

# **PCI for Chronic Total Occlusion : Guiding Catheter and Guidewire**

# Guiding Catheter for CTO

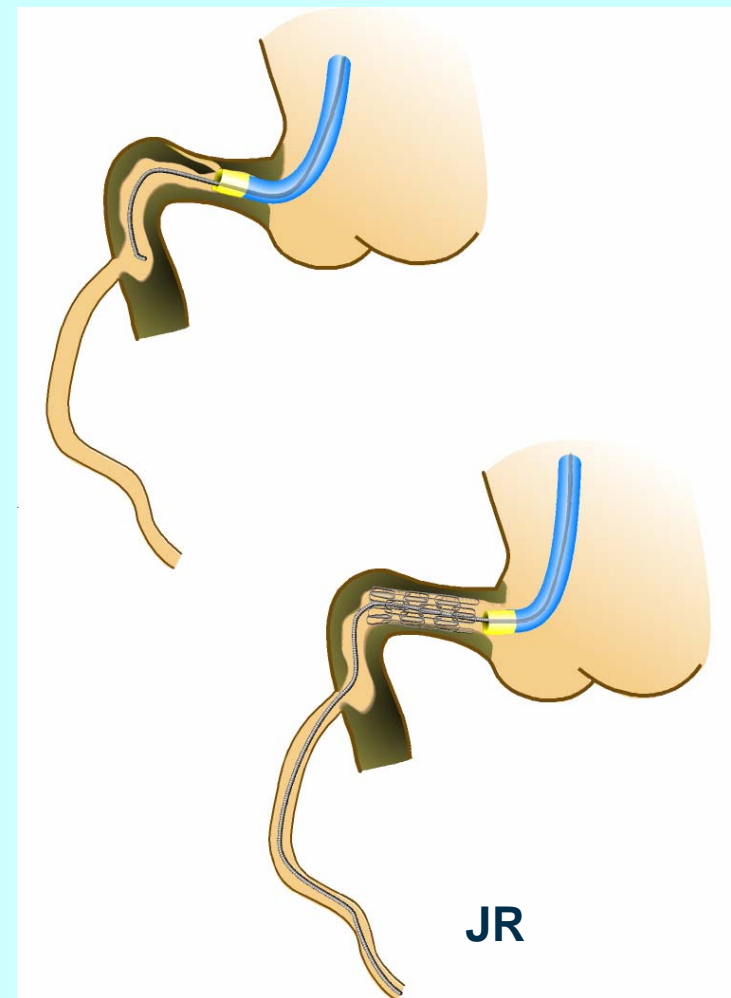
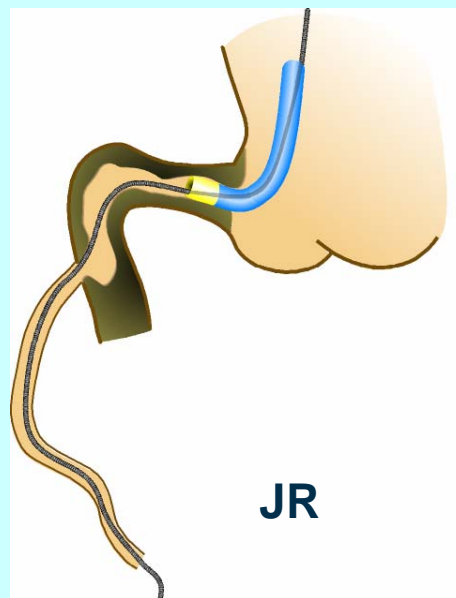
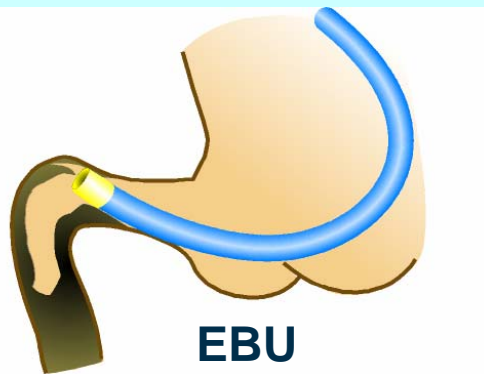
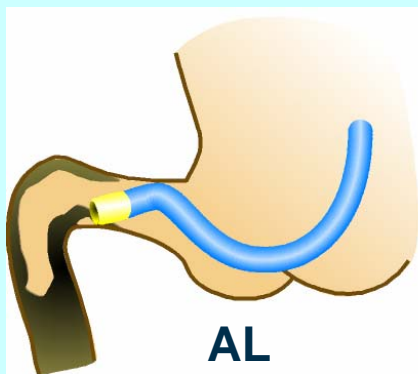
# Guiding Catheter for CTO

7F or larger guider with all Side Hole

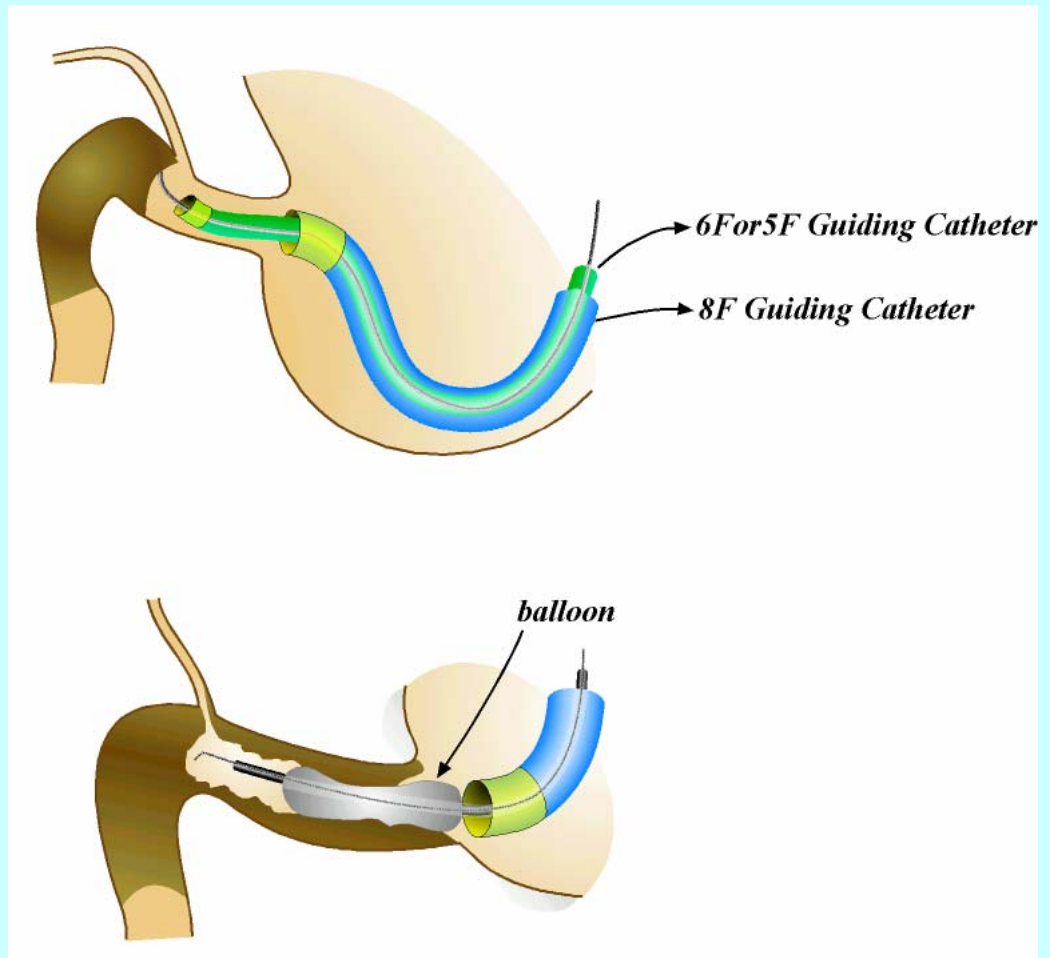
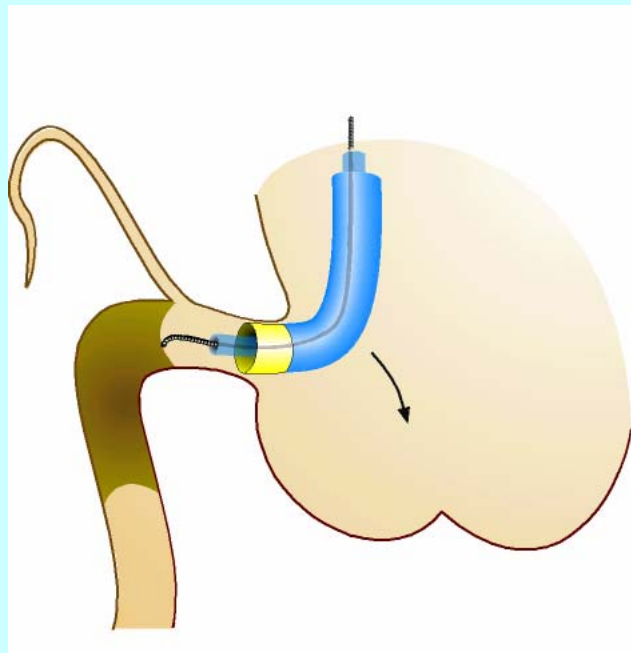
- Left Coronary Artery
  - LAD: EBU 3.5, EBU 4.0
  - LCX: AL 1.0, 1.5
- Right Coronary Artery
  - AL 0.75, 1.0

