

Balloon Design and Performance: Presentation of various types of balloons on the market

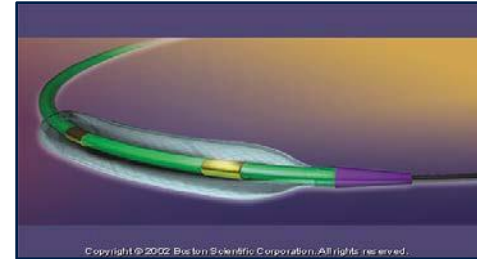
CHICAGO BALLOON SUMMIT 2016
Demetrius Lopes, MD



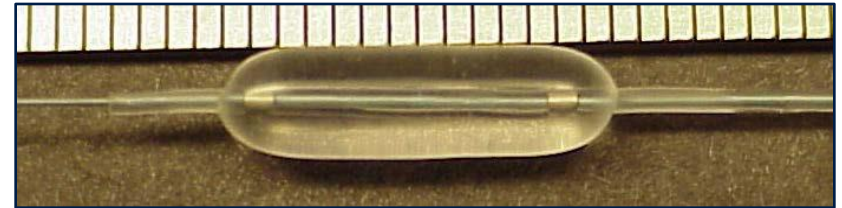
Rush Center for
Neuroendovascular surgery

Balloon Summit: So much to talk about

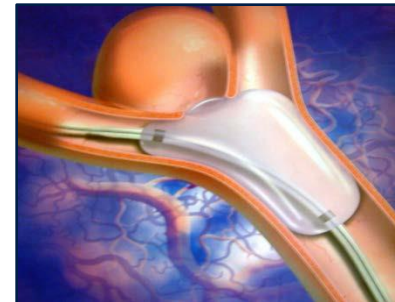
**Non-Compliant &
Semi-Compliant Balloons**



Compliant Balloons



Super-Compliant Balloons



Complaint

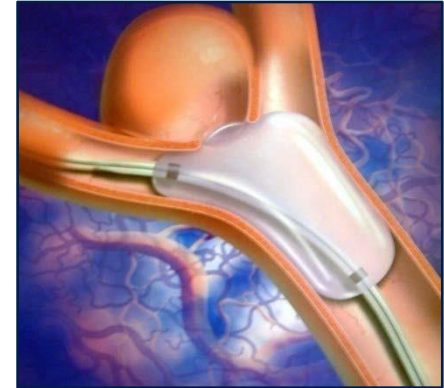
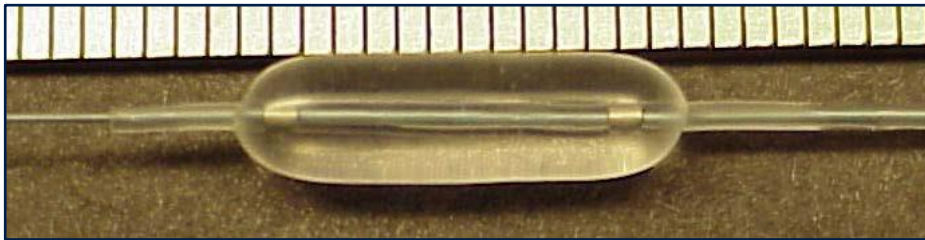
- Chronoprene
- Polyurethane

Non-complaint

- Nylon
- PBx

Compliant Balloons

- Over-the-wire and designed for use in the neurovasculature
- **Low pressure – less traumatic**
- Typically 0.5 atm (380 mmHg)



Single Lumen Balloon



ECLIPSE

A photograph of the Eclipse single lumen balloon catheter. It features a long, thin, gold-colored shaft with a clear, cylindrical balloon attached near the tip. The shaft is angled upwards from the bottom right towards the top left.



COPERNIC

A photograph of the Copernic single lumen balloon catheter. It has a long, thin, gold-colored shaft with a clear, cylindrical balloon. The shaft is curved, with the tip pointing towards the left.



Hyperglide

A close-up photograph of the Hyperglide single lumen balloon catheter. The clear balloon is shown in contact with a dark, textured surface, likely a vessel wall. The shaft is thin and white.



TransForm

A photograph of the TransForm single lumen balloon catheter. The clear balloon is shown with a blue shaft. The shaft is curved into a loop, and the tip is pointing towards the top left.



Hyperform

A photograph of the Hyperform single lumen balloon catheter. The clear balloon is shown in contact with a dark, textured surface. The shaft is thin and white.

Hyperballoon Size chart

Hyper Balloon Options		
Sizes	Durometer/Pressure	Indication
<u>HyperGlide™ 3.0 mm</u> 3.0 x 10 mm 3.0 x 15 mm	Compliant D = 40 Low Pressure	Balloon Test Occlusion
<u>HyperGlide 4.0 mm</u> 4.0 x 10 mm 4.0 x 15 mm 4.0 x 20 mm 4.0 x 30 mm	Compliant D = 40 Low Pressure	Balloon Test Occlusion, Balloon-Assisted Coiling
<u>HyperGlide 5.0 mm</u> 5.0 x 15 mm 5.0 x 20 mm 5.0 x 30 mm	Compliant D = 40 Low Pressure	Balloon Test Occlusion, Balloon-Assisted Coiling
<u>HyperForm™</u> 3.0 x 7 mm 3.0 x 15 mm 4.0 x 7 mm 4.0 x 15 mm 4.0 x 20 mm 7.0 x 7 mm 7.0 x 15 mm	Super-Compliant D = 15 Low Pressure	Balloon Test Occlusion, Balloon-Assisted Coiling

Size Chart For Transform Balloon



Compliant (mm/mm)				
	10	15	20	30
3	●	●		
4	●	●	●	●
5	●	●	●	●



Super Compliant (mm/mm)				
	5	7	10	15
3	●			
4		●	●	
7		●	●	●

Size Chart for Eclipse and Copernic

REFERENCE	Catheter length (cm)	Balloon length (mm)	Balloon Ø (mm)	Volume max (mL)	OD max	Guidewire
COPERNIC10	160	10	3 to 5	0,30	/	HYBRID121 4
COPERNIC15		15		0,35		
COPERNIC20		20		0,40		
COPERNIC30		30		0,50		
COPERNIC8X8 0RC		80	8	/		
COPERNIC10X 80RC	80	10	/	5F (1,6mm)	TRANSEND 14	
ECLIPSE7	160	7	4 to 6	0,20	/	HYBRID121 4
ECLIPSE9		9		0,25		
ECLIPSE12		12		0,30		
ECLIPSE15		15		0,40		
ECLIPSE20		20		0,50		

ECLIPSE also compatible with the exchange guide HYBRID10/12D300 (length → 300cm)

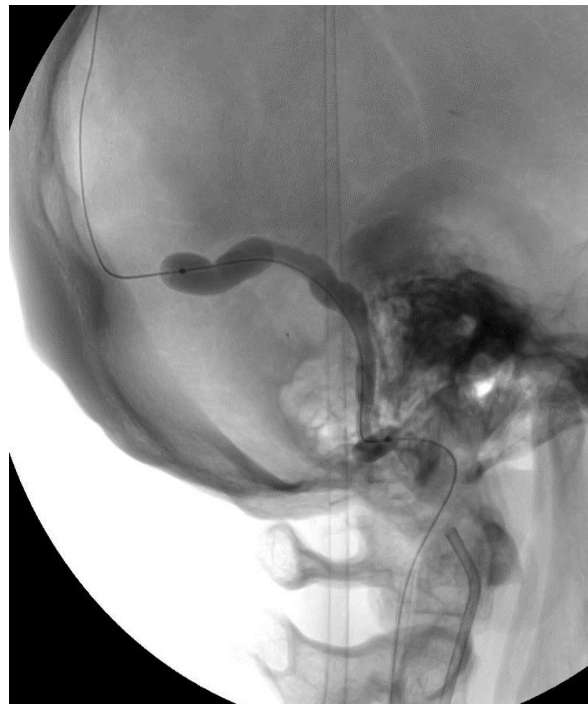
‘ECLIPSE’ or ‘COPERNIC’ → set which includes: 1 microcatheter / 1 GW HYBRID1214D / 1 TORQUE / 1 Y shaped valve connector

COPERNIC RC

8x80

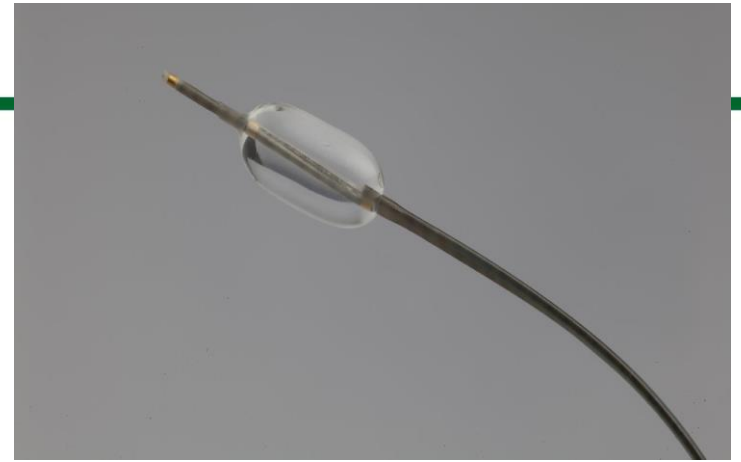


COPERNIC RC 8x80



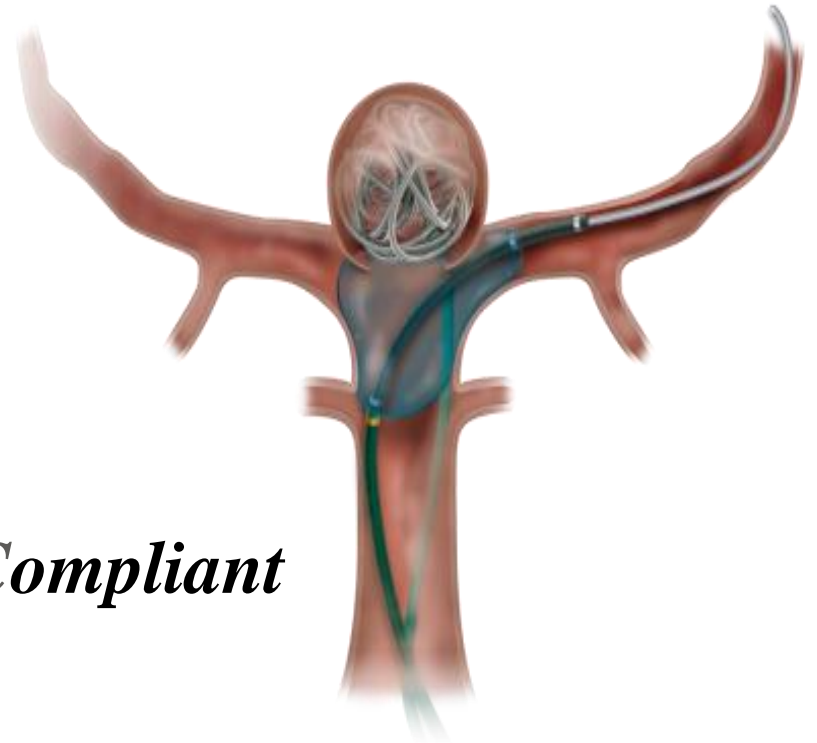
Dual Lumen Balloon

Eclipse 2L



NeuroSpeed

Accent

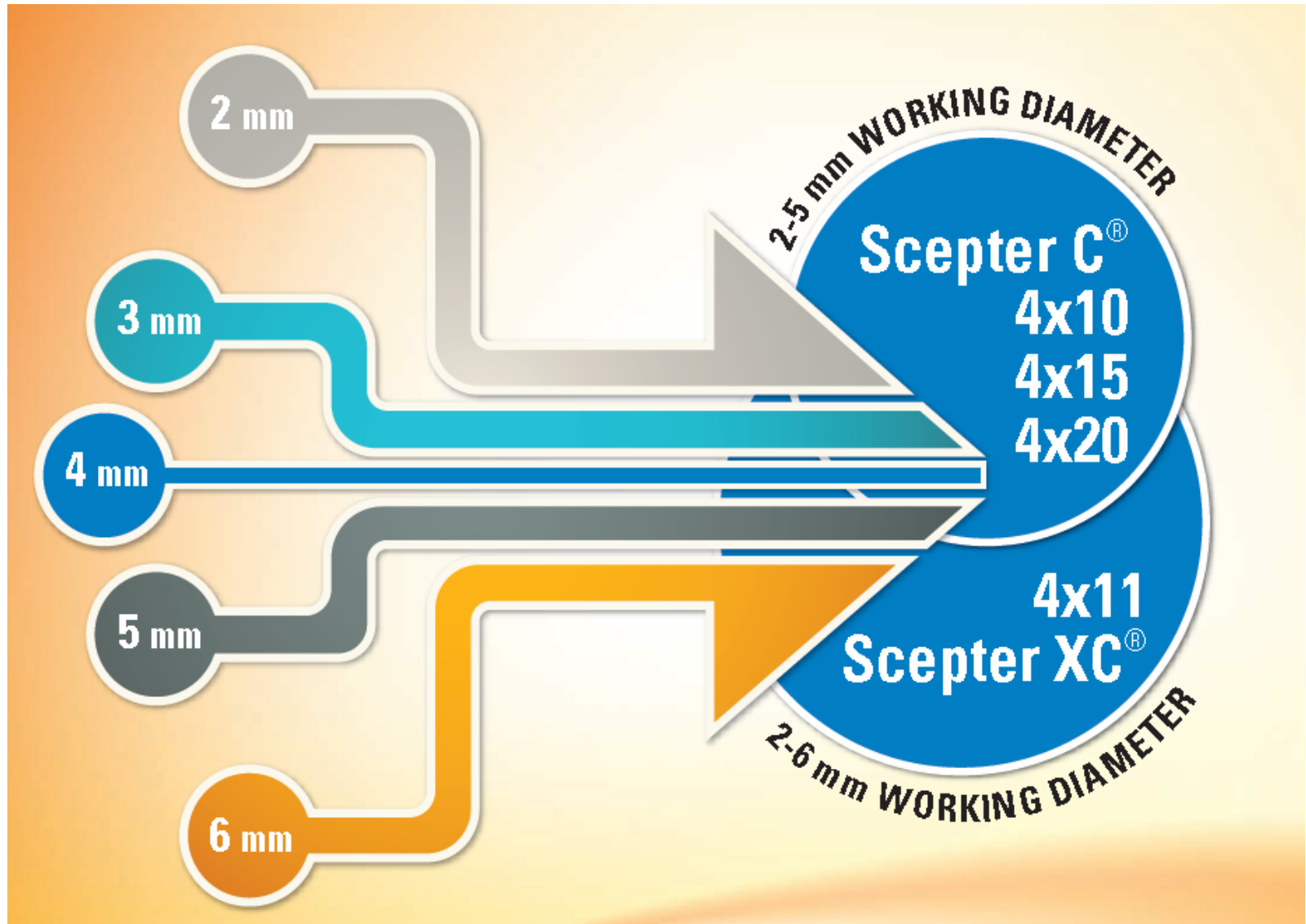


Scepter^{XC} - *X-tra Compliant*
Occlusion Balloon
Catheter

Eclipse 2L sizing chart

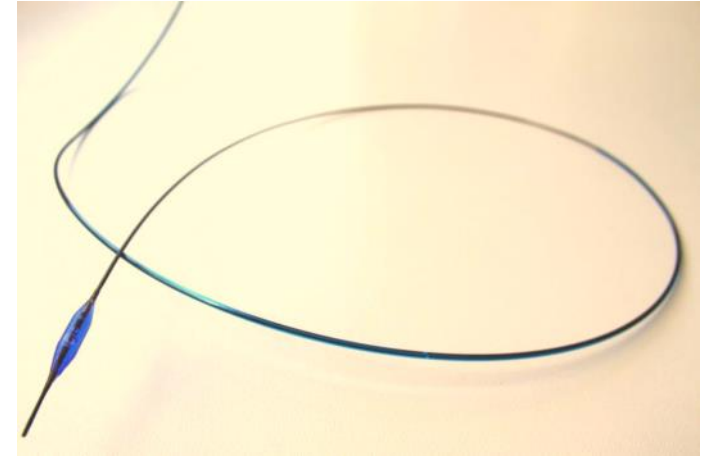
REFERENCE	Balloon length (mm)	Balloon Ø (mm)	Distal tip (OD x length)	I.D (main lumen)	Double lumen O.D (thickness)	Double lumen O.D (width)	N° of markers
ECL2L6X7SN	7		2,0F x 3mm				4
ECL2L6X9	9	6		Ø 0,42mm (.017") Equivalent to VASCO+10	0,9mm (equivalent to 2,7F)	1,15mm *	3
ECL2L6X12	12		2,0F x 7mm				
ECL2L6X20	20						

Scepter sizing



Product Overview

The NeuroSpeed® PTA Balloon Catheter is indicated for dilatation of a stenosis in the cerebral arteries in order to improve perfusion.



