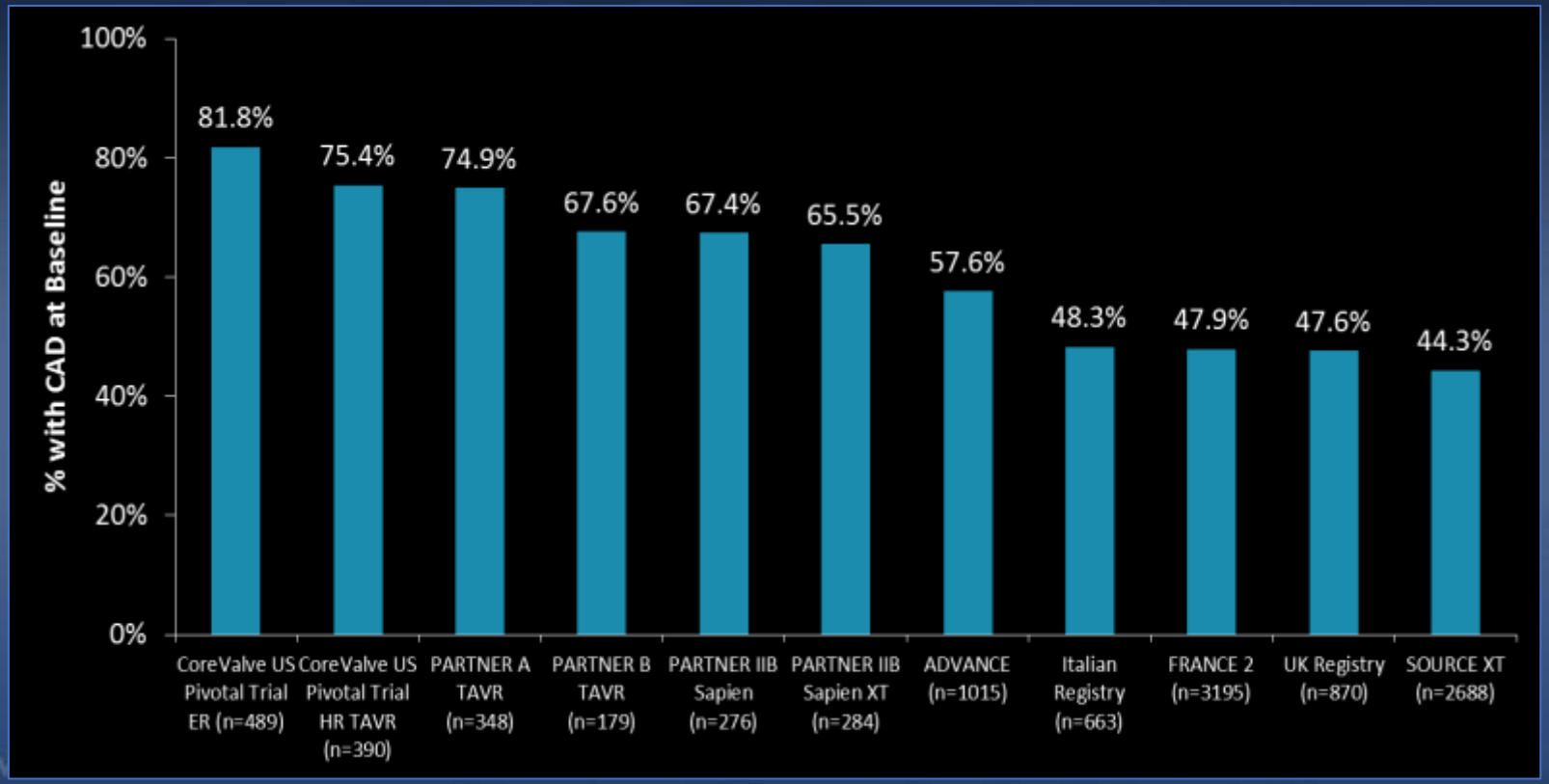
Coronary Access After TAVI Technical Tips and Tricks

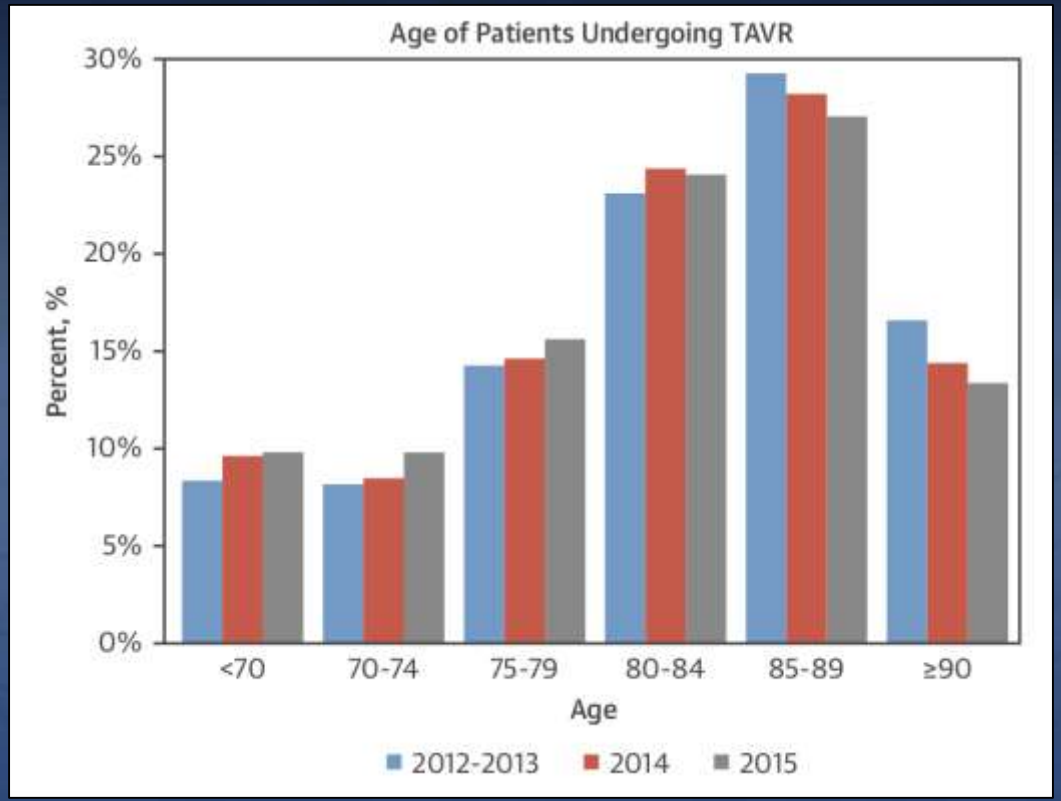
O. Christopher Raffel

Insert Department and Institution Here(20pt)

Prevalence of CAD in the TAVI Patient



Changing Trends in Age at TAVI



Grover, FL, et al. J Am Coll Cardiol 2017;69:1215–30

Coronary Access After TAVI: Key points

Different from a native AV or a Bioprosthetic AVR

- Large frames that cover the coronary sinus
- Native valve remains between the frame and the coronary sinus
- Less precise than a SAVR – depth, coronary ostia & posts

Small waist of self-expanding TAV – neoaorta

- Catheter choice is different – small curves by 0.5-1.0

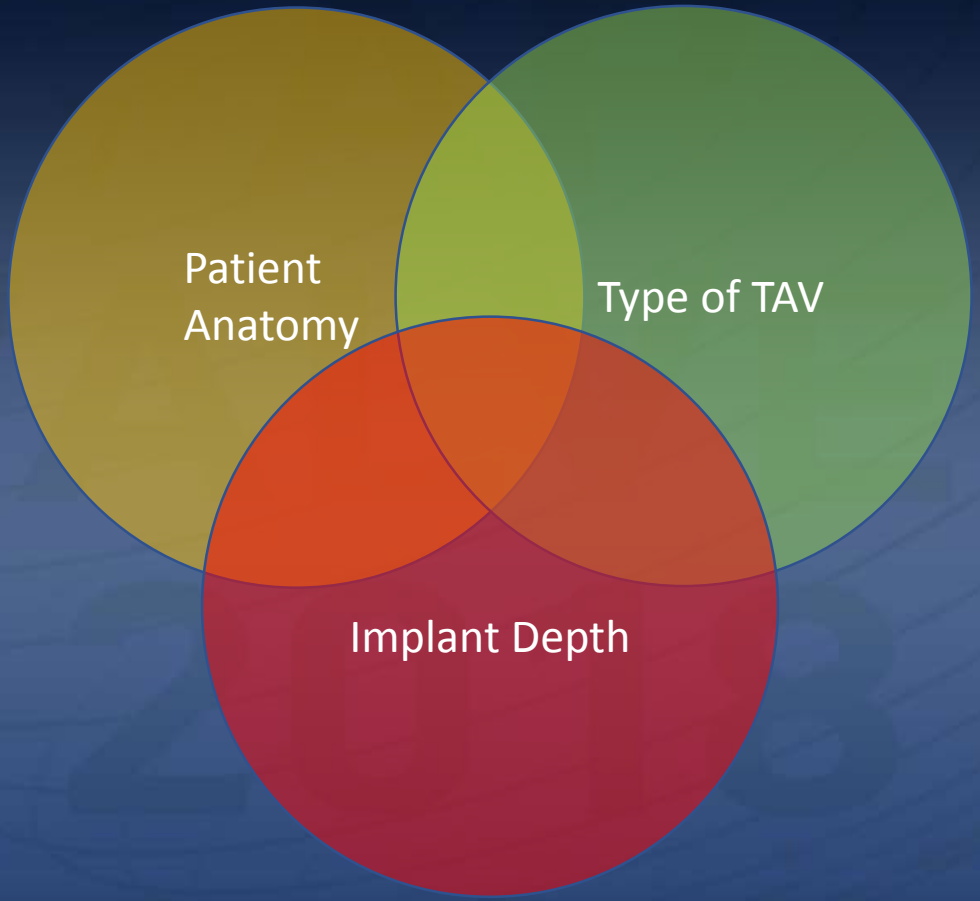
Most times the frame extends above coronary ostia