**Strong  
Back up  
support**

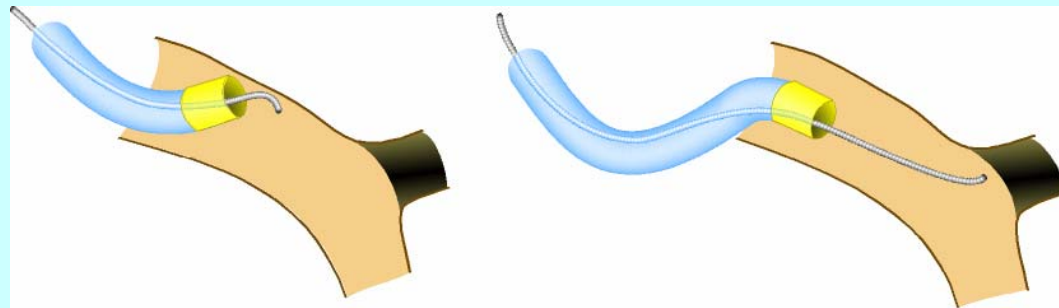
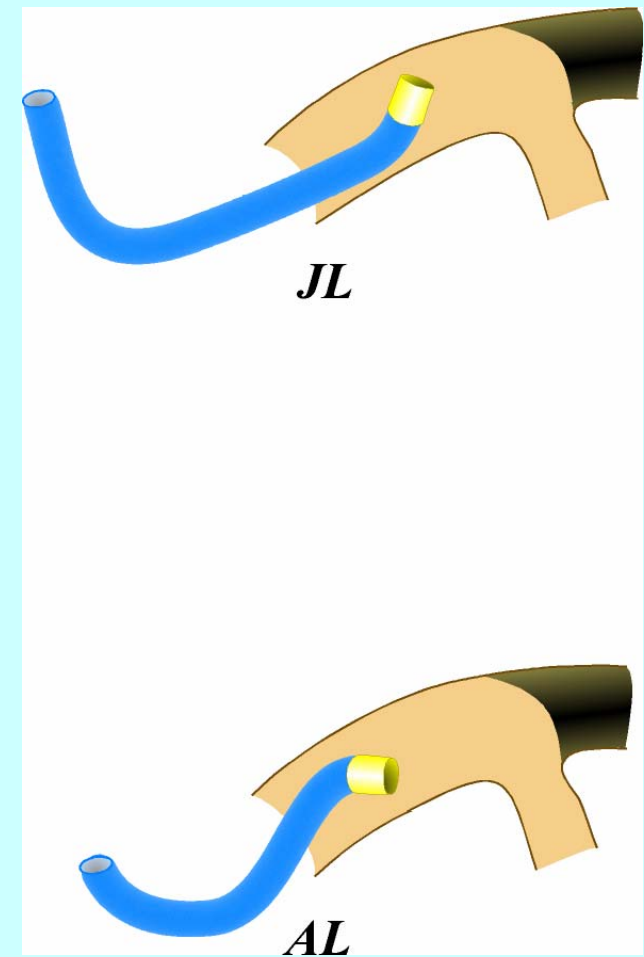
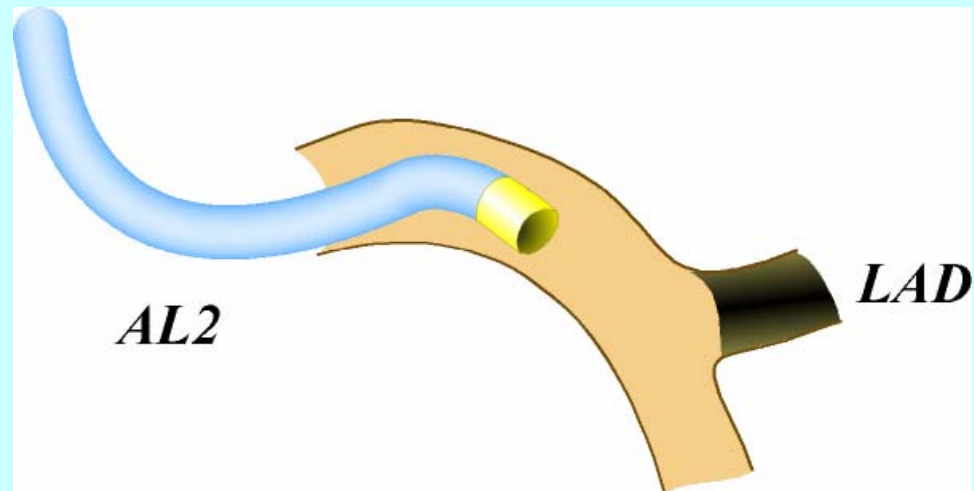
# Guiding Catheter for RCA



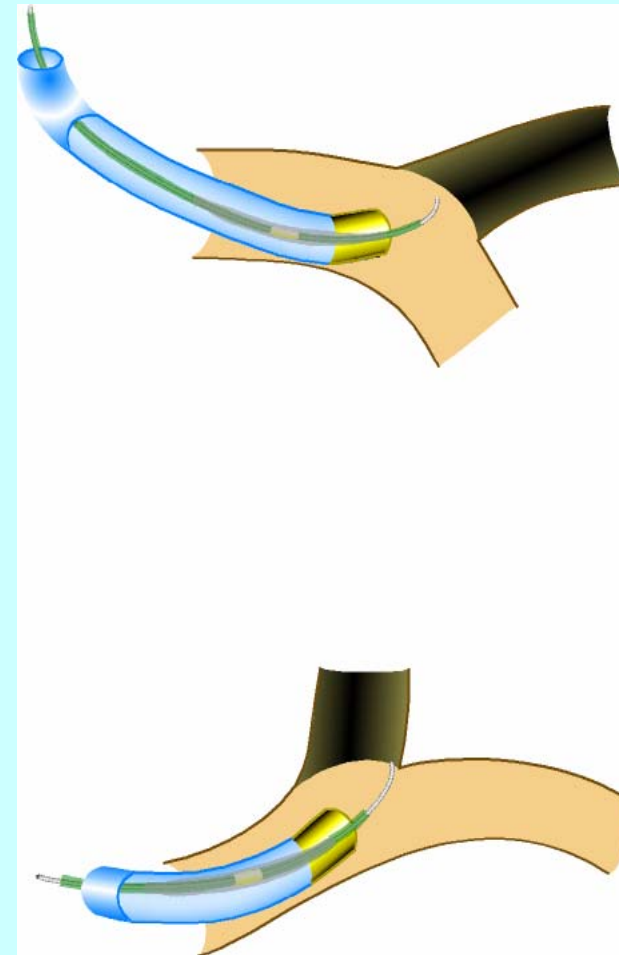
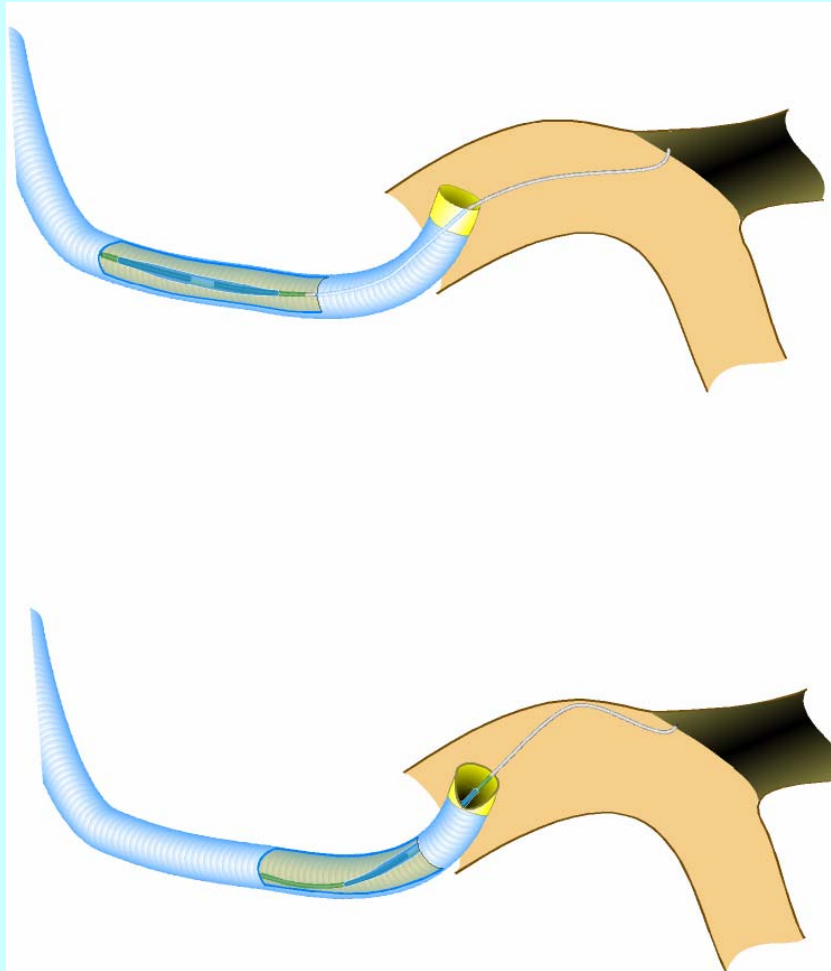
# Two Guiding Catheter for RCA



# Guiding Catheter for LCA



# Position of Support Catheter



*RAO*

*LAO Caud*

# Guidewires for CTO



# Guidewire Selection

## Polymer-Coated (Hydrophilic) Wires

Manufacturer	Wire	Shaft Diameter	Stiffness
Guidant	Whisper	0.014"	1 gram
	Pilot 50	0.014"	2 gram
	Pilot 150 & 200	0.014"	4 & 6 gram
Boston Scientific	Choice PT & P2	0.014"	2 gram
	PT Graphix & P2	0.014"	3-4 gram
Cordis	Shinobi	0.014"	2 gram
	Shinobi Plus	0.014"	4 gram
Medtronic Vascular	Persuader	0.014"	3 & 6 gram
	Persuader 9	0.014" (tip 0.011")	9 gram
Abott Vasc. Asahi	Confianza Pro (Conquest)	0.014" (tip 0.009")	9 & 12 gram

# Guidewire Selection

## Non-Coated (Non-Lubricious) Coil Wires

Manufacturer	Wire	Shaft & tip Diameter	Stiffness
Abott Vascular Asahi	Medium	0.014"	2 gram
	Miraclebros	0.014"	3, 4.5, 6, 12 g
	Confianza	0.014"	9 & 12 gram
	Confianza Pro (Conquest)	0.014" (tip 0.009")	9 & 12 gram
Medtronic Vascular	Persuader	0.014"	3 & 6gram
	Persuader 9	0.014" (tip 0.011")	9 gram
Guidant	HT Intermediate	0.014"	2-3 gram
	HT Standard	0.014"	4 gram
	Cross-IT 100	0.014" (tip 0.011")	2 gram
	Cross-IT 200	0.014" (tip 0.011")	3 gram
	Cross-IT 300	0.014" (tip 0.011")	4 gram
	Cross-IT 400	0.014" (tip 0.011")	6 gram

# Guidewire Selection

## 1. Soft

Traverse (Guidant)  
Rinato (Asahi Intec)  
Whisper (Guidant)

## 2. Intermediate

Neos (Asahi Intec)  
Miracle 3g (Asahi Intec)

## 3. Stiff

Miracle 4.5g (Asahi Intec)  
Miracle 6g (Asahi Intec)  
Miracle 12 g (Asahi Intec)  
Conquest Pro (Asahi Intec)

# Guidewire Selection

## Soft wires

- **Traverse (Guidant)**

for general use to advance the support catheter  
and to confirm the entrance

- **Rinato (Asahi Intec)**

for not so tight CTO (recent occlusion)

- **Whisper (Guidant)**

for CTO with small channels

for recent occlusion with severe tortuosity

# Guidewire Selection

## Intermediate wires

- **Neos (Asahi Intec)**  
for CTO on non-tortuous vessel
- **Miracle 3g (Asahi Intec)**  
for CTO on tortuous vessel  
for general use

# Guidewire Selection

## Stiff wires

- **Miracle 4.5g, 6g (Asahi Intec)**  
for standard step-up strategy  
Miracle 3g -> Miracle 4.5g  
->Miracle 6g ->Miracle 12g or Conquest
- **Miracle 12g (Asahi Intec) for so tight CTO**  
to penetrate proximal or distal cap  
to crash tight plaque within CTO  
to puncture from pseudo to true lumen
- **Conquest Pro (Asahi Intec) for so tight CTO**  
to penetrate proximal or distal cap  
to penetrate tight plaque within CTO  
to puncture from pseudo to true lumen

# Guidewire Selection

- **Miracle 12g** is more controllable
  - to penetrate **proximal cap**,
  - to advance in the tight CTO with bending,
  - to puncture from pseudo to true lumen
- **Conquest** should be used
  - only when the appropriate direction can be seen
  - to penetrate **distal cap**,
  - to puncture from pseudo to true lumen
- **Conquest** should not be used
  - to seek the true lumen or advance for long distance