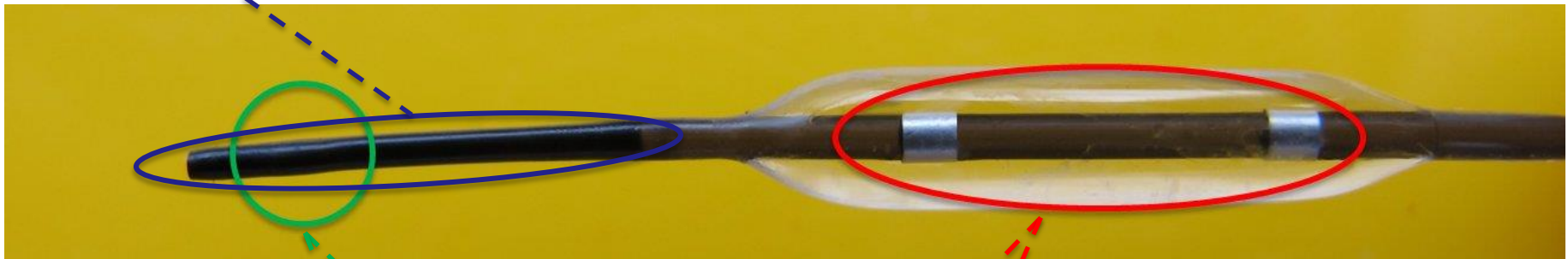
	NeuroSpeed® PTA Balloon Catheter
Balloon diameter	1.5 / 2.0 / 2.5 / 3.0 / 3.5 and 4.0 mm
Balloon working length	8 mm
Inner diameter	0,0165"
Outer diameter (dist./ prox.)	2.7 F / 3.7 F
Usable length	150 cm
Tip length	10 mm
Tip markers / Balloon markers	1 / 2



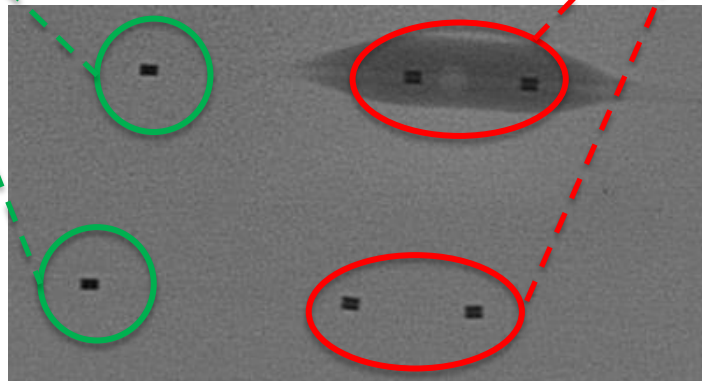
NeuroSpeed® PTA Balloon Catheter

Product Overview – Radiopaque Marker

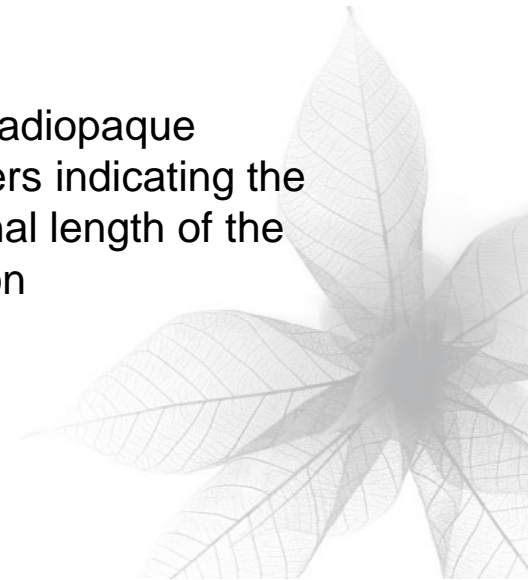
Longer soft tip for improved trackability



One radiopaque marker indicating the distal tip of the catheter (→ For positioning control)

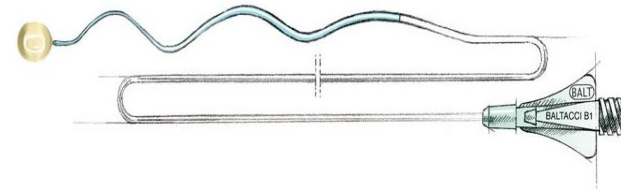


Two radiopaque markers indicating the nominal length of the balloon



Flow-dependant microcatheters with non-detachable balloon

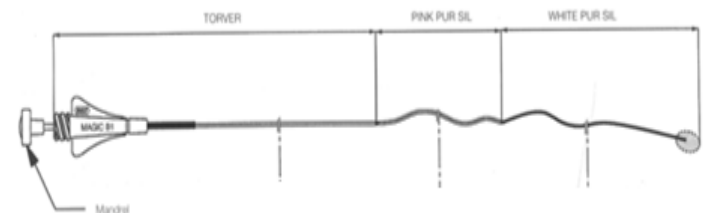
BALTACCI B1



MAGIC B1/B2

Common indications:

- Bifurcation remodeling with round balloon
 - Vasospasm
- Temporary balloon occlusion



Flow Guided Balloon Chart

BALTACCI

REFERENCE	Balloon length (mm)	Balloon Ø (mm)	Max volume (mL)	Torver + hub Ø x L (cm)	Middle part Ø x L (cm)	Distal part Ø x L (cm)	Total length (cm)
BALTACCI B1	6 to 9	4 to 6	0,20	2,7F x 135	2,4/1,5F x 20	1,5F x 10	165

MAGIC

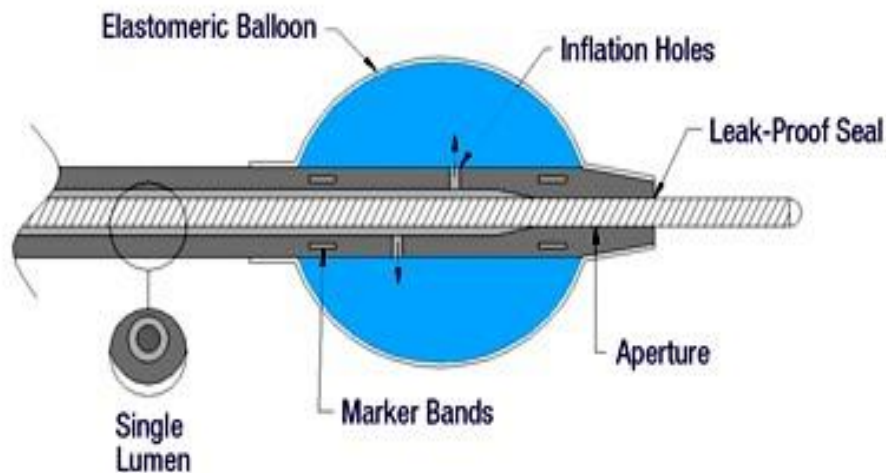
REFERENC E	Balloon length (mm)	Balloon Ø (mm)	Torver Ø x L (cm)	Pink Pursil Ø x L (cm)	White Pursil Ø x L (cm)	Total length (cm)
MAGIC B1	9	6	2,7F x 114	2,4F x 25	1,8F x 10	155
MAGIC B2	18		2,7F x 114	2,4F x 25	1,8F x 10	155

Performance Comparison

What is the difference between single vs dual balloon?

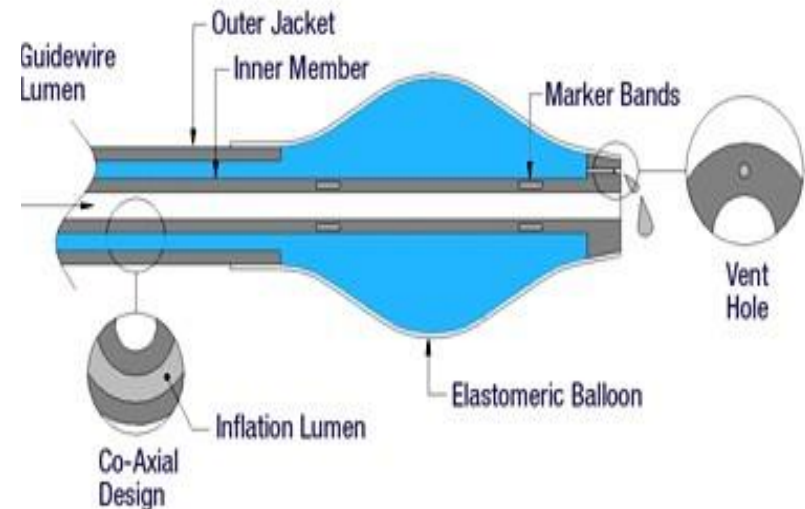
▪ Single Lumen Balloon Catheter

- Less Dense
- Smaller Profile
- More Flexible
- Air Removal Independent of Vent Holes
- Mechanical Seal

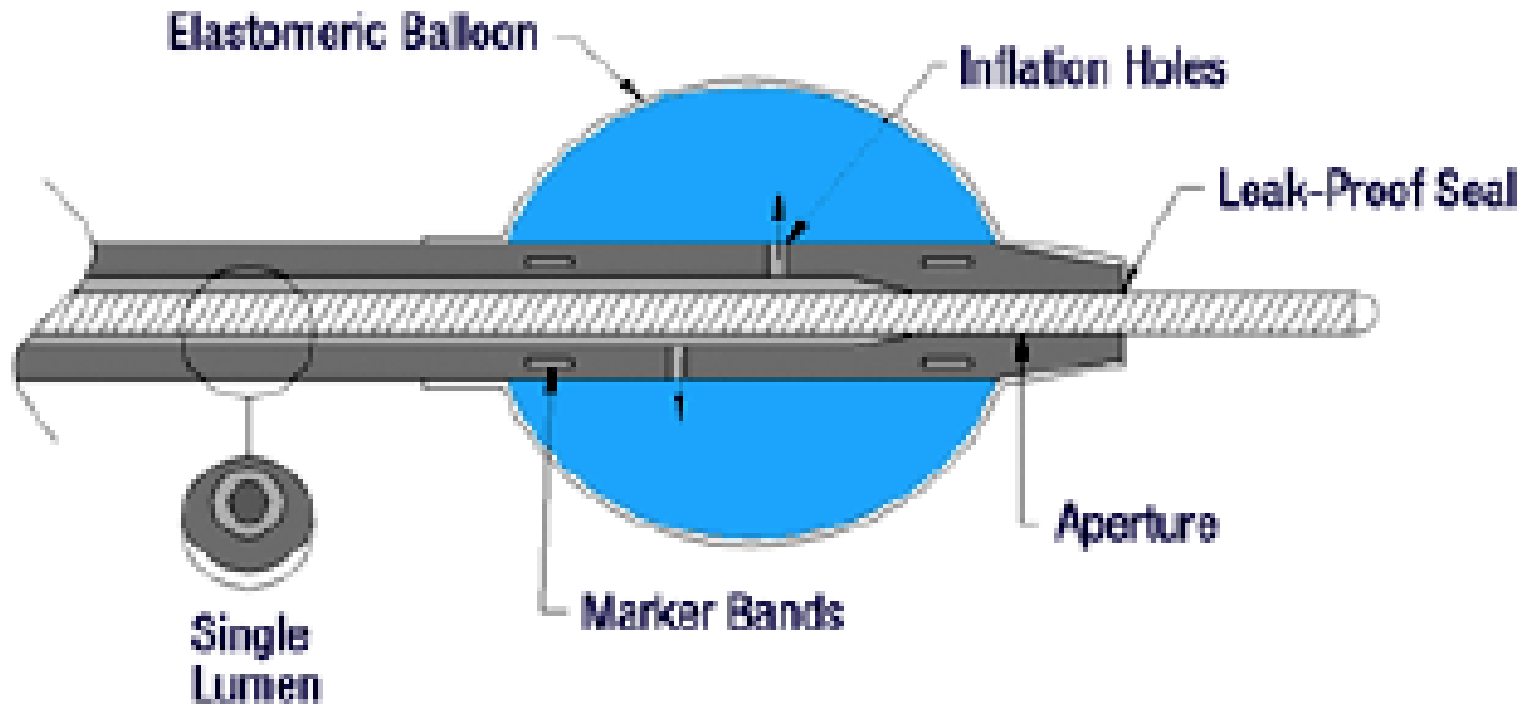


Dual Lumen Balloon Catheter

- More Dense (2 lumens)
- Larger Profile
- Time Consuming Preparation
- Less Versatile
- Relies on occlusion of vent holes by contrast to create seal

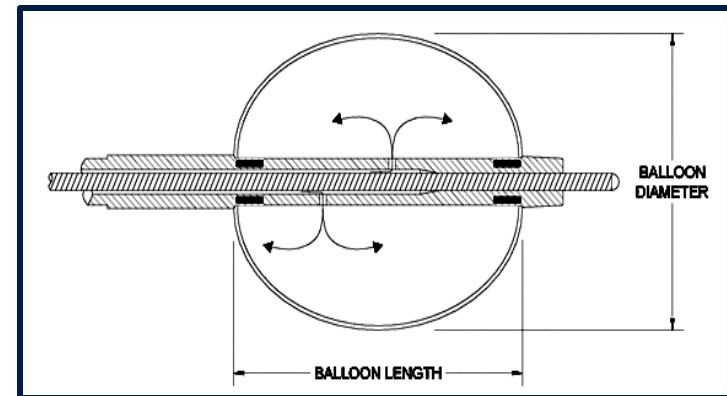
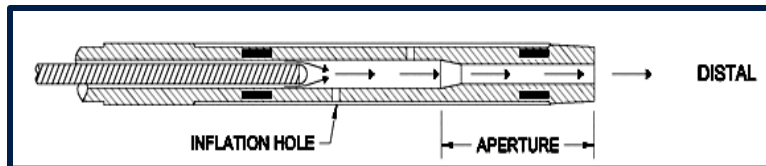


- Single vs Double Lumen

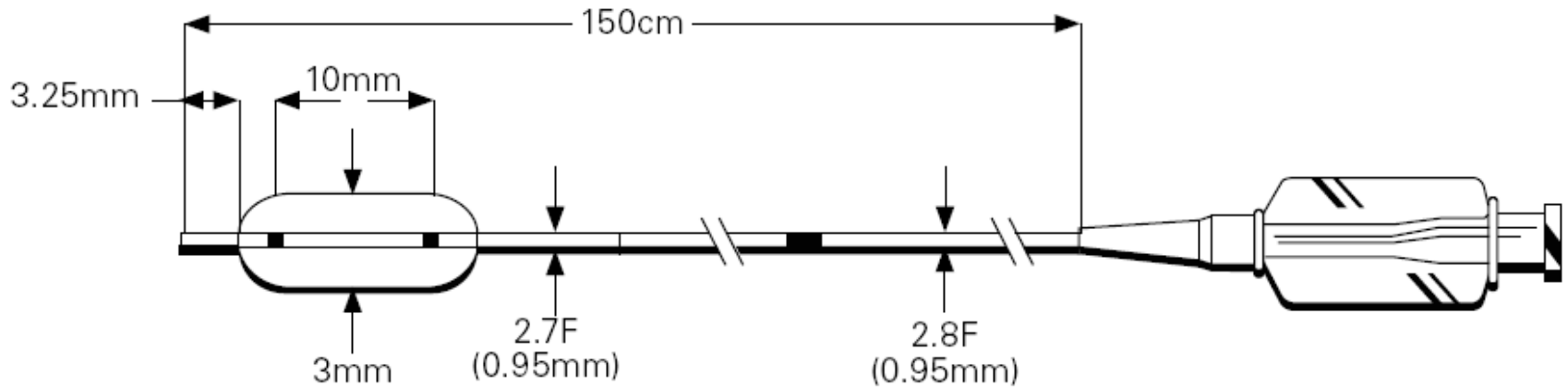


INFLATION/DEFLATION

- Inflation/Deflation occurs through inflation holes when guidewire seals distal aperture
- 50% contrast and saline solution recommended to inflate balloon



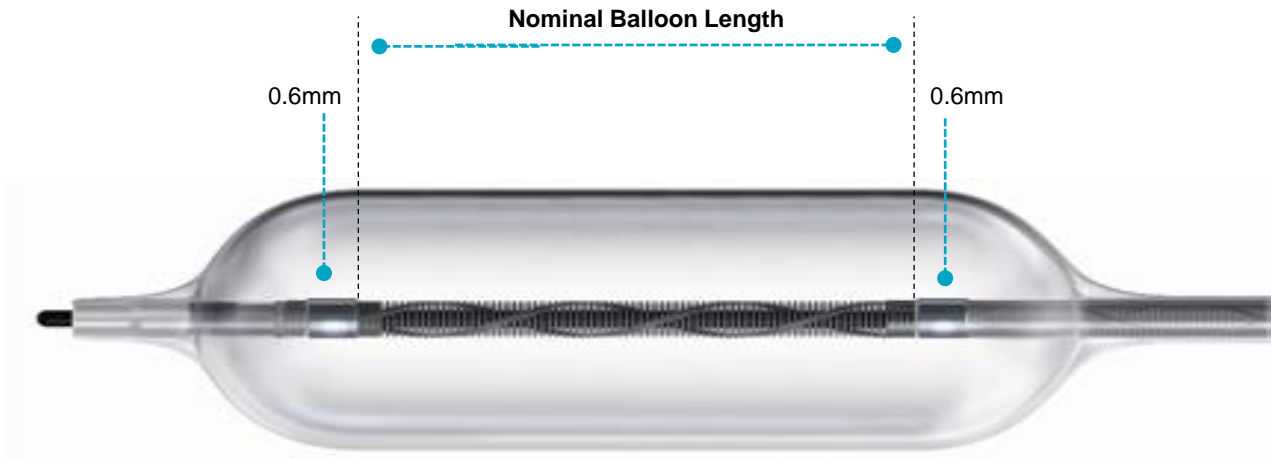
Balloon Catheter Overview - Transform



- **Catheter Length:** 150cm
- **Proximal OD:** 2.8F
- **Distal OD:** 2.7F
- **Distal Tip:** 3.25mm

- **Fluoro Saver Marker:** 94cm from distal tip
- **Parallel Technique:** Compatible in a 6F Guide
- **DMSO Compatible**

Balloon Construction



- Balloon made from a thermoplastic elastomer
- Balloon mounted on a nitinol slotted hypotube with hundreds of micromachined ports for contrast infusion
- Balloon material is DMOS compatible



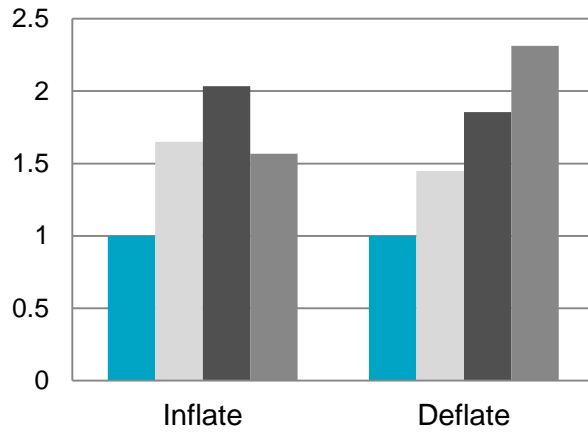
Older technology:
Infusion holes on polymer shaft