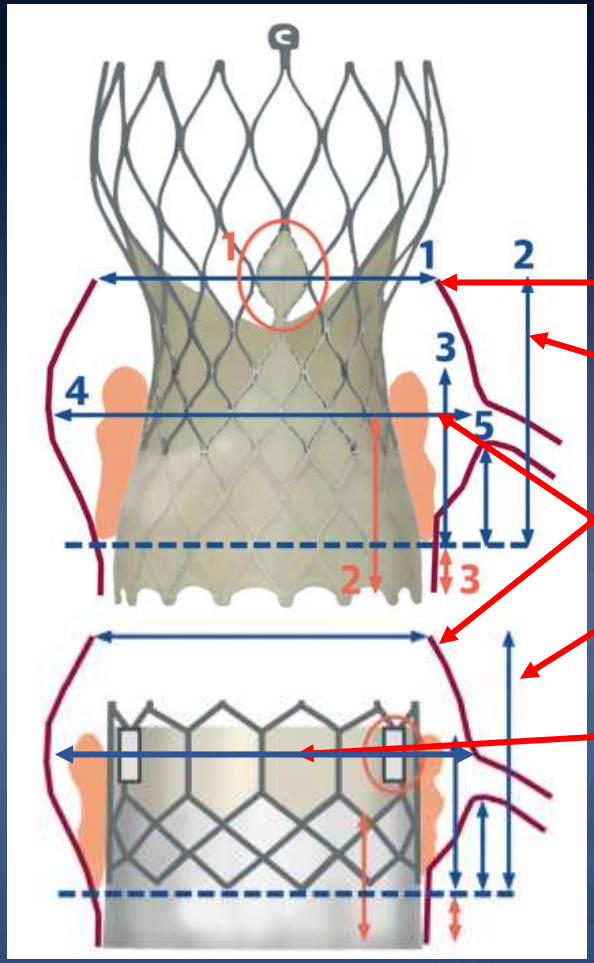
- Catheter frame interaction – guide going through frame cell
- Use guidewire as rail intubate and extubate ostia across frame

Coaxiality is not always (often is not) possible – BIGGEST CHALLENGE

- Free wiring – “fly fishing” wiring – not uncommon
- More frequent use of wire and balloons to rail road guide
- More liberal use of guide extension devices (Guideliner/Guidezilla)
- Use of different guides to Ikari, MPA

Coronary Access After TAVI

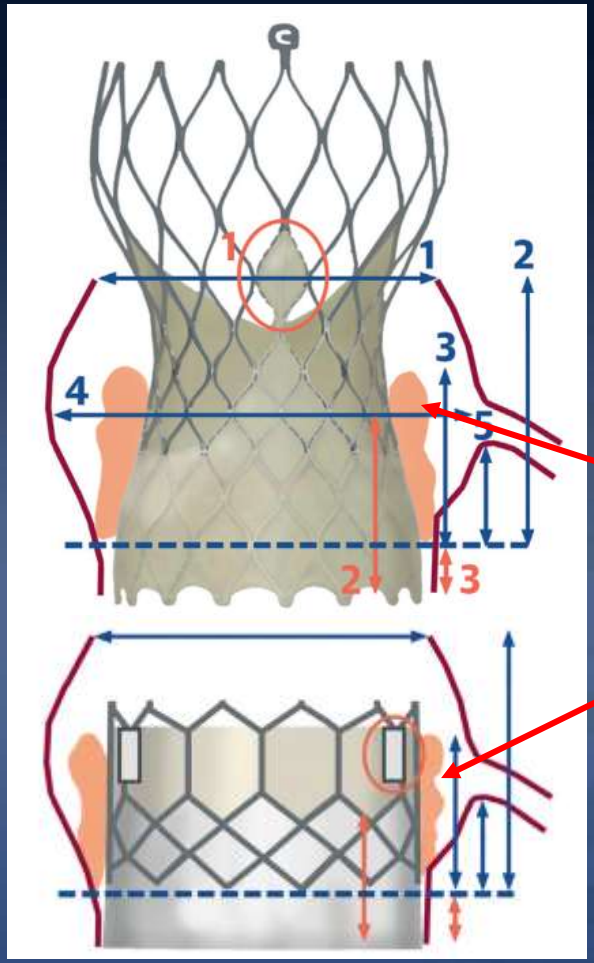




Anatomical

1. Sinotubular junction dimensions
2. Sinus height
3. Leaflet length and bulkiness
4. Sinus of Valsalva width
5. Coronary height

Modified from Yudi, et al., *J Am Coll Cardiol* 2018; 71(12):1360–78



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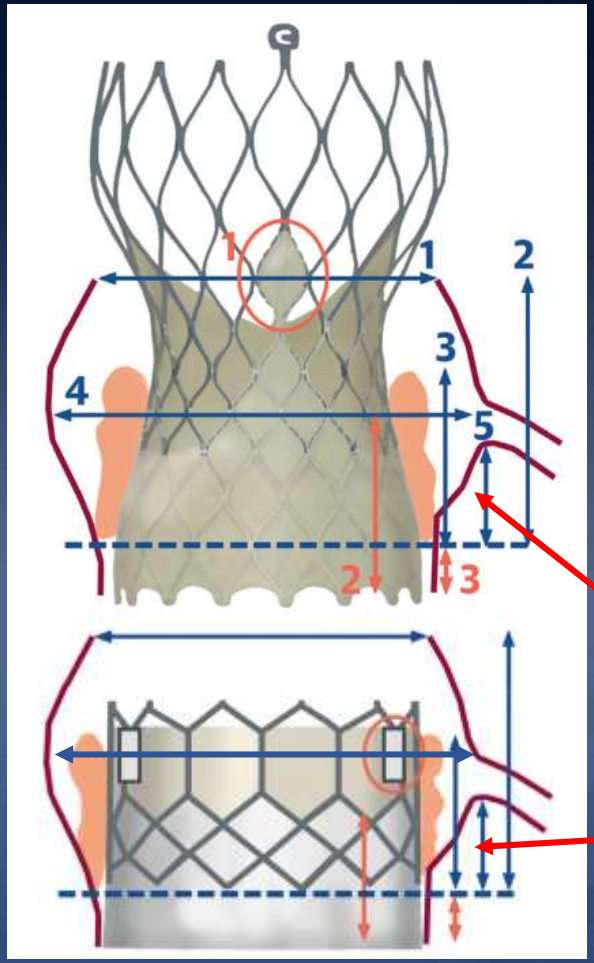