# Guidewire Selection for CTO

## Steps for Success

- Become familiar with one or two wire sets
- Over-the wire balloon or Transit catheter
- Frequent wire changes
- Frequent reshaping of wire tip
- Stepwise approach
- Penetration of proximal cap
- Wire passage through the body of the CTO
- Penetration of the distal cap



# **Guidewire Selection for CTO**

## **Stepwise Approach**

### **1. Explore with Soft Tip or Medium Wire**

Asahi: Soft or medium 2 gram

Guidant: 014" intermediate 2 gram

014" Standard 4 gram

Boston Sci: Choice PT (Hydrophilic) 2 gram

PT Graphix (Hydrophilic) 3-4 gram

### **2. Medium to Heavy Wire**

Asahi: Miraclebro 3, 4.5, 6 gram

Mdt Vasc: Persuader 3, 6 gram

Cordis: Shinobi (Hydrophilic) 2, 4 gram

Guidant: Cross-IT 100, 200 2, 3 gram

# Guidewire Selection for CTO

## Stepwise Approach

### 3. Heavy Wire (Distal Cap)

Asahi: Miraclebro 6, 9 gram

Confianza 8, 12 gram

Confianza Pro 9, 12 gram

Guidant: Cross-IT 300 4 gram

Cross-IT 400 6 gram

Medtronic Vascular Persuader 9 9 gram

### 4. Following successful crossing to true lumen. Exchange for soft-tipped wire (avoid hydrophilic)

Asahi: soft

Guidant: HT-Floppy

# Randomized Comparison of the CrossWire vs. Conventional Wire

	Conventional (n=46)	Crosswire (n=42)	P-value
1st GW Success (%)	34.8	73.8	0.001
2nd GW attempt (%)	10.8	-	0.004
Crossover (%)	58.7	26.2	0.009
Total attempt duration (min)	21.2 ± 10.5	14.8 ± 9.8	0.004
Total GW number	1.70 ± 0.56	1.29 ± 0.51	<0.001
Angiographic Success(%)	78.3	71.4	NS
Procedure Time (min)	57.2 ± 32.8	42.0 ± 19.7	0.013
Fluoro time (min)	24.3 ± 14.1	19.2 ± 10.5	0.06
In-Hospital MACE (%)	0	0	N/A

T.Lefevre et al, Am J Cardiol 2000

# Technical Improvements in Treating CTO's

	New Guide Wires	Old Guide Wires
n	69	81
>15 mm Occ.	35 (51%)	21 (26%)
Bridging Coll.	23 (33%)	12 (15%)
<3 months old*	34 (49%)	49 (60%)
Success*	55 (80%)	50 ( 62%)

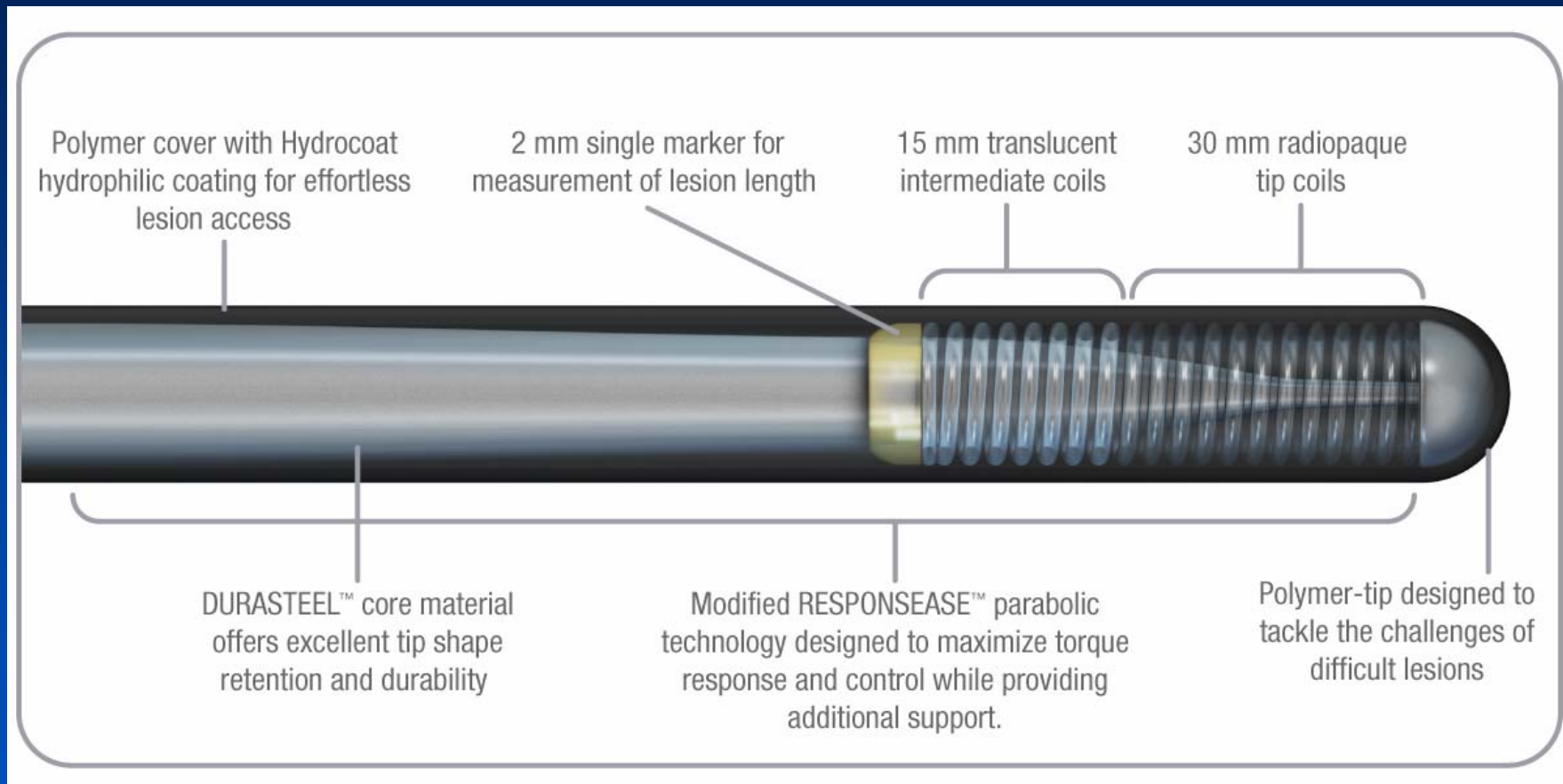
# **HI-TORQUE PILOT™**

## **Family of Guide Wires**



**A polymer-tip, hydrophilic guide wire designed for CONTROL**

# HI-TORQUE PILOT™ Design



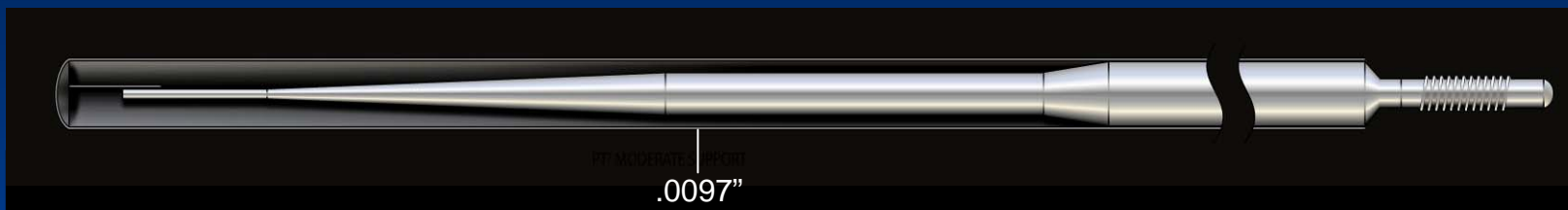
# Choice PT Guidewire



- Description: Crossing guidewire with light rail support, unibody stainless steel core and hydrophilic-coated polymer sleeve for smooth device delivery
- Application: Designed for more challenging cases involving severe tortuosity and tight lesions.
- Available in 182 cm and 300 cm length, Straight and J-Tip Configurations
- Wire diameter .014"
- Tip radiopacity 35 cm
- Compatible with: Magnet™ Exchange device

# PT2™ Coronary Guide Wire

## PT2 Moderate Support



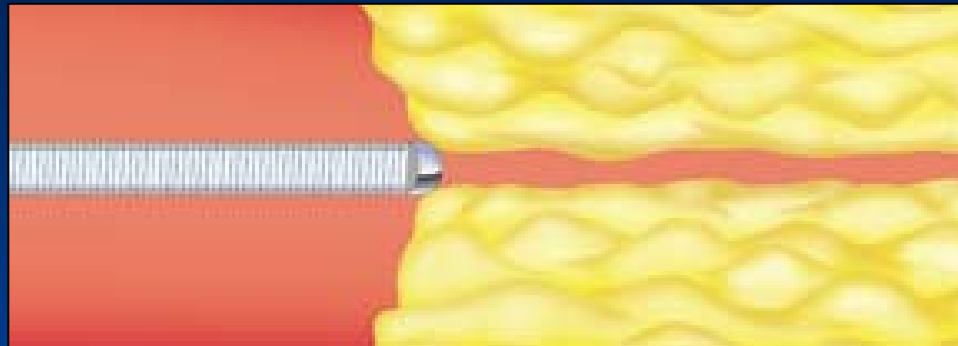
## PT2 Light Support





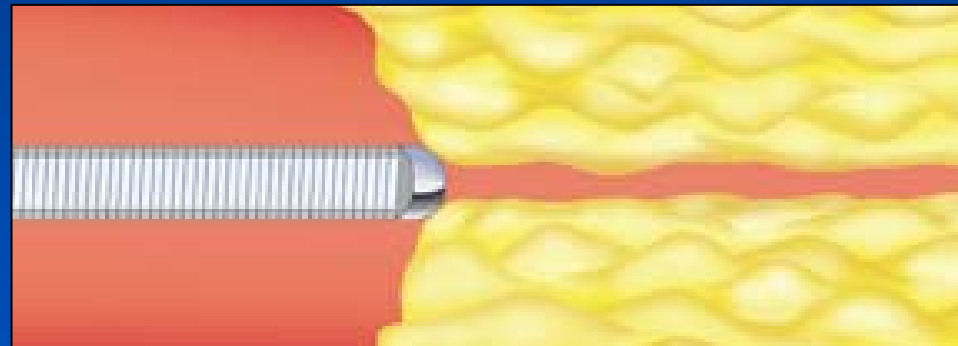
# Big Tips Are for Waiters!

