

# DIAGNOSTIC CATHETERS FOR INTERVENTIONAL CARDIOLOGY

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# Imaging and diagnostic catheters

- Imaging and diagnostic catheters are used to investigate and evaluate patients with suspected or known cardiovascular diseases.
- Imaging and diagnostic catheters include products such as:
  - Angiography Catheters
  - MRI Guided Catheters
  - Intravascular Ultrasonic Catheters (IVUS)
  - EP Mapping Devices
  - Cardiac Output Catheters
  - Pressure Monitoring Catheters
  - Flow Monitoring Catheters
  - Oximetry Catheters
  - Temperature Monitoring Catheters
  - Critical Care Monitoring Systems

- In this article we are concentrating only on the diagnostic catheters used for right and left heart catheterization and coronary angiogram.
- Rest of the catheter details will be given in subsequent articles.

# LENGTH

- Rt heart catheters- 100 to 125cm.
- Lt heart catheters- 100 to 110cm.
- 125cm - for very tall person.

# RIGHT HEART DIAGNOSTIC CATHETERS

## General purpose – Right heart catheters

- Cournand
- Lehman
- Goodale–Iubin
- Balloon floatation catheters

# ANGIOGRAPHIC CATHETERS

- Gensini
- NIH
- Eppendorf
- Lehman ventriculography
- Pigtail angiographic catheter
- Flow directed angiographic catheter

## Specialised catheters

- Shirey transvascular catheter
- Brockenbrough transeptal catheter
- Double lumen catheter
- Multilumen catheter
- Fogarty catheter
- Transducer-tip catheter
- Angioscopic catheter
- Pacing catheter.

# Cournard catheter

- **Designer:** Andre Cournand
- End hole radio-opaque woven Dacron catheter with an outer coating of polyurethane.
- **Construction:** Very gradual distal curve Tapered tip.
- **Use :** All purpose right heart catheter.
- It has an end hole and no side holes. Hence it is suitable for wedge pressure measurements.

Cournard catheter



# Multipurpose catheter

- Designer : Dr.Fred W Schoomaker.
- Construction: polyurethane with an inner wire braid

A-1 MP:A bend –hockey stick with straight tip 1-one end hole only

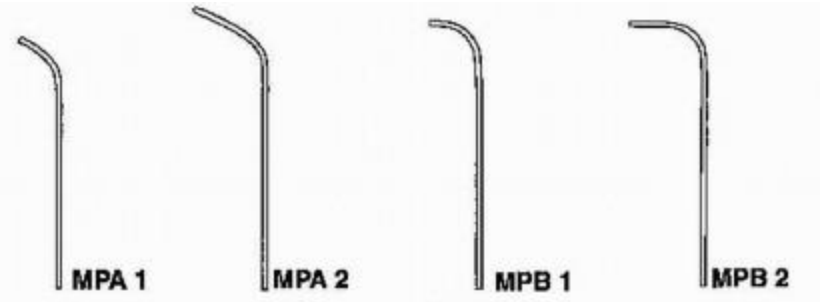
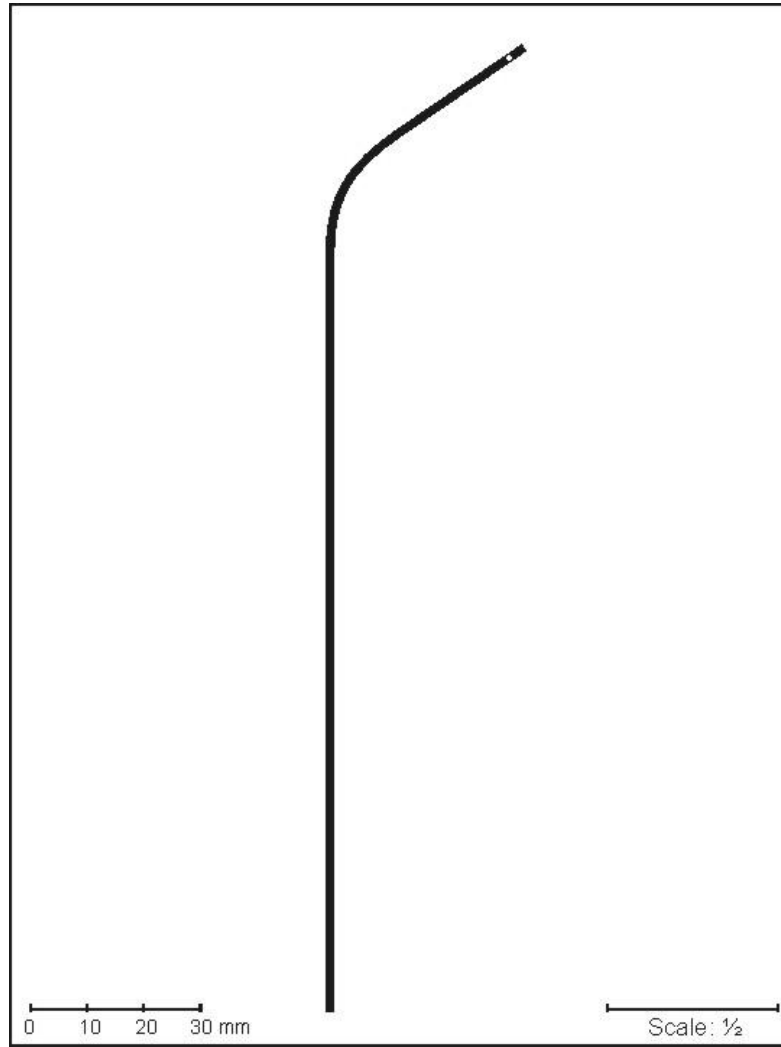
A-2 MP:2side holes ,1end hole

B-1 MP :B bend gradual 90 degree curve,1 end hole only

B -2 MP: 2 sideholes and an end hole

Use- CAG & LV,for crossing different lesions  
PDA and MAPCAcoiling.

- Size : 7 & 8 Fr. length –100cm.

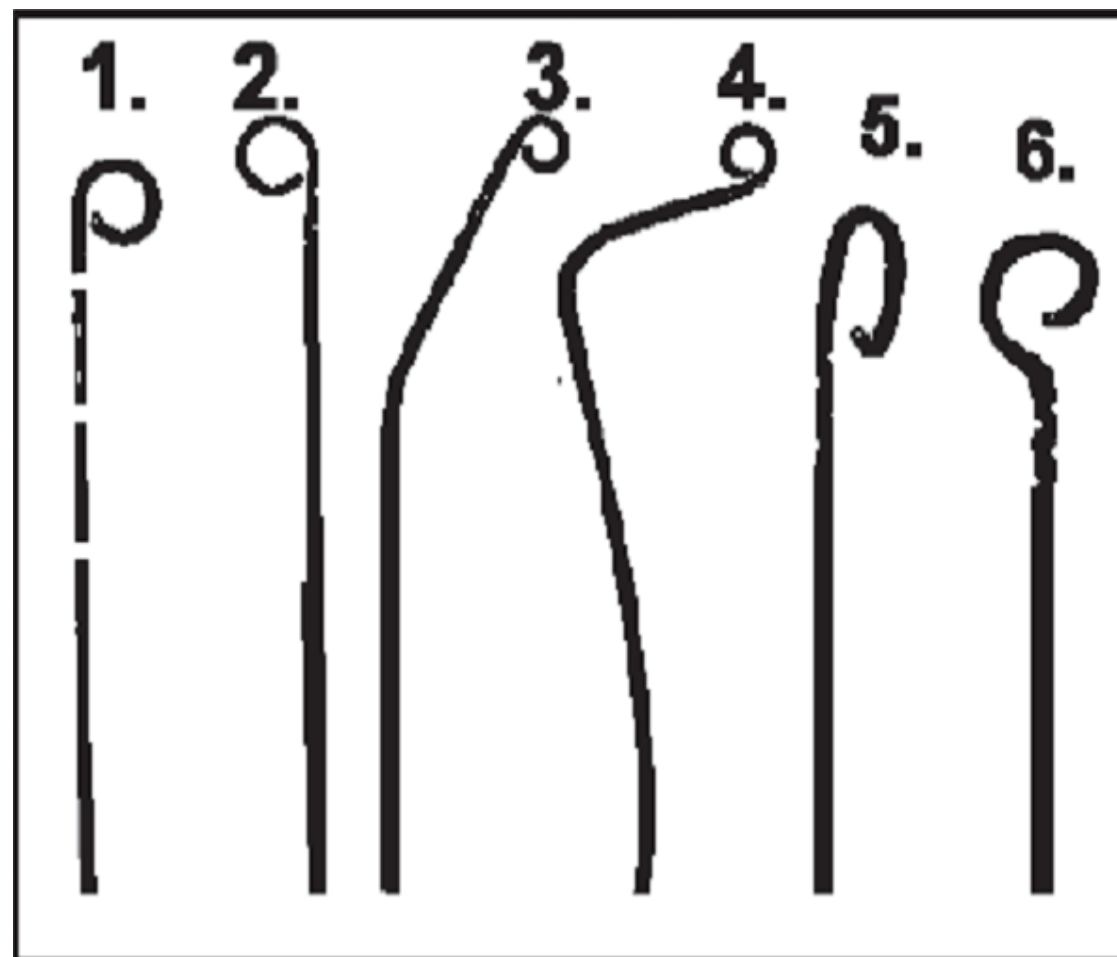


# NIH catheter

- It is a side hole catheter without any endhole.
- NIH catheter prepared by USCI (Bard Inc.) is made of woven Dacron with nylon reinforcement and is especially stiff. Has 6 sideholes.
- COOK – polyethylene with a stainless steel braid, 4 to 6 sideholes.
- The polyurethane Cordis NIH catheter (Cordis Corporation, Miami, FL) and the polyethylene Cook NIH Torcon blue catheter (Cook, Bloomington, IN) are much softer and less likely to cause dissection or perforation.
- Use : visualizing RV, LV,arterial,pulmonary vasculature.
- Size :USCI 5 to 8Fr.length –50, 80,100 ,125cm.
- COOK:6.5,7.3 & 8.2Fr, all 100cm.

## Pigtail catheter

- Designer : Judkins.
- Construction: woven dacron coated with polyurethane or polyethylene with a tapered tip, the terminal 5 cm of which is coiled back on itself in a tight loop (pigtail)
- Open or closed end
- 4 to 12 non-laterally opposed side holes located in the terminal 5 cm of the catheter
  
- Micro loop= 9mm
- Standard loop = 12mm
  
- Use : most commonly used for LV, RV angiography, aortography & pulmonary angiography.
  
- Size : 6.5,7,3 & 8.2Fr.length – 65,80,100 & 110cm.side holes-4,6,8 or 12.



- 1. Quanticor (Cardiomarker pig): This is a standard pigtail with radiopaque markers set 2 cm apart.

These act to calibrate distance for quantitative angiography. Exact LV distances, volumes and stroke volume can then be calculated using these markers as a “ruler.”

- 2. Pigtail Angiographic: The pigtail catheter is the most commonly used LV gram catheter. With up to 12 sideholes it evenly disperses the contrast within the LV.
- 3. Van Tassel angled pigtail: This is a Nylon core or woven steel high-flow pigtail. The 145-155 degree angle is 7 cm from the tip. This angle lifts the catheter off the inferior LV wall for a more centrally located LV gram. Also, it is useful for dilated aortas.
- 4. Grollman PA: is an angled pigtail catheter with the curve generally on the reverse side. It is designed for RV and selective PA angiography by the femoral approach.
- 5. Elliptical or Oval: Designed to pass small aortic valves or vessels with the curve intact
- 6. Tennis Racquet: The central shaft was designed to reduce the risk of vessel wall extravasation.