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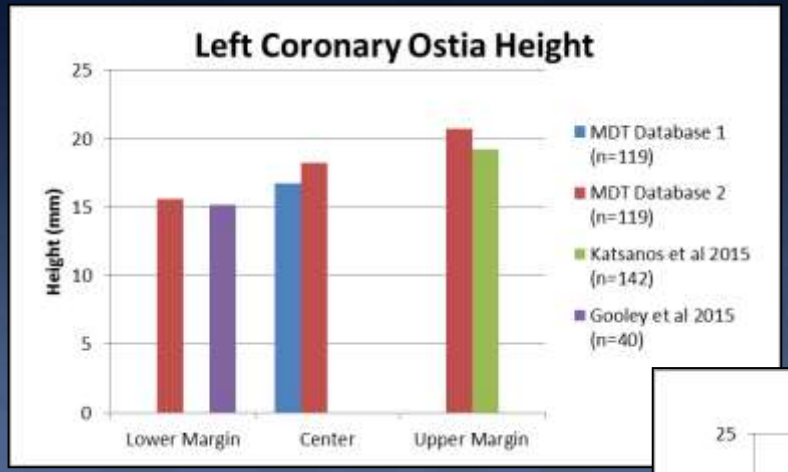
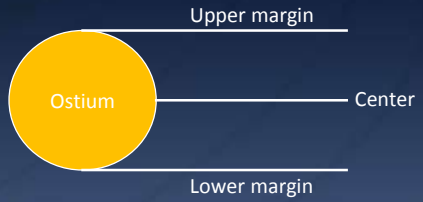
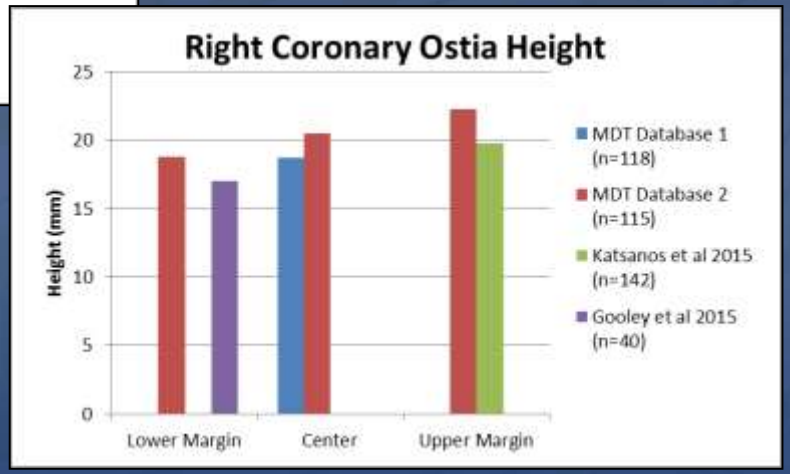
Coronary Ostia Heights





* All measured from the basal plane

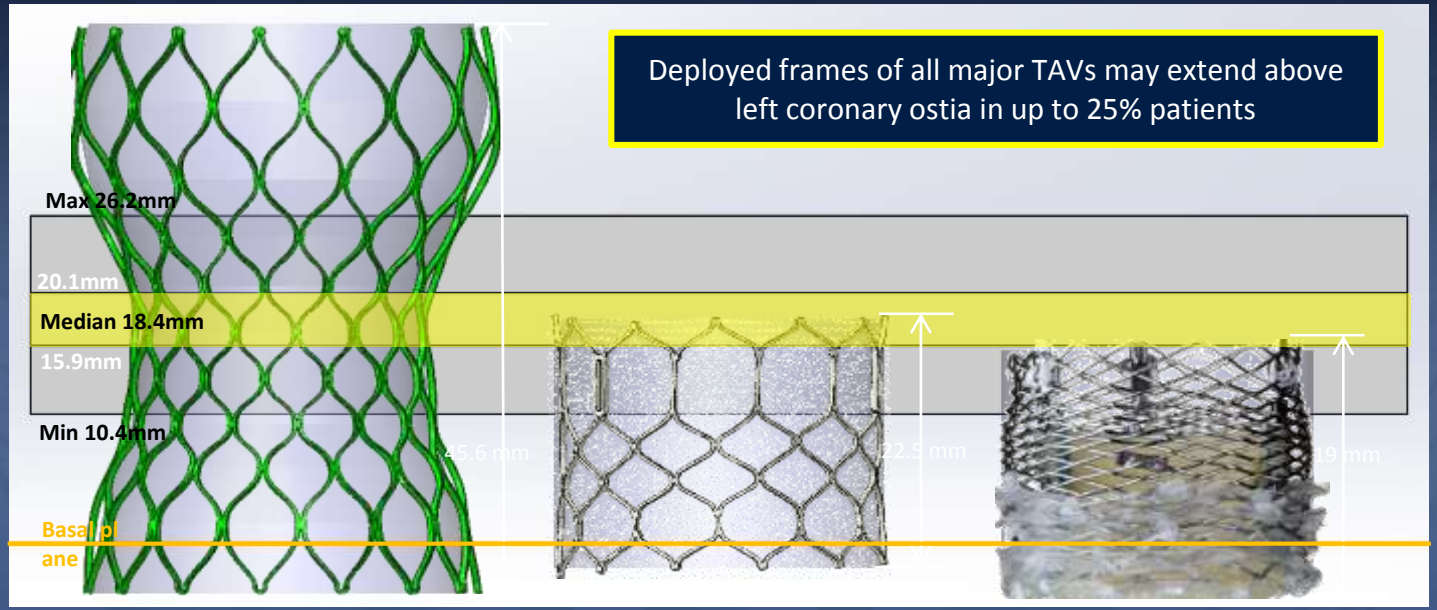


* Gooley et al., JACC Cardiovasc Interv, 2015
* Katsanos et al., Catherization and CV Interv, doi: 10.1002/ccd.25718

Coronary Access After TAVI

ALL TAV'S MAY EXTEND ABOVE CORONARY OSTIA

- Coronary ostia height measurements are from CoreValve US IDE Trial
- Measurements represent the height from the basal plane to the center of the left coronary ostium
- Yellow box represents the interquartile range (+/- 25%)



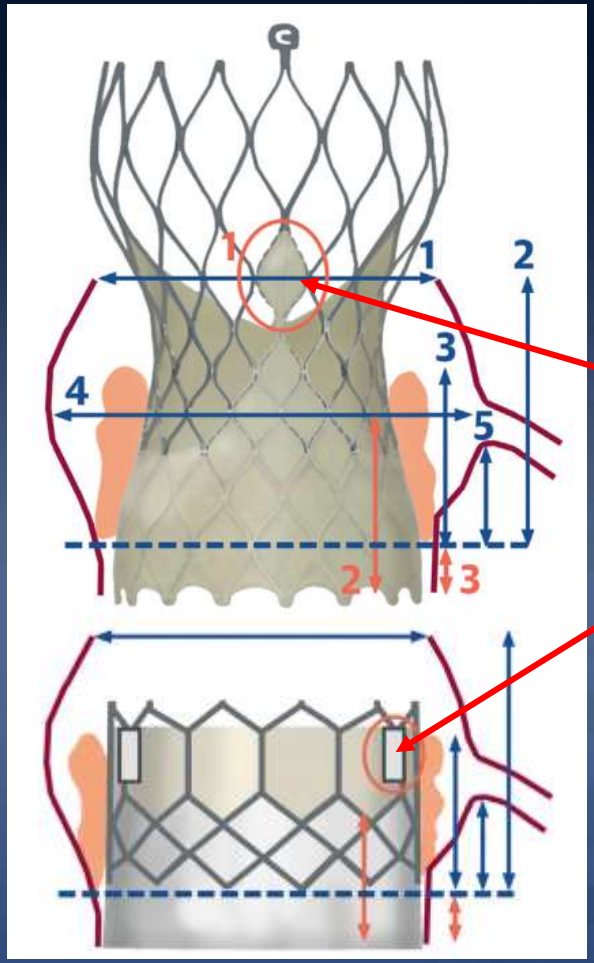
Evolut R valve - Size 29
- Annulus Range = 23-26mm
- Depth = 3-5mm

Sapien ™*3 - Size 26
- Annulus Range = 23.4-26.4 mm
- Depth = 10% of height

Lotus™* - Size 25
- Annulus Range = 23-25mm
- Depth = 3.6 mm*

* Gooley et al., JACC Cardiovasc Interv, 2015

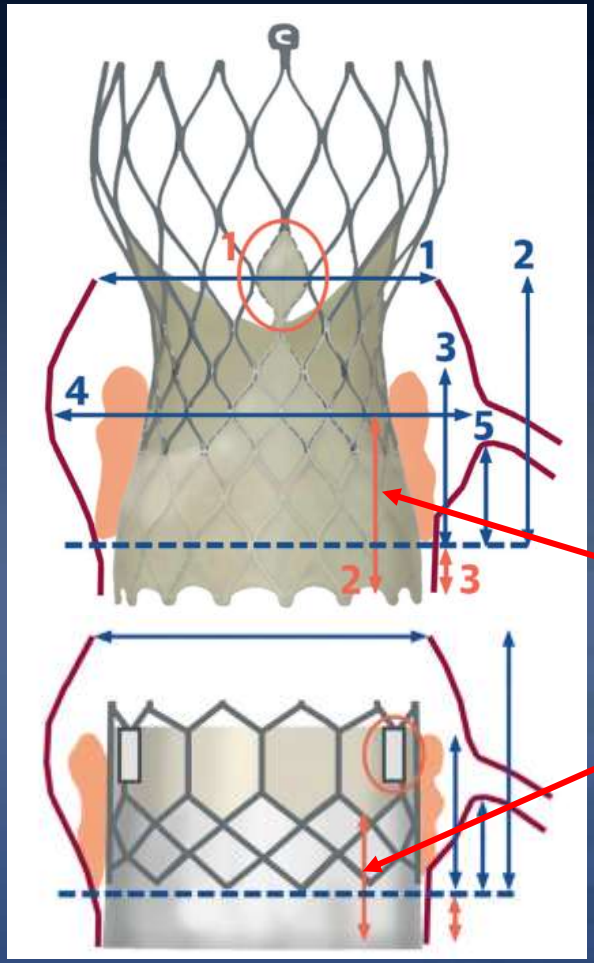
Sapien 3 Instructions for Use. http://www.accessdata.fda.gov/cdrh_docs/pdf14/P140031c.pdf
Lotus: https://www.bostonscientific.com/content/dam/bostonscientific/Interventional%20Cardiology/portfolio-group/Valves/FV_BC00815_Lotus_SpecSheet_Update_DINSH0052EA_72dpi.pdf