0.010"  
tip



0.007"  
microchannel

0.014"  
tip



0.007"  
microchannel

# Crosswire NT

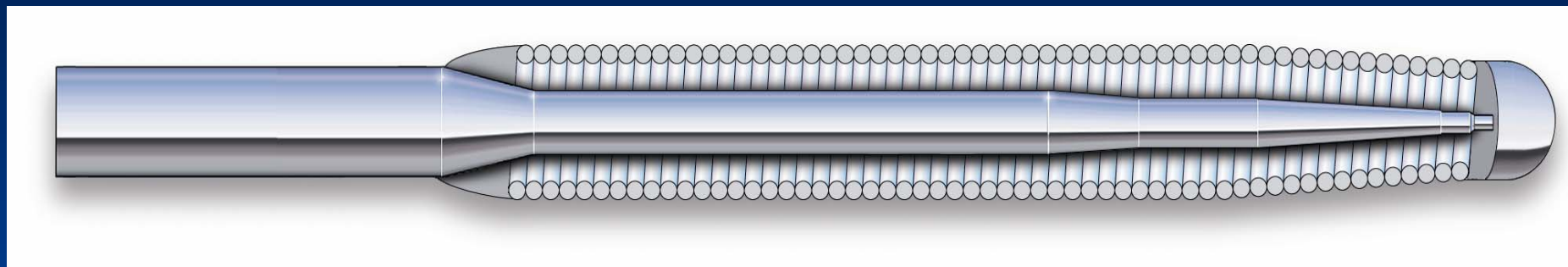
Polyurethane  
which mixed Tungsten(45wt%)

Size : 0.014inch, 180cm



- Urethane/Hydrophilic coating = Distal 40 cm only
  - Ensure a better handling
  - Reduce a chance of slipping out from the lesion
  - Enhance the stiffness of shaft body
- Milder Core Wire Tapering
  - For wider applications
- Packaging
  - Trayless package to be environmental friendly

# Cross-IT XT Wire: Tapering Tip

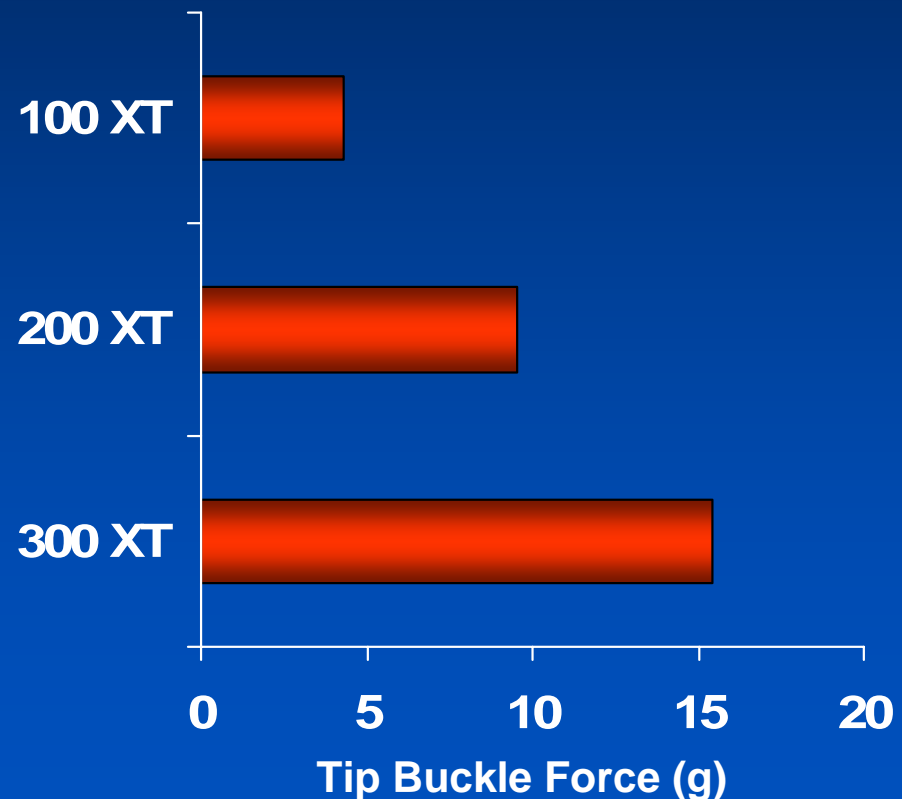


- Designed for greater torque transmission/control
- Broad transition/tapered core design based on ACS HI-TORQUE TRAVERSE
- Tapered tip coil design (0.014" to 0.010" at distal 3 cm)
- Hydrophilic coating over distal 30 cm
- PTFE coating over proximal portion
- 30 cm of coils

# Cross-IT XT Wire: Range of Tip Stiffness Levels

- Different lesions may require different tips
- Guide wire must have enough tip stiffness to cross
- Physicians may prefer to “step up”

Tip Support Range of XT Family



# Recanalization with Cross-IT XT Guidewire

**Success Rate (%)** 34.8

100 XT 61

All Cross-it XT wires 76

Cross-IT & Other GW 82

## In-Hospital Events

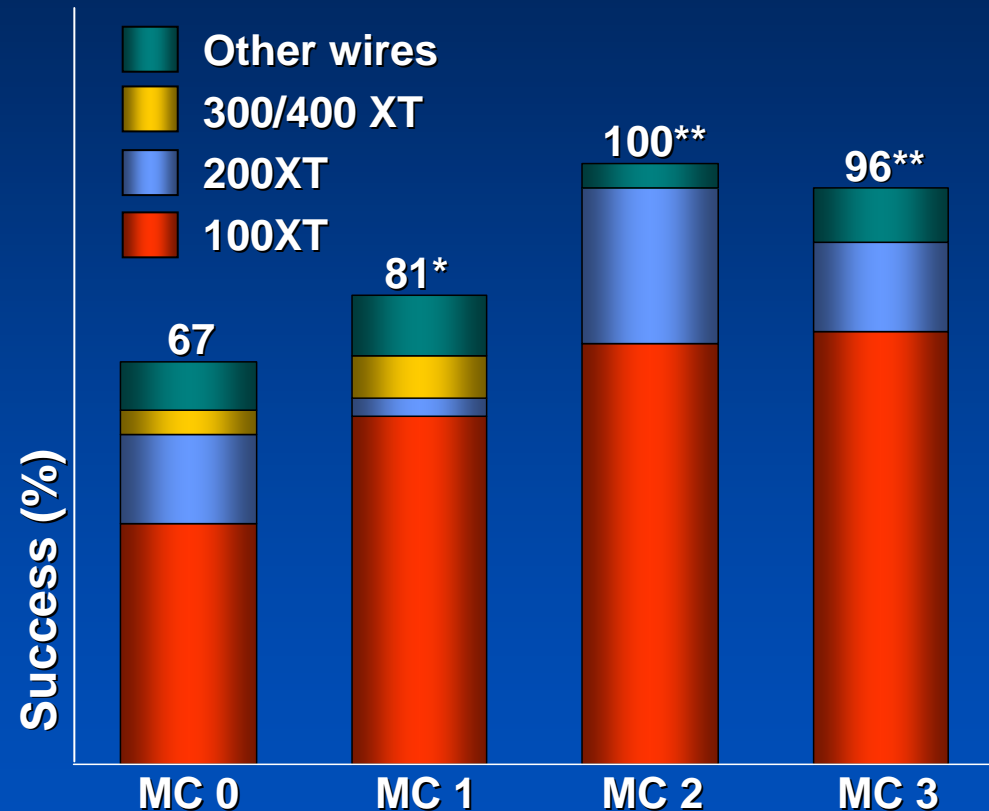
Pericardial Tamponade 0.5%

Non Q-MI 1%

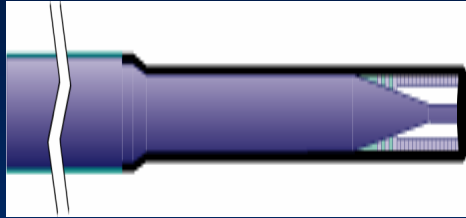
Death 0

n= 214 CTO

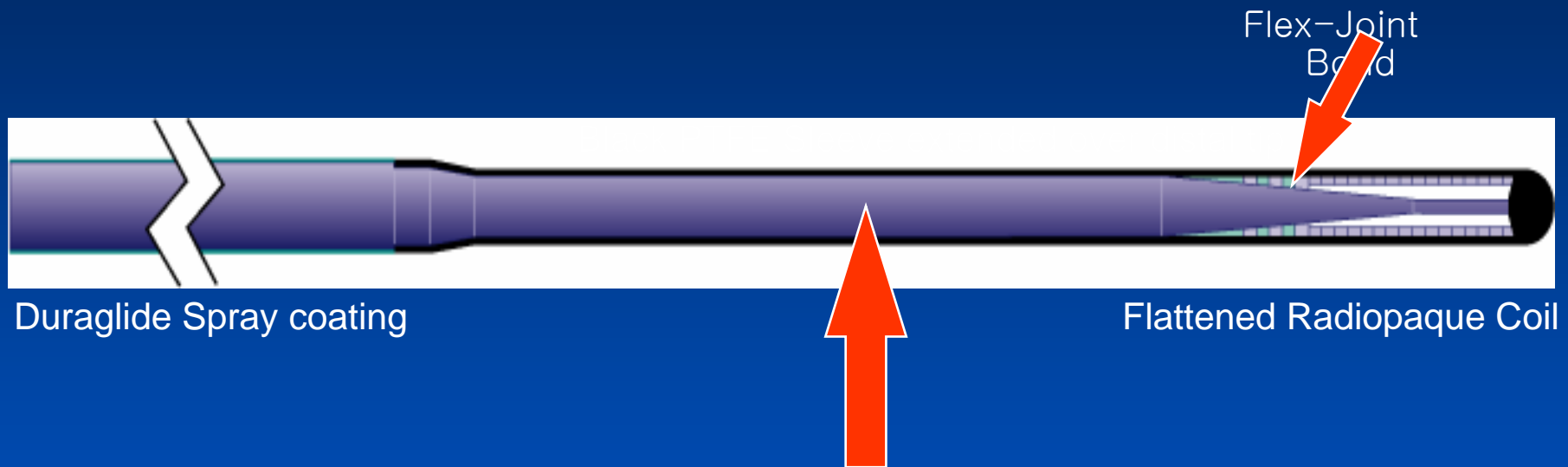
MC = vascular micro channels



HJ Buettner et al, ACC 2002



# Shinobi



Shinobi: .007" Inner Corewire Diameter  
Shinobi Plus: .010" Inner Corewire Diameter

# SHINOBI Advantage in Uncrossable Lesions

- **Designed as a highly steerable wire with exceptional tactile feel - “to sleek in”**
  - Permanent PTFE sleeve extends over the tip for added lubricity & more control as compared to hydrophilic coatings
  - FLEX-JOINT Bond enhances distal flexibility & tip control
- **Able to cross tight lesions**
  - Firm tip flexibility that is easy to see
  - Flattened radiopaque coils yield more surface area to improve tip memory
- **Two support levels (WIZDOM & Stabilizer PLUS platforms)**
  - Added tip pushability with the extra support of the SHINOBI Plus

# Persuader Crossing Guidewires

- Diameter: 0.014" system
- Materials:
  - Core Wire: Stainless Steel
  - Outer Cover: Coils (Stainless Steel/Platinum)
- Distal Radiopaque Tip: 3 cm
- Tip Shape: Straight Tip Only
- Total length (RX): 180 cm
- Total length (OTW): 300 cm
- Extension System: Doc Extension
- Coating: Hydro-track (Hydrophilic) & Pro/Pel (Silicone)



# Persuader 3

## Grind Profile:

(Flat drop)