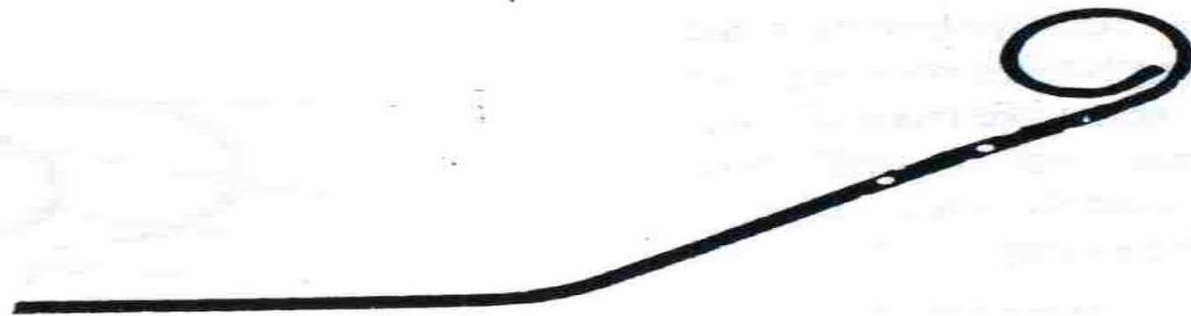
## Grollman pigtail catheter

- **Construction:** polyethylene with for spiraled side ports near tip.
- **Hole :** 12 nonlaterally opposed sidehole near the endhole. 60 degree bend.
- **Use:** RV & selective PA angiography.
- **Size :** 5,7 & 8Fr. length – 65,90 & 110cm.

## VAN TASSEL ANGLED PIGTAIL

**Construction:** polyurethane over a thin nylon core.

- **Hole** : 8 nonlaterally opposed sidehole near the endhole 145° or 155° angle 7cm from the tip. Use: LV, aortography.
- **Size** : 7 & 8Fr. length – 110cm.
- **Advantage** : can cross stenotic aortic valve



**Fig. 1-11.** Van Tassel angled pigtail catheter (USCI).

# Positrol II pigtail catheter

- **Construction:** polyurethane with stainless steel braid.
- **Hole :** 8 nonlaterally opposed sidehole near the endhole.
- **Use.** most commonly used LV, aortography & pulmonary angiography
- **Size :** 7 & 8Fr. length – 110cm.

# Nycore high-flow pigtail catheter

- **Construction:** polyurethane over a thin nylon core.
- **Hole :** 8 nonlaterally opposed sidehole near the endhole.
- **Use:** LV, aortography.
- **Size :** 7 & 8Fr. length – 65,80 & 110cm.
- **Advantage :** flow rate equal to one Fr > than designated.

# Ducor high-flow femoral-ventricular Pigtail catheter

- **Construction:** polyurethane with a stainless steel braid except in tip.
- **Hole :** 12 nonlaterally opposed sidehole near the endhole.
- **Use:** LV, aortography.
- **Size :** 5,7 & 8Fr. length – 65,90 & 110cm.
- **Advantage :** can withstand upto 1000psi.

# Goodale-lubin catheter

- Birdseye catheter.
- **Construction:** woven dacron coated with polyurethane.
- **Hole :** Two laterally opposed sidehole near the endhole.
- **Use :** right heart pressure, including wedge & blood sampling.
- **Size :** 4 to 8Fr.length – 80,100 & 125cm.
- **Variation :**Standard wall –Cournand
  - Thin wall- Lehman

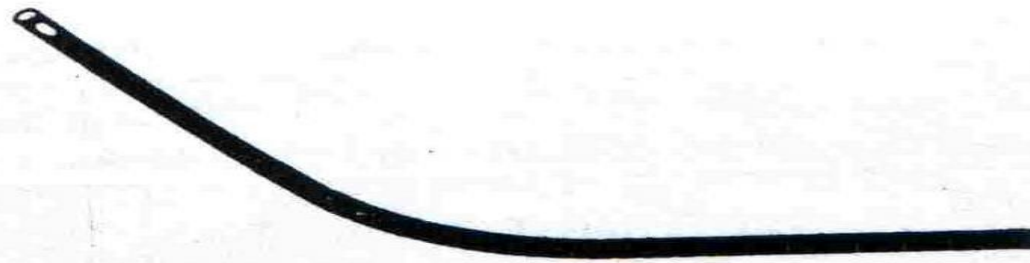


Fig. 1-3. Goodale-Lubin catheter.

# Lehman catheter

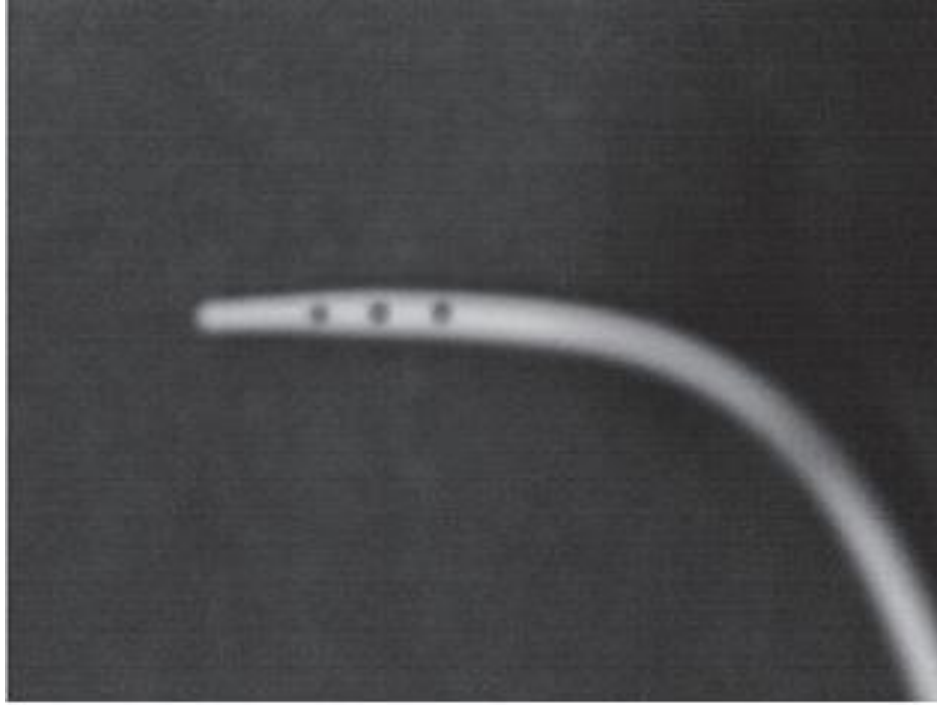
- Thin wall variation of cournand.
- Shorter distal curve, increased inner diameter & decreased stiffness.
- Size-4 to 9Fr.length-50,80,100 &125cm.



**Fig. 1-2. Lehman catheter.**

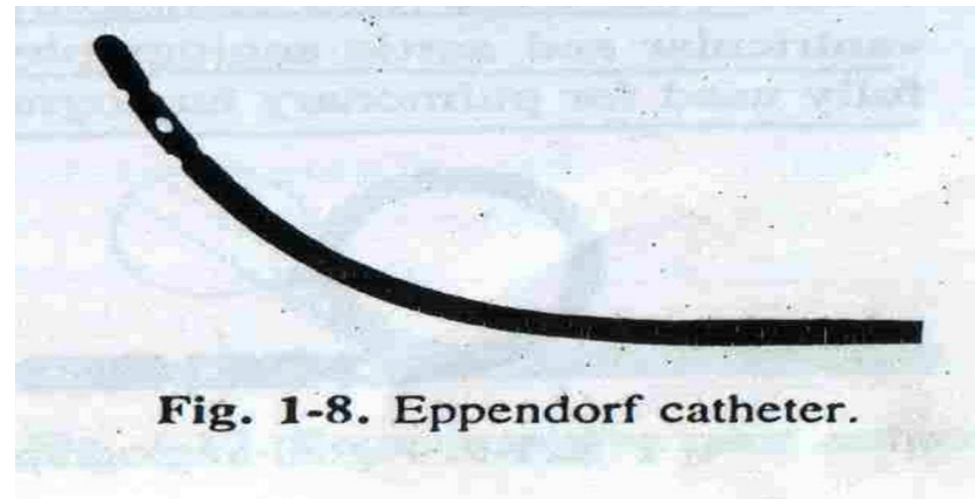
# Gensini catheter

- Construction: woven dacron coated with polyurethane.
- Hole : Three laterally opposed oval sideholes within 1.5cm of its open tip.
- Use : right or left heart, pulmonary & vena cava angiographic studies.
- Size : 5 to 8Fr.length – 80,100 & 125cm.
- Disadvantage: More arrhythmogenic
- Catheter recoil during injection at high flow rates
- Risk of intramyocardial injection and myocardial injection



# Eppendorf catheter

- **Construction:** woven dacron coated with polyurethane area 20cm proximal to hub is reinforced with nylon
- **Hole :** closed-end, six laterally opposed sidehole catheter with a gentle curve.
- **Use :** visualizing RV, LV, arterial, pulmonary vasculature & great veins.
- **Size :** 7 to 8Fr. length – 100 & 125cm.
- **Feature:** less stiff, & more torque control.



**Fig. 1-8. Eppendorf catheter.**

## Wedge pressure catheter (Swan-Ganz catheter)

- Most widely used catheter for right heart hemodynamics
- Balloon tipped – Float through the right side of the heart safely and easily
- Available with two to five lumens
- Two lumen catheter: distal port for pressure monitoring and one lumen for the balloon
- Three lumen catheter: additional proximal port for RAP monitoring
- Four lumen catheter: additional thermistor and computer connecting cable
- Five lumen catheter: additional proximal port for fluid and drug infusion
- Other use: Balloon occlusion catheter for large PDA

- Available in sizes from 4 Fr. to 8 Fr.
- Catheter length markings every 10 cm to confirm insertion depth



## SINGLE PRESSURE LUMEN BALLOON WEDGE-PRESSURE CATHETERS

PRODUCT NO.	FRENCH SIZE	INTRODUCER SIZE RECOM'D	USEFUL LENGTH	MAX. INFLATION* CAPACITY	INFLATED MAXIMUM BALLOON DIAMETER	MAX. WIRE RECOM'D	MAX. INJECTION <sup>10</sup> FLOW RATE	MAX. INJECTION <sup>10</sup> PRESSURE	CE MARK
AI-07121	4 Fr.	5 Fr.	60cm	0.60cc	6.5mm	.021"	n/a	n/a	yes
AI-07122	4 Fr.	5 Fr.	110cm	0.60cc	6.5mm	.021"	n/a	n/a	yes
AI-07123	5 Fr.	5 Fr.	60cm	0.75cc	8.0mm	.025"	n/a	n/a	yes
AI-07124	5 Fr.	5 Fr.	110cm	0.75cc	8.0mm	.025"	5cc/sec	600p.s.i.g.	yes
AI-07125	6 Fr.	6 Fr.	60cm	1.00cc	10.0mm	.035"	n/a	n/a	yes
AI-07126	6 Fr.	6 Fr.	110cm	1.00cc	10.0mm	.035"	6cc/sec	600p.s.i.g.	yes
AI-07126-J	6 Fr.	6 Fr.	90cm	1.00cc	10.0mm	.035"	n/a	n/a	yes
AI-07127	7 Fr.	7 Fr.	110cm	1.25cc	11.0mm	.038"	6cc/sec	600p.s.i.g.	yes
AI-07127-STC <sup>11</sup>	7 Fr.	7 Fr.	110cm	1.25cc	11.0mm	.038"	n/a	n/a	yes
AI-07128	8 Fr.	8 Fr.	110cm	1.25cc	11.0mm	.038"	n/a	n/a	yes