Device and Procedural

1. Commissural tab orientation
2. Sealing skirt height
3. Valve implant depth

Modified from Yudi, et al., *J Am Coll Cardiol* 2018; 71(12):1360–78



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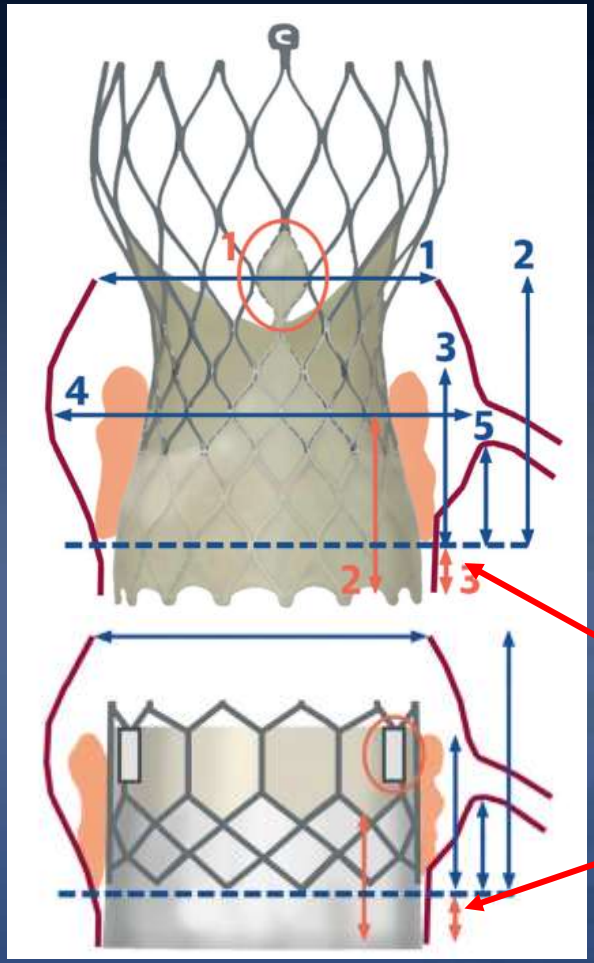

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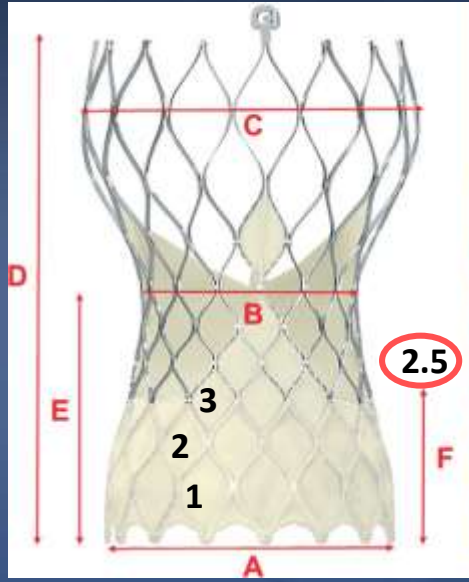
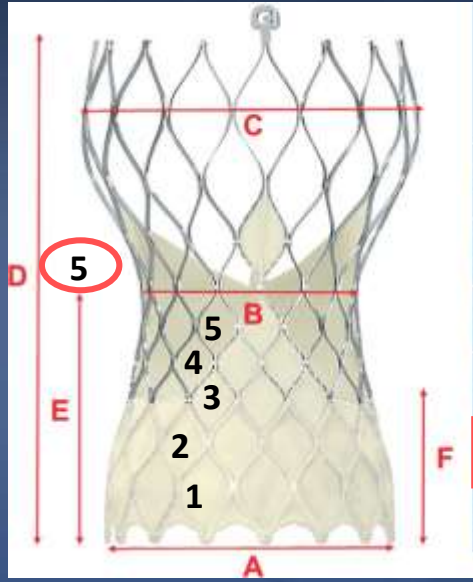
CoreValve: Skirt Height



	23mm Evolut R / PRO	26 mm Evolut R / PRO	29mm Evolut R / PRO	34mm Evolut R
A. Inflow Diameter	23 mm	26 mm	29 mm	34 mm
B. Waist Diameter	20 mm	22 mm	23 mm	24 mm
C. Outflow Diameter	34 mm	32 mm	34 mm	38 mm
D. Frame height	45 mm	45 mm	45 mm	46 mm
E. Commissure Height	26 mm	26 mm	26 mm	26 mm
F. Skirt Height	13 mm	13 mm	13 mm	14 mm

Modified from Yudi, et al., *J Am Coll Cardiol* 2018; 71(12):1360–78

CoreValve: Commissure Height



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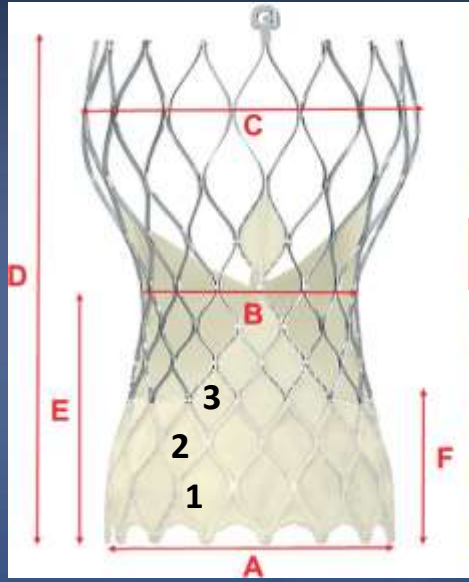
CoreValve: Waist Diameter – “neo aorta”



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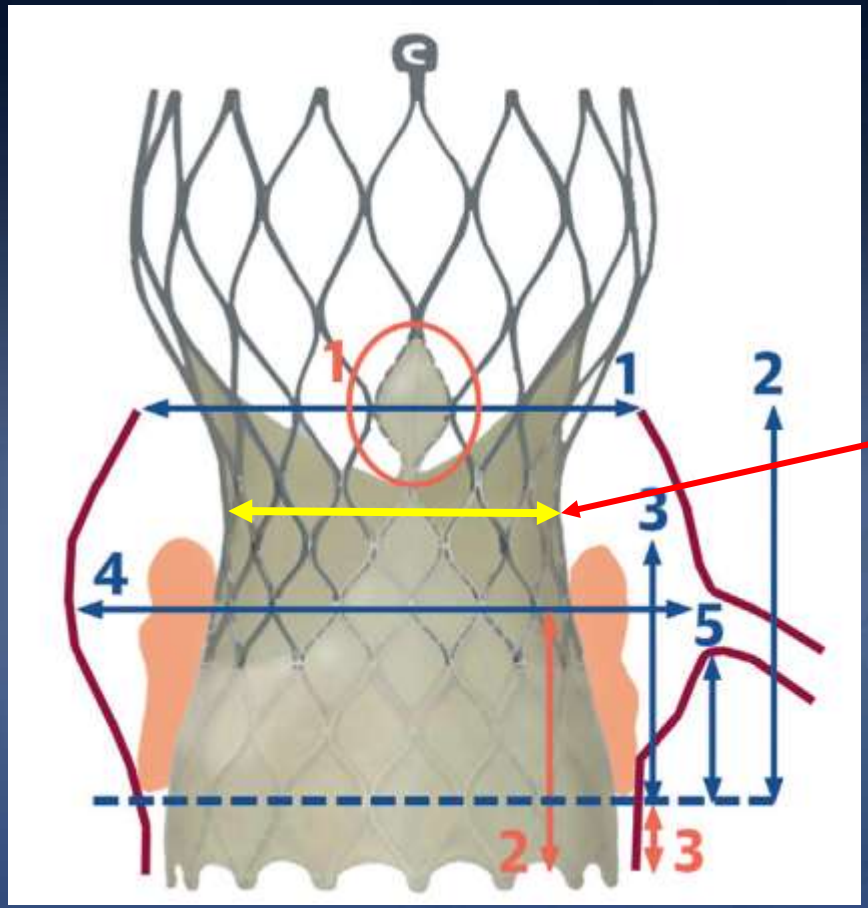


