZE & STYLE*	CABLE LENGTH	CONNECTOR	CALIBRATION	CUSTOMIZATION
Pig: Acute	25-35 kg	MA-16PAU, MA-20PAU	WC200 (2 m)	CRA10	PAU-Series GAC- acute/chronic	PAU-Series Momentary Acute Use: acute open liners Extended Acute Use: closed liners Chronic Use: chronic liners
Pig: Chronic	25-50 kg	MA-16PAU, MA-20PAU	WC50 (50 cm)	CRS10, CS12, CB12		
	60-80 kg	MA-24PAU, MA-28PAU				
Dog: Acute	8-12 kg	MA-14PAU, MA-16PAU	WC200 (2 m)	CRA10		
	12-15 kg	MA-14PAU, MA-16PAU				
	18-22 kg	MA-16PAU, MA-20PAU				
	22-25 kg	MA-20PAU, MA-24PAU				
	25-30 kg	MA-24PAU, MA-28PAU				
Dog: Chronic		MC-nPAU*	WC50 (50 cm)	CS12, CRS10		
Sheep: Acute	35-45 kg	MA-16PAU	WC200 (2 m)	CRA10		
	45-60 kg	MA-20-PAU				
Sheep: Chronic	35-50 kg	MC-20PAU	WC40 (40 cm)	CRS10, CS12, CB12		
	50-60 kg	MC-24PAU	WC50 (50 cm)			
Lamb: Acute	6-8 kg	MA-8PAU, MA-10PAU	WC200 (2 m)	CRA10		
	12-15 kg	MA-12PAU, MA-14PAU				
Lamb: Chronic		MC-nPAU*	WC100 (1 m)	CS12, CRS10		
Monkey: Chronic	4 kg	MC-6PSS, MC-8PSS, MC-8PAU, MC-10PAU	WC38 (38 cm)	CS12, CB12	GAC-	U reflector with silicone for PS-
Rabbit: Acute	3-4.5 kg	MA-4PSB	WC100 (1 m)	CRA10	GA- acute	
Rabbit Chronic		MC-6PSB	WC30 (30 cm)	CM4B, CM4S	GC- chronic	
Rat: Acute	< 270 g	MA-2PSB	WC100 (1 m)	CRA10	GA- acute	Choose cable orientation
	270-400 g	MA-2.5PSB, MA-2.5PSL				
	> 400 g	MA-3PSB, MA-3PSL				
Rat: Chronic		MC-nPS*	WC10 (10 cm)	CM4S, CA4S	GC- chronic	
Mouse: Acute	17-50 g	MA-1.5PSL	WC60 (60 cm)	CRA10	GA- acute	
Mouse: Chronic	17-50 g	MC-1.5PSL	WC04 (4 cm)	CA4S	GC- chronic	

PS-Series Probe for small animal models

Acute PAU-Series Probe for large animal models

*n = size based on vessel diameter

All recommendations are based on vessel diameter estimates. Probe choice will depend on surgical approach, species and weight. MA-Probes are configured for standard acute application. Order MC-Probes for any customization or chronic configuration options.

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