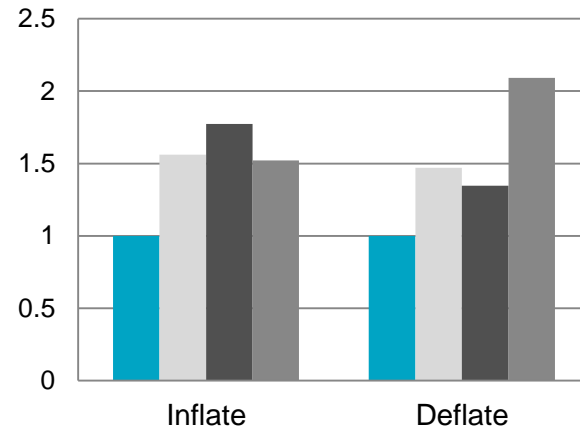
Newer technology:
Nitinol hypotube



50% Contrast



100% Contrast

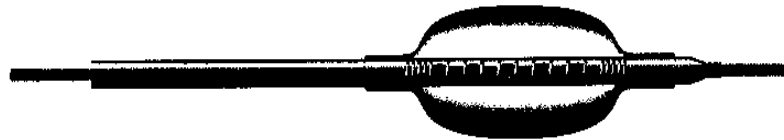


■ Transform ■ HyperGlide ■ Ascent ■ Scepter C

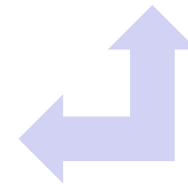
OVERVIEW OF HYPER BALLOONS

INFLATION

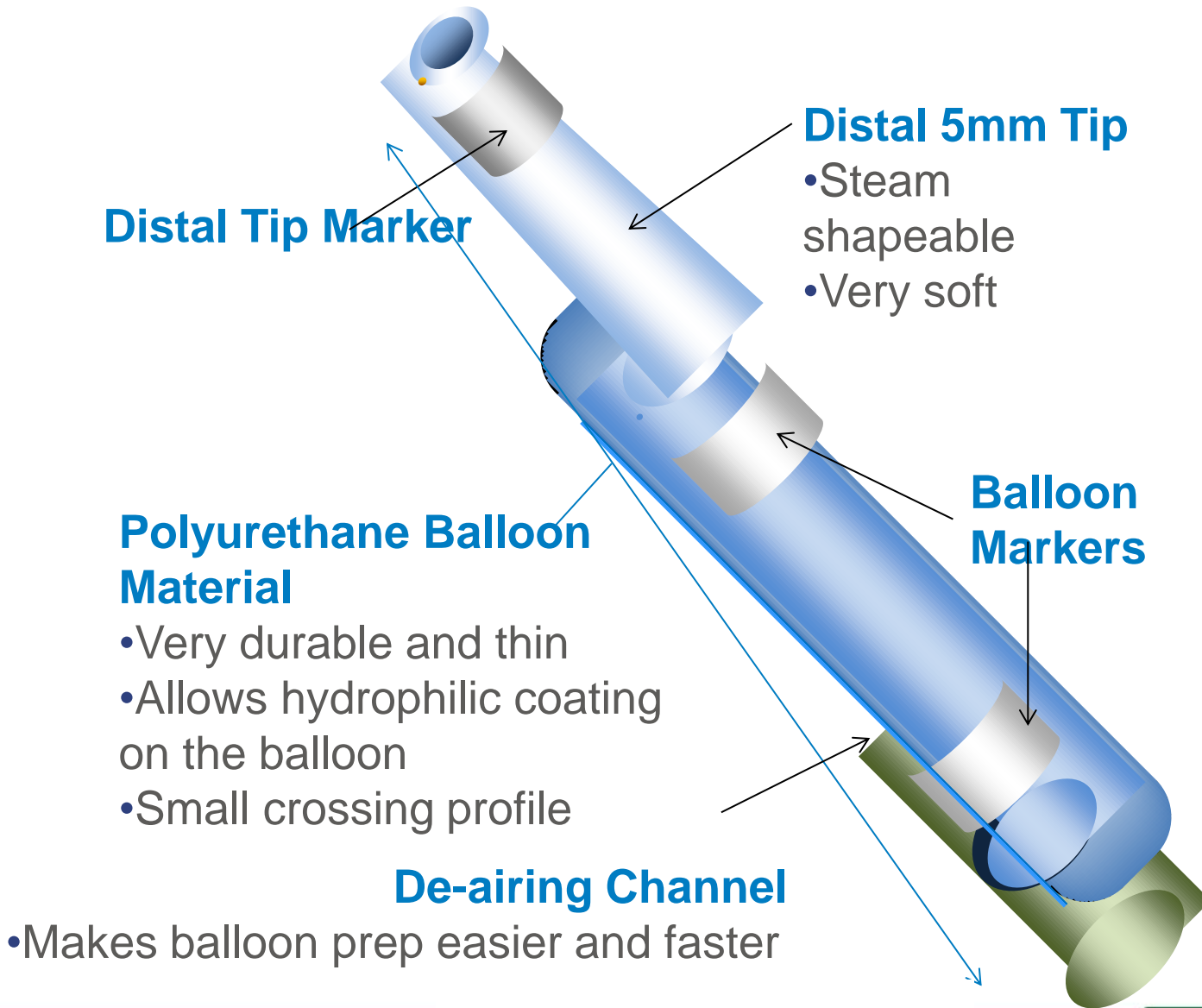
- Advance distal 10cm of guidewire to or past the catheter tip
- Use Cadence™ syringe to inject contrast/saline solution



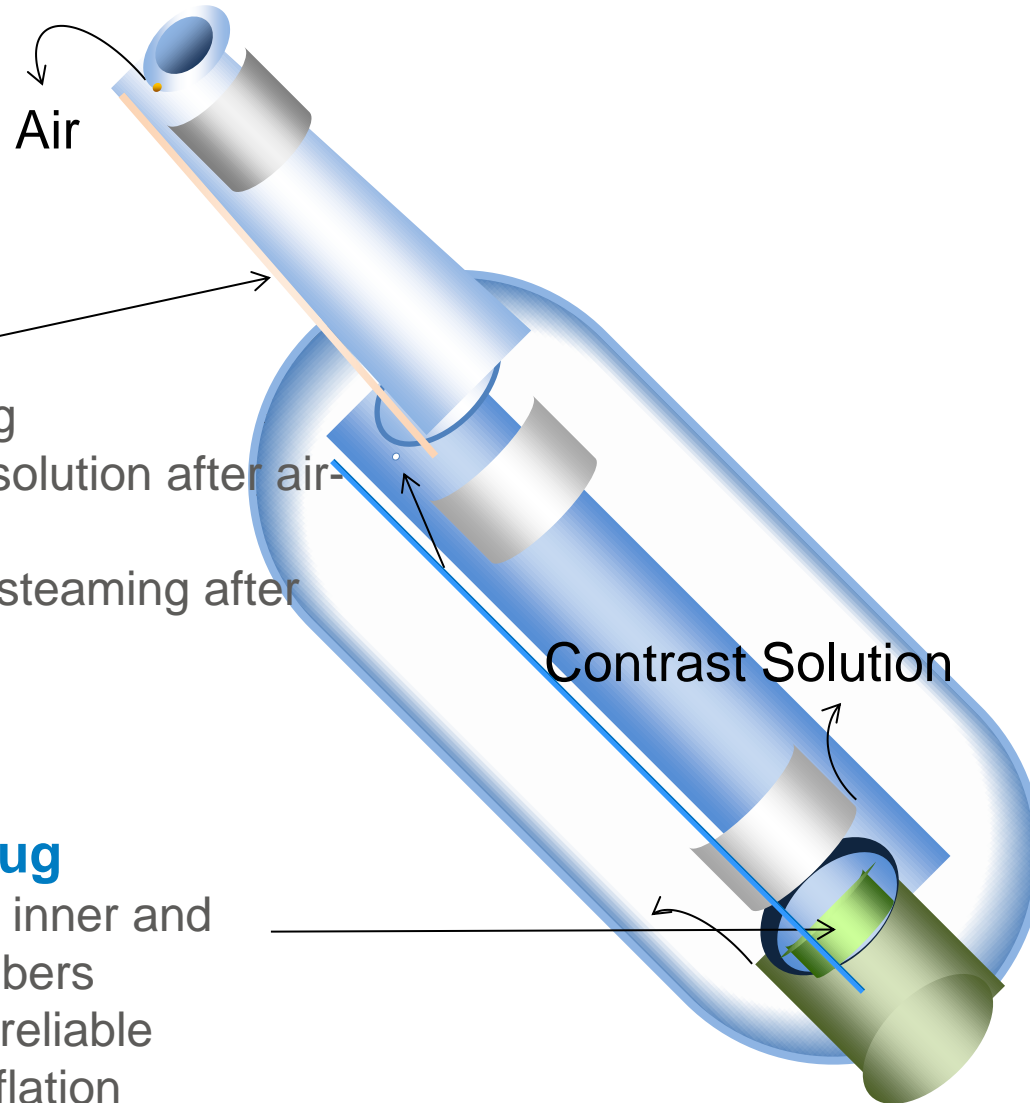
Wire distal=inflate



Technical Design Dual Lumen



Technical Design Dual Lumen



Air-purge Hole

- For quick air-purging
- Filled with contrast solution after air-purging
- Can be closed with steaming after prepping

Inflation Plug

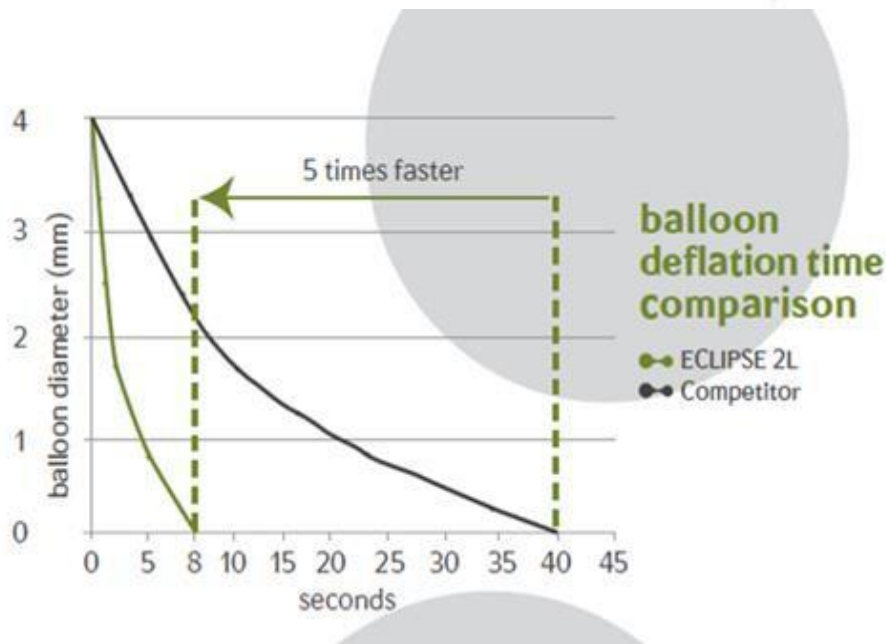
- Unifies the inner and outer members
- Enhances reliable balloon deflation

FLAT CATHETER CONCEPT

Inflation tube



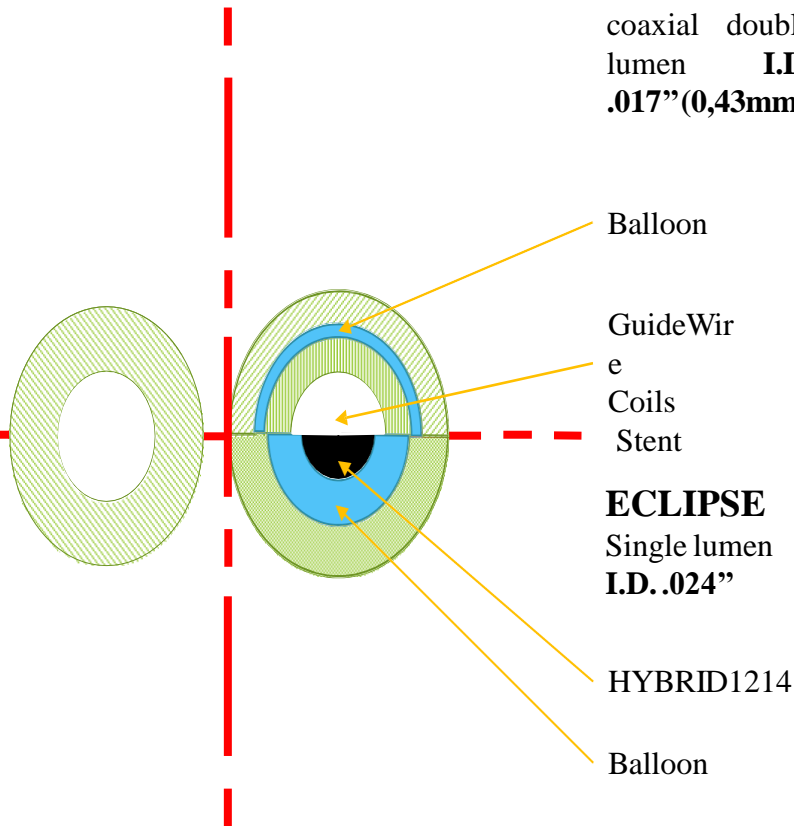
Infusion catheter



- Wide lumen to both the inflation tube & the infusion catheter which enables the use in parallel of the remodeling balloon & a guide, stent, liquid embolic or coiling microcatheter in a single 6F guiding catheter
- The wide inflation tube allows a much better control of the inflation / deflation. The ECLIPSE 2L deflates **5 times quicker** than competitor's balloons on a coaxial catheter
 - 8 seconds for the ECLIPSE
 - 40 seconds for other 2L balloon
- Quick inflation / deflation time of the balloons, a wider range of balloons can be proposed : up to **20 mm long**
- **100% contrast solution**

**Other 2L
balloon**

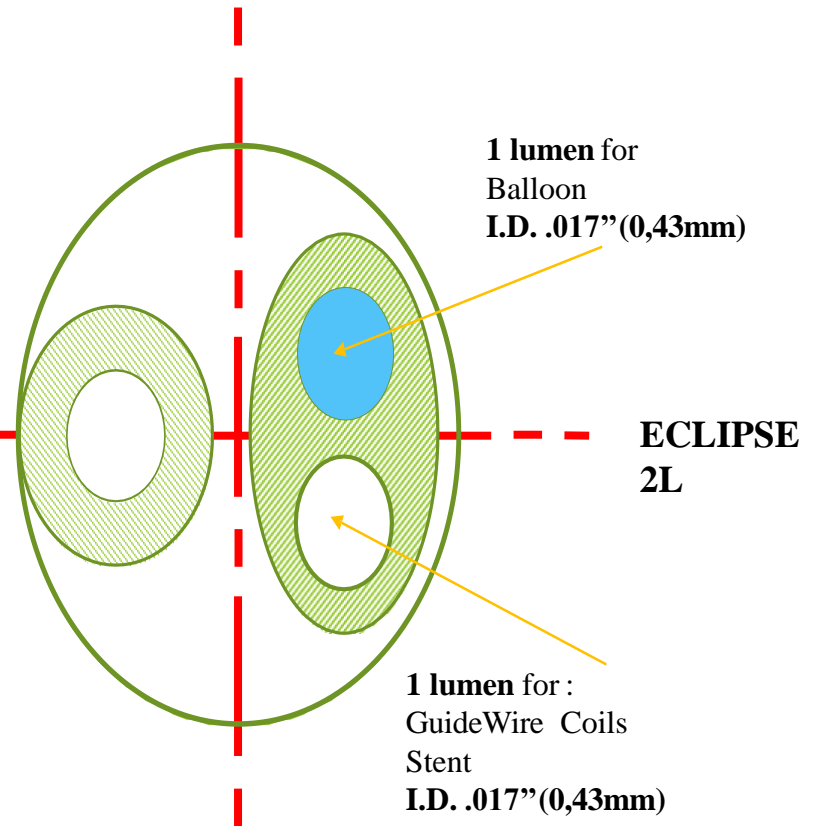
coaxial double
lumen I.D.
.017”(0,43mm)



I.D. Ø 1,78mm FRGMAX

O.D. Ø 0,80mm VASCO+10 / ECHELON10

**1 lumen for
Balloon
I.D. .017”(0,43mm)**

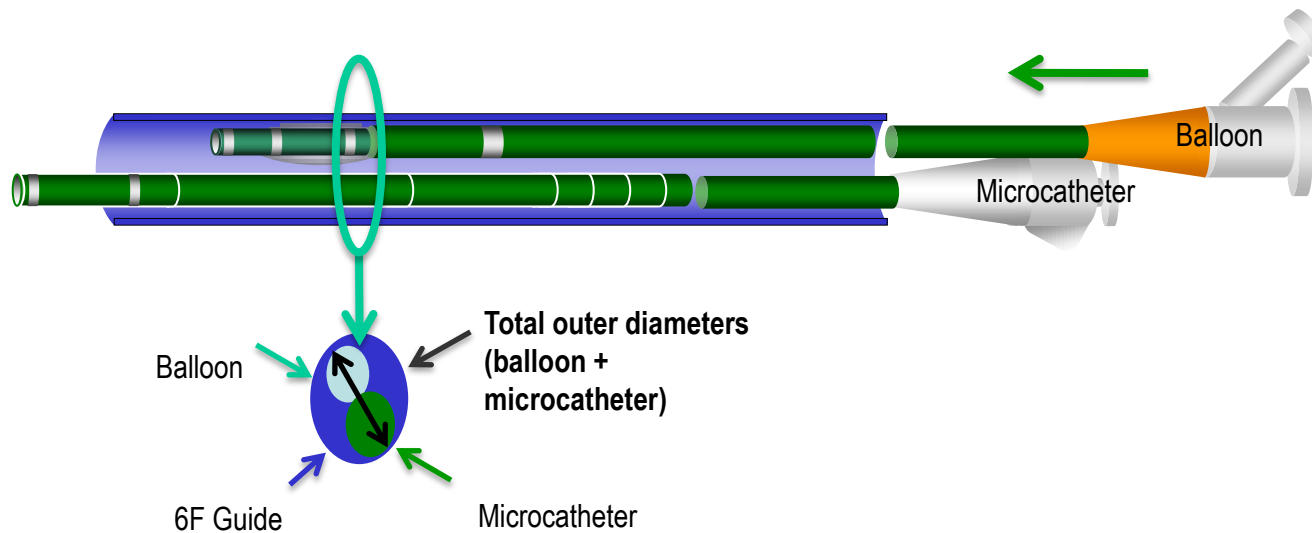


I.D. Ø 1,78mm FRGMAX

O.D. Ø 0,80mm VASCO+10 / ECHELON10

Double microcatheter: compatibility with 0.070" ID Guide Catheter

Insert Microcatheter first and Balloon Occlusion Catheter second!!!!