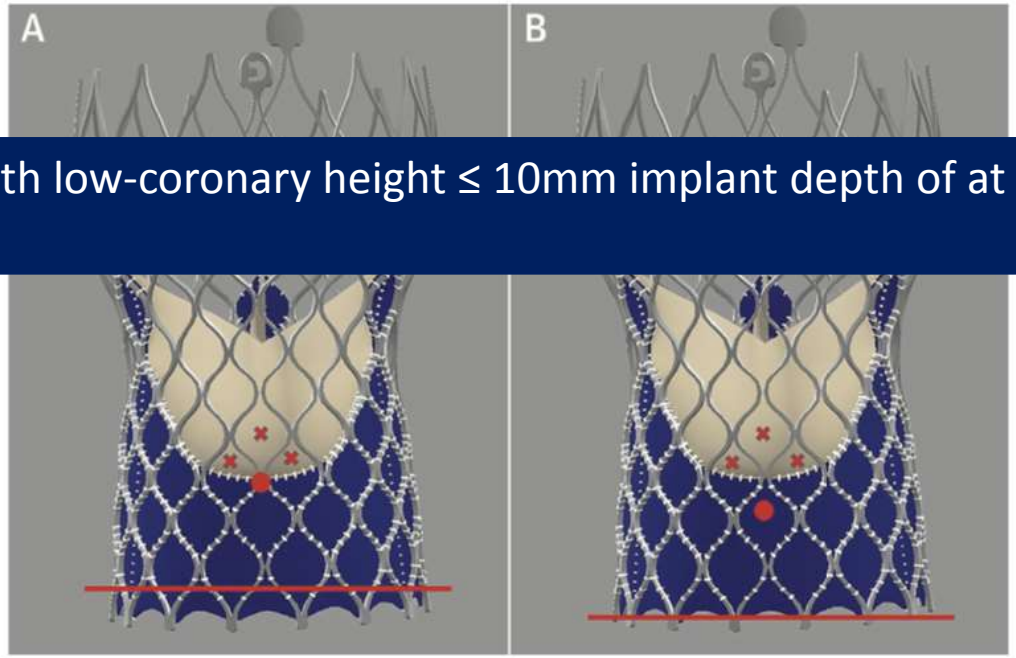
Waist Diameter

- Narrow "Neo-aorta"
- Smaller curve catheters/guides
- Contralateral backup support

Modified from Yudi, et al., *J Am Coll Cardiol* 2018; 71(12):1360–78

Coronary Access Depending on Implantation Depth

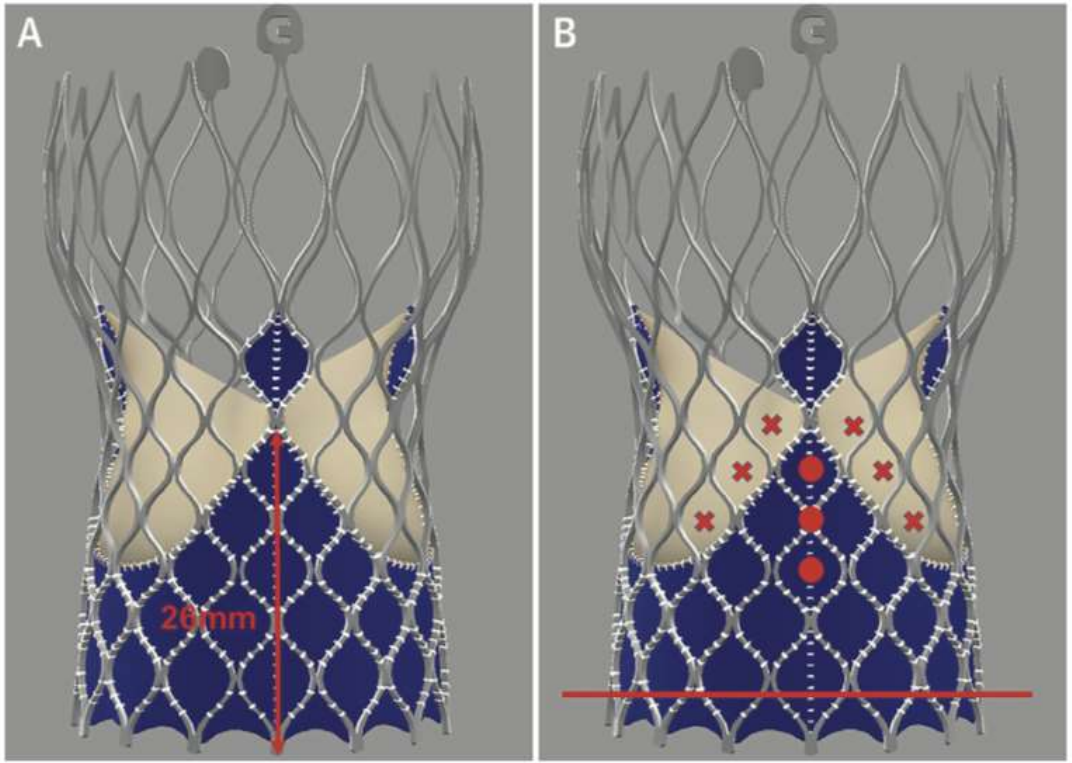
FIGURE 2 Self-Expanding Valve and Coronary Access Depending on Level of Implantation Across the Annulus



Particularly with low-coronary height ≤ 10mm implant depth of at least ~ 4mm is important.

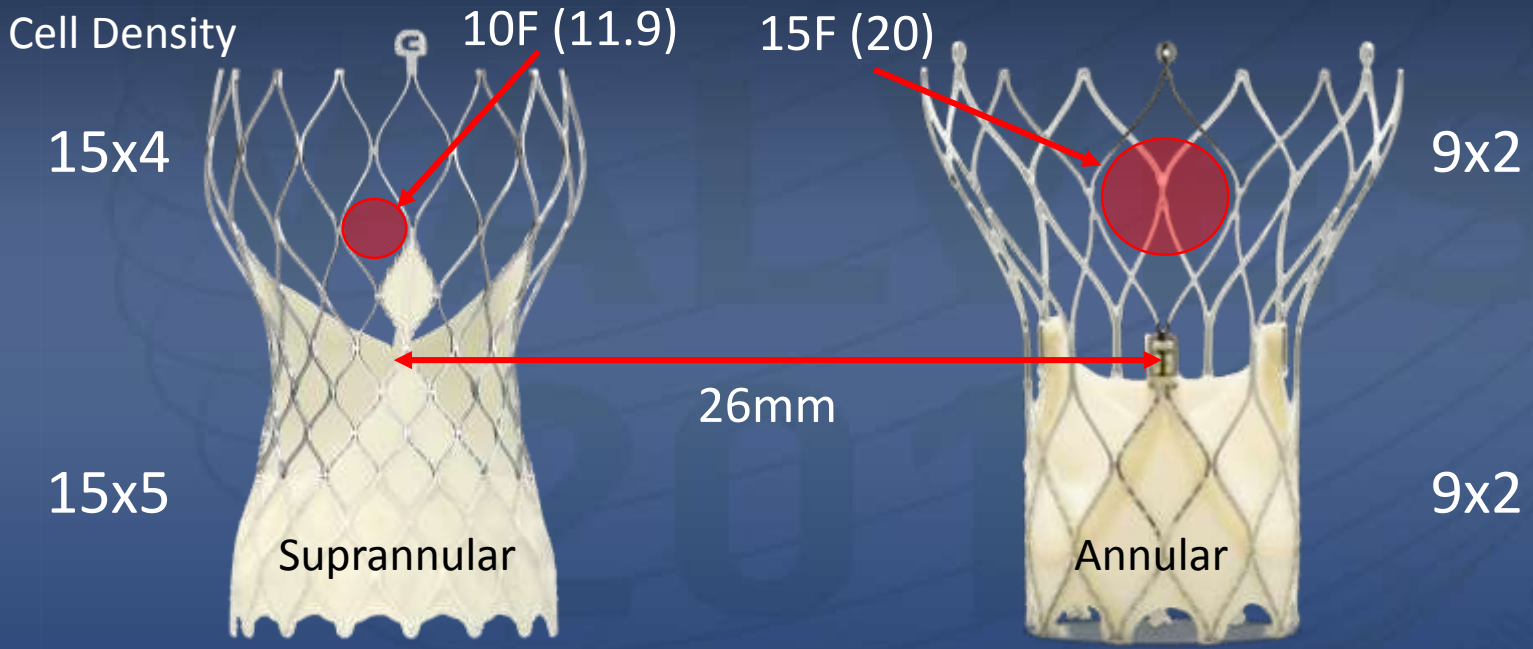
Yudi, et al., *J Am Coll Cardiol* 2018; 71(12):1360–78

Coronary Access Depending Position of Commissural Post



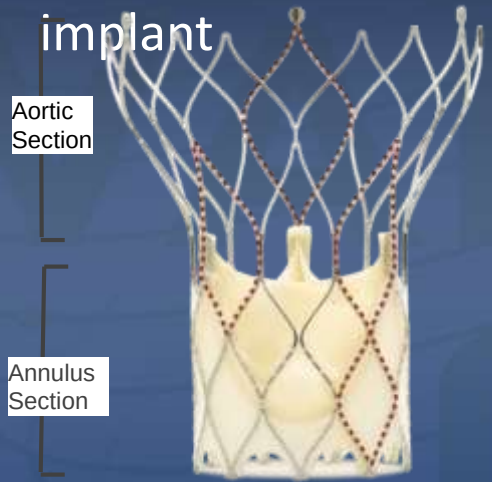
Yudi, et al., *J Am Coll Cardiol* 2018; 71(12):1360–78