BALLOON WEDGE-PRESSURE CATHETERS FOR B.O.F.A. CONTRALATERAL APPROACH<sup>3</sup>

PRODUCT NO.	FRENCH SIZE	INTRODUCER SIZE RECOM'D	USEFUL LENGTH	MAX. INFLATION* CAPACITY	INFLATED BALLOON <sup>10</sup> DIAMETER	MAX. WIRE RECOM'D	MAX. INJECTION <sup>10</sup> FLOW RATE	MAX. INJECTION <sup>10</sup> PRESSURE	CE MARK
AI-07124	5 Fr.	5 Fr.	110cm	0.75cc	8.0mm	.025"	5cc/sec	600p.s.i.g.	yes
AI-07126	6 Fr.	6 Fr.	110cm	1.00cc	10.0mm	.035"	6cc/sec	600p.s.i.g.	yes
AI-07127	7 Fr.	7 Fr.	110cm	1.25cc	11.0mm	.038"	6cc/sec	600p.s.i.g.	yes

## DOUBLE PRESSURE LUMEN BALLOON WEDGE-PRESSURE CATHETERS

PRODUCT NO.	FRENCH SIZE	INTRODUCER SIZE RECOM'D	USEFUL LENGTH	MAX. INFLATION* CAPACITY	INFLATED BALLOON DIAMETER	MAX. WIRE RECOM'D	EXIT PORT SPACING	CE MARK
AI-07025	5 Fr.	5 Fr.	80cm	1.00cc	8.0mm	.018"	Proximal Port exits 3cm from tip	yes
AI-07026	6 Fr.	6 Fr.	110cm	1.00cc	10.0mm	.021"	Proximal Port exits 3cm from tip	yes
AI-07141	6 Fr.	6 Fr.	110cm	1.00cc	10.0mm	.021"	Proximal Port exits 20cm from tip	yes
AI-07027	7 Fr.	7 Fr.	110cm	1.50cc	12.0mm	.025"	Proximal Port exits 3cm from tip	yes
AI-07143	7 Fr.	7 Fr.	110cm	1.50cc	12.0mm	.025"	Proximal Port exits 30cm from tip	yes

## SPECIAL DOUBLE LUMEN BALLOON WEDGE-PRESSURE CATHETER

PRODUCT NO.	FRENCH SIZE	INTRODUCER SIZE RECOM'D	USEFUL LENGTH	MAX. INFLATION* CAPACITY	INFLATED BALLOON DIAMETER	MAX. WIRE RECOM'D	EXIT PORT SPACING	CE MARK
AI-07142	8 Fr.	8 Fr.	100cm	1.50cc	11.0mm	Both to .038"	Proximal Port exits 6cm from tip	yes

# Double Pressure Lumen Balloon Wedge-Pressure Catheter

- Double Pressure Lumen Balloon Wedge-Pressure Catheters in 5, 6 and 7 French sizes are available, allowing determination of pressure gradients between adjacent parts of the heart as well as identifying a variety of congenital heart defects and obstructions

# THERMODILUTION CATHETERS

THERMODILUTION CATHETERS												ARROW
CONVENTIONAL STYLE CATHETERS												
PRODUCT NO.	FRENCH SIZE	HEPARIN COATED	USEFUL LENGTH (CM)	NO. OF LUMENS	CATHETER BODY STYLE	RECOM'D INTRODUCER SIZE (FR)	BALLOON MAXIMUM CAPACITY	BALLOON INFLATED DIAMETER	MAXIMUM WIRE FOR INSERTION (IN)	CVC PROXIMAL LUMEN PORT DISTANCE FROM TIP	INFUSION LUMEN PORT DISTANCE FROM TIP	CE MARK
AI-07044	4 Fr.	no	75cm	4	T	5 Fr.	.75cc	8mm	0.014	10cm	n/a	yes
AI-07044-H	4 Fr.	yes	75cm	4	T	5 Fr.	.75cc	8mm	0.014	10cm	n/a	no
AI-07055-H	5 Fr.	yes	80cm	4	T	5 or 6 Fr.	1.0cc	8mm	0.018	10cm	n/a	no
AI-07065	5 Fr.	yes	80cm	4	T	5 or 6 Fr.	1.0cc	8mm	0.018	15cm	n/a	no
AI-07165	5 Fr.	no	80cm	4	T	5 or 6 Fr.	1.0cc	8mm	0.018	15cm	n/a	yes
AI-07365-H	6 Fr.	yes	80cm	4	T	6 or 7 Fr.	1.0cc	10mm	0.018	15cm	n/a	no
AI-07365-HL	6 Fr.	yes	110cm	4	T	6 or 7 Fr.	1.0cc	10mm	0.018	15cm	n/a	no
AI-07067	7 Fr.	yes	110cm	4	T	7 or 8 Fr.	1.5cc	12mm	0.025	29cm	n/a	no
AI-07167	7 Fr.	no	110cm	4	T	7 or 8 Fr.	1.5cc	12mm	0.025	29cm	n/a	yes
AI-07367	7 Fr.	no	110cm	4	F	7 or 8 Fr.	1.5cc	12mm	0.025	29cm	n/a	yes
AI-07368	7 Fr.	yes	110cm	4	F	7 or 8 Fr.	1.5cc	12mm	0.025	29cm	n/a	no
AI-07368-F	7 Fr.	yes	110cm	4	FL	7 or 8 Fr.	1.5cc	12mm	0.025	29cm	n/a	no
AI-07368-NHF	7 Fr.	no	110cm	4	F	7 or 8 Fr.	1.5cc	12mm	0.025	29cm	n/a	no
CATHETERS WITH INFUSION PORT												
AI-07077	7.5 Fr.	yes	110cm	5	T	8.5 Fr.	1.5cc	12mm	0.025	29cm	31cm	no
AI-07077-G	7.5 Fr.	no	110cm	5	FL	8.5 Fr.	1.5cc	12mm	0.025	29cm	31cm	yes
AI-07377	7.5 Fr.	yes	110cm	5	F	8.5 Fr.	1.5cc	12mm	0.025	29cm	31cm	no
AI-07377-NH	7.5 Fr.	no	110cm	5	F	8.5 Fr.	1.5cc	12mm	0.025	29cm	31cm	no

NOTE: Catheter body style: T - Higher Torque Control FL - Flexi Torque (mid-range) F - Flotation (softest)

Each package includes: Thermistor catheter, Control stroke syringe, non-vented dust cap, extension line clamps

# Thermodilution catheters

- The thermodilution catheters monitor intracardiac pressures, cardiac output, and provide infusing solutions.
- Variety of French sizes from 4 Fr. to 7.5 Fr.
- With or without Heparin coating

# Swan-Ganz Advanced Technology Catheters

## Swan-Ganz Advanced Technology Catheters

Model No.	Type	French Size	Length (cm)	Lumens
744HF75	CCOmbo (CCO+SvO <sub>2</sub> )	7.5	110	6
744F75	CCOmbo (CCO+SvO <sub>2</sub> )	7.5	110	6
746HF8	CCOmbo VIP (CCO+SvO <sub>2</sub> +VIP lumen)	8	110	7
746F8	CCOmbo VIP (CCO+SvO <sub>2</sub> +VIP lumen)	8	110	7
774HF75	CCOmbo RVEDV (CCO+SvO <sub>2</sub> +RVEDV)	7.5	110	6
774F75	CCOmbo RVEDV (CCO+SvO <sub>2</sub> +RVEDV)	7.5	110	6
757HF8	CCOmbo RVEDV/VIP (CCO+SvO <sub>2</sub> +RVEDV+VIP lumen)	8	110	7
777HF8	CCOmbo RVEDV/VIP (CCO+SvO <sub>2</sub> +RVEDV+VIP lumen)	8	110	7
777F8	CCOmbo RVEDV/VIP (CCO+SvO <sub>2</sub> +RVEDV+VIP lumen)	8	110	7

\* All models with an "H" contain AMC THROMBOSHIELD coating (an antimicrobial+ heparin coating). Antimicrobial activity associated with AMC THROMBOSHIELD coating has been demonstrated using *in vitro* diffusion agar assays against the following organisms: *Staphylococcus epidermidis*, *Staphylococcus aureus*, *Streptococcus faecalis*, *Candida albicans*, *Escherichia coli*, *Serratia marcescens*, and *Acinetobacter calcoaceticus*.

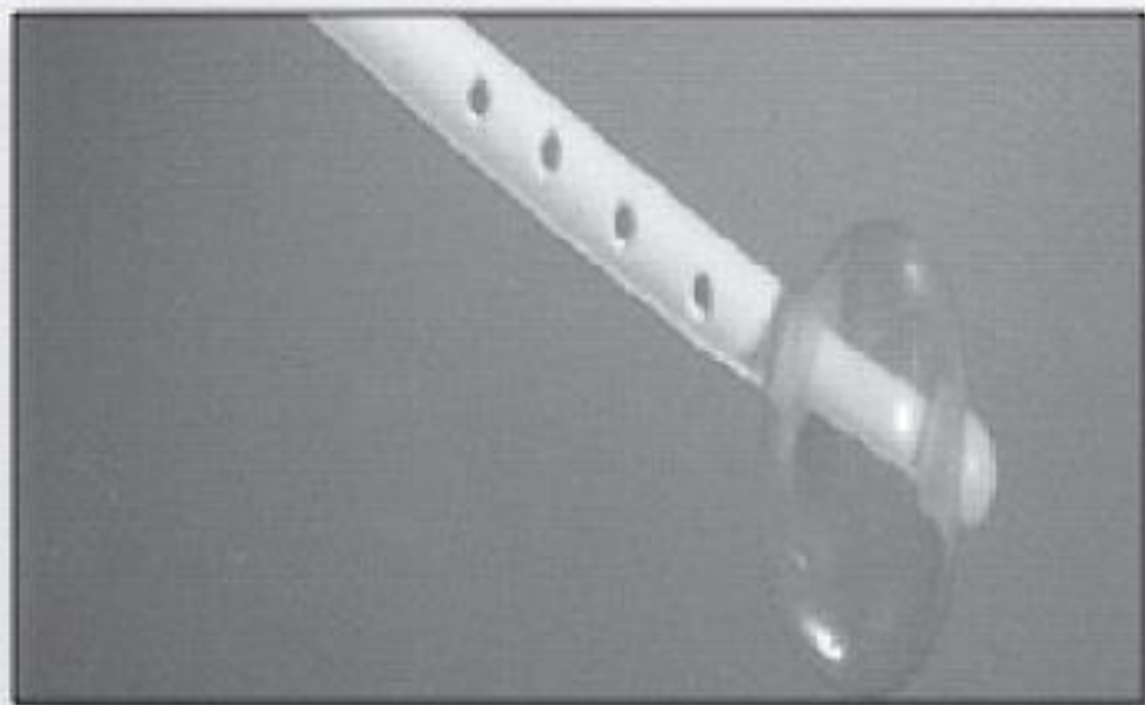
+ Decreases viable microbe count on surface of product during handling and placement.