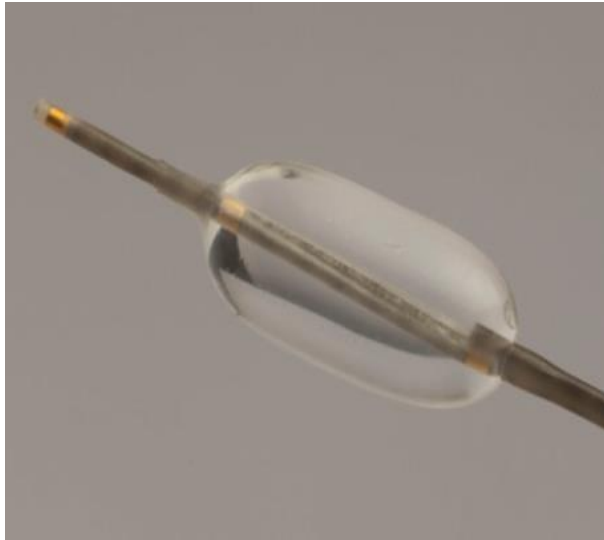
Green: Can be used without friction

Yellow: The balloon must be inserted before a microcatheter

Red: Cannot be used together

Microcatheter	Max OD (inch)	Total outer diameter (inch)								
		Scepter C/XC .037	HyperGlide™ HyperForm™ 4mm .040	HyperForm™ 7mm .046	Ascent® .038	Eclipse .037	Copernic .035	Eclipse 2L .045	Copernic 2L .050	TransForm™ .041
Headway Duo	.028	.065	.068	.074	.066	.065	.063	.073	.078	.069
Headway17	.030	.067	.070	.076	.068	.067	.065	.075	.080	.071
Headway21	.031	.068	.071	.077	.069	.068	.066	.076	.081	.072
SL10	.030	.067	.070	.076	.068	.067	.065	.075	.080	.071
Echelon10	.028	.065	.068	.074	.066	.065	.063	.073	.078	.069
Echelon14	.030	.067	.070	.076	.068	.067	.065	.075	.080	.071
Prowler14	.030	.067	.070	.076	.068	.067	.065	.075	.080	.071
Excel14	.032	.069	.072	.078	.070	.069	.067	.077	.082	.073
Excelsior1018	.034	.071	.074	.080	.072	.071	.069	.079	.084	.075

Air Purging vs. Blood Aspiration



vs.



EASY VALVE PURGING SYSTEM WITH NO BACK FLOW

The new design is particularly helpful for purging the air out of the balloon.

Risk of **blood aspiration** while deflating the device :

- No need to seal the purge with hot air
- No risk of damaging the balloon

Deflation Time

Approximate Balloon Deflation Time (seconds)					
Contrast Name	Contrast:Saline	Scepter C			Scepter XC
		4x10	4x15	4x20	4x11
Omnipaque™ 300	50:50	9	12	14	8

- *Deflation time of the Hyper Balloons is 18-35 sec with 50:50 contrast-saline solution (Omnipaque™ 300) according to the IFU.*
- *Deflation time of the TransForm™ balloon is 10 sec with 50:50 contrast-saline solution (Omnipaque™ 300) according to the IFU.*

Balloon compliance vs length difference?

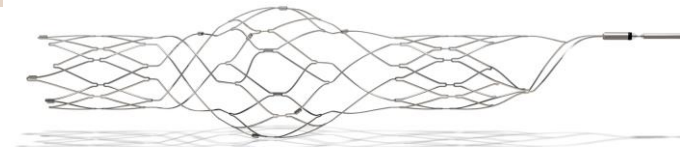
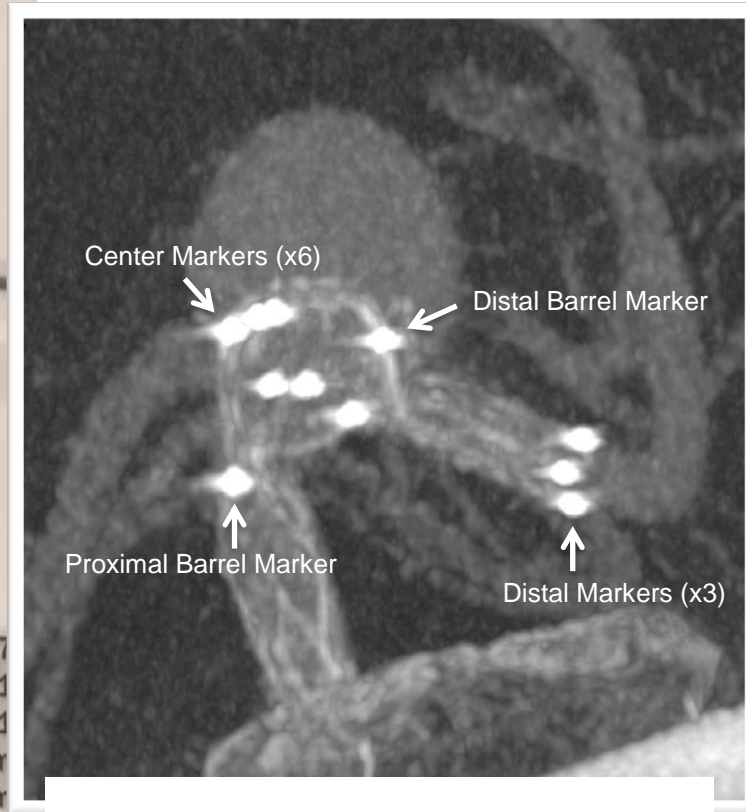
Scepter XC 4x11



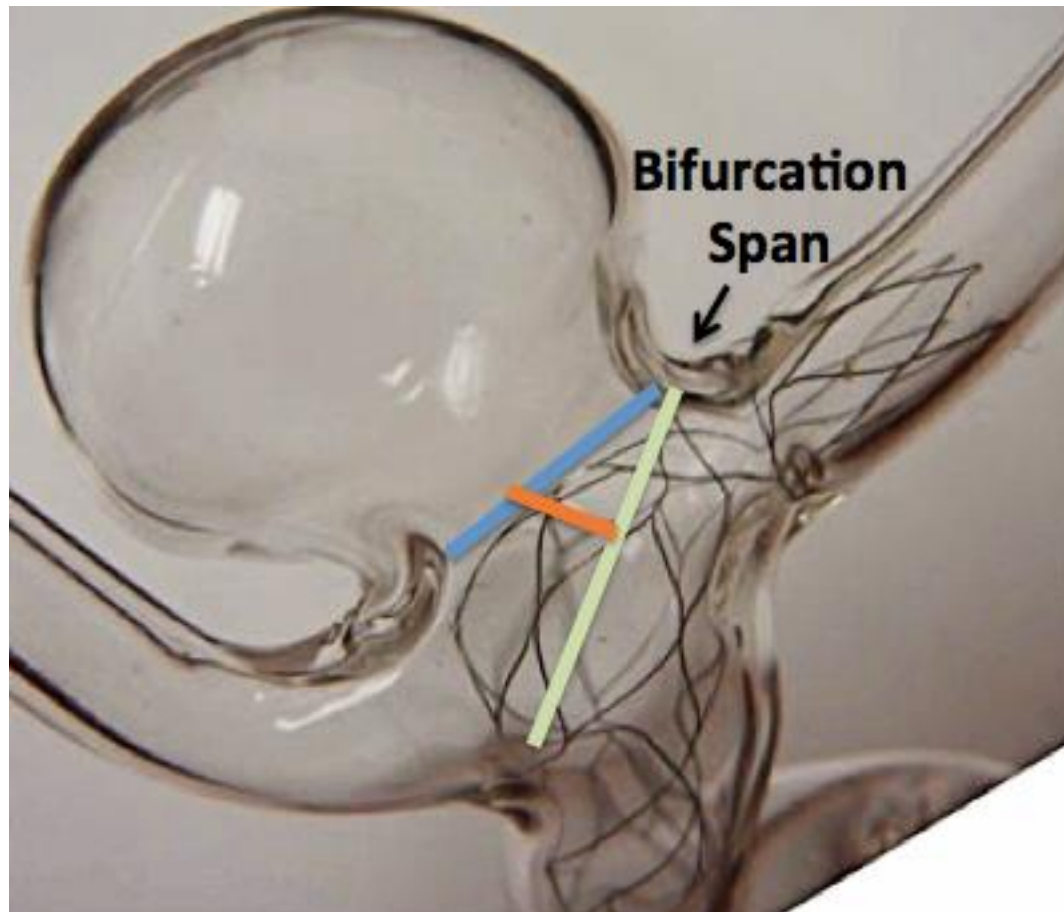
HyperForm™ 4x7



Barrel Stent

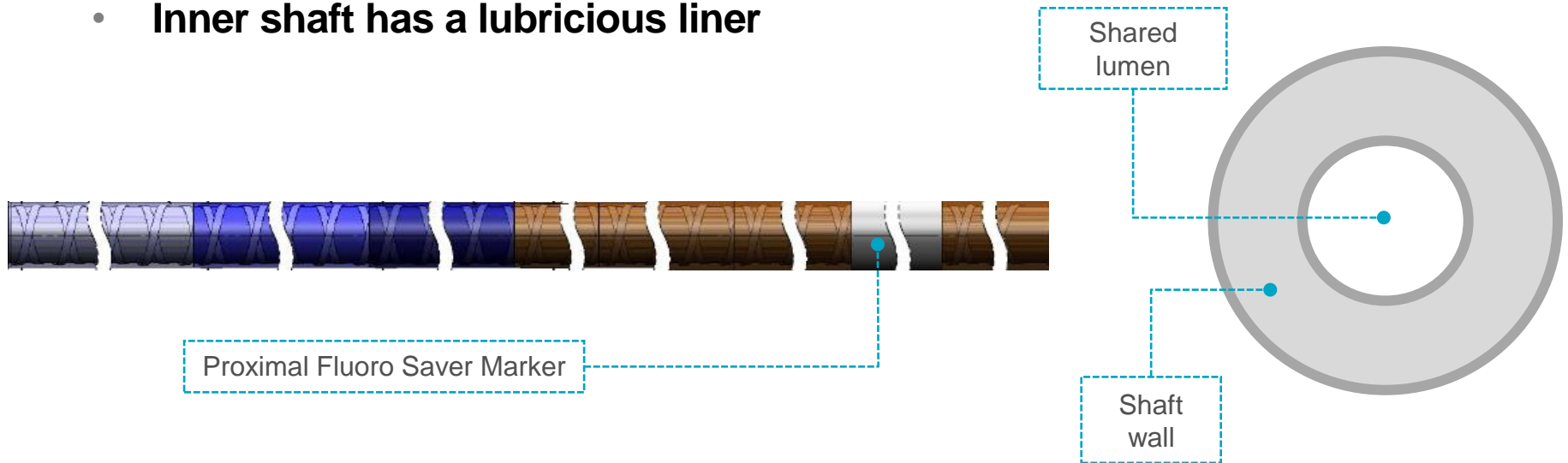


Should we calculate bifurcation span to choose balloon?
OR
Should balloon disclose its bifurcation span?

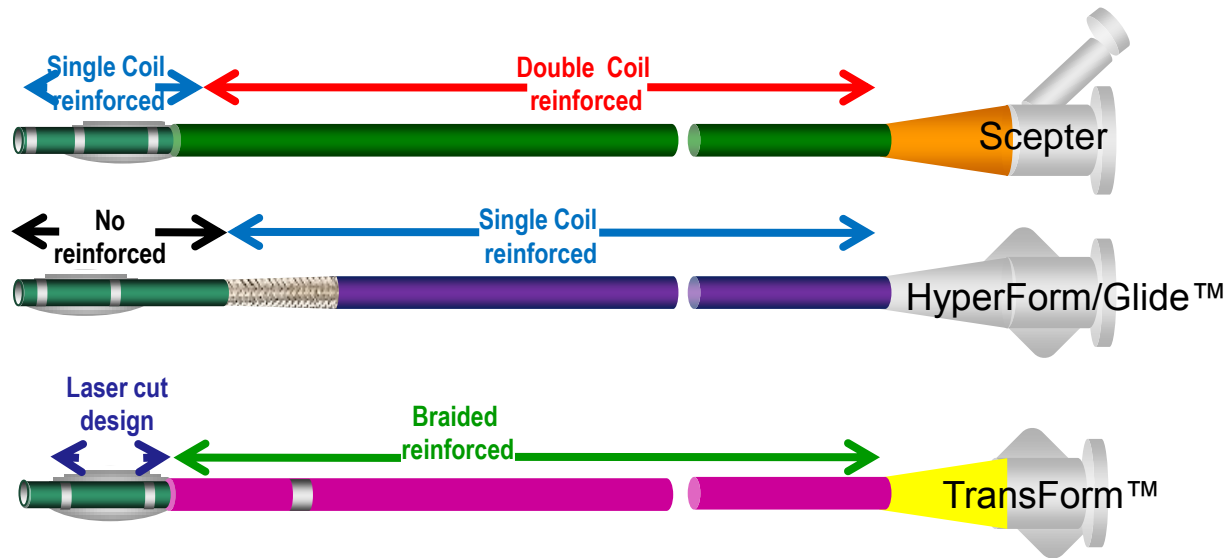


Catheter Construction

- **Single lumen balloon sealed by an 0.014 in guidewire that is passed through the distal tip**
- **Catheter made of multi-durometer _____ polymers to obtain variable stiffness from proximal end to distal end**
- **Catheter length is reinforced with braided metal**
- **Hydrophilically coated**
- **Inner shaft has a lubricious liner**

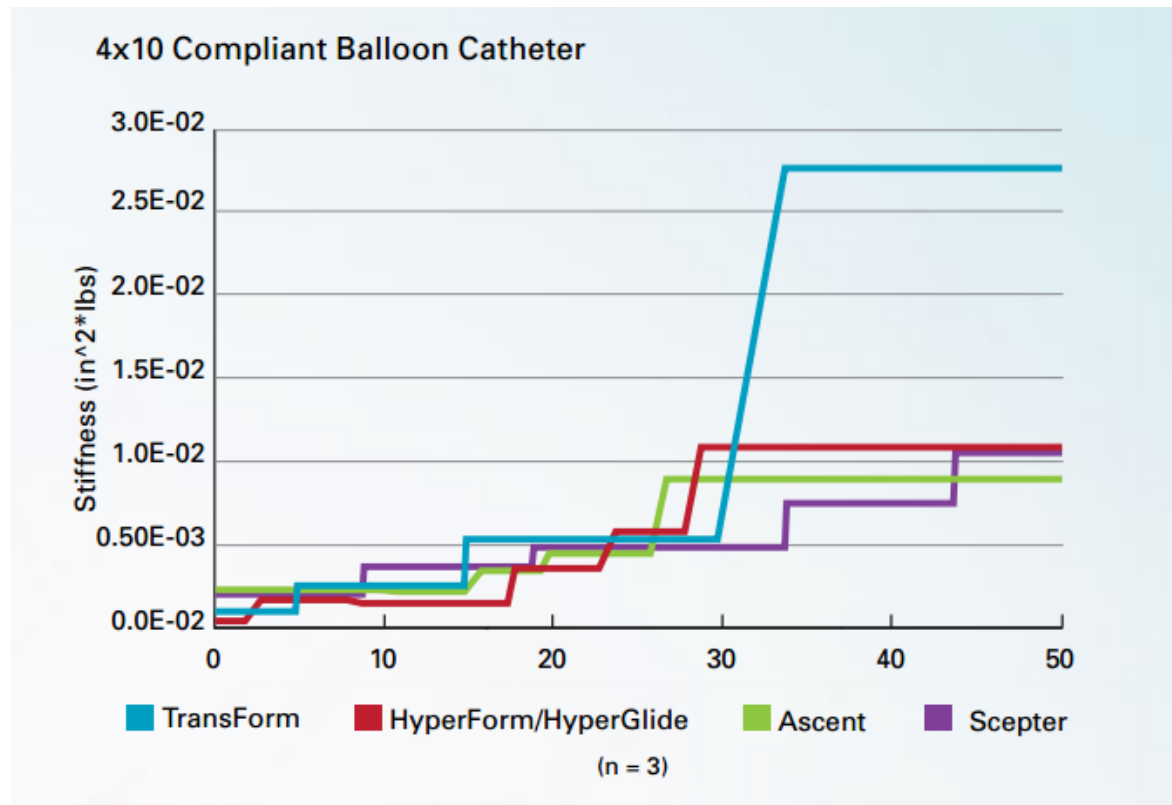


Coil vs Braid Reinforcement + Balloon Stability



Designed for Stability and Trackability

Catheter shaft support profile optimizes balance between stability and trackability

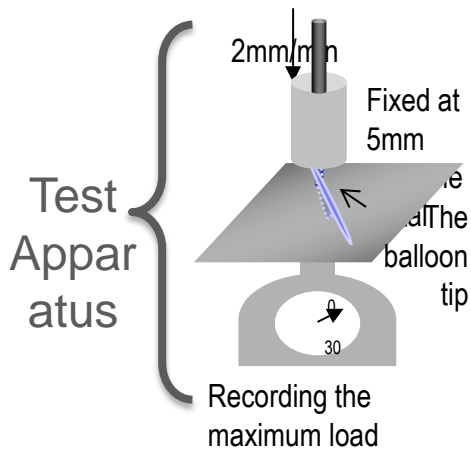




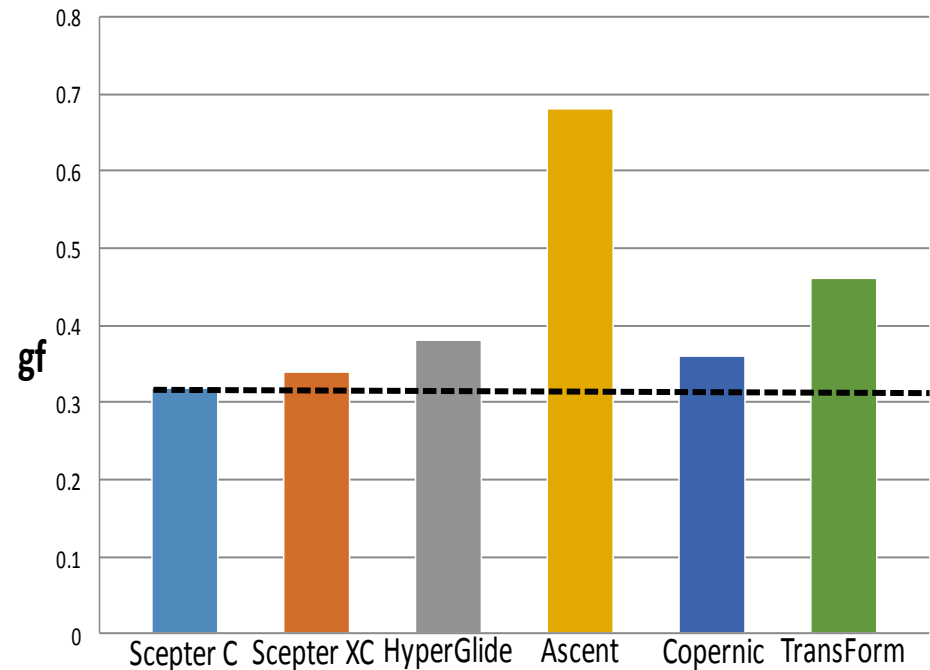
Distal Tip Deflection Test

The distal 5mm of the Scepter C and XC Balloon are:

- 11.7% softer than the HyperGlide™ Catheter
- 100% softer than the Ascent® Catheter
- 5.8% softer than the Copernic Catheter
- 35.2% softer than the TransForm™ Catheter



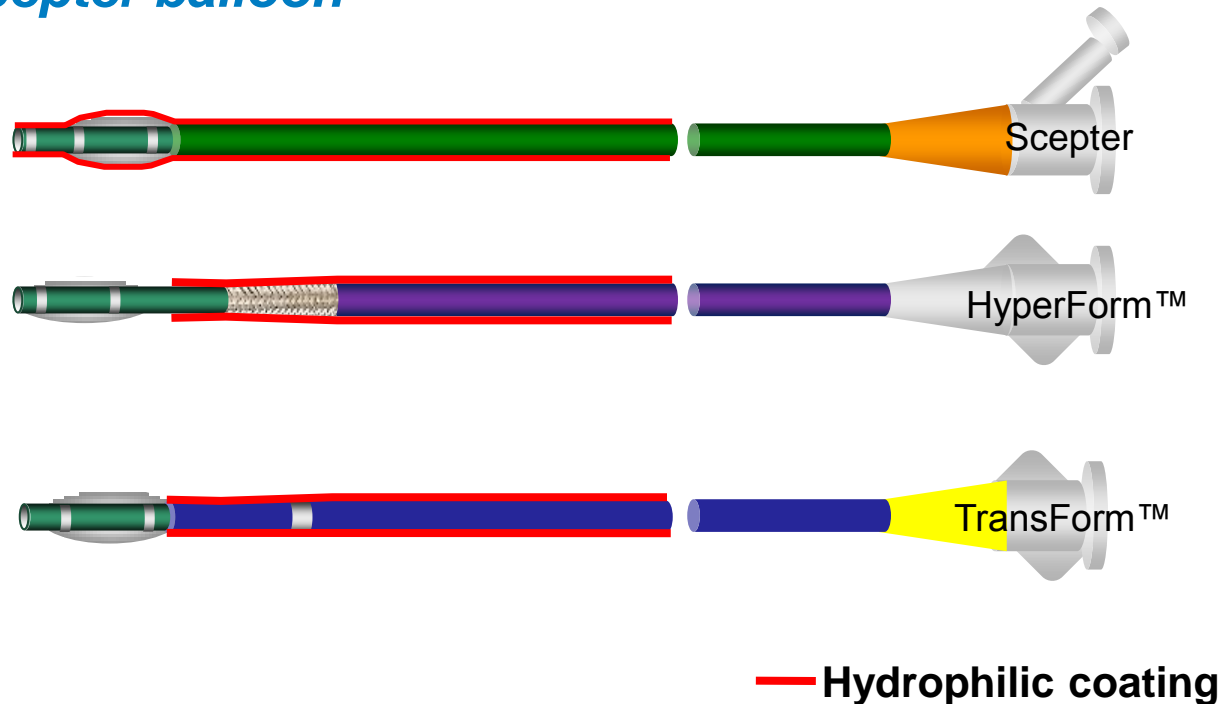
Less Deflection = Softer Tip



hydrophilic coating

Hydrophilic coating on the balloon and catheter shaft assist the trackability of the Scepter balloon

Balloon	MV Scepter C Scepter XC	Covidien HyperGlide™ HyperForm™	Stryker TransForm™
Hydrophilic coating on the balloon	Yes	No	No

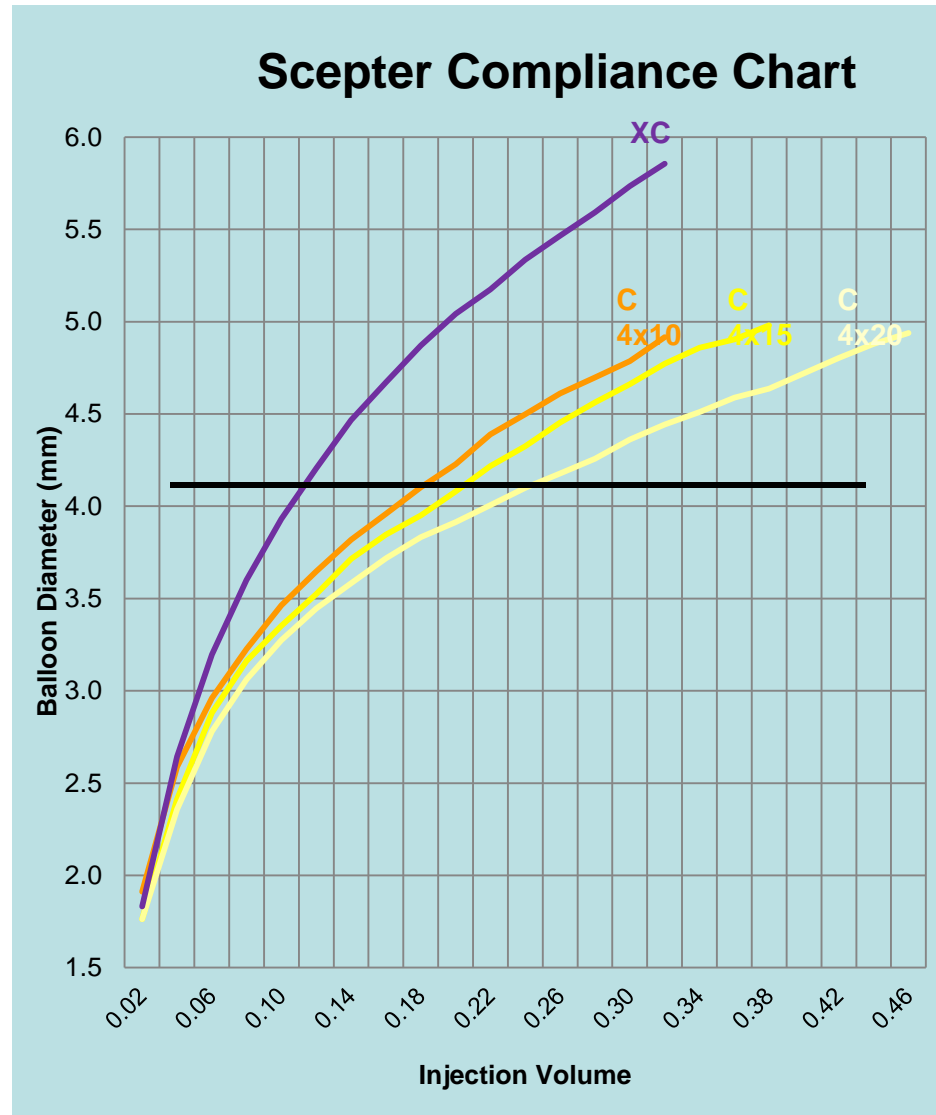


compliance chart

Balloon Inflation Compliance				
Inflation Volume* (cc)	Scepter C Dia., (mm)			Scepter XC Dia., (mm)
	4x10	4x15	4x20	4x11
0.02	1.9	1.8	1.8	1.8
0.04	2.6	2.4	2.4	2.6
0.06	3.0	2.9	2.8	3.2
0.08	3.2	3.2	3.1	3.6
0.10	3.5	3.4	3.3	3.9
0.12	3.6	3.5	3.4	4.2
0.14	3.8	3.7	3.6	4.5
0.16	4.0	3.8	3.7	4.7
0.18	4.1	4.0	3.8	4.9
0.20	4.2	4.1	3.9	5.0
0.22	4.4	4.2	4.0	5.2
0.24	4.5	4.3	4.1	5.3
0.26	4.6	4.5	4.2	5.5
0.28	4.7	4.6	4.3	5.6
0.30	4.8	4.7	4.4	5.7
0.32**	4.9	4.8	4.4	5.9
0.34		4.9	4.5	
0.36		4.9	4.6	
0.38**		5.0	4.6	
0.40			4.7	
0.42			4.8	
0.44			4.9	
0.46**			4.9	

*After Priming
Catheter

**Maximum Injection
Volume



Clinical Applications

Indications



Distal & bifurcation remodeling (smaller vessels)



Vasospasms



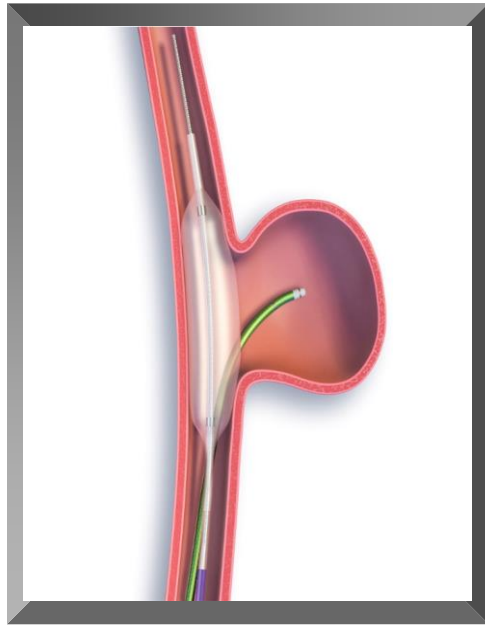
Temporary occlusion tests



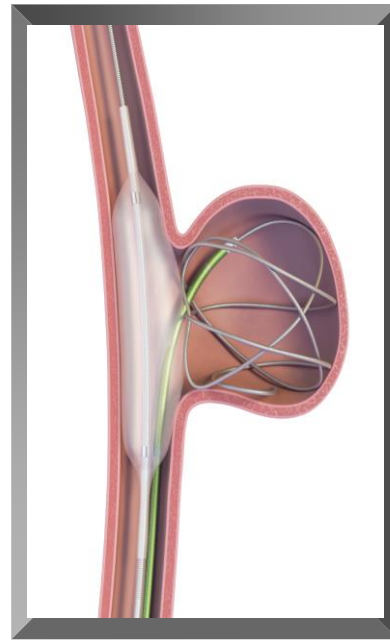
Carotid Syphon Remodeling



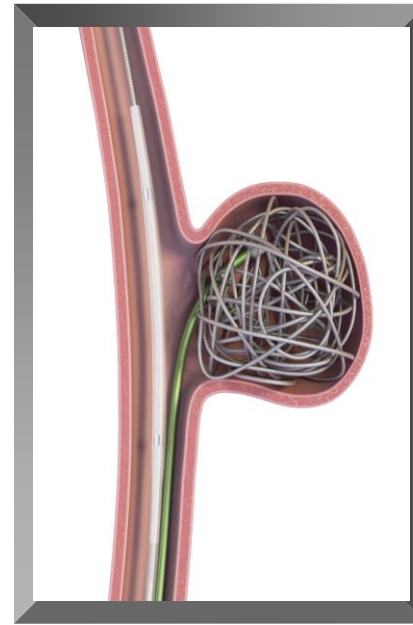
balloon assisted coiling



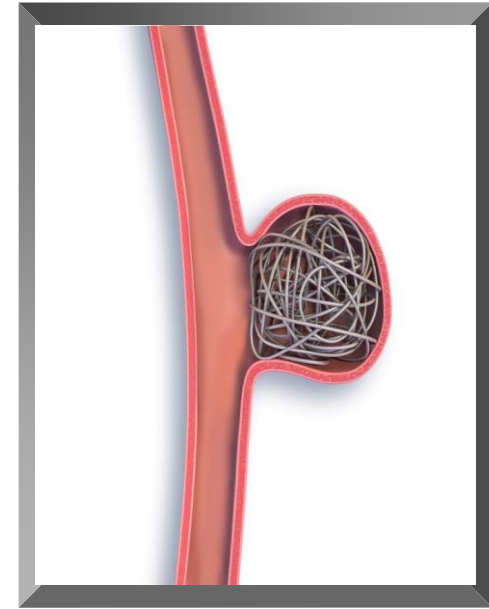
Step 1: Jail microcatheter and inflate balloon



Step 2: Begin to coil aneurysm

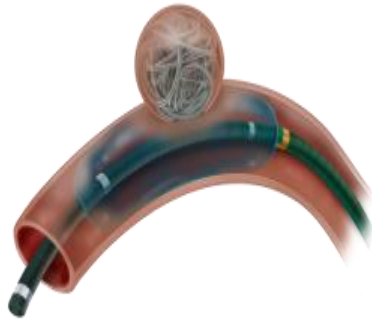


Step 3: Deflate balloon and check for stability within the coil mass.

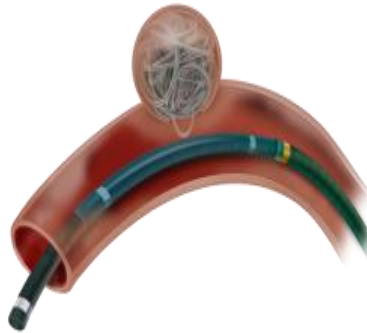


Step 4: Remove microcatheter and balloon.

Stent delivery



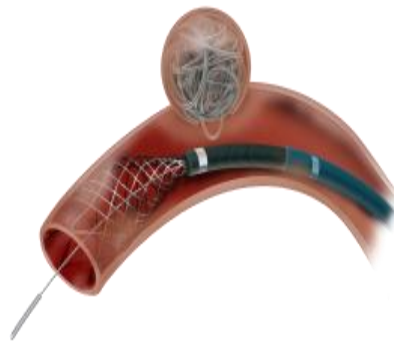
1 - Balloon assisted embolization



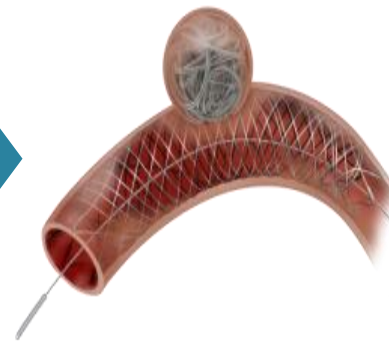
2 - After balloon deflation, some coil prolapses into the parent vessel



3 - Deliver LVIS Jr device through Scepter Balloon



4 - Deploy the stent



5 - The stent is placed in the parent vessel

LE INJECTION THROUGH SCEPTER BALLOON

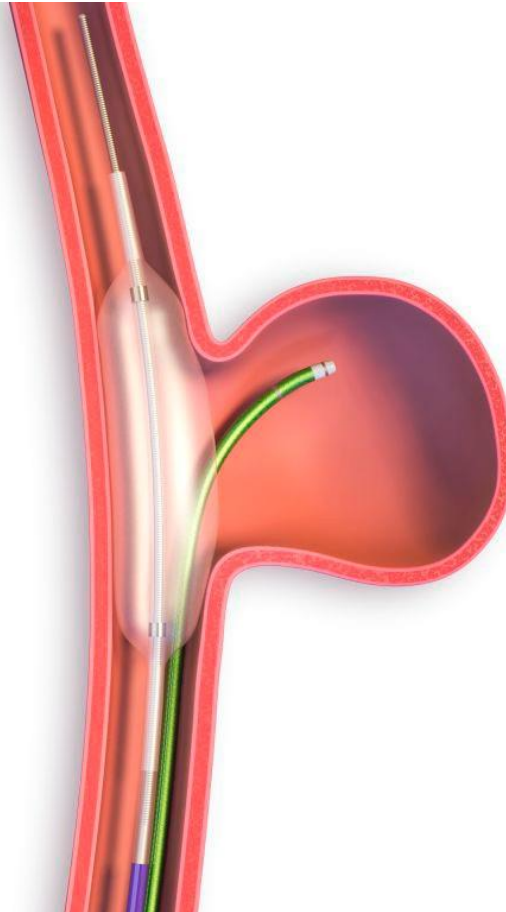


Liquid embolic such as Onyx™ Liquid Embolic can be infused through working lumen of the Scepter Balloon with the balloon inflated.