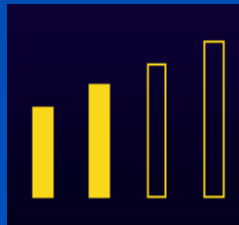
## Outer Covering



## Coating



Support



Tip Stiffness



# Asahi Neo's Guidewire Line-up

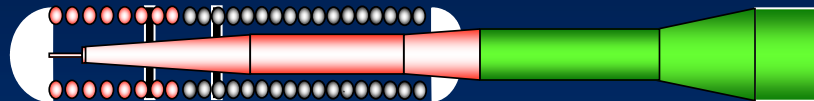
# Light

AG145000

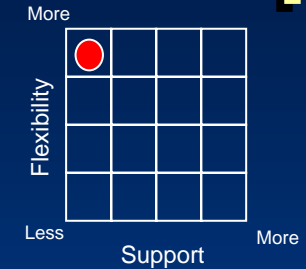
## Radio-opacity 3cm

Diameter 0.014inch

Length 175cm



Improved lubricity and good tip shape memory with our unique core design. Excellent torque response. This wire has a flexible tip and can be used as a first choice wire for almost all procedures. (Tip load 0.5G)



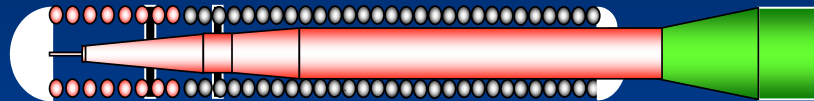
# Soft

AG141000

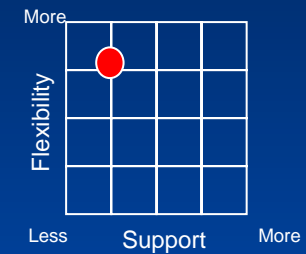
## Radio-opacity 3cm

Diameter 0.014inch

Length 175cm



This is a first choice guidewire with high torque response and excellent steerability because of the unique core property. (Tip load 0.7G)



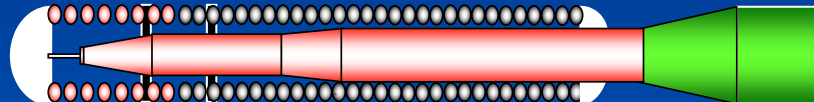
## Intermediate

AG142000

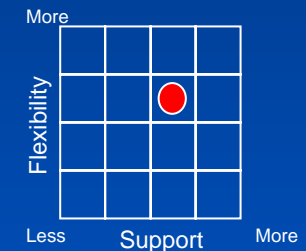
## Radio-opacity 3cm

Diameter 0.014inch

Length 175cm



This is a guidewire with a good balance of tip flexibility and support performance. (Tip load 3.0G)



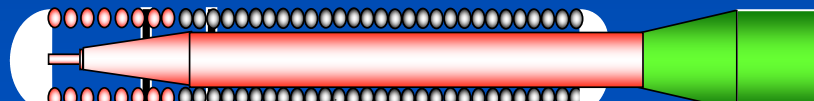
# Standard

AG143000

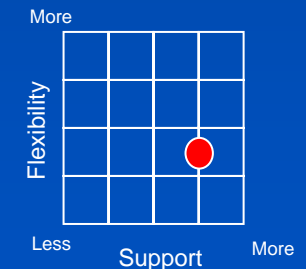
## Radio-opacity 3cm

Diameter 0.014inch

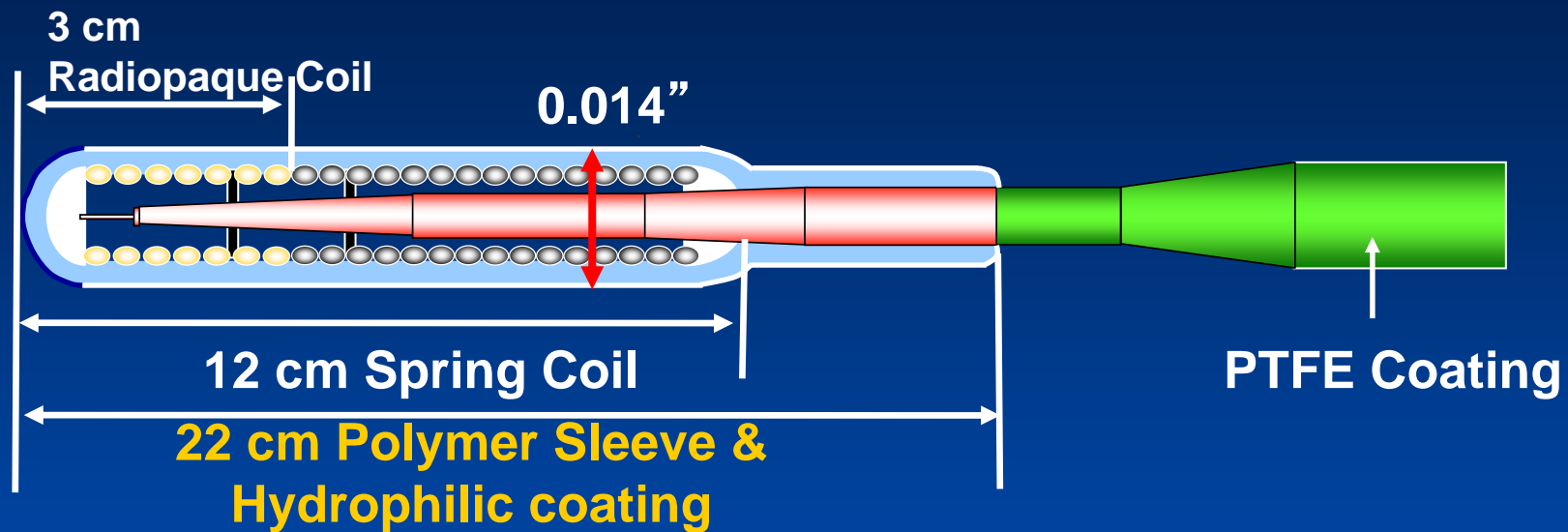
Length 175cm



Improved tip stiffness with our unique core taper design. (Tip load 6.5G)

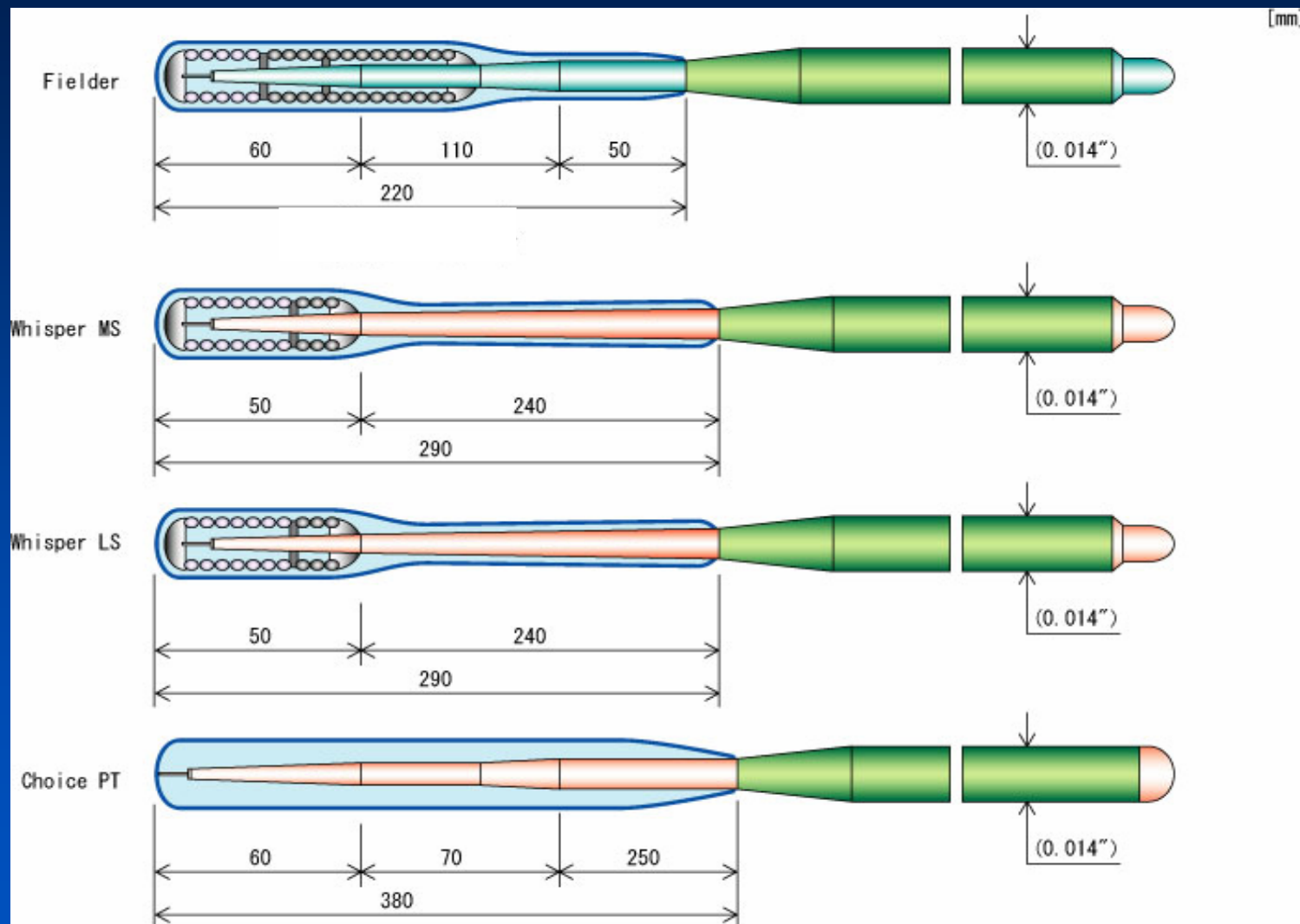


# Asahi Neo's Fielder

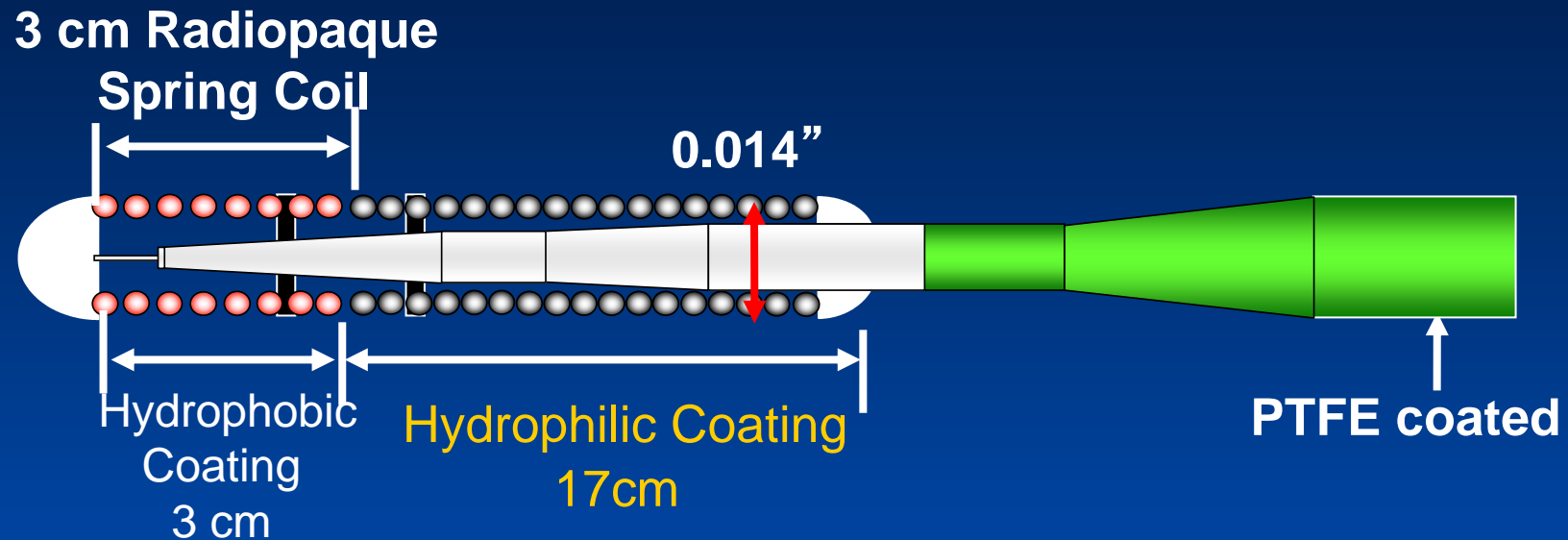


- Catalog No.: AGP140000
- Tip weight: 1.0G
- Radiopacity length: 3cm
- Outside diameter: 0.014inch
- Total length: 175cm