## BERMAN ANGIOGRAPHIC CATHETER

- Standard Berman
- Reverse Berman
  
- Available in 4, 5, 6, 7 and 8 French Catheter sizes
- Selected French sizes available in lengths from 50 - 110 cm
  
- Catheters easily identified by color-coded injectate port
- Standard Berman is Pink
- Reverse Berman is Blue

## Berman Angiographic catheter

- Large lumen – flow rates similar to the pigtail catheter
- Balloon tipped – increases the catheter stability during angiography
- No end hole – can't measure wedge pressure
- Multiple side-holes proximal to the balloon
  
- Uses:
  - Measurement of pulmonary artery pressure
  - Right ventriculography



Berman

## BERMAN AND REVERSE BERMAN CATHETERS

ARROW

## ARROW-BERMAN ANGIOGRAPHIC CATHETERS FOR BALLOON OCCLUSION FEMORAL ANGIOGRAPHY (B.O.F.A.) IPSILATERAL APPROACH

PRODUCT NO.	FRENCH SIZE	INTRODUCER SIZE RECOM'D	RECOM'D USEFUL LENGTH	MAX. INFLATION CAPACITY	INFLATED MAXIMUM BALLOON DIAMETER	MAX. WIRE RECOM'D	IMPROVED MAX. INJ. FLOW RATE	MAX. INJECTION PRESSURE	CE MARK
AI-07134	4 Fr.	5 Fr.	50cm	0.60cc	6.5mm	.021"	6cc/sec	600 p.s.i.g.	yes
AI-07130	5 Fr.	5 or 6 Fr.	50cm	0.75cc	8.0mm	.032"	15cc/sec	540 p.s.i.g.	yes
AI-07130-J	5 Fr.	5 or 6 Fr.	60cm	0.75cc	8.0mm	.032"	15cc/sec	540 p.s.i.g.	yes
AI-07135	5 Fr.	5 or 6 Fr.	80cm	0.75cc	8.0mm	.032"	12cc/sec	540 p.s.i.g.	yes
AI-07131	6 Fr.	6 or 7 Fr.	60cm	1.00cc	10.0mm	.035"	20cc/sec	650 p.s.i.g.	yes
AI-07136	6 Fr.	6 or 7 Fr.	90cm	1.00cc	10.0mm	.035"	18cc/sec	650 p.s.i.g.	yes
AI-07132	7 Fr.	7 or 8 Fr.	90cm	1.25cc	11.0mm	.038"	24cc/sec	700 p.s.i.g.	yes
AI-07137	7 Fr.	7 or 8 Fr.	110cm	1.25cc	11.0mm	.038"	24cc/sec	600 p.s.i.g.	yes
AI-07138	8 Fr.	8 or 9 Fr.	70cm	1.25cc	11.0mm	.038"	42cc/sec	750 p.s.i.g.	yes
AI-07133	8 Fr.	8 or 9 Fr.	110cm	1.25cc	11.0mm	.038"	35cc/sec	800 p.s.i.g.	yes

## REVERSE ARROW-BERMAN CATHETER FOR SELECTIVE PULMONARY OCCLUSION ANGIOGRAPHY STUDIES

PRODUCT NO.	FRENCH SIZE	INTRODUCER SIZE RECOM'D	RECOM'D USEFUL LENGTH	MAX. INFLATION CAPACITY	INFLATED BALLOON DIAMETER	MAX. WIRE RECOM'D	IMPROVED MAX. INJ. FLOW RATE	MAX. INJECTION PRESSURE	CE MARK
AI-07035	5 Fr.	5 or 6 Fr.	80cm	1.25cc	12.0mm	.032"	8cc/sec	600 p.s.i.g.	yes
AI-07037	7 Fr.	7 or 8 Fr.	110cm	1.50cc	12.0mm	.038"	20cc/sec	700 p.s.i.g.	yes

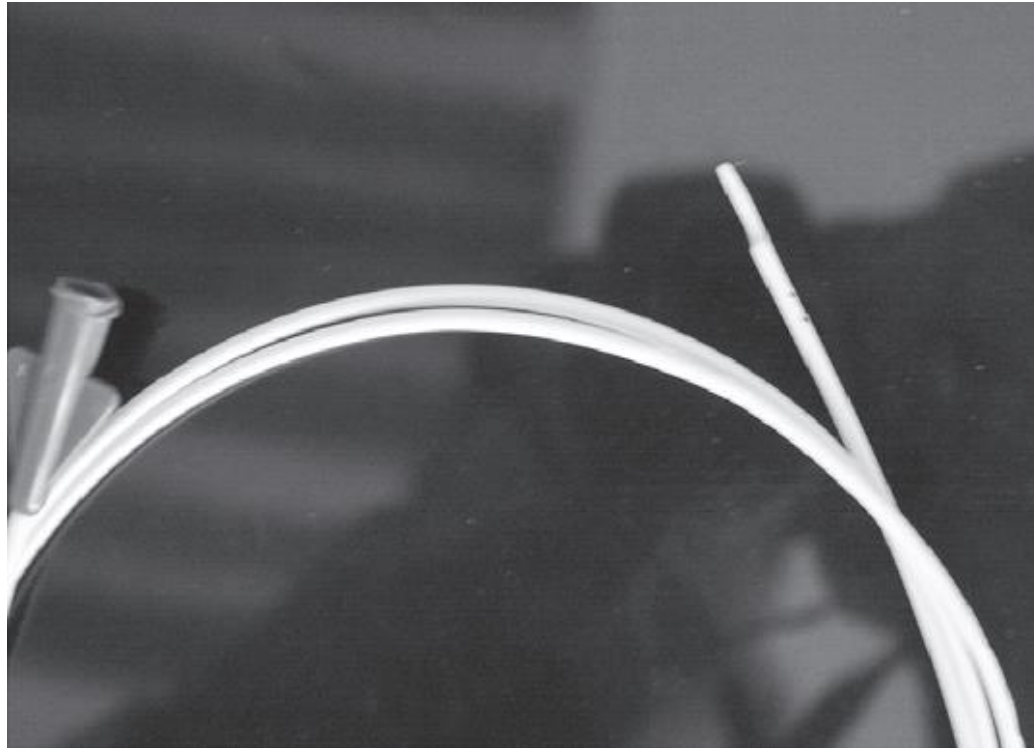
## Reverse Berman catheter

- Multiple side-holes distal to the balloon
- Use: Pulmonary angiography



# Multitrack catheter

- End hole and side hole catheter
- To record pressure while wire inside ( Pull back gradient across valvular or arterial stenoses)
- Angiography while wire inside



## Diagnostic vessel sizing catheters

- All side ports between tip and first band
- \*"SH" suffix identifies marker bands that are 16mm closer to the pigtail curve.

	French size	internal diameter	length	recommended guide wire	# of side ports	bands and spacing	style
<b>VESSEL SIZING CATHETERS - ALL SIDE PORTS BETWEEN TIP AND FIRST BAND</b>							
<b>I</b>	4	.041"/1.04mm	65cm	.035" (0.89mm)	5	2 (2cm apart)	Pigtail
<b>iH</b>	4	.041"/1.04mm	100cm	.035" (0.89mm)	5	2 (2cm apart)	Pigtail
<b>I</b>	4	.041"/1.04mm	65cm	.035" (0.89mm)	5	2 (2cm apart)	Straight
<b>iH</b>	4	.041"/1.04mm	100cm	.035" (0.89mm)	5	2 (2cm apart)	Straight
<b>I</b>	4	.041"/1.04mm	65cm	.035" (0.89mm)	5	2 (2cm apart)	Ultra Bolus
<b>iH</b>	4	.041"/1.04mm	100cm	.035" (0.89mm)	5	2 (2cm apart)	Ultra Bolus
	4	.041"/1.04mm	65cm	.035" (0.89mm)	6	2 (2cm apart)	Mod. Hook
	4	.041"/1.04mm	100cm	.035" (0.89mm)	6	2 (2cm apart)	Mod. Hook
	5	.052"/1.32mm	65cm	.035" (0.89mm)	10	2 (2cm apart)	Pigtail
	5	.052"/1.32mm	100cm	.035" (0.89mm)	10	2 (2cm apart)	Pigtail
	5	.052"/1.32mm	65cm	.035" (0.89mm)	10	2 (2cm apart)	Ultra Bolus
	5	.052"/1.32mm	100cm	.035" (0.89mm)	10	2 (2cm apart)	Ultra Bolus
	5	.052"/1.32mm	65cm	.035" (0.89mm)	10	2 (2cm apart)	Straight
	5	.052"/1.32mm	100cm	.035" (0.89mm)	10	2 (2cm apart)	Straight
	5	.052"/1.32mm	65cm	.035" (0.89mm)	6	2 (2cm apart)	Mod. Hook
	5	.052"/1.32mm	100cm	.035" (0.89mm)	6	2 (2cm apart)	Mod. Hook
	5	.052"/1.32mm	65cm	.035" (0.89mm)	10	11 (1cm apart)	Pigtail
	5	.052"/1.32mm	100cm	.035" (0.89mm)	10	11 (1cm apart)	Pigtail
	5	.052"/1.32mm	65cm	.035" (0.89mm)	10	11 (1cm apart)*	Straight
	5	.052"/1.32mm	100cm	.035" (0.89mm)	10	11 (1cm apart)*	Straight
	5	.052"/1.32mm	65cm	.035" (0.89mm)	6	11 (1cm apart)	Mod. Hook
	5	.052"/1.32mm	100cm	.035" (0.89mm)	6	11 (1cm apart)	Mod. hook



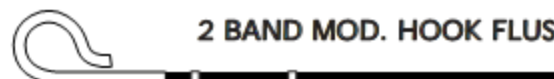
**2 BAND PIGTAIL**



**2 BAND STRAIGHT**



**2 BAND ULTRA BOLUS**



**2 BAND MOD. HOOK FLUSH**

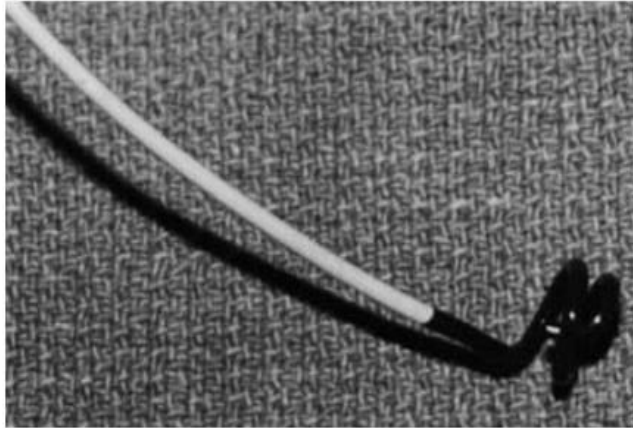


**11 BAND PIGTAIL**



**20 BAND PIGTAIL**

- A **Halo catheter** is a novel 5 F catheter with a perpendicular helical tip with inwardly and upwardly directed tip.
- The side holes are located on the helix and produce equivalent left ventriculograms with minimal ectopy because the contrast jets are directed inward and not to the myocardium
- It is excellent to measure distal left ventricular chamber pressure in hypertrophic cardiomyopathy because, in contrast to a pigtail catheter, there are no holes along the shaft to create a falsely low distal intraventricular pressure gradient.



**Figure 2-28** Halo ventriculography catheter. Side holes are contained only within the spiral, which is directed inward to reduce premature ventricular contractions.