- *Dead space of the working lumen is 0.44cc*
- *Distal tip length is 5mm*
- *Distal tip steaming prior to use may be recommended in order to prevent gradual balloon deflation over the time (about 5 min depending on viscosity of contrast solution)*

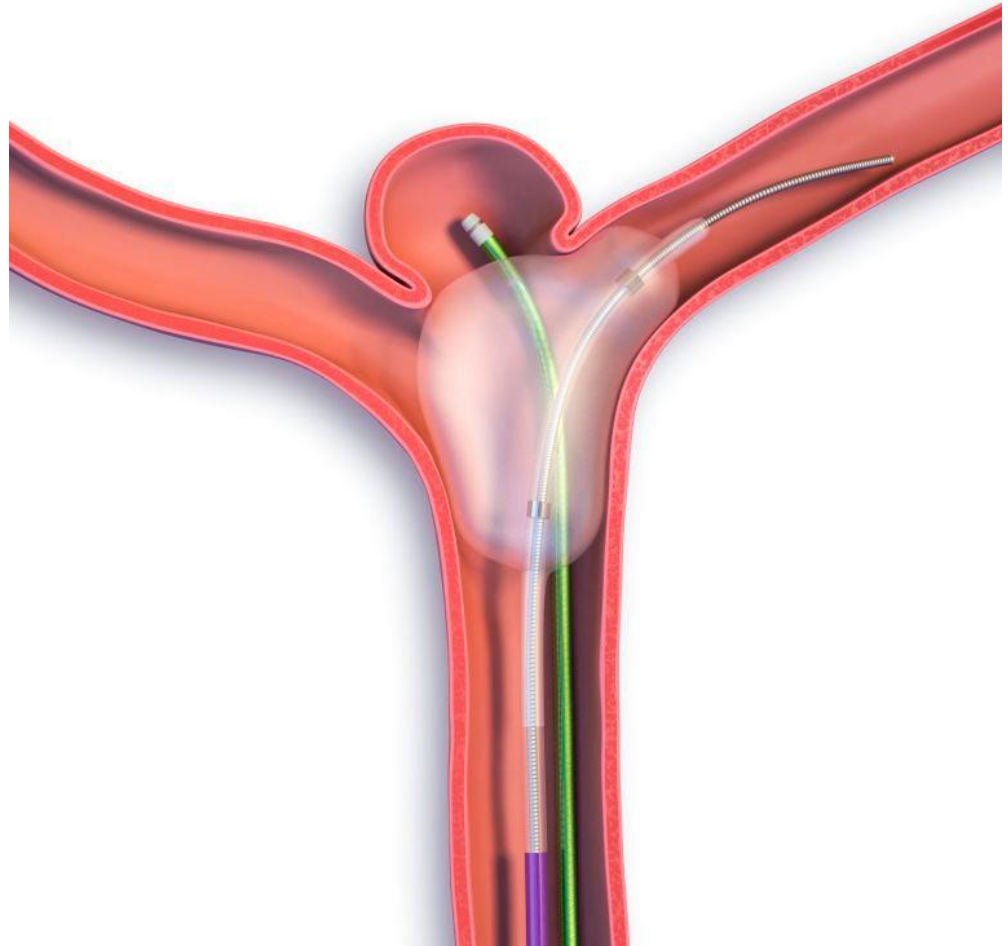
BAC APPLICATIONS

Sidewall Aneurysm

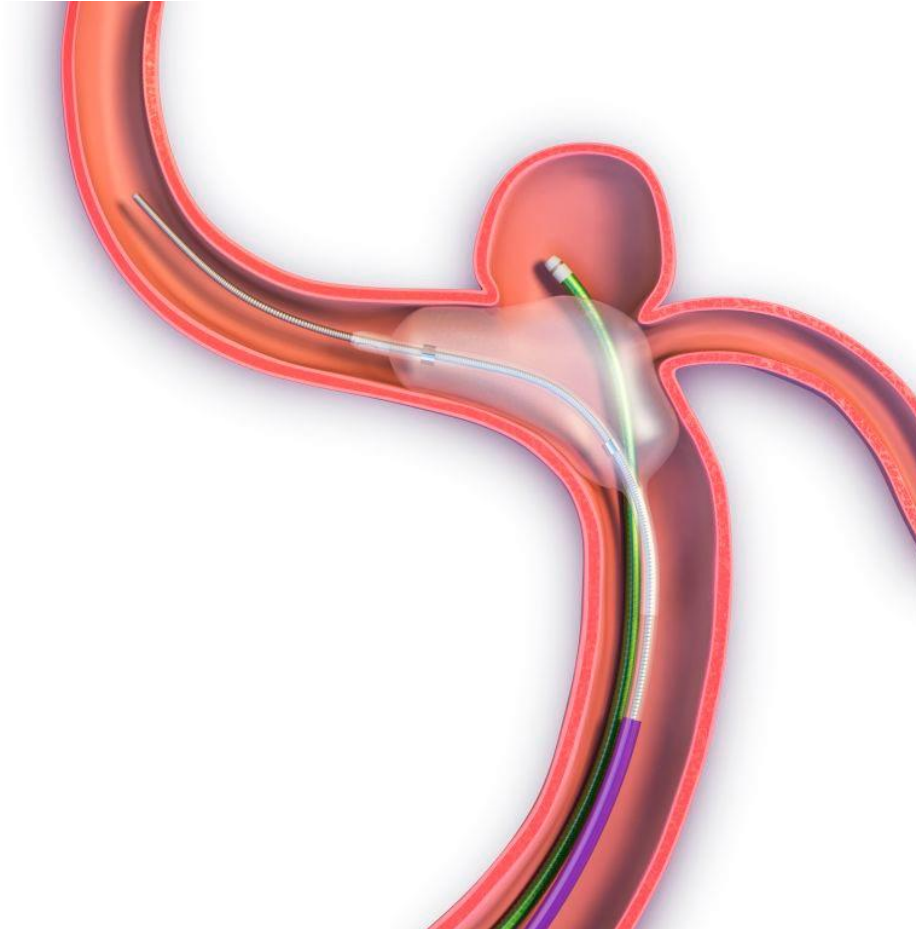


BAC APPLICATIONS

Efferent Artery Protection

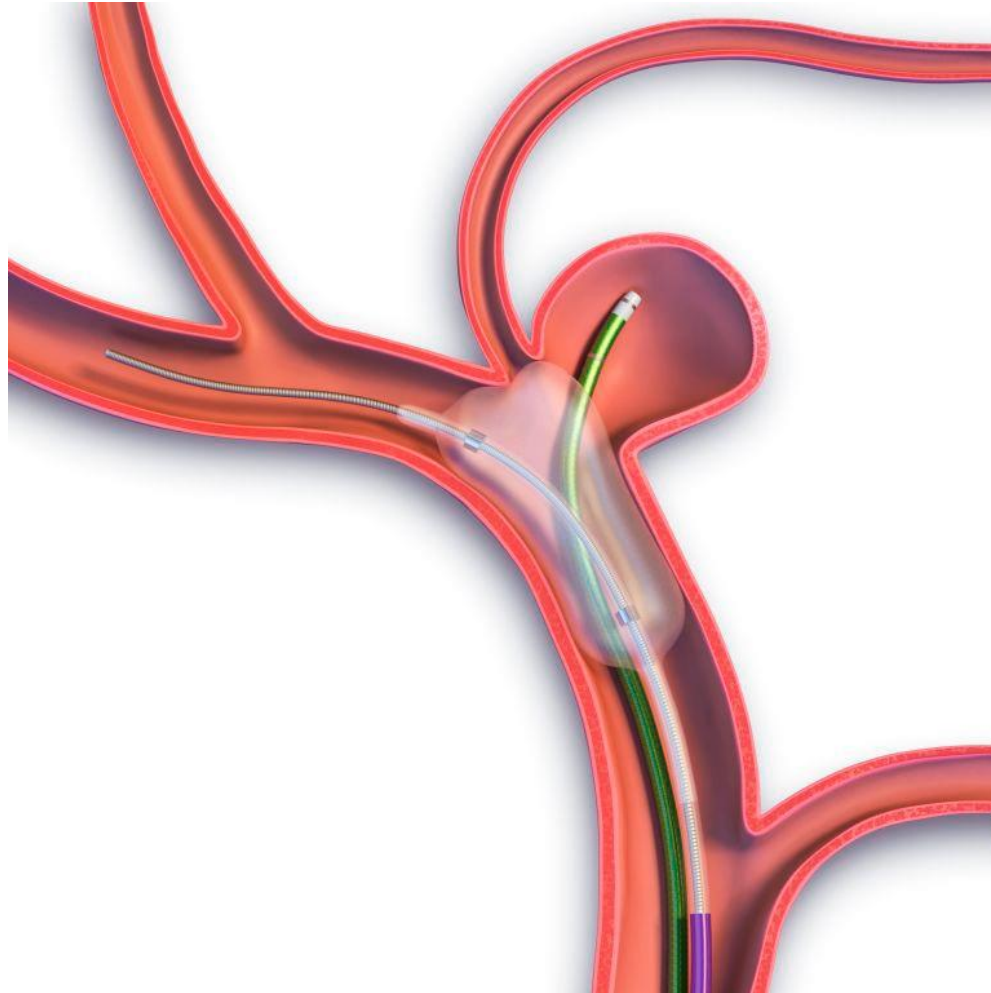


Heel of the Balloon

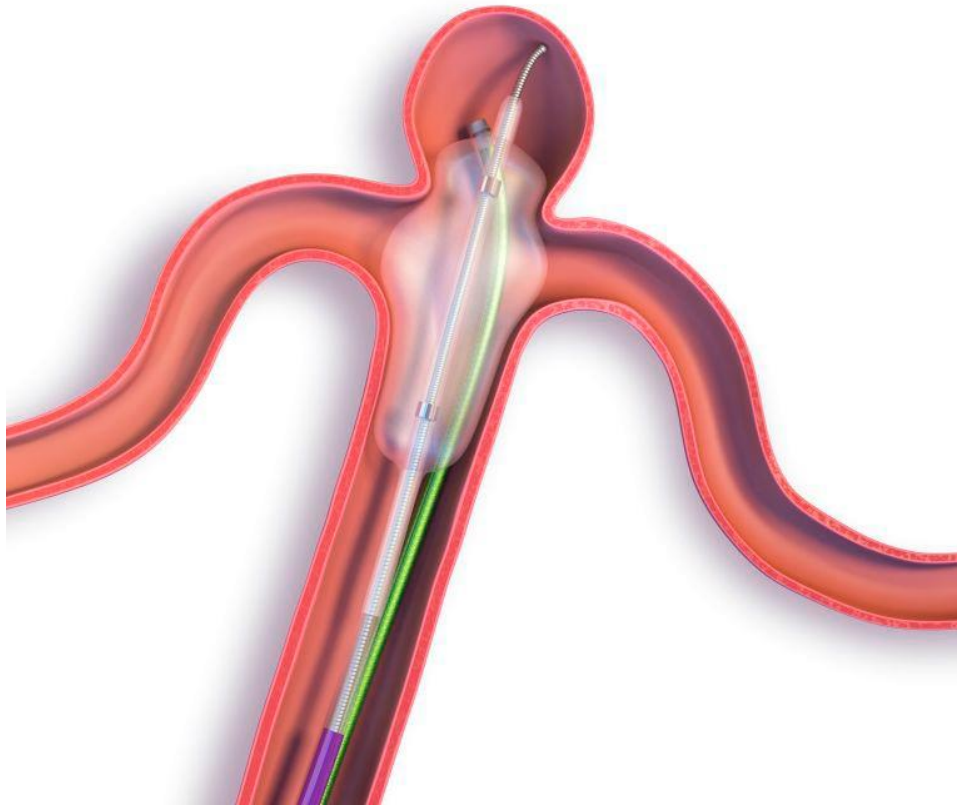


BAC APPLICATIONS

Toe of the Balloon

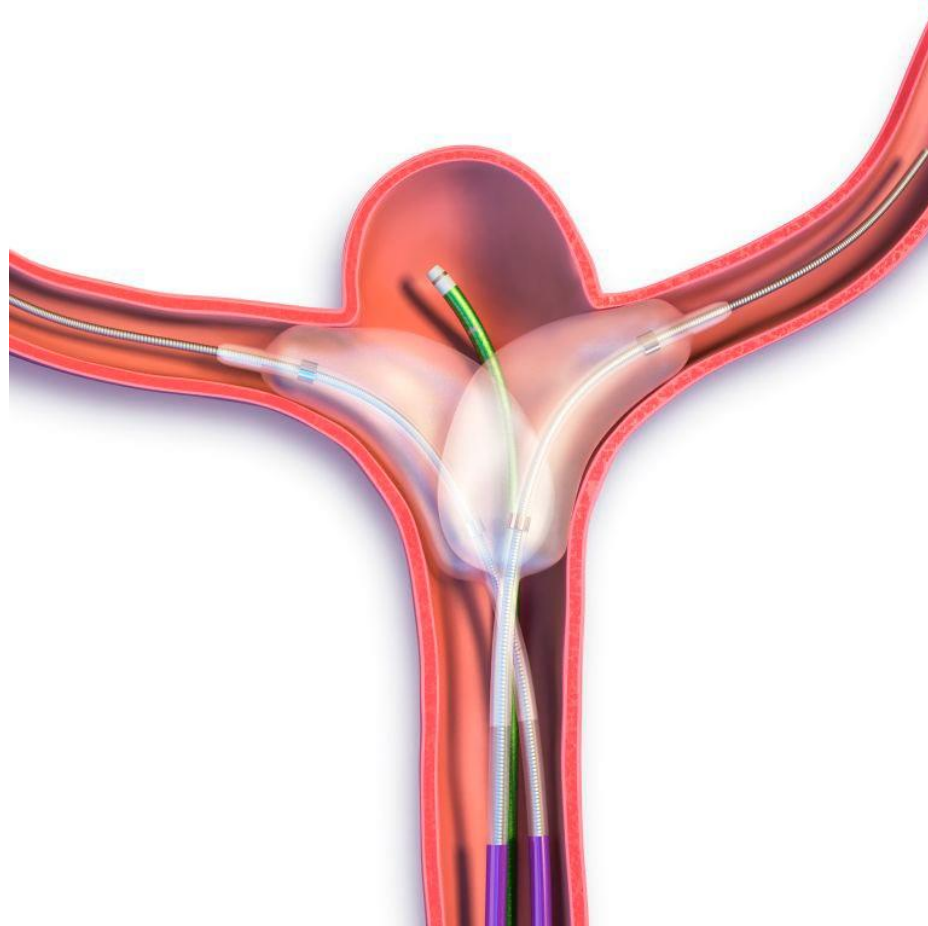


Tip of the Balloon

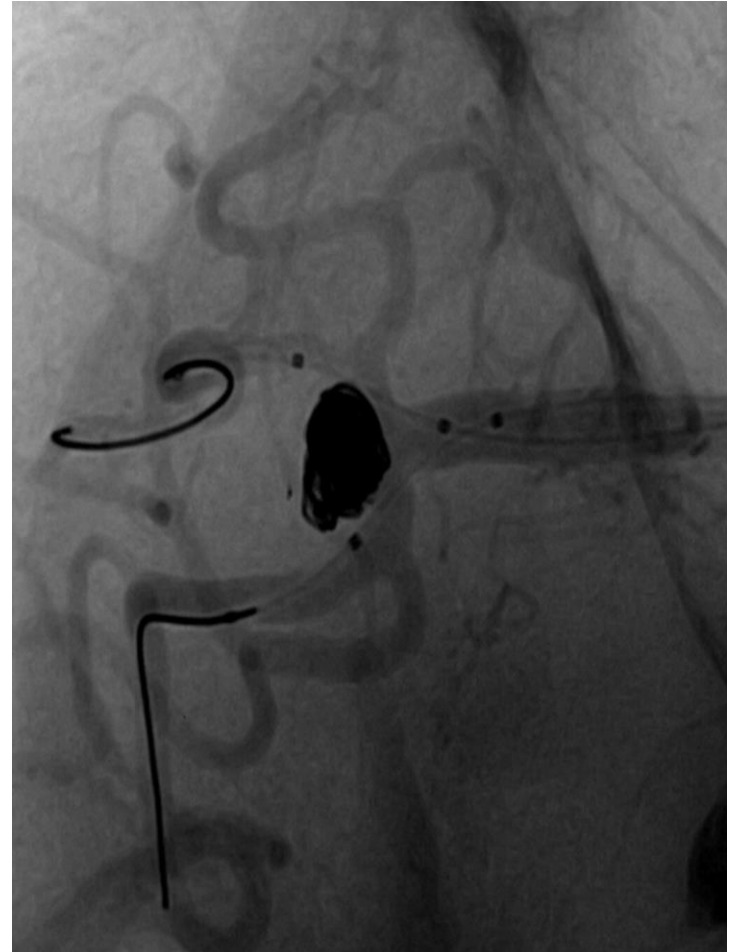
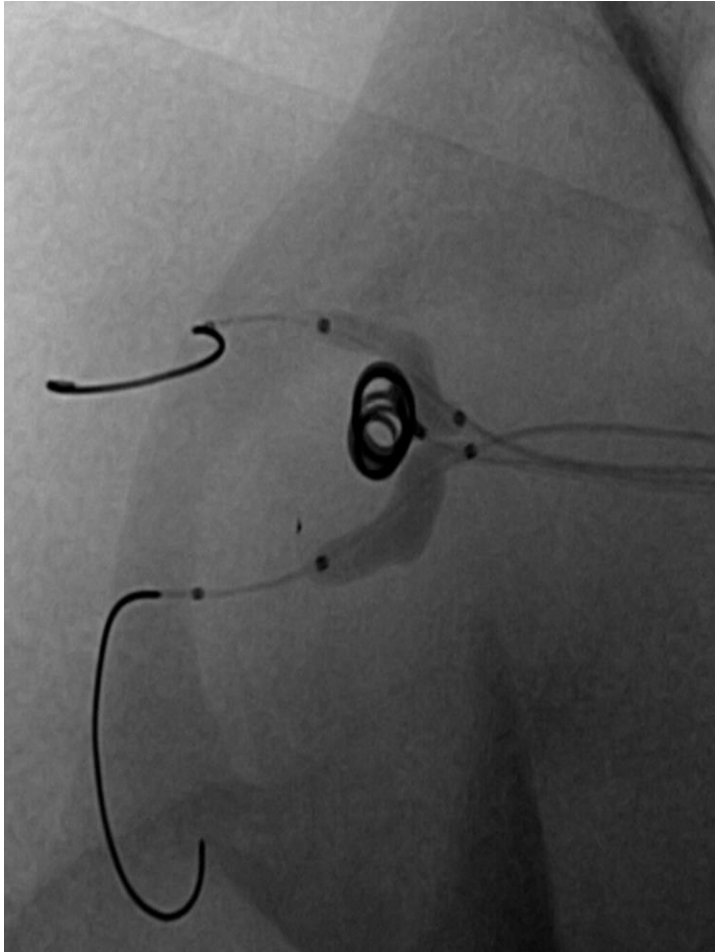