# Asahi Neo's Fielder: Comparison

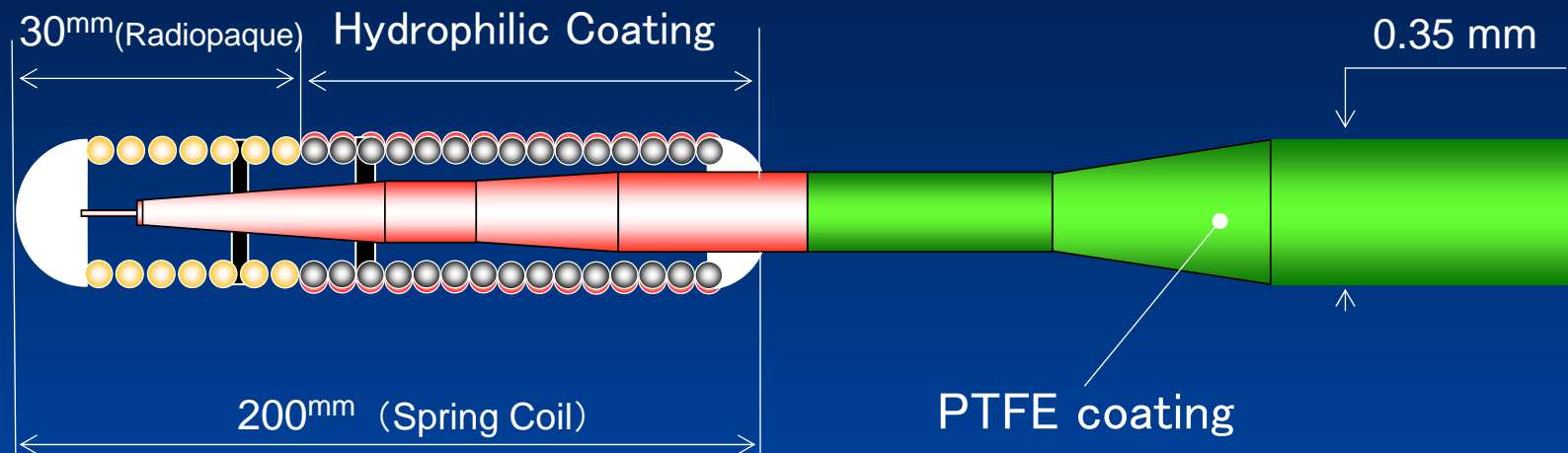


# Asahi Neo's Route



- Catalog No.: AGH147000
- Tip weight: 0.8G
- Radiopacity length: 3cm
- Outside diameter: 0.014inch
- Total length: 175cm

# Asahi Neo's Rinato

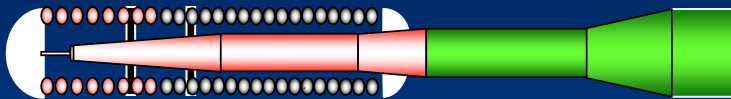


- Improved support performance at the range of 50 -100 mm from tip, which is most often used with/for mounting intervention device(s).
- Excellent Torqueability (near to 1:1)
- Good lubricity even in tortuous vessels.

# Asahi Neo's vs. ACS (soft type): Structural Comparison

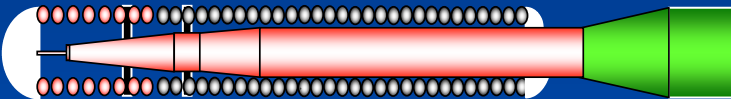
## ASAHI NEO'S Family

### Light



Improved lubricity and tip shape memory with our unique core design. Excellent torque response. This wire has the flexible tip and can be used as a first choice wire for almost all procedures. (Tip load 0.5G)

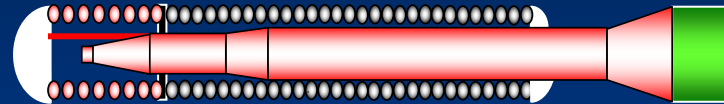
### Soft



This is a first choice guidewire with high torque response and excellent steerability because of the unique core property. (Tip load 0.7G)

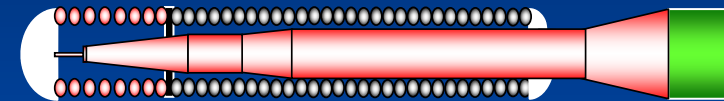
## HI-TORQUE Family

### Floppy II



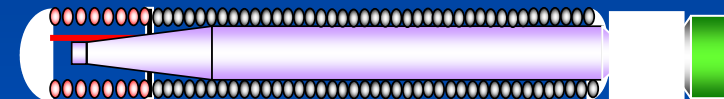
Flexible tip by using shaping ribbon. (Tip load 0.4G)

### Traverse



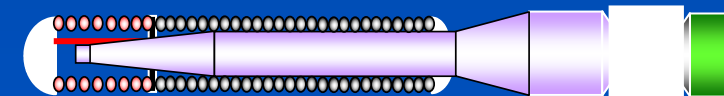
Core-To-Tip structure. Its stiffness is middle between HTF II and HTI. (Tip load 0.7G)

### Balance



Good durability and shape adjustability by applying memory shape alloy (Nitinol Elastinite) to its core. Flexible tip by using shaping ribbon. (Tip load 0.4G)

### Balance Middle Weight



Good durability and shape adjustability by applying memory shape alloy (Nitinol Elastinite) to its core. Higher support performance than Balance. (Tip load 0.5G)

# ASAHI Wires: Miraclebros & Confianza Family

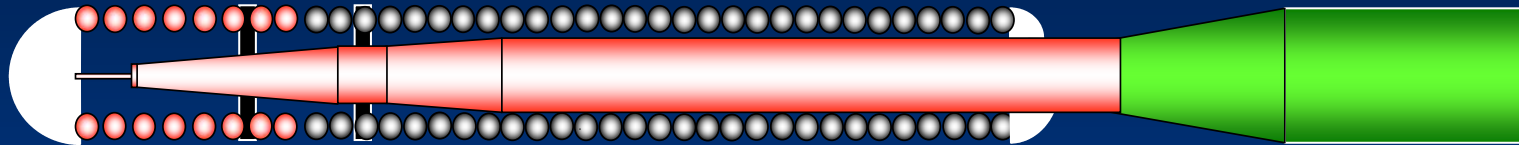
Miraclebros 3g  
Miraclebros 4.5g  
Miraclebros 6g  
Miraclebros 12g

Confianza 9g  
CP(Confianza Pro) 9g  
CP(Confianza Pro) 12g

- Excellent trackability, 1:1 torque, and tactile response
- Incremental tip stiffness and wire support (Miraclebros line)
- Smallest tapered tip design (Confianza & CP, 0.009")



# Asahi MiracleBros Wires

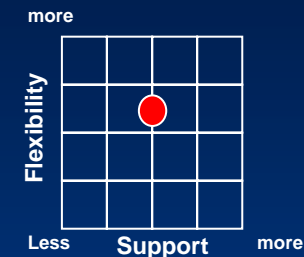
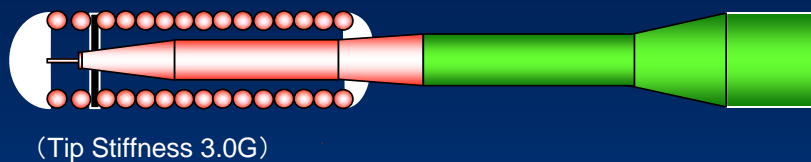


- MiracleBros Family 3, 4.5, 6, & 12
- Smooth trackability & delivery with Joint-less spring coils
- Core-to tip design
- Excellent tip shapeability & shape retention
- Radiopacity = 11cm
  - Visibility of full wire length, for chronic occlusions
- Hydrophilic coating

# Miracle Series

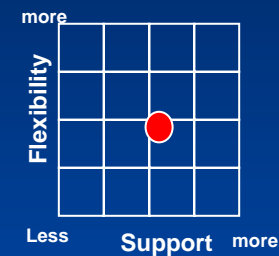
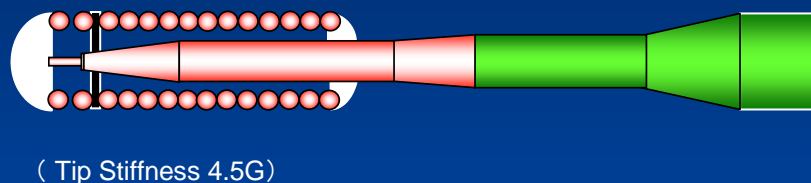
## Miracle 3

AG14M050  
Tip Radiopacity  
11cm  
0.014inch  
175cm



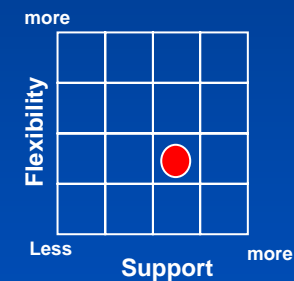
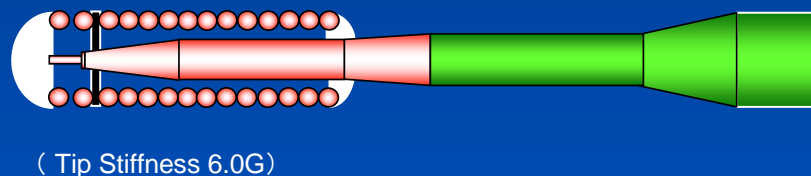
## Miracle 4.5