# Balloon floatation catheter

- A quick and easy method for catheterizing high-flow lesions such as arteriovenous fistulas or vascular tumors is to insert a two-lumen occlusion balloon catheter in the major proximal aortic branch feeding the lesion.
- Once the catheter is sufficiently inflated with carbon dioxide or dilute contrast medium, it will be carried into the lesion by the more rapid blood flow and end well positioned for embolization

# LEFT HEART CATHETERS

# Performa® Diagnostic Cardiology Catheter - Meril

**Nylon Material make it** Kink resistant, Optimal surface smoothness, Thermal stability at body temperature, Thin wall design for improved flow rate

**Good Radiopacity**

**Winged Polycarbonate Hub** - Enhanced handling and control

**Wire Braid Design** - Greater torque for maximum control, Improved longitudinal stability

High degree of maneuverability, Provides superior pushability

**Tip Designs** - Excellent tip memory, Re-forms accurately time after time

**Bumper Tip** - Added softness to the 4F Performa catheter line

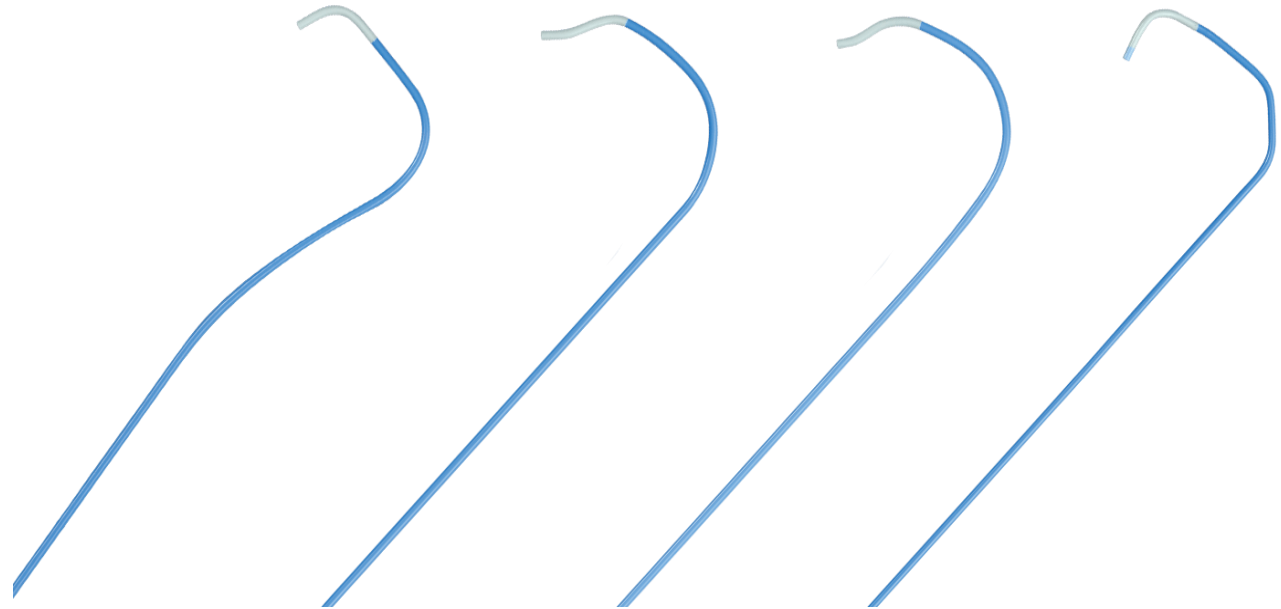
**Flat Wire Braid** - Increased Torque, Greater stability, Excellent kink resistance

**Inner Lumen Sizes** - 4F 0.042" (1.07 mm), 5F 0.046" (1.17 mm), 5F 0.052" (1.32 mm) high flow

6F 0.054" (1.37 mm), 6F 0.059" (1.49 mm) high flow

**Strain Relief** - Increased strength at catheter/hub interface, Color coded for easy identification

**Available as JL, JR, MOD AMP Right.**



# PERMULTIANGIOCARDO CATH- MERIL

**Pig tail is available** in straight or 145°, or 155°, with 10 side holes, MIV RADIAL PIG ST, . ultimate 1, 2, 4, 4-T45, 4-T40.

Performa Multipack combines all three typical workhorse catheters in one convenient package.

Catheter, the surface of the distal portion of the catheter must be completely wet with solution to remain lubricated.



# FEP CATHETERS - MERIL

Merit's FEP Teflon<sup>®</sup> Angiographic Pigtail catheters provide softness, control, and imaging. These catheters are available in 3F to 7F sizes, and 40cm to 100cm lengths.

Available as 3F to 7F

40 cm, 50 cm, 65cm, 80 cm, 100 cm

With 4 or 6 side holes.



# EXPO DIAGNOSTIC CATHETER - BOSTON

## Design and Performance Dynamics

Softer catheter shaft for users preferring an active diagnostic catheter

Firm primary curve to improve responsiveness

Available in three sizes: 5F (0.045"), 6F (0.056"; 0.052" for Pigtail and MP) and 7F (0.064"; 0.060" for Pigtail and MP)

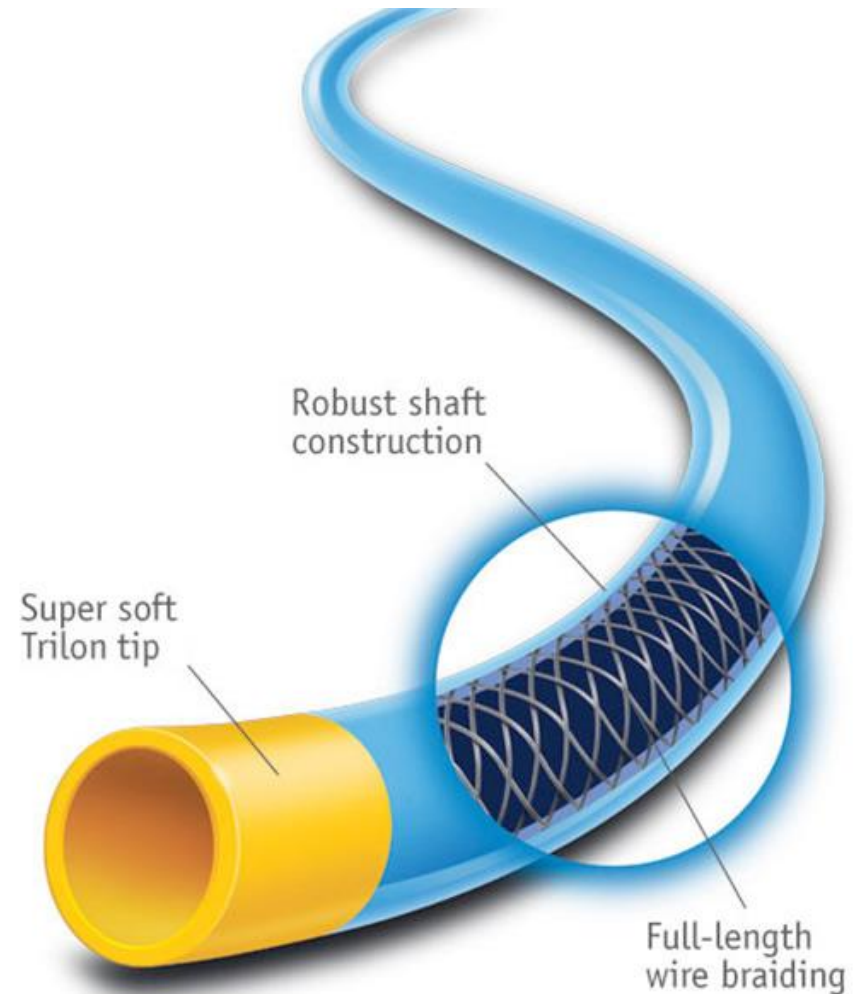
## Trilon Material with Full-Length Wire Braiding

Provides excellent pushability and efficient torque transmission from hub to tip, for smooth traversing through even the most tortuous anatomy

Resists softening in the body

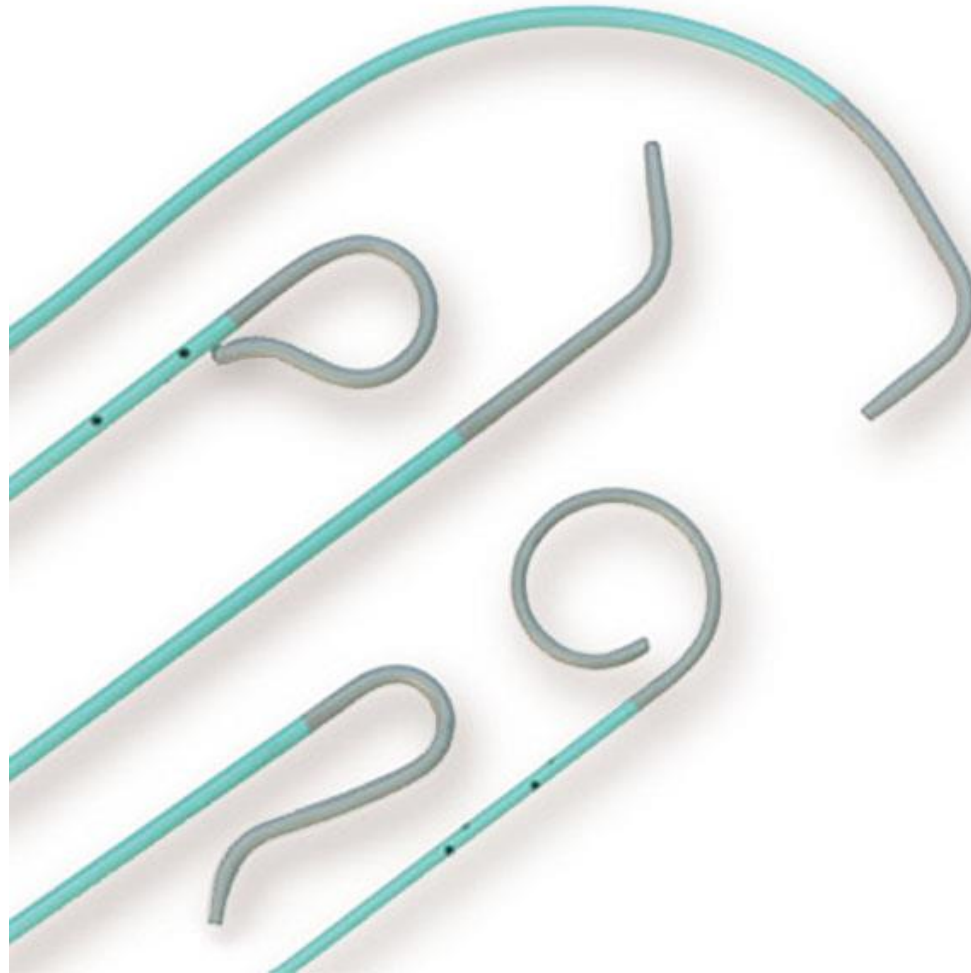
Promotes excellent curve retention that keeps the catheter in position during injections

Designed to minimize potential for vessel trauma



# IMAGER ANGIOCARDIOGRAPHIC CATHETER - BOSTON

- Tungsten layering in the distal catheter segment results in a highly radiopaque catheter tip that promotes clear fluoroscopic visualization.
- Soft tip material.
- Advanced tip construction provides the balance of flexibility and the shape retention .
- Polished, tapered tip design provides smooth tip-to-wire transition to facilitate entry and crossing.
- Predictable torque response .
- Advanced braided shaft designed to promote kink resistance and pushability .
- Durable, fluted hub designed to ease guidewire manipulation and provide strain relief for kink-resistant advancement.
- Wide variety of shapes .
- Proprietary Medi-Glide™ coating enhances lubricity for sheathless insertion and superb tracking.