BAC APPLICATIONS

Dual Balloon Technique

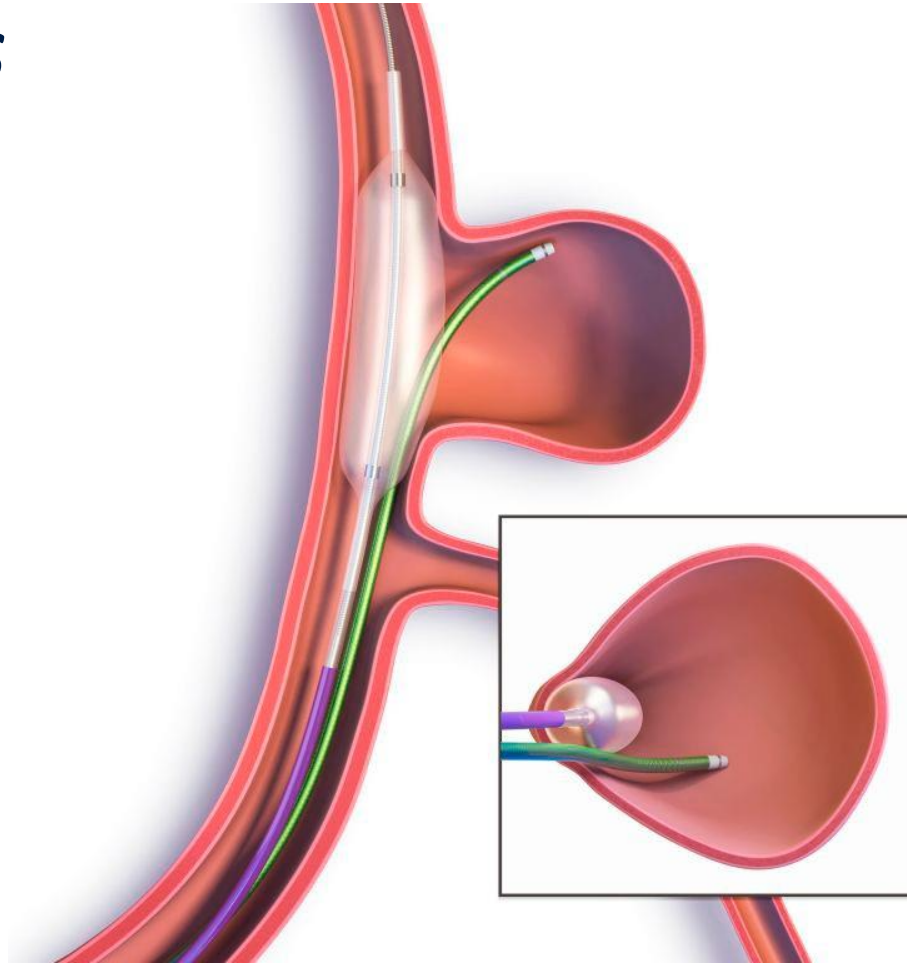


Coiling with two balloon remodeling the aneurysm neck



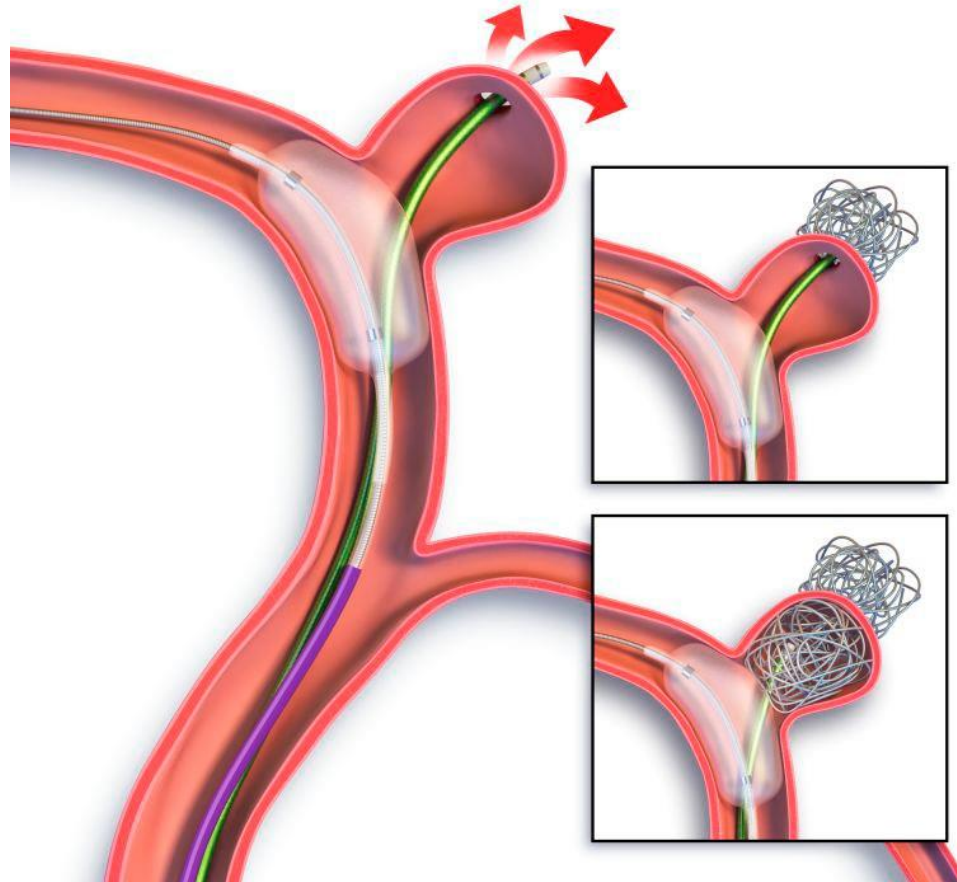
BAC APPLICATIONS

Parent Artery Visualization



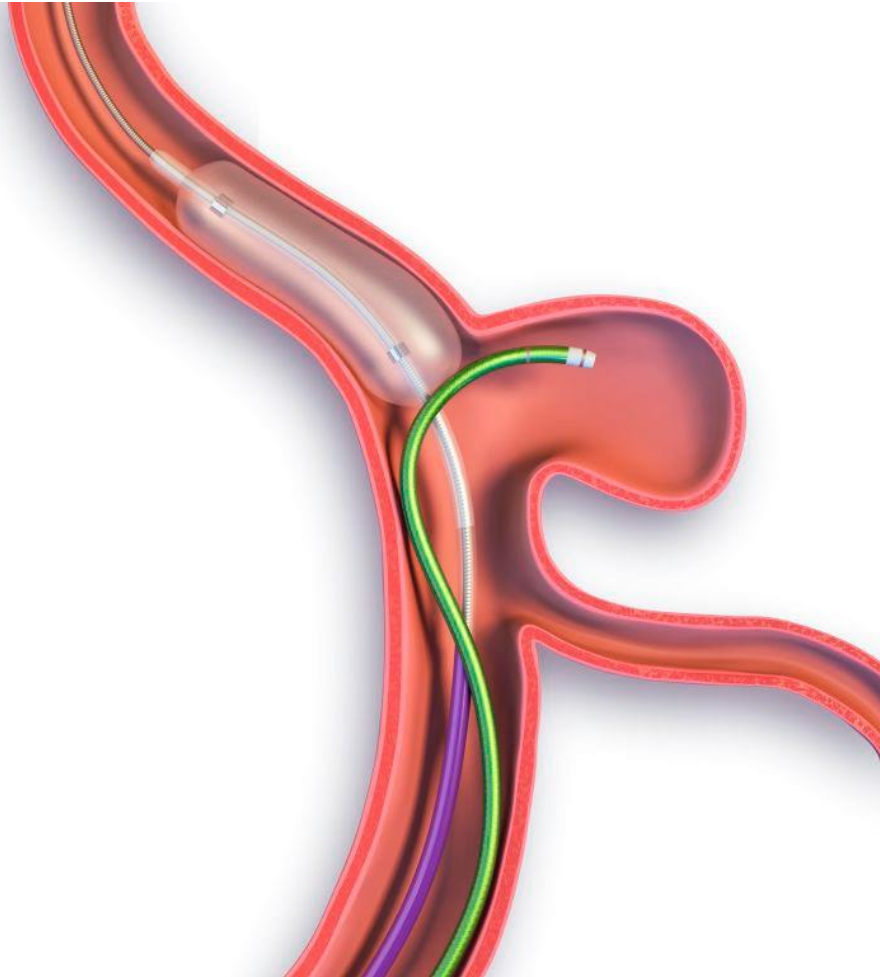
BAC APPLICATIONS

Rupture Protection



BAC APPLICATIONS

Balloon-Assisted Catheterization



Single lumen balloon prep

1. **Balloon**
2. **Guidewire**
3. **Rotating Hemostatic Valve (RHV)**
4. **3-Way Stopcock**
5. **3 cc Syringe**
6. **1cc Syringe**
7. **Saline and Contrast**

Balloon Guide Catheters

FlowGate



CORAIL+



Cello™ Balloon Guide Catheter Product Overview



Key BGC Details:

- Distal balloon occludes flow and assists in aspiration
- 4 sizes available: 6F+, 7F+, 8F and 9F

Cello™ Balloon Guide Catheter Ordering Information

Reference Number	Product Name	Conformable Sheath	Tip Length (mm)	Balloon Length (mm)	OD (in)	ID (in)	Effective Length (cm)	Total Length (cm)
1610560	Cello 6F+	7F	3	7	0.075	0.051	95	103
1610570	Cello 7F+	8F	3	7	0.095	0.067	95	103
1610580	Cello 8F	8F	3	10	0.102	0.075	95	103
1610590	Cello 9F	9F	3	10	0.118	0.085	92	100

Cello™ Balloon Guide Catheter Inflation Tables

Balloon Diameter / Recommended Balloon Volume							
Cello™ 6F+ BGC		Cello™ 7F+ BGC		Cello™ 8F BGC		Cello™ 9F BGC	
3mm	0.02ml	-		-		-	
4mm	0.04ml	4mm	0.04ml	4mm	0.04ml	4mm	0.04ml
5mm	0.07ml	5mm	0.07ml	5mm	0.08ml	5mm	0.07ml
6mm	0.11ml	6mm	0.11ml	6mm	0.12ml	6mm	0.12ml
7mm	0.18ml	7mm	0.16ml	7mm	0.17ml	7mm	1.18ml
8mm	0.26ml	8mm	0.24ml	8mm	0.25ml	8mm	0.26ml
-		9mm	0.34ml	9mm	0.35ml	9mm	0.36ml
Max V*	0.8 ml		1.0ml		1.0ml		1.0ml

*Inflation volumes in an unconstrained environment.

Do not inflate the balloon over 1.0mL, this is the maximum inflation volume.

Inflation beyond this volume may cause the balloon to over expand and occlude the main lumen.



Image of over-inflation

Optimizing Stroke Access with a Balloon Guide Catheter

A large lumen balloon guide catheter is recommended for every procedure as it appears to offer the fastest procedure times and best clinical outcomes.**

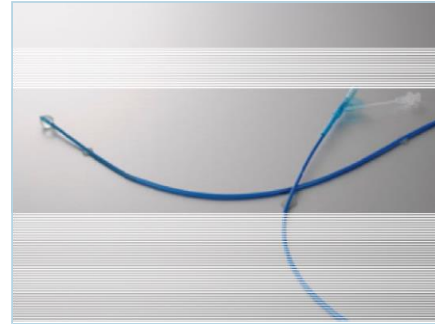
Recommended Procedure	Option #2	Option #3
80cm 8-9F Sheath	80cm 6F Sheath	80cm 6F Sheath
8-9F Balloon Guide Catheter	6F Catheter	5F Catheter
.021"/.027" Micro catheter	.021"/.027" Micro catheter	.021"/.027" Micro catheter
Mechanical Thrombectomy Device	Mechanical Thrombectomy Device	Mechanical Thrombectomy Device
.014" Wire	.014" Wire	.014" Wire

Solitaire™ device Set-up with a BGC

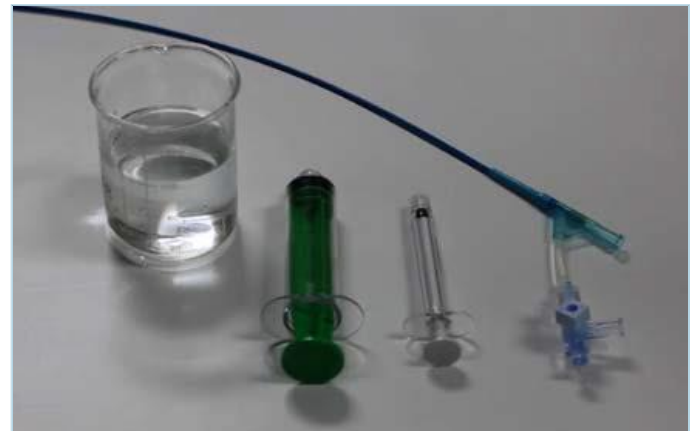


Items Needed for Device Preparation

- (1) Cello™ balloon guide catheter**
- (1) Dilator**

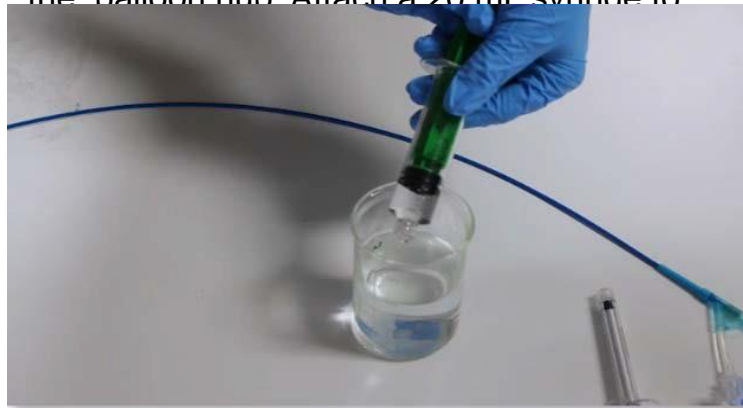


- (1) 1ml syringe** (not included)
- (1) 20 ml syringe** (not included)
- (1) 3-way stopcock** (not included)
- (1) Beaker of 50/50 saline/contrast mix**
(not included)



Cello™ BGC Instructions for Use

1. Gently remove the catheter from the pouch by grasping the hub and slowly pulling the catheter straight out of the protective tubing without bending the shaft. Inspect the catheter before use to verify that its size, shape and condition are suitable for the specific procedure.
2. Prepare balloon inflation media by mixing contrast with saline (50% by volume or equivalent to 150 mg/mL iodine).
3. Fill a 20 mL syringe with 5 mL of balloon inflation media. Attach a 3-way stopcock to the balloon hub. Attach a 20 mL syringe to



1. Attach a 1 mL syringe to the balloon's 3-way stopcock. Turn the stopcock towards the 1 mL syringe.
2. With the 20 mL syringe pointing downward:
 - a. Pull back on the syringe plunger to aspirate the balloon lumen. Maintain negative pressure until the air bubbles stop forming in the syringe.
 - b. Release the syringe plunger to allow media to be drawn into the balloon lumen. Do not infuse media.
 - c. Repeat steps a and b again**
 - d. Release the syringe plunger to allow media to be drawn into the balloon lumen. Do not infuse media.



6. Turn stopcock towards the balloon hub.
Transfer maximum recommended balloon inflation volume from the 20 mL syringe to the 1 mL syringe.

7. Inflate the balloon up to the maximum recommended inflation volume. Refer to Table 1. Turn the stopcock off towards the balloon hub.

6. Inspect the balloon for leakage. Keep the balloon inflated until the air bubbles diffuse from the balloon. If air remains in the balloon, it should dissipate if left in a sterile field for several minutes.

7. Deflate the balloon by turning stopcock towards the 1 mL syringe and aspirating with the 20 mL syringe.

8. After ensuring that the balloon is fully deflated, wet the distal shaft with saline and insert the balloon portion of the catheter into the inserter.



Balloon Guide Catheter Competitive Measurements

	6F		7F		8F		9F	
	Cello™ BGC	Merci™* BGC	Cello™ BGC	Merci™* BGC	Cello™ BGC	Merci™* BGC	Cello™ BGC	Merci™* BGC
Effective Length (cm)	95	NA	95	95	95	95 & 80	92	95 & 80
Max OD Profile (in)	0.075	NA	0.095	0.091	0.102	0.105	0.118	0.118
ID Profile (in)	0.051	NA	0.067	0.059	0.075	0.078	0.085	0.085
Max Recommended Balloon Inflation	0.26mL	NA	0.34mL	0.2→ 0.6mL	0.35mL	0.2→ 0.6mL	0.36mL	0.2→ 0.6mL
Balloon Diameter at Recommended Inflation Level	8mm	NA	9mm	spec not listed	9mm	spec not listed	9mm	spec not listed
Max Balloon Inflation Volume	0.8mL	NA	1.0mL	0.6mL	1.0mL	0.6mL	1.0mL	0.6mL
Balloon Length	7mm	NA	7mm	10mm	10mm	10mm	10mm	10mm
# Marker Bands	2	NA	2	1	2	1	2	1
Dual Braided	Yes	NA	Yes	No	Yes	No	Yes	No

BGC Dimension Measurements

6F+ Cello™ Catheter: OD – 0.075", ID – 0.051"

Product	OD	Clearance
Neuron™* 3.5F Catheter	0.045"	0.006"
Neuron™* 5F Catheter	0.066"	-0.015"
Neuron™* 6F Catheter	0.080"	-0.029"
Penumbra™* 026 Catheter	0.051"	0.000"
Penumbra™* 036 Catheter	0.054"	-0.003"
Penumbra™* 041 Catheter	0.054"	-0.003"
Penumbra™* 054 Catheter	0.080"	-0.029"
Concentric DAC™* 4.3F Catheter	0.056"	-0.005"
Concentric DAC™* 5.2F Catheter	0.068"	-0.017"
Navien™ 058 Catheter	0.070"	-0.019"
Navien™ 072 Catheter	0.084"	-0.033"
Orion™ Micro Catheter	0.021"	0.030"
Rebar™ 18 Micro Catheter	0.021"	0.030"
Rebar™ 027 Micro Catheter	0.027"	0.024"

Cello™ BGC Dimension Measurements

7F+ Cello™ Catheter: OD – 0.095”, ID – 0.067”

Product	OD	Clearance
Neuron™* 3.5F Catheter	0.045"	0.022"
Neuron™* 5F Catheter	0.066"	0.001"
Neuron™* 6F Catheter	0.080"	-0.013"
Penumbra™* 026 Catheter	0.051"	0.016"
Penumbra™* 036 Catheter	0.054"	0.013"
Penumbra™* 041 Catheter	0.054"	0.013"
Penumbra™* 054 Catheter	0.080"	-0.013"
Concentric DAC™* 4.3F Catheter	0.056"	0.011"
Concentric DAC™* 5.2F Catheter	0.068"	-0.001"
Navien™ 058 Catheter	0.070"	-0.003"
Navien™ 072 Catheter	0.084"	-0.017"
Orion™ Micro Catheter	0.021"	0.046"
Rebar™ 18 Micro Catheter	0.021"	0.046"
Rebar™ 027 Micro Catheter	0.027"	0.040"