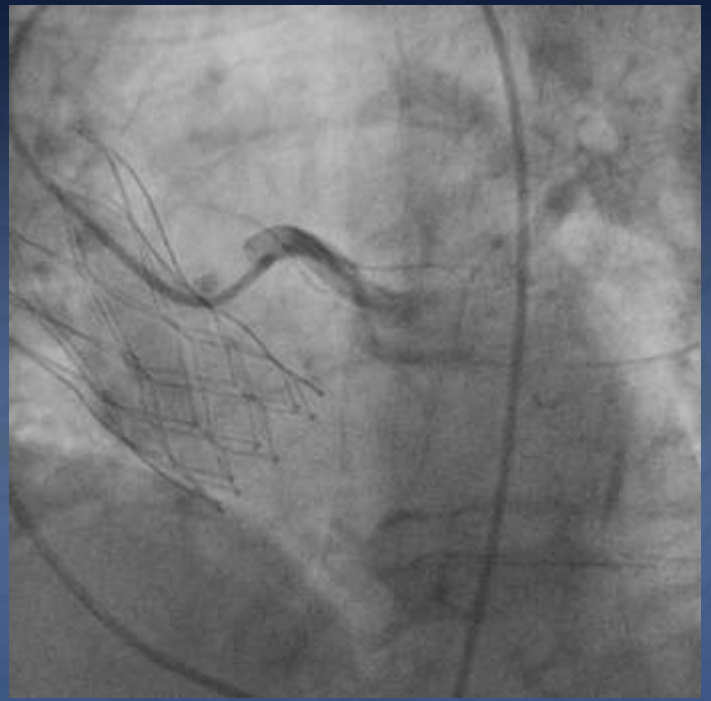
CoreValve vs Portico



Portico: Large cell design

- Large stent cells in the aortic section of the stent, allows access to coronary ostia post-implant

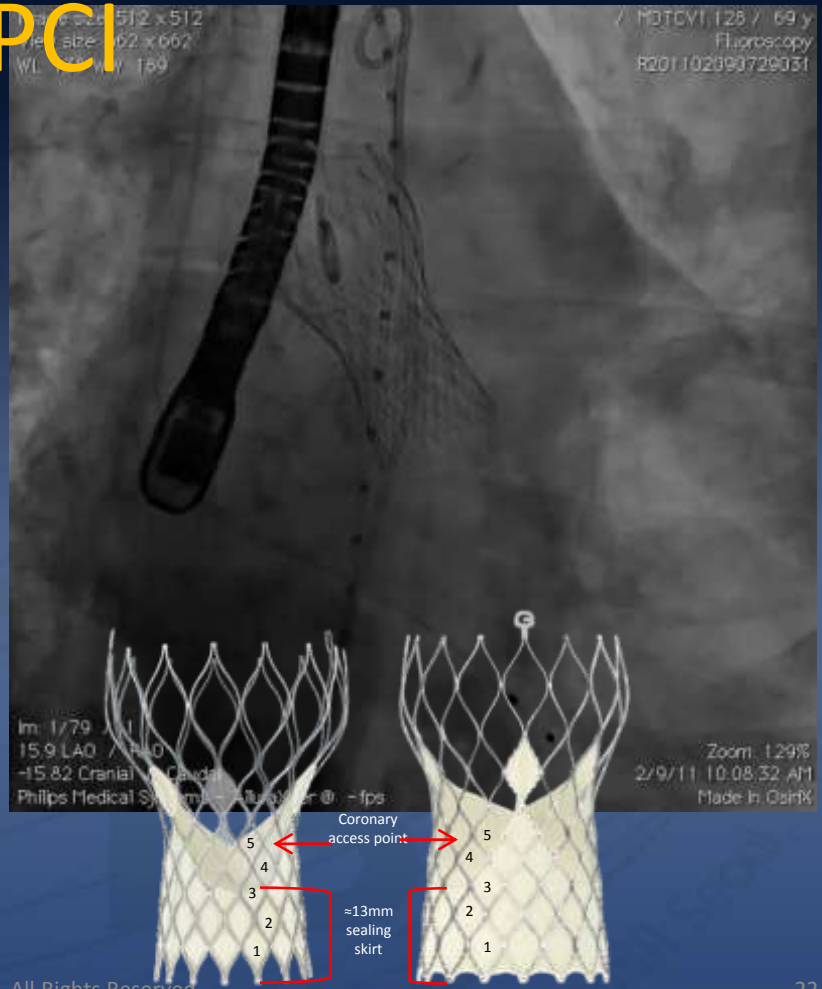




Manoharan, G., St. Jude Medical Portico™ Transcatheter Aortic Valve Clinical Experience, EuroPCR, 05/17/2012.

CoreValve: Angio + PCI

1. Use aortography to confirm ostia takeoff points and positioning of the Evolut R prosthesis by using a pigtail catheter
   - Assess implant height, and anatomical and device specific features.
   - Count 4-5 alternating diamonds on the valve to identify access point above the sealing skirt
     - 2.5 diamonds = top of sealing skirt
     - 5 diamonds = top of commissure point



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Coronary Angiography and PCI after TAVR with CoreValve

Initial non-selective injection followed by selective

- Facilitated by using J-wire to enter diamond in-front/adjacent to ostia (angled stiff glide wire useful too for entering diamond or tracking the catheter)

CoreValve

2. Engage the coronary ostium coaxially through the middle of the frame cell:
    1. Target the valve frame cell that is co-axial to the coronary ostia
    2. Always try and take the catheter tip into the frame cell over the guide wire. ALWAYS remove guide over guide wire.
    3. If there is difficulty with the frame cell that is directly coaxial to the ostium, use the frame cell to the left or right or above the ostium
    4. May need to “fly-fish” the guidewire and rail guide in.