# IMAGER ANGIOCARDIOGRAPHIC CATHETER - BOSTON

- The IMAGER II Angiographic Catheters are designed to provide a pathway for delivering contrast media to selected sites in the vascular system, including the carotid arteries.
- Additionally, the 5F Selective IMAGER II Angiographic Catheters without side holes can also be used for the controlled and selective delivery of the Boston Scientific Interlock - 35 Detachable Coils into the peripheral vasculature.
- Due to the various sizes and shapes, and the relative stiffness of angiographic catheters, extreme care must be taken when selecting and using the IMAGER™ II Angiographic Catheters to avoid damage to the vessel walls through which this catheter passes.
- Do not exceed the pressure ratings printed on the device labeling. Catheter integrity may be compromised if pressure limits are exceeded.

# IMPULSE DIAGNOSTIC CATHETER - BOSTON

## Flextrusion Technology

Soft distal segment is designed to reduce potential for vessel trauma, allowing safe engagement and coaxial alignment in the vessel

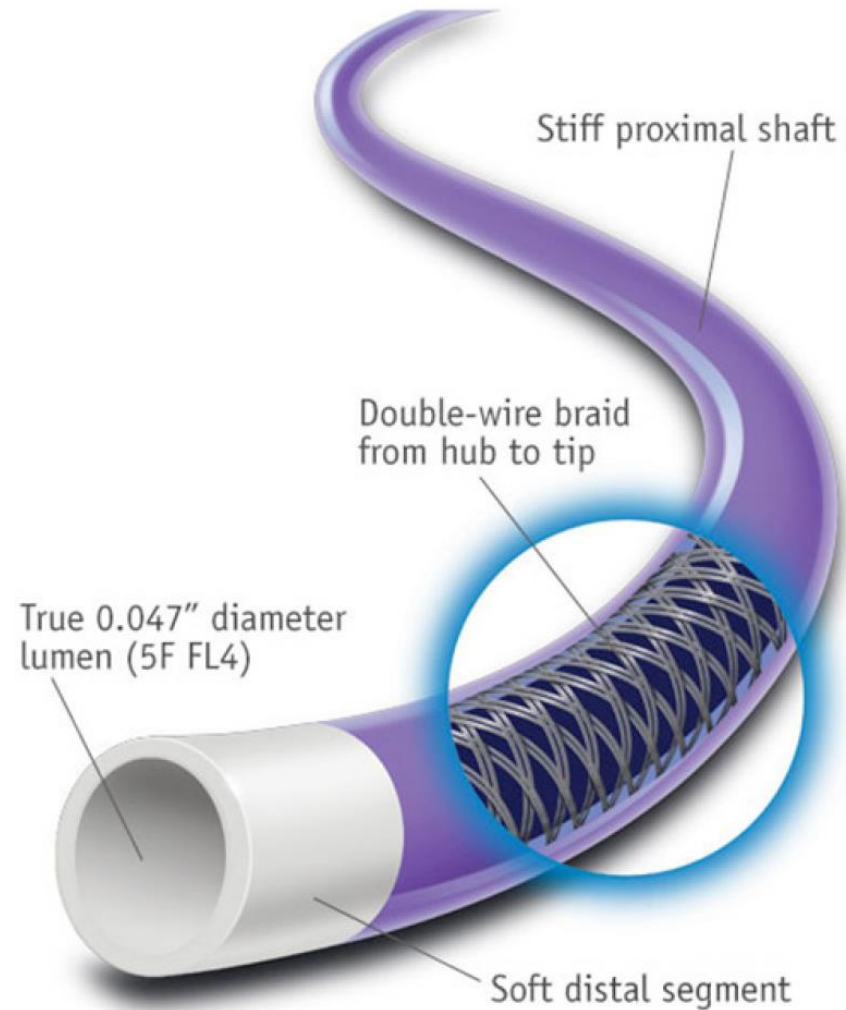
Smooth transition is designed to allow for better conformity to the anatomy and more controlled distal torque response

## Design and Performance Dynamics

Firm catheter shaft for users preferring a passive diagnostic catheter

Soft primary curve to help minimize vessel trauma

Available in 5F (0.045"; 0.047" FL4) and 6F (0.056") sizes.



# PRO-FLOW ANGIOGRAPHIC CATHETER MEDTRONIC

Material	Polyurethane
Braiding	Single wire
Hub	Winged

**Flow Rate** 6F pigtail catheter = 27 cc/sec @ 1000 psi

7F Pigtail catheter = 39 cc/sec @ 1200 psi

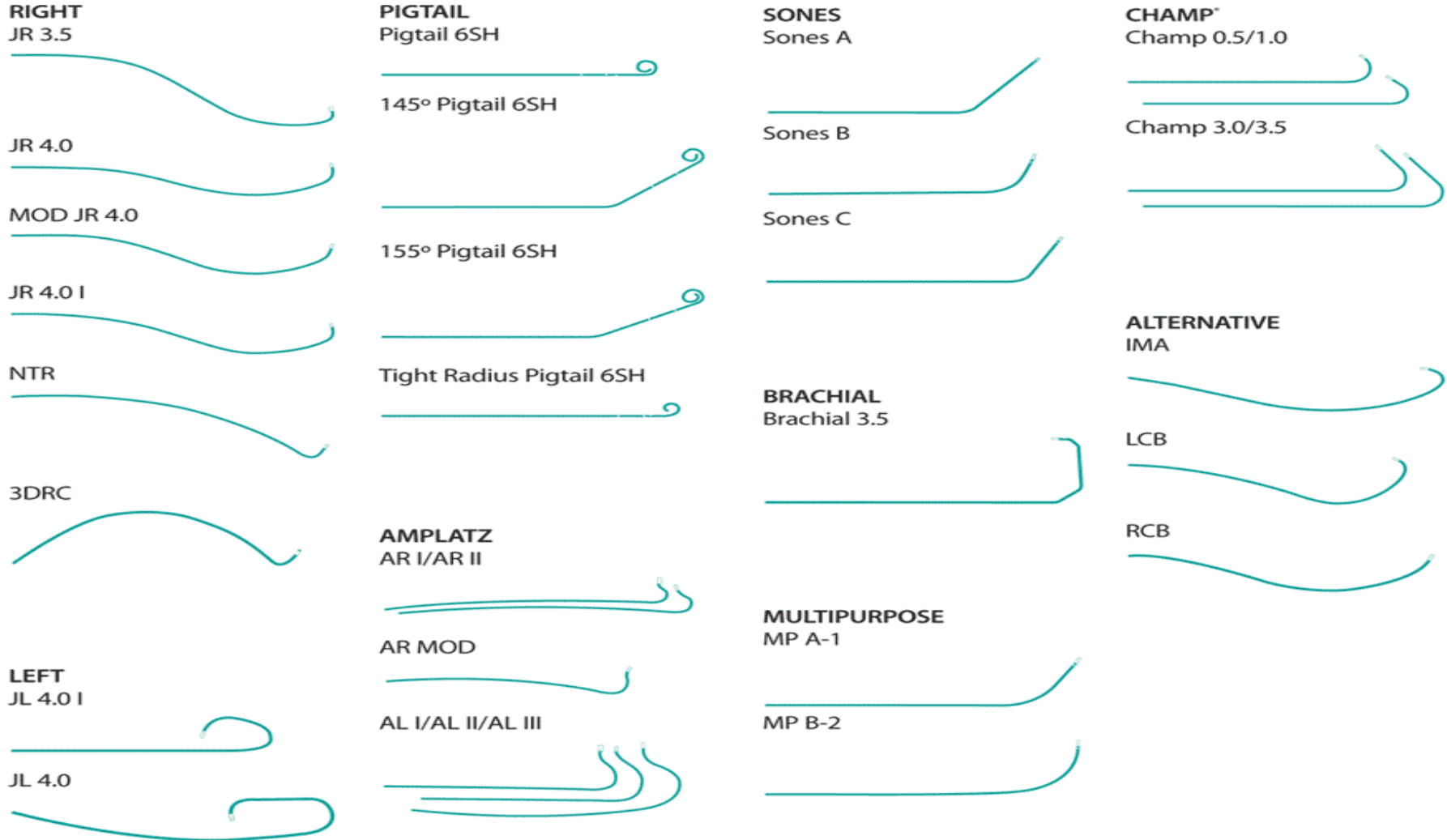


# PRO-FLOW ANGIOGRAPHIC CATHETER MEDTRONIC

- High strength polyurethane core and stainless steel single-wire braiding
- Braiding extends close to the tip, enhancing responsiveness
- Tip gradually tapers, decreasing chance of damage to delicate tissue
- Atraumatic soft tip available for ostial engagement
- Unique polymer blend gives Pro-Flo XT increased stiffness for navigating difficult anatomy



# PRO-FLOW ANGIOGRAPHIC CATHETER – DIFFERENT CURVES - MEDTRONIC



# SITSEER ANGIOGRAPHIC CATHETER - MEDTRONIC

Double-braided construction yields optimal 1:1 torque

Pebax material allows for thinner walls and larger lumens in the smaller French sizes

Atraumatic soft tip for ostial engagement

## Flow Rate

4F Pigtail catheter = 15.5 ml/sec @ 1000 psi

5F Pigtail catheter = 19 cc/sec @ 1200 psi

6F Pigtail catheter = 25 cc/sec @ 1000 psi

## O.D.

## I.D.

4F = 0.054 in

4F = 0.042 in

5F = 0.065 in

5F = 0.045 in

6F Coronary = 0.078 in 6F Coronary = 0.055 in

6F Pigtail = 0.080 in 6F Pigtail = 0.050 in



# Outlook™ - Angiographic catheter - Terumo

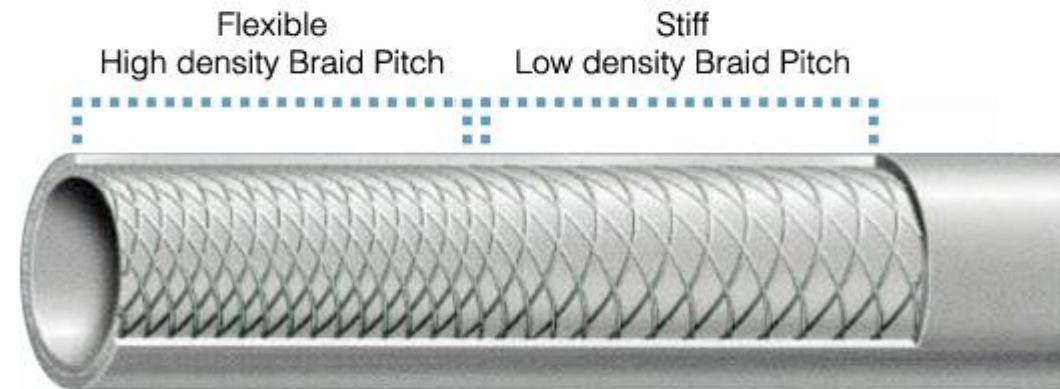
The Outlook 4 Fr (1.40 mm) has a large lumen to allow contrast media to be injected at high flow rates and is designed to exhibit good torque control.<sup>1</sup>

Fixed strain relief prevents the catheter from kinking at its proximal end.