BGC Dimension Measurements

8F Cello™ Catheter: OD – 0.102”, ID – 0.075”

Product	OD	Clearance
Neuron™* 3.5F Catheter	0.045"	0.030"
Neuron™* 5F Catheter	0.066"	0.009"
Neuron™* 6F Catheter	0.080"	-0.005"
Penumbra™* 026 Catheter	0.051"	0.024"
Penumbra™* 036 Catheter	0.054"	0.021"
Penumbra™* 041 Catheter	0.054"	0.021"
Penumbra™* 054 Catheter	0.080"	-0.005"
Concentric DAC™* 4.3F Catheter	0.056"	0.019"
Concentric DAC™* 5.2F Catheter	0.068"	0.007"
Navien™ 058 Catheter	0.070"	0.005"
Navien™ 072 Catheter	0.084"	-0.009"
Orion™ Micro Catheter	0.021"	0.054"
Rebar™ 18 Micro Catheter	0.021"	0.054"
Rebar™ 027 Micro Catheter	0.027"	0.048"

BGC Dimension Measurements

9F Cello™ Catheter: OD – 0.118”, ID – 0.085”

Product	OD	Clearance
Neuron™* 3.5F Catheter	0.045"	0.040"
Neuron™* 5F Catheter	0.066"	0.019"
Neuron™* 6F Catheter	0.080"	0.005"
Penumbra™* 026 Catheter	0.051"	0.034"
Penumbra™* 036 Catheter	0.054"	0.031"
Penumbra™* 041 Catheter	0.054"	0.031"
Penumbra™* 054 Catheter	0.080"	0.005"
Concentric DAC™* 4.3F Catheter	0.056"	0.029"
Concentric DAC™* 5.2F Catheter	0.068"	0.007"
Navien™ 058 Catheter	0.070"	0.015"
Navien™ 072 Catheter	0.084"	0.001"
Orion™ Micro Catheter	0.021"	0.064"
Rebar™ 18 Micro Catheter	0.021"	0.064"
Rebar™ 027 Micro Catheter	0.027"	0.058"

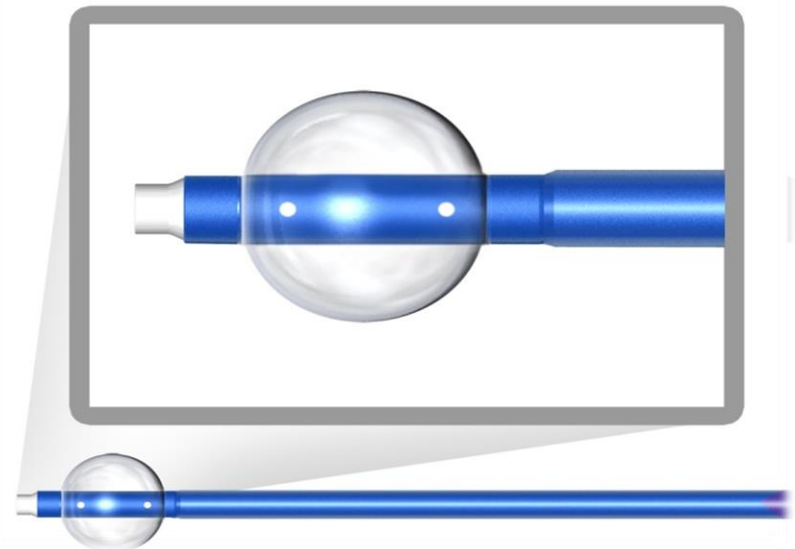
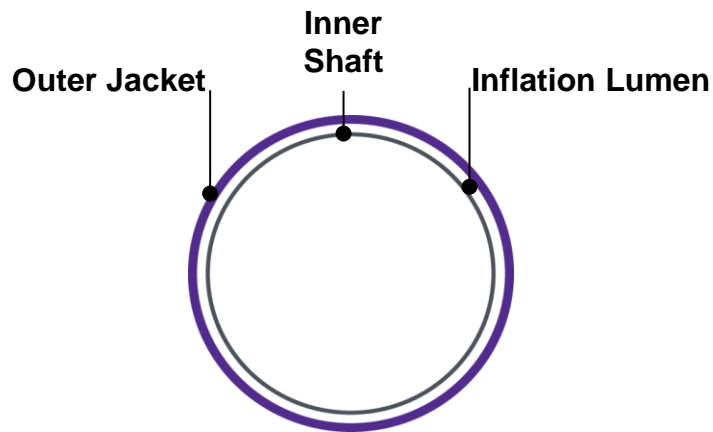
Catheter Construction

- **Stainless steel double braid throughout provides stability and pushability**
- **5 transition zones**
 - Smooth transition from proximal support to distal flexibility
 - Improves kink resistance



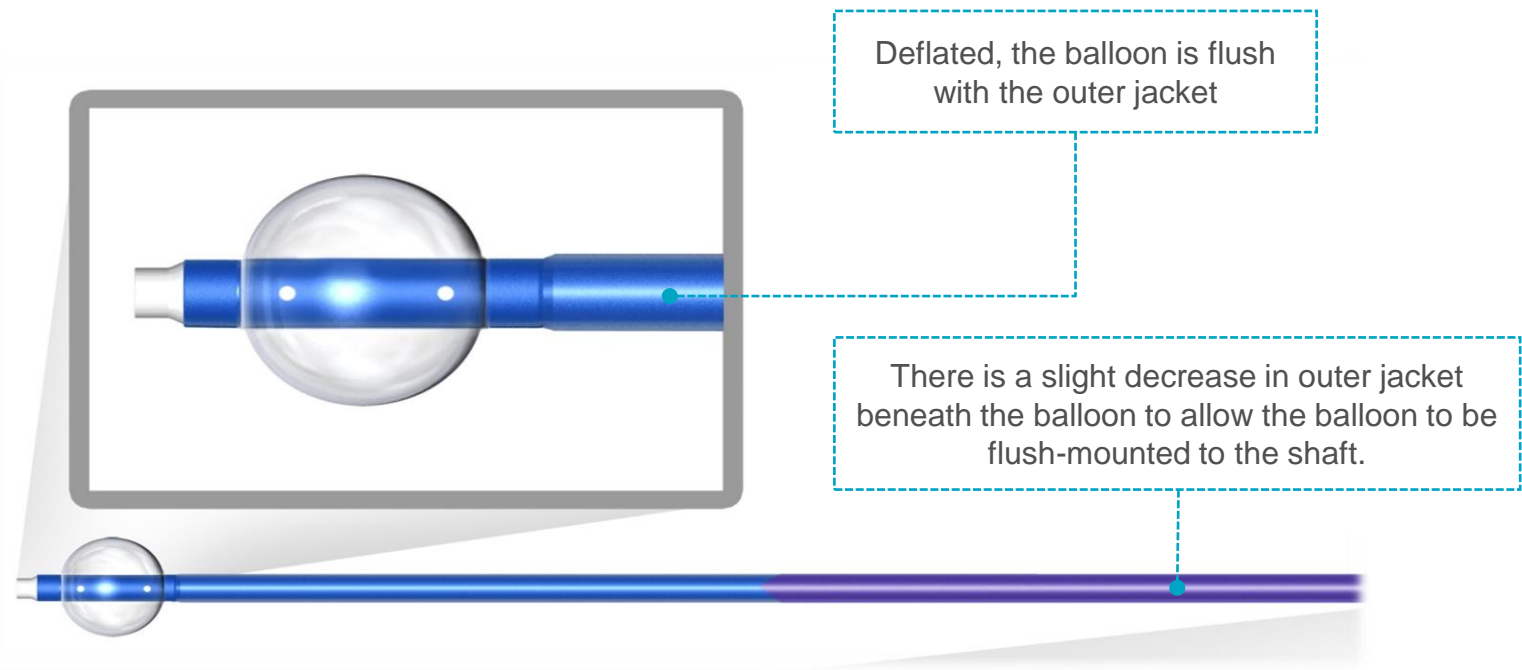
Catheter Construction

- Co-axial lumen with fast inflation and deflation
- Slight decrease in OD beneath the balloon allows the balloon to be flush mounted
- Holes in outer jacket allow for inflating and deflating the balloon

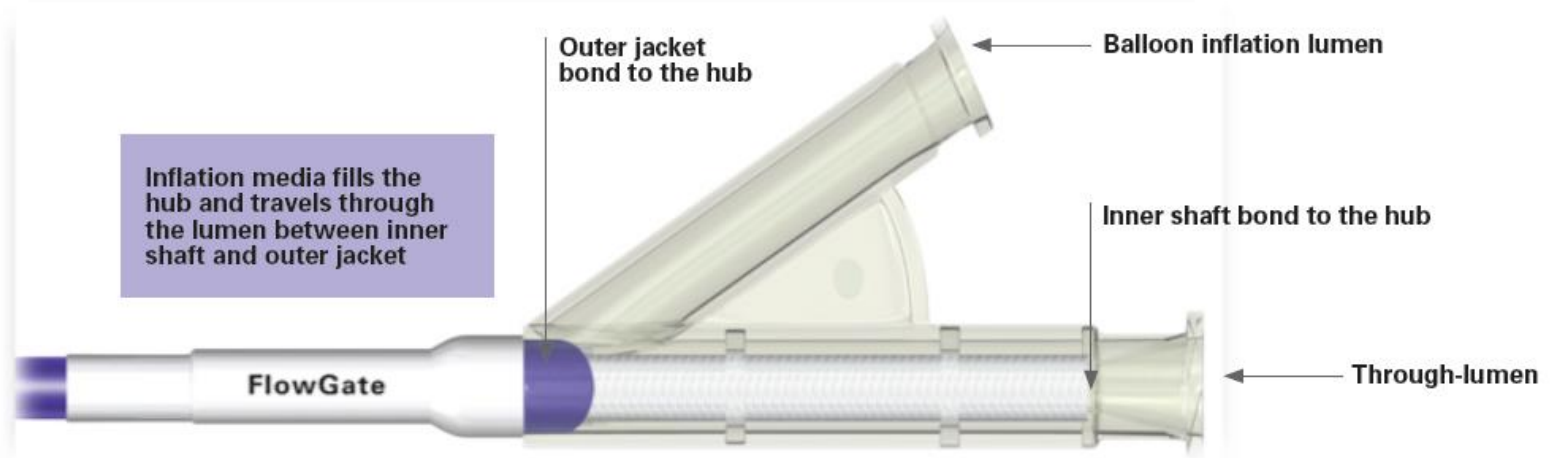


Balloon Construction

- Compliant 10mm diameter and length balloon at maximum infusion volume – designed to conform to the vessel wall
- Gas-permeable – air bubbles will diffuse out of the balloon during prep
- Provides proximal flow control



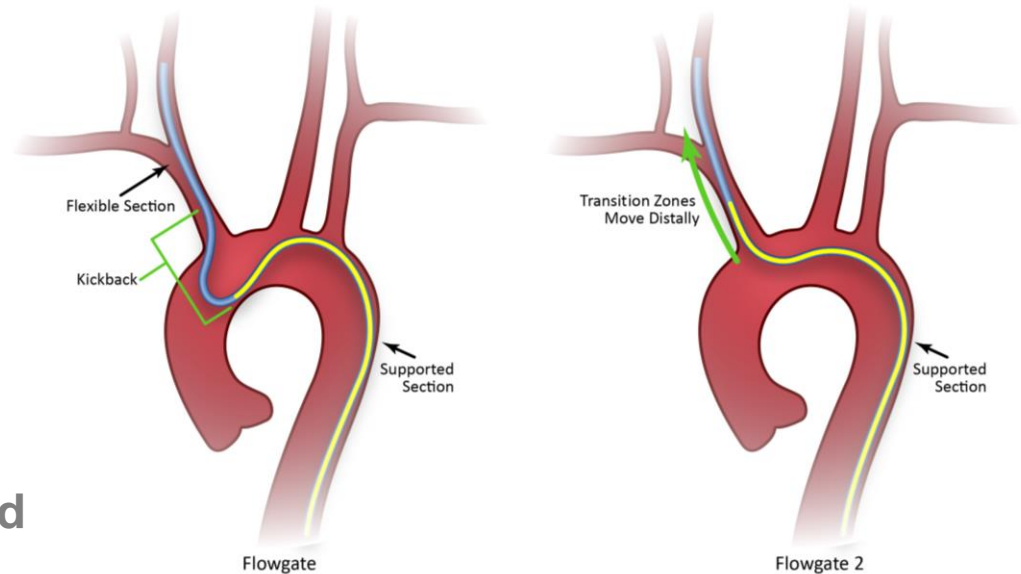
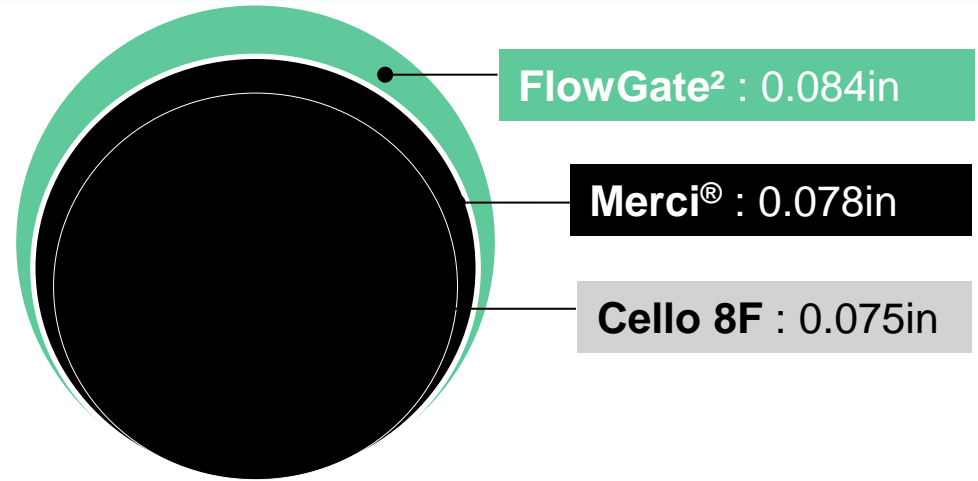
Hub Construction



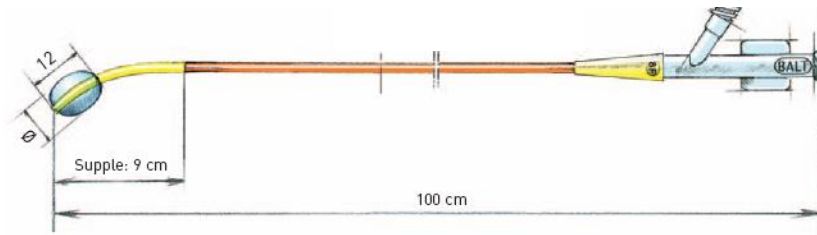
Reference number	Description	Length	OD	ID
90485	FlowGate ² 8F Balloon Guide Catheter	85cm	8F (2.7mm, 0.10in)	0.084in (6.4F, 2.13mm)
90495	FlowGate ² 8F Balloon Guide Catheter	95cm	8F (2.7mm, 0.10in)	0.084in (6.4F, 2.13mm)

Success Accelerated

- Largest 8F BGC lumen for clot capture and Trevo system compatibility
- Optimized combination of trackability and support
- Proximal flow control correlates with better procedural, angiographic and clinical outcomes

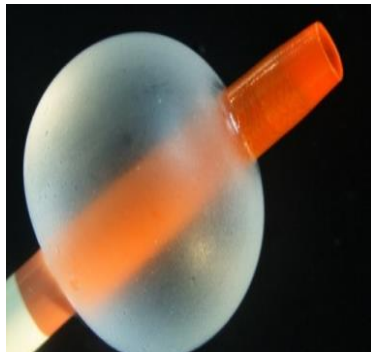


Indications



CORAIL+

Guiding catheters with distal tip balloon

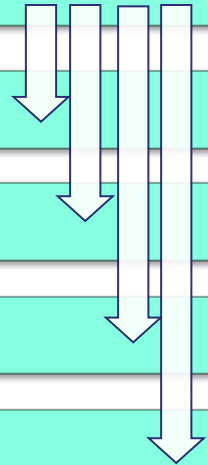


For occlusion test of the Carotid artery

To reverse the flow in the Carotid artery before stenting

For blockage of flow during carotid angioplasty

For placement of all thrombectomy devices



Features & Benefits

FEATURES CORAIL+	BENEFITS
<u>Double-lumen</u> catheter	MAXIMIZED STABILITY & BEST NAVIGABILITY
<u>No hydrophilic treatment</u>	
<u>Compliant</u> balloon	
<u>Inner-braiding</u>	
<u>Distal soft & flexible part</u> → 9mm	
Balloon size → <u>inflatable up to 12mm</u>	COMPLETE OCCLUSION (CCA & ICA)
Catheter's tip of the balloon in the middle	BETTER COAXIAL ARRANGEMENT
Compatible with most microcatheters & thrombectomy devices	HIGH COMPATIBILITY
<u>Large inner lumen</u> → up to .074' '	ASPIRATION POWER
3 references	DEVELOPED PORTFOLIO

Compatibilities

COMPATIBILITY

CORAIL6F+	Large microcatheters (VASCO+) and with most thrombectomy devices
CORAIL8F+	<ul style="list-style-type: none"> - Aspiration catheters - Microcatheters used for thrombectomy - Carotid stent up to 7mm
CORAIL8F+L T30	<p>For extra distal access (petrosal ICA) Distal tip can be steam shaped</p>



Indeed, thanks to its long shapeable, flexible & atraumatic distal tip (30mm) the CORAIL8F+LT30 enables us to reach further away segments (extra distal access).

Global range

REFERENCE	Ø ID	Ø OD	Supple part lenght	Total length	Inflated balloon 1mL Ø x L (mm)	Max balloon volume	N° of RX markers
CORAIL6F+	1,20mm (.047'')	6F	9cm	100cm	11 x 12	1,20mL	1 distal to the balloon
CORAIL8F+	1,89mm (.074'')	8F	9cm	100cm	12 x 12	1,20mL	1 distal to the balloon
CORAIL8F+LT30	1,89mm (.074'')	8F	12cm	110cm	12 x 12	1,20mL	1 distal to the long tip

CORAIL+



CORAIL8F+LT30

→ mandrel to steam shaped the distal tip (**30mm**)