Left Coronary with JL 4.0

Right Coronary with JR 4.0

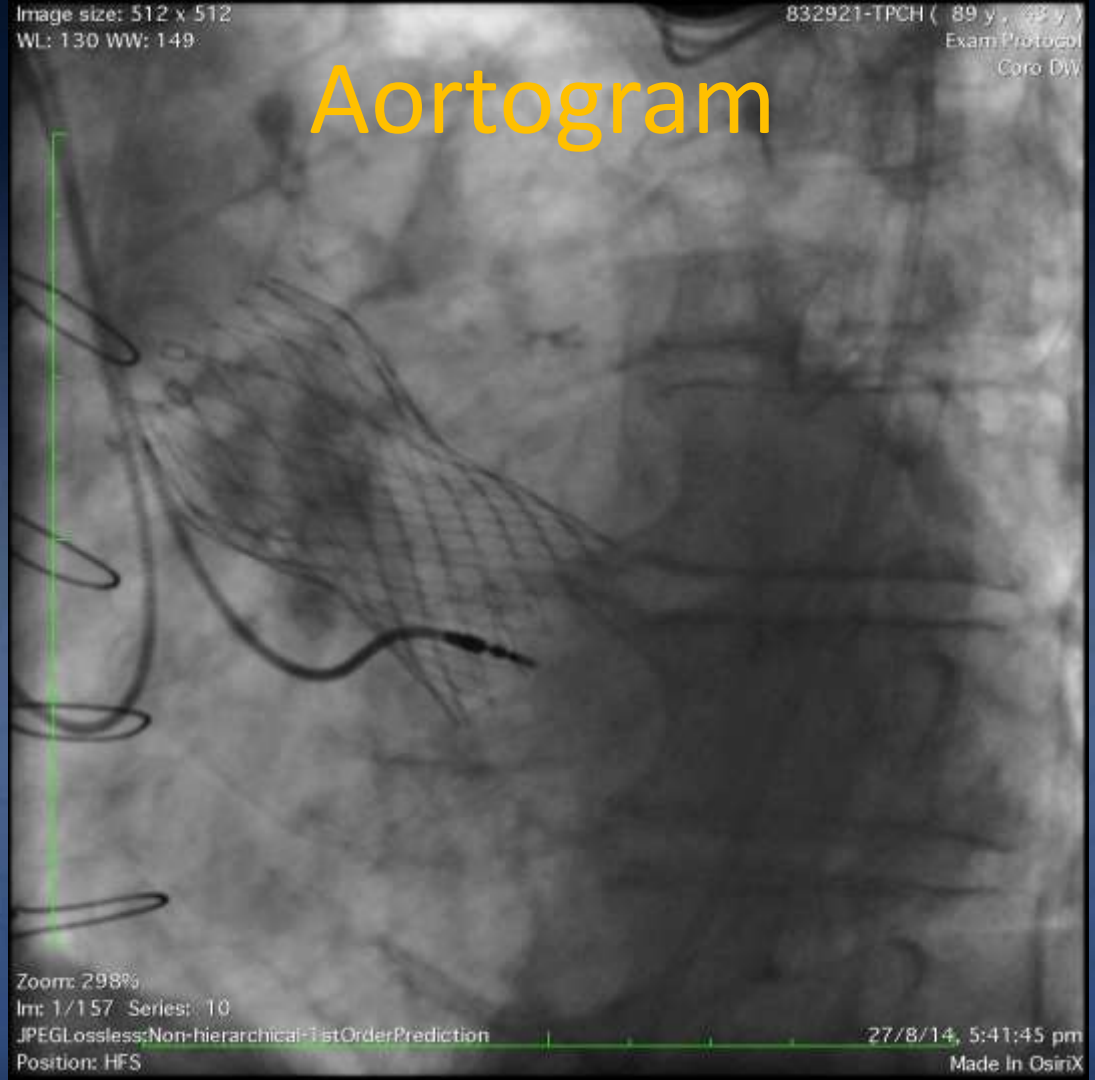
Coronary PCI after CoreValve TAVI

Left Coronary

- Use JL3.5/3.0, EBU 3.0. JR4 if small neo aorta and sinus.
- Second line guide: Ikari right 1.0 or IkR 1.5
- If difficulty with coronary engagement, rail guide using:
  - Coronary guidewire ±
  - Balloon support ±
  - Guide extension catheter

Right Coronary

- Use JR4 guide
- Second line guide: Ikari Right 1.5, AR (wide sinuses), MP
- If skirt is high, use Ikari Right or MPA guide to enter diamond from above coronary ostia and rail guide towards ostium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JPEGLossless:Non-hierarchical-1stOrderPrediction
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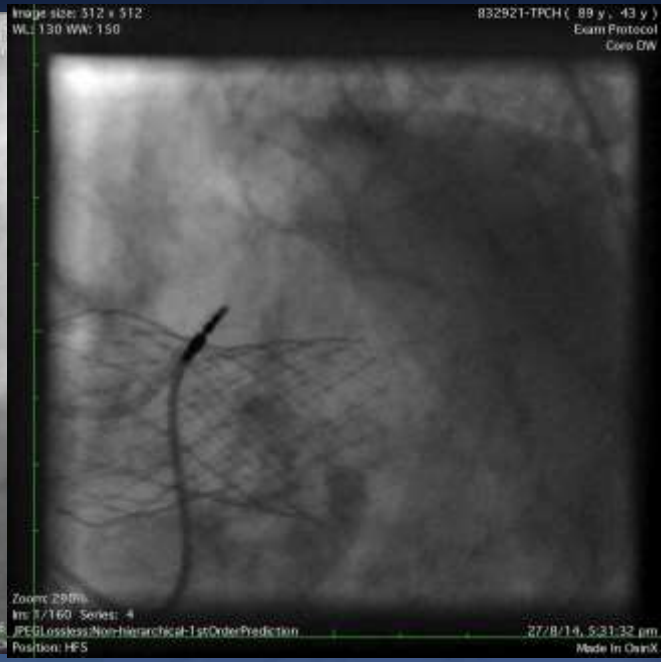
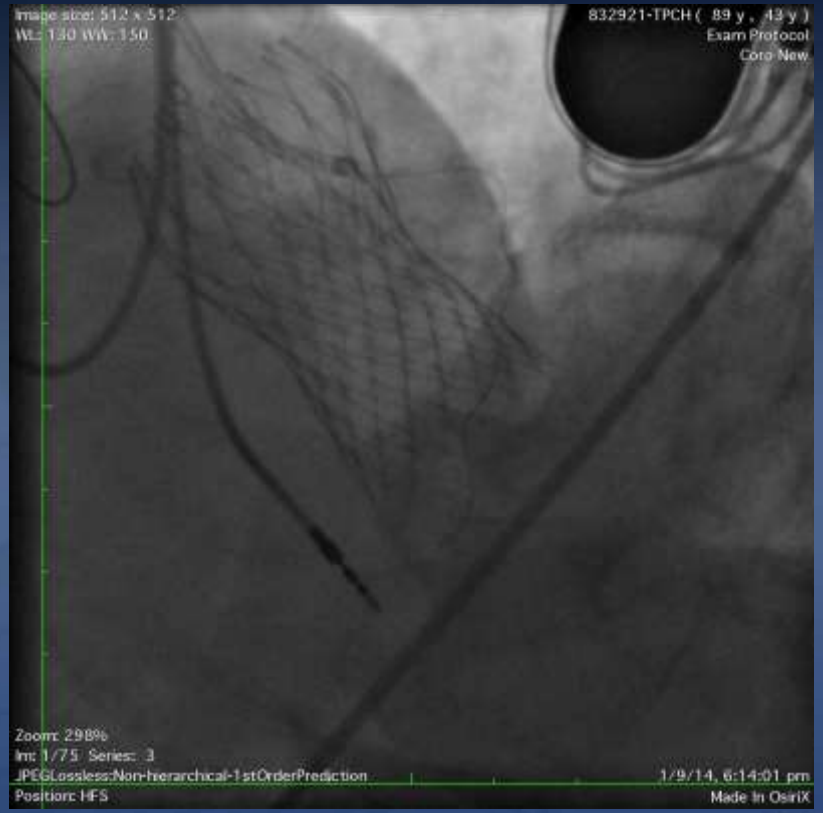
Position: HFS
Made In OsiriX