The thin wall structure permits flow rates up to 23 ml/sec (saline) and a maximum pressure limit of 1,200 psi (8.274 kPa)<sup>1</sup>

Braiding with variable pitch offers partial proximal rigidity and increased flexibility at the distal end<sup>2</sup>

The Tiger and BLK curves enable angiography of right and left coronary arteries using either a radial or brachial approach. This single catheter concept decreases procedure and fluoroscopy times, providing both procedural and cost-efficiency<sup>3</sup>



# Outlook™ - Angiographic catheter - Terumo

## General Specifications

<b>Pressure limit</b>	4 Fr (1.40 mm) – 1200 psi
<b>Guidewire compatibility</b>	0.038" (0.97 mm)
<b>Outer diameter of the shaft</b>	4 Fr / 1.40 mm
<b>Inner diameter of the shaft</b>	0.041" / 1.05 mm

## Item Specifications

Shape name	Shape code	Side holes	Length (cm)
<a href="#">Amplatz Left</a>	AL-1	0	100
<a href="#">Amplatz Left</a>	AL-2	0	100
<a href="#">Amplatz Left</a>	AL-3	0	100
<a href="#">Amplatz Right</a>	AR-1	0	100
<a href="#">Amplatz Right</a>	AR-2	0	100
<a href="#">Amplatz Right</a>	AR-JP	0	100
<a href="#">Amplatz Modified</a>	AR-RC	0	100
<a href="#">Judkins Left</a>	JL-3.5	0	100
<a href="#">Judkins Left</a>	JL-4.0	0	100
<a href="#">Judkins Left</a>	JL-5.0	0	100
<a href="#">Judkins Left</a>	JL-6.0	0	100
<a href="#">Judkins Right</a>	CR-25	0	80
<a href="#">Judkins Right</a>	JR-3.5	0	100
<a href="#">Judkins Right</a>	JR-4.0	0	100
<a href="#">Judkins Right</a>	JR-5.0	0	100
<a href="#">Multipurpose</a>	MP-2.5	0	100
<a href="#">Multipurpose</a>	MP-4.0	2	100
<a href="#">Multipurpose</a>	El Gamal 2	0	100
<a href="#">Internal Mammary</a>	IM-Short tip	0	100
<a href="#">Internal Mammary</a>	IM-JP type	0	100
<a href="#">Bypass</a>	BP-JL	0	100
<a href="#">Bypass</a>	BR-JR	0	100
<a href="#">Straight Pigtail</a>	PIG	8	110

# Outlook™ - Angiographic catheter - Terumo

<u>Straight Pigtail</u>	PIG	8	65
<u>Straight Pigtail</u>	PIG	4	65
<u>Straight Pigtail</u>	PIG-Small	4	65
<u>Angled Pigtail</u>	PIG-145°	8	110
<u>Angled Pigtail</u>	PIG-155°	8	110
<u>Radial</u>	Tiger I	1	100
<u>Radial</u>	TR-35	1	100
<u>Radial</u>	Tiger II-4.0	0	100
<u>Radial</u>	TR-40	1	100
<u>Radial</u>	Tiger II-5.0	0	100
<u>Radial</u>	BLK-4.0	1	100

# Radifocus® Optitorque® - Angiographic catheter TERUMO

High-torque design and precise manipulation

The catheter's ultra-thin wall creates a large lumen to enable a short injection time

The Tiger and BLK curves enable angiography of right and left coronary arteries using either a radial or brachial approach. This single catheter concept decreases procedure and fluoroscopy times, providing both procedural and cost-efficiency



# INFINITI<sup>®</sup> diagnostic catheter Cordis

These catheters incorporate proprietary Vestan Nylon to deliver exceptional responsiveness and flow rates, optimal torque, and shape retention.

The THRULUMEN Design: Provides the same inner lumen diameter from hub to tip, which eliminates contrast jetting and allows for smoother flow and improved catheter stability.

Large Inner Lumen: Thin-wall technology allows for larger inner lumen diameter, thus facilitating easy injections and higher flow rates.

Radiopaque tip: Helps reduce the risk of vascular damage upon entering tortuous or fragile vessels.

- SUPER TPRQUE
- SUPER TORQUE PLUS
- INFINITY
- INFINY 4

# Diagnostic Catheters - CORDIS

- LEFT CORONARY JUDKINS TECHNIQUE (100 cm)
- LEFT CORONARY AMPLATZ TECHNIQUE (100 cm)
- RIGHT CORONARY JUDKINS TECHNIQUE (100 cm)
- RECESSED BRAID
- MOD Judkins Right 4
- SHT (Short Tip)Judkins Right 4
- RIGHT CORONARY AMPLATZ TECHNIQUE MODIFIED (100 cm)
- AR MOD Amplatz Right Modified , AR I MOD Amplatz Right 1 Modified , AR II MOD Amplatz Right 2 Modified
- RIGHT CORONARY EXTRA BACK-UP SHAPES - WILLIAMS TECHNIQUE
- 3D RC Right Coronary
- RIGHT CORONARY NOTO TECHNIQUE (100 cm)
- SRC Right Coronary
- MULTIPURPOSE A COURNAND TECHNIQUE (OPEN END, NO SIDES HOLES)
- MPA 1 Multipurpose A Cournand, 100 cm, MPA 1 Multipurpose A, 125 cm
- MPA 1 Multipurpose A, 80 cm
- MULTIPURPOSE A PAEDIATRIC CURVE (OPEN END, 2 SIDE HOLES)
- MPA 2 (I) Multipurpose A-2, 100 cm 2 side holes , MPA 2 (I) Multipurpose A-2, 125 cm 2 side holes, MPA 2 (I) Multipurpose A-2, 65 cm 2 side holes, MPA 2 (I) Multipurpose A-2, 80 cm 2 side holes
- MULTIPURPOSE A ADULT CURVE (OPEN END, 2 SIDE HOLES)
- MPA 2 Multipurpose A-2, 100 cm, MPA 2 Multipurpose A-2, 125 cm , MPA 2 Multipurpose A-2, 80 cm , MPA 2 Multipurpose A-2, 65 cm
- MULTIPURPOSE B (OPEN END, 2 SIDE HOLES, 100 cm)
- MPB 2 Multipurpose B-2
- MULTIPURPOSE B GENSINI TECHNIQUE (OPEN END, 6 SIDE HOLES, 100 cm)
- MPB 3 Multipurpose B Gensini

# Diagnostic Catheters - CORDIS

## SONES TECHNIQUE

SON II Sones II, 80 cm, SON I Sones I, 100 cm, SON I.5 Sones I.5, 100 cm , SON II Sones II, 100 cm , SON III Sones III, 100 cm, SON I Sones I, 80 cm 2 side holes, SON II Sones II, 80 cm 2 side holes

## CASTILLO TECHNIQUE (80 cm)

CAS II Castillo II, 80 cm , CAS I Castillo I, 100 cm , CAS II Castillo II, 100 cm , CAS III Castillo III, 100 cm .

## BARBEAU TECHNIQUE

High Flow™ BARBEAU Barbeau, 100 cm, 2 side holes , BARBEAU Barbeau, 125 cm, 2 side holes

## EL GAMAL TECHNIQUE (100 cm)

EGB I El Gamal I , EGB II El Gamal II .

## CORONARY BYPASS TECHNIQUES (100 cm)

LCB Left Coronary Bypass , RCB Right Coronary Bypass , IM Internal Mammary .

## VENTRICULAR STRAIGHT PIGTAIL (110 cm)

PIG Straight Pigtail 4 side holes , PIG Straight Pigtail 5 side holes , PIG Straight Pigtail 6 side holes , PIG Straight Pigtail 8 side holes , PIG Straight Pigtail 12 side holes .

## VENTRICULAR ANGLED PIGTAIL: VAN TASSEL TECHNIQUE (110 cm)

PIG Angled Pigtail 145° 5 side holes Modified, PIG Angled Pigtail 145° 6 side holes, PIG Angled Pigtail 145° 6 side holes Modified, PIG Angled Pigtail 155° 5 side holes Modified, PIG Angled Pigtail 155° 6 side holes, PIG Angled Pigtail 155° 6 side holes Modified, PIG Angled Pigtail 145° 12 side holes PIG Angled Pigtail 155° 12 side holes

# Diagnostic Catheters for other vasculature - CORDIS

- These catheters may be used in anomalous coronaries
- HEADHUNTER – H1,H3,H1H
- SIDEWINDER – SIM1, SIM2, SIM3, SIM4
- NWTON – HN 3, HN 4
- BENTSON, MANI – JB 1, JB 2, JB 3, MAN, CK 1
- SHEPARD HOOK – SHK 0.8, SHK 1.0, RDC 1, RDC
- COBRA – C 1, C 2, C 3, RC 1, RC 2, RC 3, USL 2

# OSCAR CATHETER ANGIOS CLASSIC

Kink resistant shaft featuring superior pushability, optimum torque and longitudinal stability  
Hydrophobic Coated shaft for easy insertion  
Large shaft lumen for high flow rate  
Soft atraumatic tip to minimize vessel trauma  
Curve retention for accurate catheter placement  
Excellent shaft and tip visualization under fluoroscopy  
Ergonomically designed and color coded hub  
Ergonomically designed tip straightener for easy loading over guidewire and sheath introducer (Pigtail catheter model only)  
Maximum Recommended Guidewire 0.038"  
JUDKINS LEFT, JUDKINS RIGHT, STRIGHT PIG TAIL , PIGTAIL 145 WITH SIDE HOLES.



ROYAL FLUSH PLUS  
BEACON  
COOK MEDICAL



# Soft-Vu Omni angiographic catheter Angiodynamics

## Soft-Vu Omni Flush 4 French High Flow Features:

Super-Radiopaque tip means better visualization and more accurate placement.

Reforms and maintains shape – even under injection pressure – with less catheter whipping, resulting in less vessel wall injury

Unique tip weld transitions smoothly and securely from stiff shaft to flexible tip

Less contrast reflux than other flush catheters, thus resulting in lower total contrast dose

The top of the Omni flush shape to the tip end measures approximately 15 mm

Specialized Catheter Options Available



# Omni™ Flush Angiographic Catheter Angiodynamics

- Unique tip weld transitions smoothly and securely from stiff shaft to flexible tip
- Super-Radiopaque™ tip means better visualization and more accurate placement
- Reforms and maintains shape—even under injection pressure—with less catheter whipping, resulting in less vessel wall injury
- The top of the Omni Flush shape to the tip end measures approximately 15 mm
- Less contrast reflux than other flush catheters, thus resulting in lower total contrast dose, which is recommended

## **SOS Omni® Selective Catheter**

The SOS Omni selective catheter is the first of its kind, featuring a soft, atraumatic, Super-radiopaque tip designed to reform the thoracic aorta. This versatile visceral catheter is just the right catheter for just the right results, reforming in the descending thoracic aorta – below the great vessels rather than the transverse arch – for increased safety and reduced risk.