AG14M045  
Tip Radiopacity  
11cm  
0.014inch  
175cm



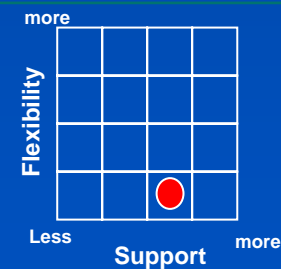
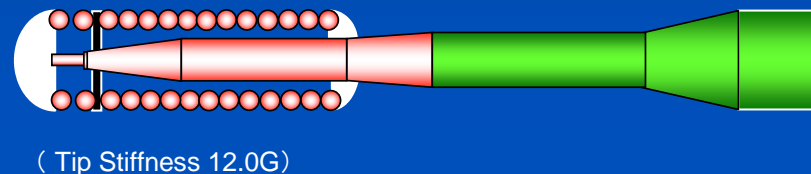
## Miracle 6

AG14M060  
Tip Radiopacity  
11cm  
0.014inch  
175cm



## Miracle 12

AG14M070  
Tip Radiopacity  
11cm  
0.014inch  
175cm



# Asahi Confianza Family



## Confianza

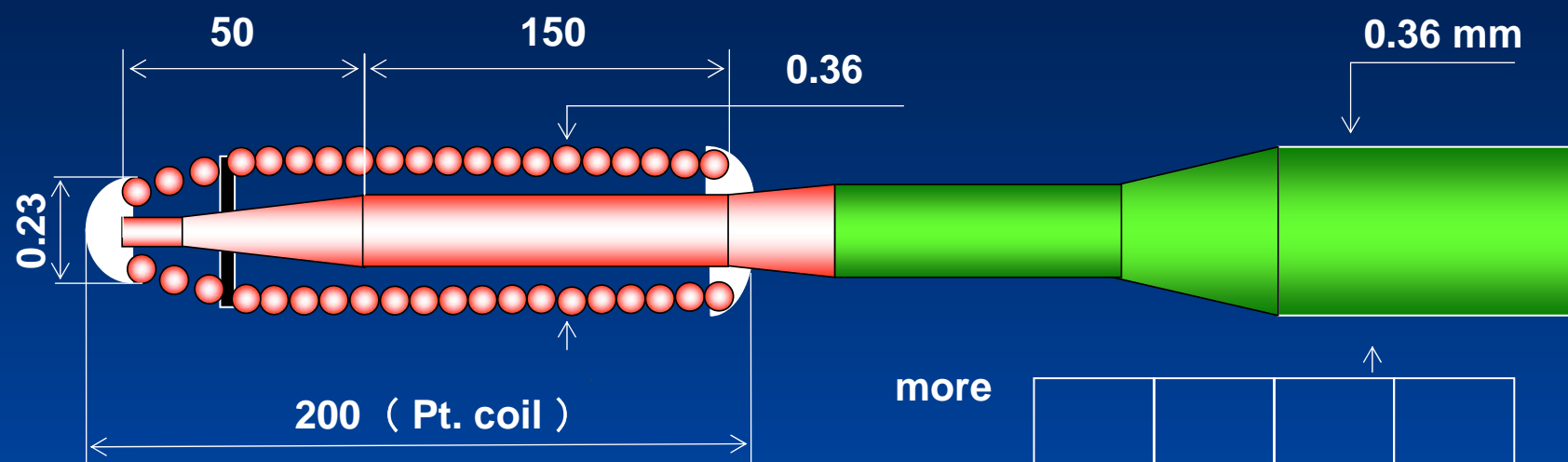
- Designed for chronic occlusions
- Hydrophobic coating
- Tip tapers to 0.009"
- Tip Load = 9 g
- Radiopacity = 20 cm



## Confianza Pro (CP)

- Designed for chronic occlusions
- Hybrid: hydrophobic tip for tactile feedback & hydrophilic coating for lubricity in lesion
- Tip tapers to 0.009"
- Tip Load = 9g, 12g
- Radiopacity = 20 cm

# Confianza Wire (Conquest)



- Developed for of CTO lesions
- Higher crossability than Miracle series
- Distal OD is 0.009 inches(  $\phi$  0.23mm with tapered coil
- Tip Stiffness 9.0G)

more

Flexibility

less


Support

more

## CONQUEST

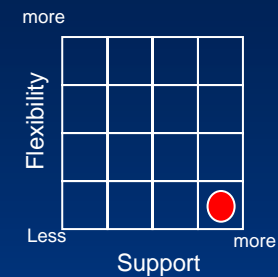
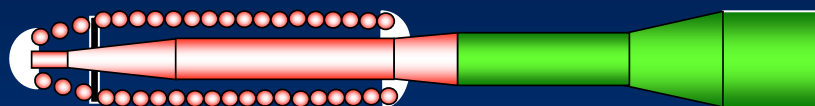
AG143090

Tip Radiopacigy

20cm

0.014inch

175cm



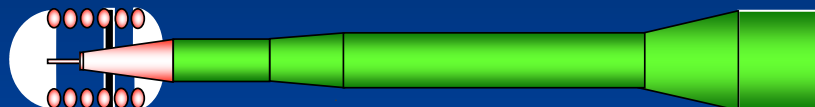
## Grand Slam

AG141002

Tip Radiopacigy 4cm

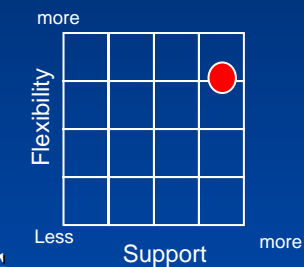
0.014inch

175cm



Flexible distal tip.

Provide more support for tortuous vessel. Tip Stiffness 0.7G



## Maker Wire

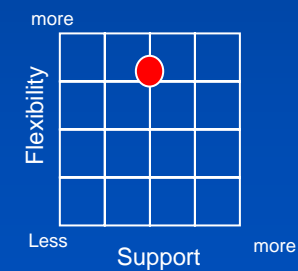
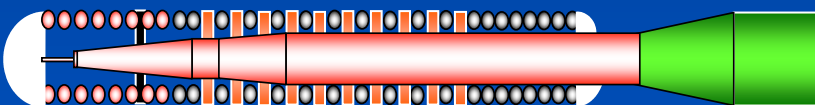
AG141010

Tip Radiopacigy

3cm

0.014inch

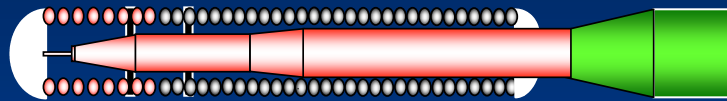
175cm



# Asahi Neo's vs. ACS (CTO type): Structural Comparison

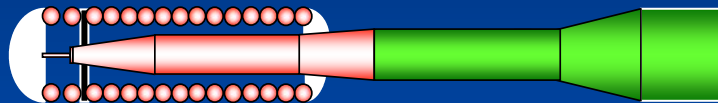
## ASAHI NEO'S Family

### Intermediate



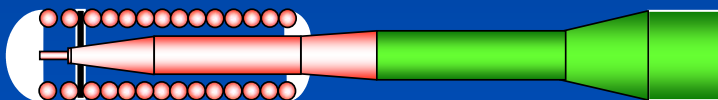
This is a guidewire with a good balance of tip flexibility and support performance. (Tip load 3.0G)

### Miracle 3



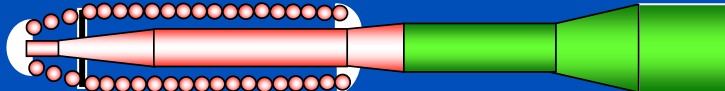
Applying the structure which further improves torque performance for CTO use. The tip part has the structure which is difficult to be trapped by the lesions. (Tip load 3.0G)

### Miracle 6



(Tip load 6.0G)

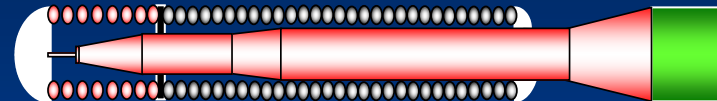
### CONQUEST



This wire is developed for CTO use. Diameter of tip coil is tapered to 0.009 inch ( $\phi$  0.23 mm). (Tip load 9.0G)

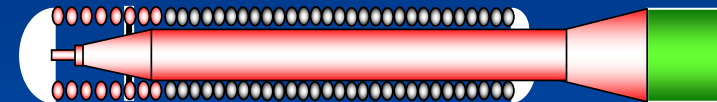
## HI-TORQUE Family

### Intermediate



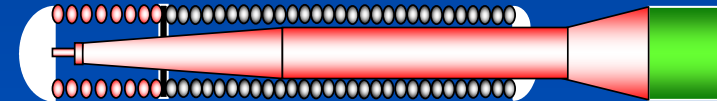
Good controllability and torque response with Core-To-Tip Structure (Tip load 2.0G)

### Standard



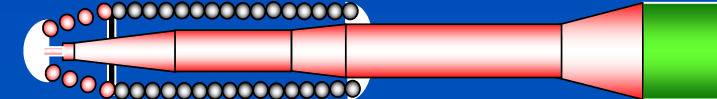
Suitable to CTO. High pushability and support performance (Tip load 5.0G)

### STING



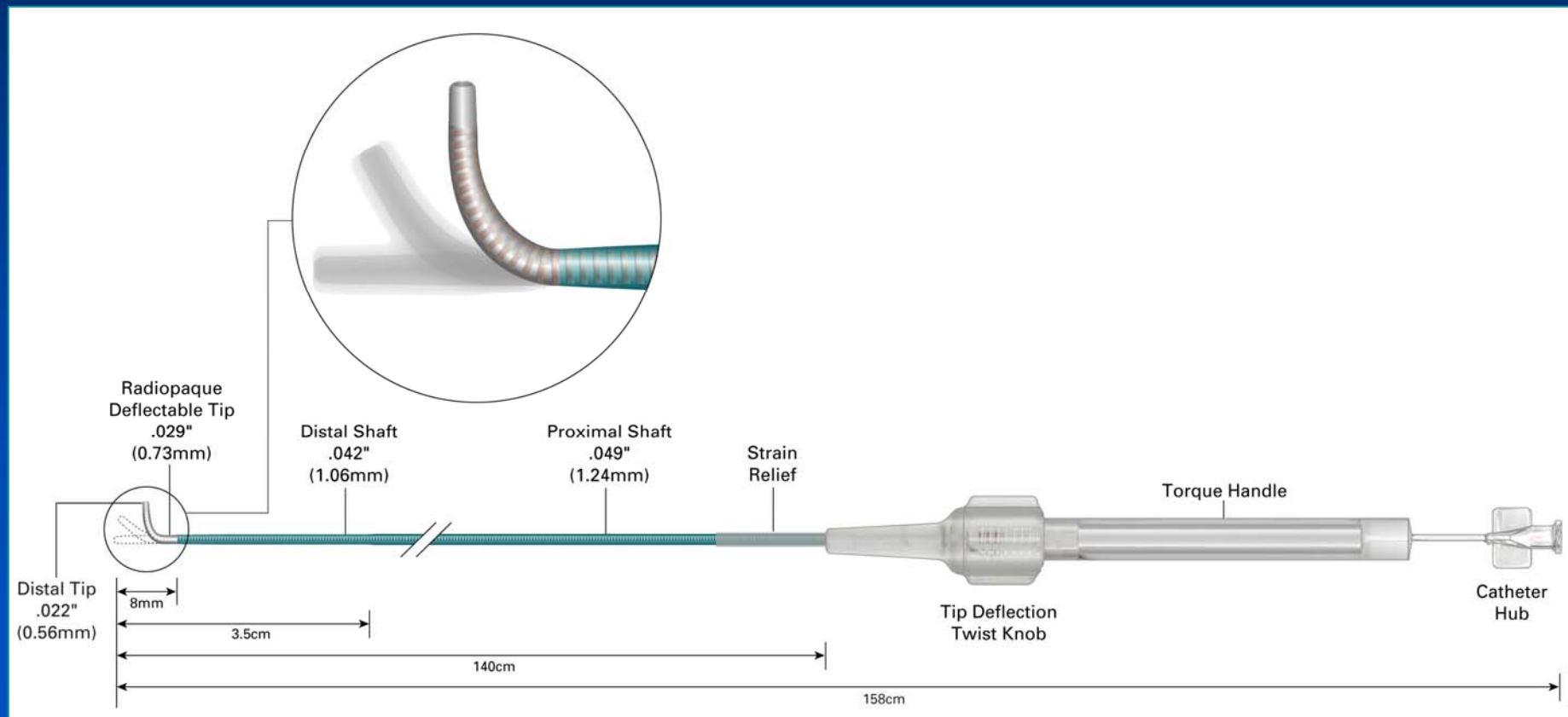
Improved trackability by its thicker distal core and longer taper length than HTS. (Tip load 8.0G)