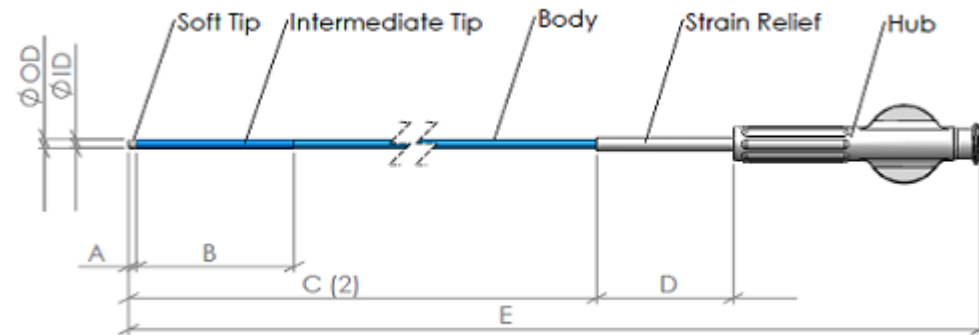
# Diagnostic catheter PENDRACARE

Low resistance due to unique hydrodynamic surface

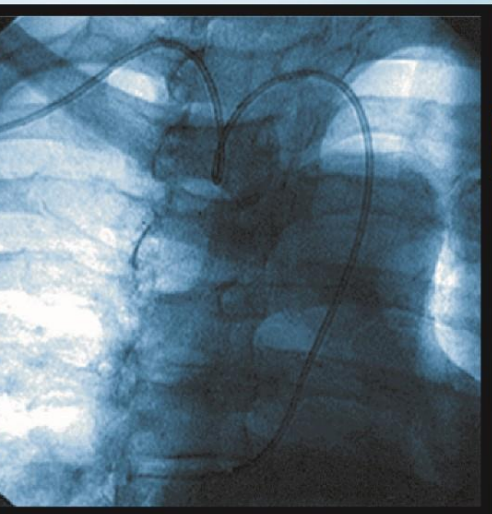
Large inner lumen

Superior kink resistance and 1-to-1 torque

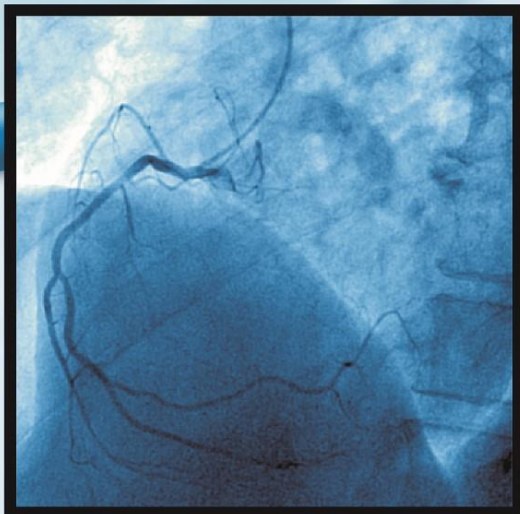
Atraumatic soft tip



low friction

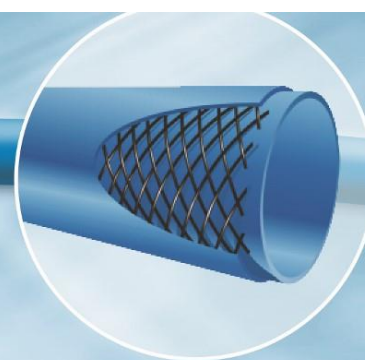


easy access



radial approach

Pointer provides easy introduction leading to lower occurrence of vessel spasms providing quick and reliable coronary vessel access.



double wire stainless steel braiding



hub with grip section for optimal torque control

Pointer proprietary nylon material combination resulting in unsurpassed performance:

- High flexibility
- Superior surface smoothness
- Excellent torque control

atraumatic soft tip



inner lumen  
superior flow rates

Pointer provides reliable kink free passage of tools through tortuous anatomy and calcified lesions while keeping optimal

# Pendracare

JUDKINS (JL6, JR6)

WILLIAMS – 3DS

SONES (1, ½, 2, 2/2)

GAMAL

AMPLATZ (AL 1, AL 2, AL 3, AR 1 MOD, AR 2 MOD, AR MOD)

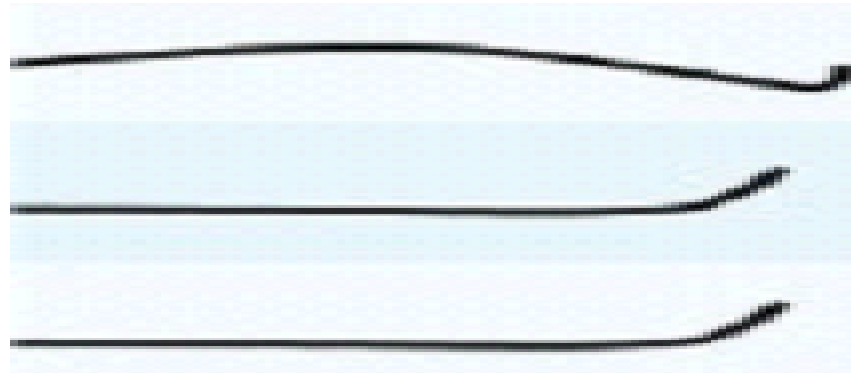
MULTIPURPOSE (MPA, MPA/2, MPB, MPB/2)

RADIAL (RAD, TIG2)

BYPASS (IM, LCB, RCB)

PIG TAIL (PIG 110/8, PIG 145/110/8, PIG 155/110/8, PIG 130/8)

MAX. PRESSURE 1200 psi/84 bar  
Guide wire 0.038" / 0.97 mm



# Occlu-Marker pfm medical

**Gold markers** Fitted with three clearly visible distal gold rings, spaced 10 mm and 20 mm apart, for exact measurement of the PDA.

**Pigtail**

**Good manoeuvrability in the blood vessel**

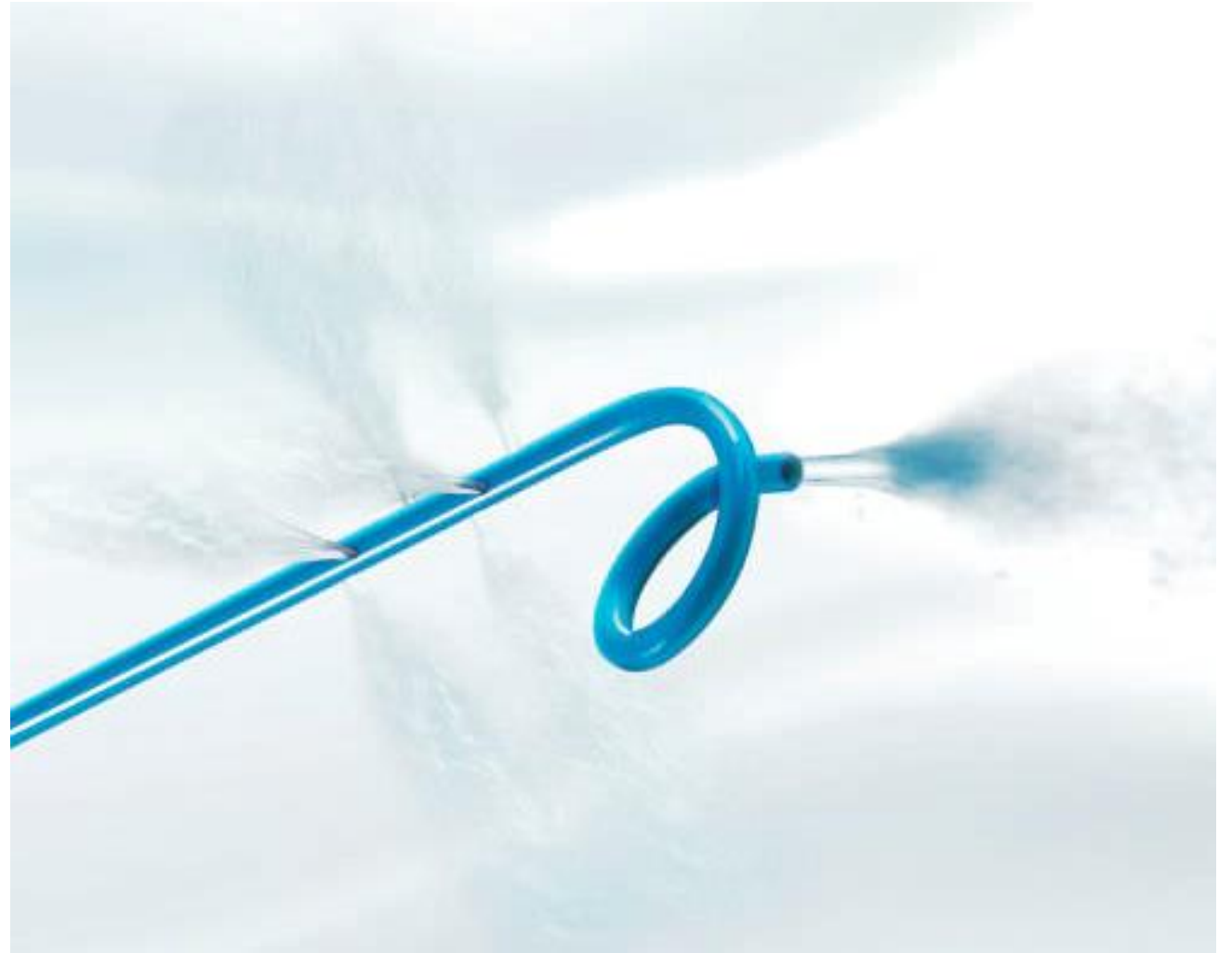
50, 75, 90, 110 cm



# Coronary angiographic catheter B | BRAUN

Superior flow rates thanks to extra large inner catheter lumen

- Symmetrically braided shaft for 1:1 force transmission
- Atraumatic non braided tip
- Color coded ergonomic catheter hub



## ALVIMEDICA



## IN SITU TECHNOLOGIES

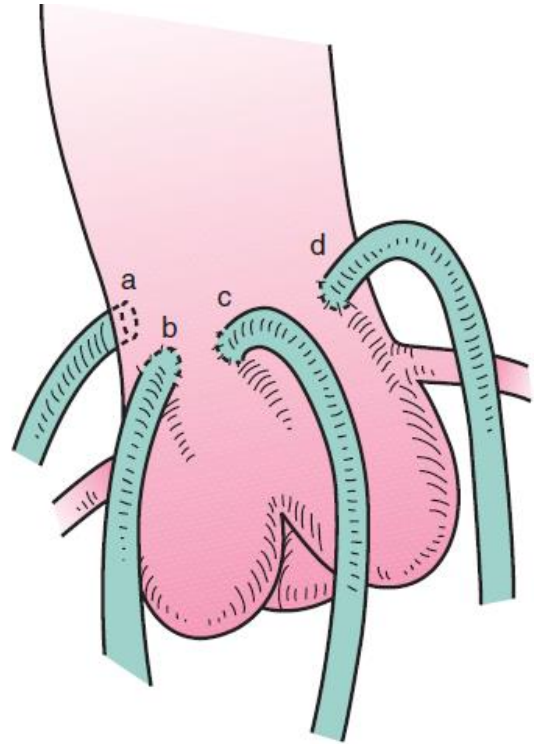


## CURATIVE

It has an advanced braided design for efficient 1:1 torque transmission and excellent support. The unique polymer blend offers optimum stiffness while navigating through tight and twisted anatomy. It provides flexibility and shape retention. It has a robust shaft that permits downsize and improves performance. The hub is durable and has a molded strain relief, making it easy to manipulate.



# SVG grafts



a- Multipurpose

b- Multipurpose, JR

c- HS, AL, JR

d- HS, JL

# OTHER ANGIOCATHETERS USED FOR SVG/IM ANGIOGRAM

- TURUMO – BYPASS – BP-JL, BR-JR – NO SIDE HOLES
- CORDIS – LCB, RCB, IM
- SAPHANEOUS VEIN GRAFT CHAMP 2
- IMA CHAMP
- EL GAMAL
- MAC (Multi lumen access catheters) - Teleflex
- Bernstein for LIMA