### CROSS-IT



For CTO use. Tip diameter is 0.010inch. (Tip load 3.5G)

# Steerable guidewire: Hydrophilics



# **Tapering Tip Guidewires:** **Designed to Enter MicroChannels**

- Cross It Series (Guidant)-(0.10)
- Confianza Series (Asahi, Abbott (0.009))  
Lubricious vs Not

If microchannels can be visualized to connect,  
then lubricious wires are frequently successful  
and always quick



# Microchannels

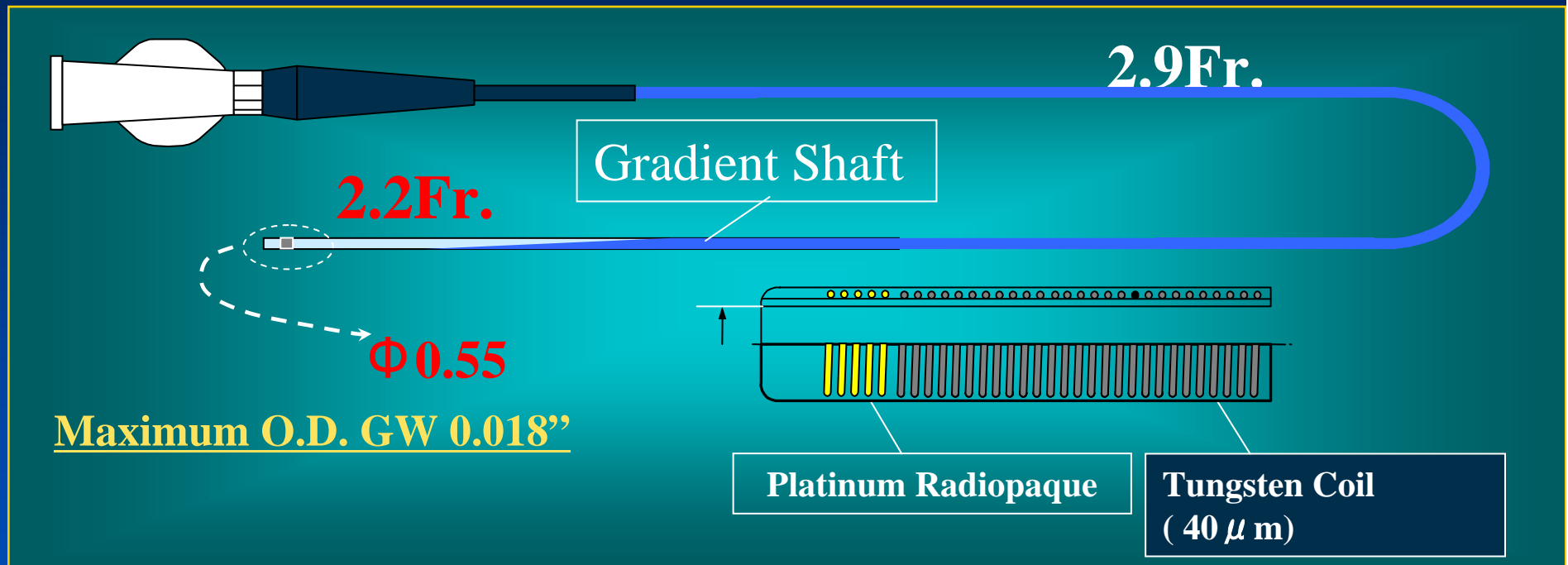
- Provide contact with agents that might alter CTO

**Lytics** : O'Neill, et al

**Matrix-Metalloproteinase-1 (MMP-1)**  
**(collagenase)** : Strauss, et al

# Terumo's Progreate

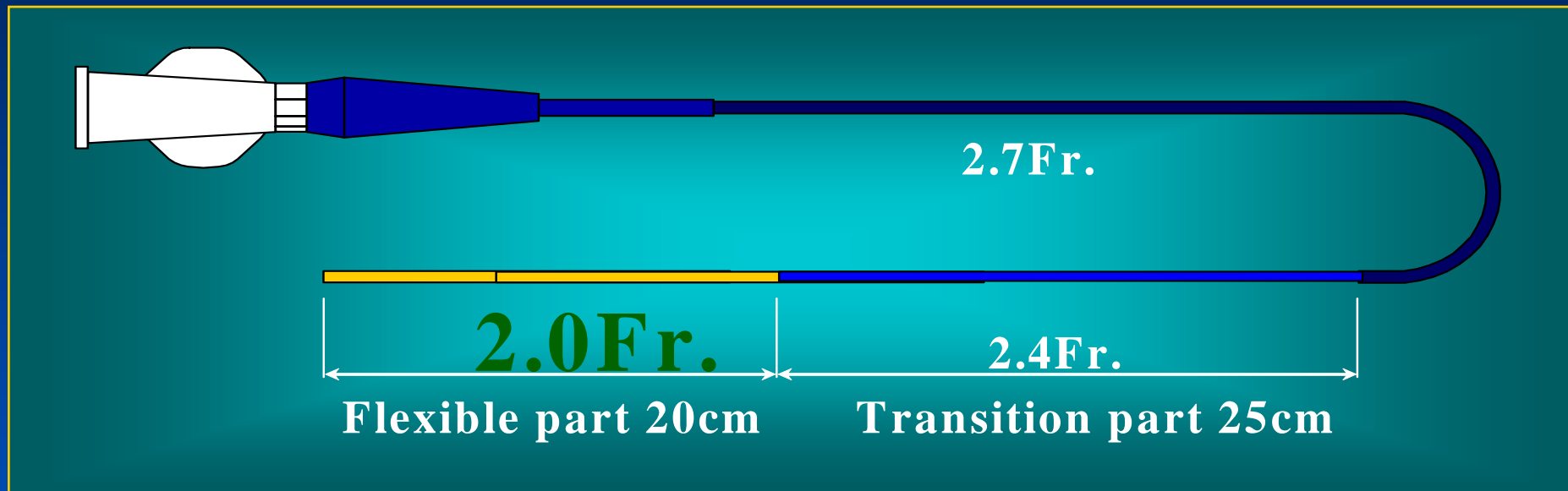
*2.2Fr. <super selective>*



- Excellent Tracability
- Excellent Handling
- Enough Flow rate

# Terumo's Progreate

*2.0Fr.<super selective>*



Outer surface : Hydrophilic coating  
(Except 60mm from proximal end)

*Catheter Size: 2.0 - 2.7Fr. (Distal-Proximal)*

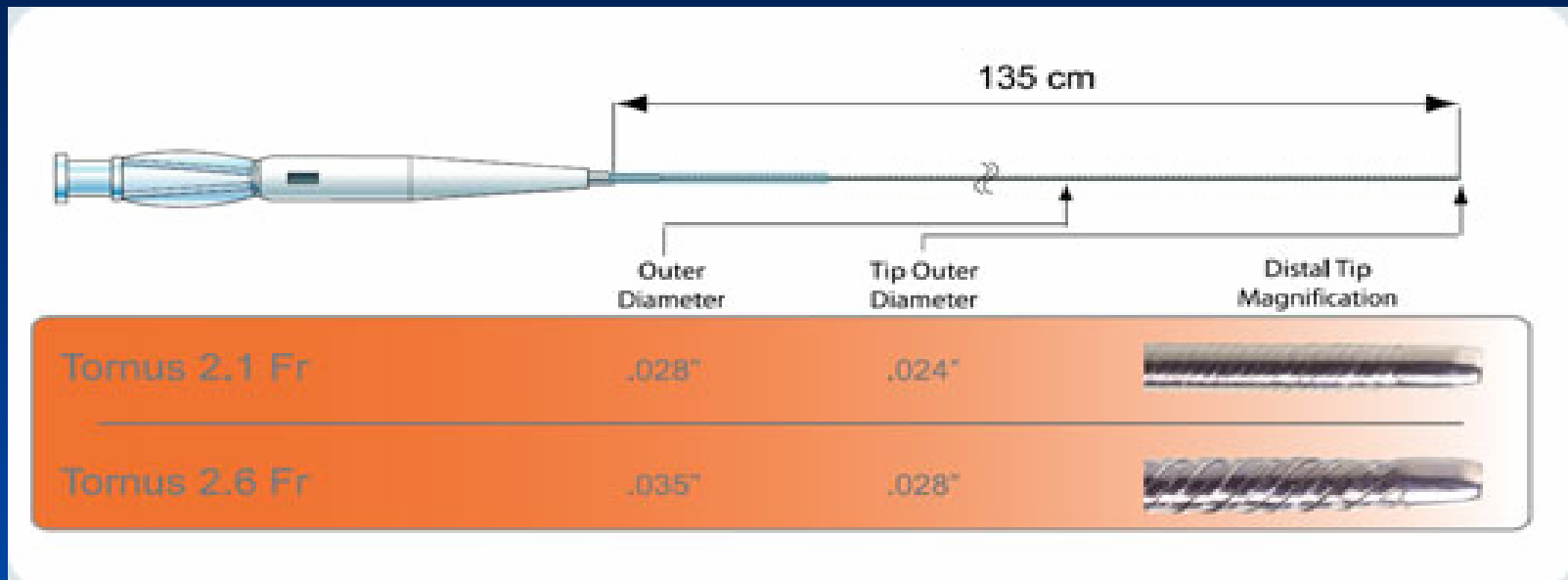
*Inner diameter: 0.49mm/0.019inch*

*Length: 100cm,110cm,130cm, 150cm*

*Max. Injection Pressure: 750psi*

*Hydrophilic coating*

# Asahi's Tornus



- Braided stainless steel catheter
  - for greater support and pushability
- 1mm distal radiopaque marker
  - for easy visualization of the distal tip
- Tapered threaded tip
- Excellent flexibility for tortuous anatomy