LCA diagnostic with JL 3.5

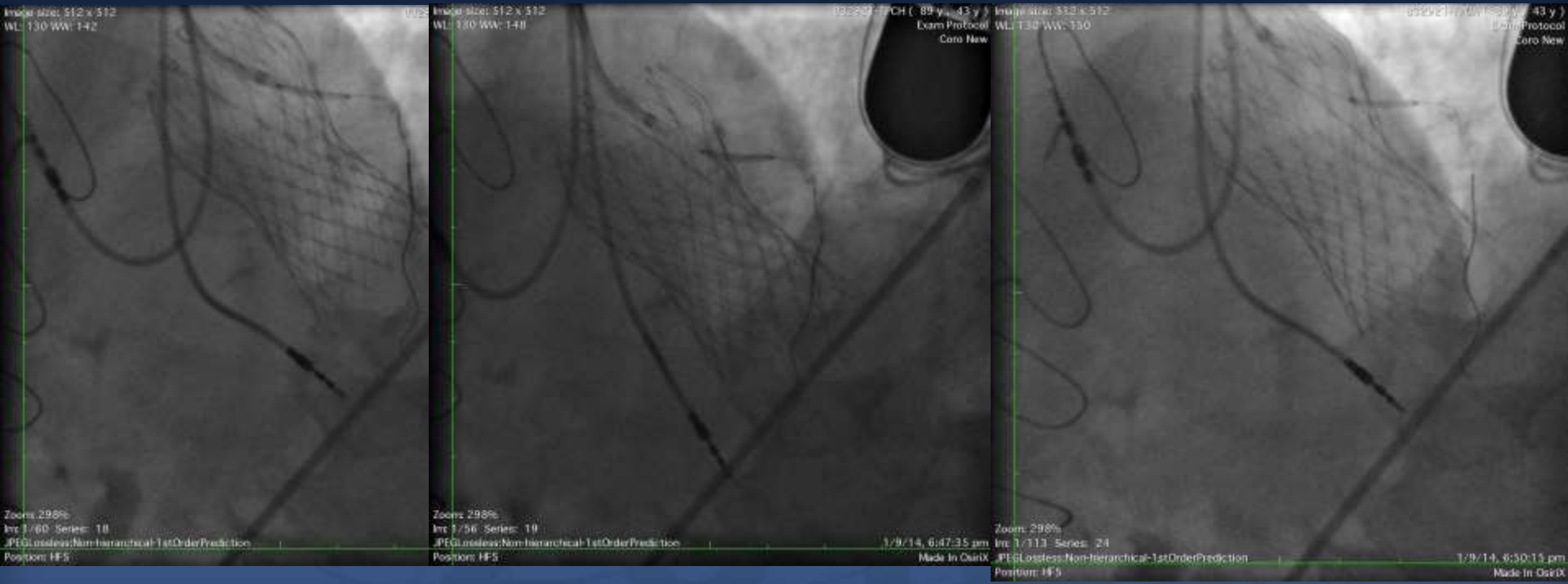


RCA diagnostic with JR 4

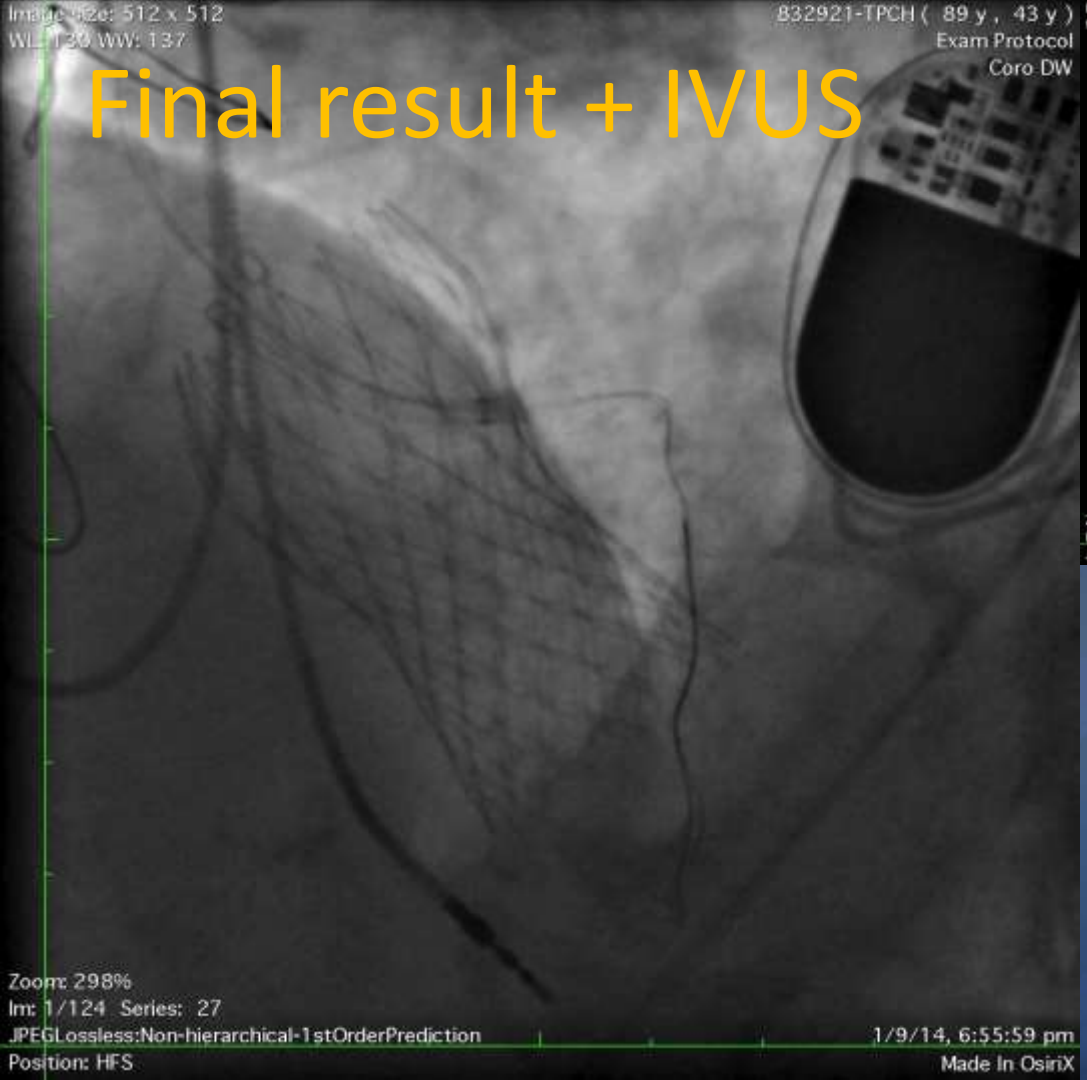
JL 3.5 guide: wire support

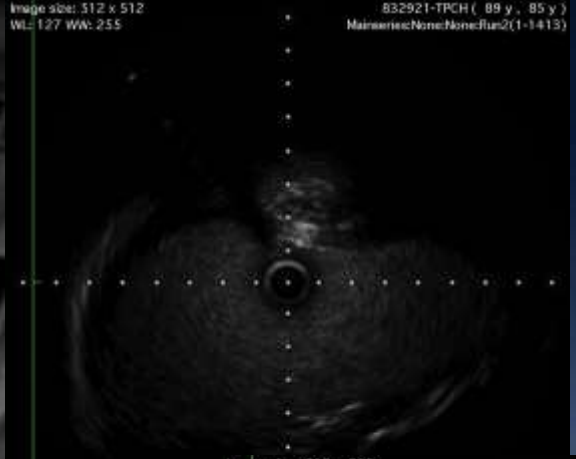


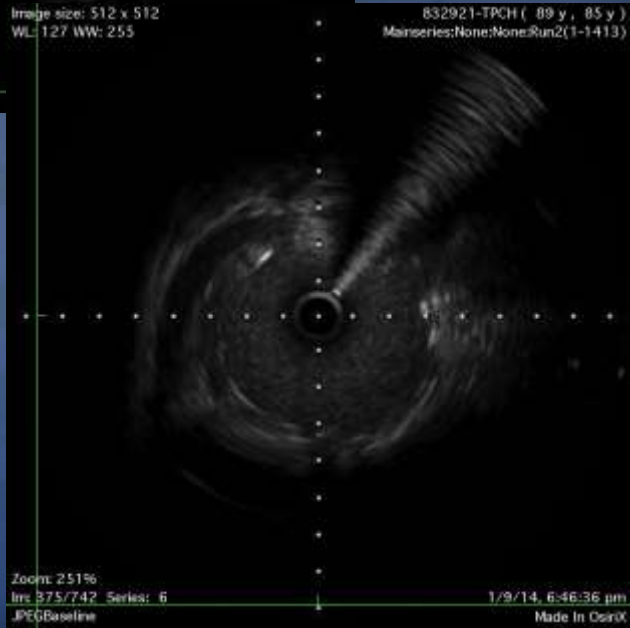
LM stenting using “snorkeling technique”



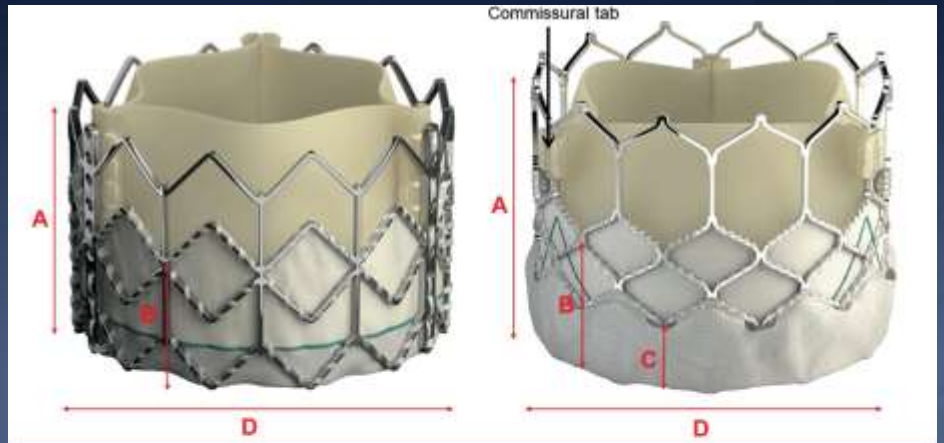
Final result + IVUS



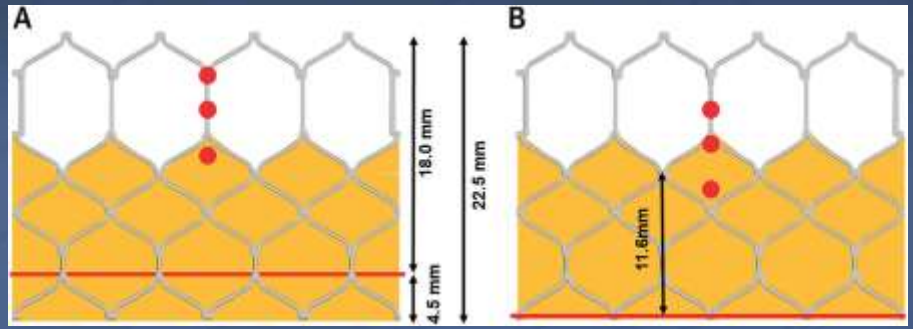




Edwards Sapien



	23 mm Sapien XT	26 mm Sapien XT	29 mm Sapien XT	20 mm Sapien 3	23 mm Sapien 3	26 mm Sapien 3	29 mm Sapien 3
A. Frame Height	14 mm	17 mm	19 mm	15.5 mm	18 mm	20 mm	22.5 mm
B. Inner Skirt Height	6.7 mm	8.7mm	11.6 mm	7.9 mm	9.3 mm	10.2 mm	11.6 mm
C. Outer Skirt Height	N/A	N/A	N/A	5.2 mm	6.6 mm	7.0 mm	8.1 mm
D. Valve Diameter	23 mm	26 mm	29 mm	20 mm	23 mm	26 mm	29 mm



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Yudi, et al., *J Am Coll Cardiol* 2018; 71(12):1360–78

Coronary PCI after Sapien

Left Coronary

- Standard diagnostic & guide Catheters: JL4, EBU/VL 3.5 or 4

Right Coronary

- Standard cathters: JR4, IM, AR

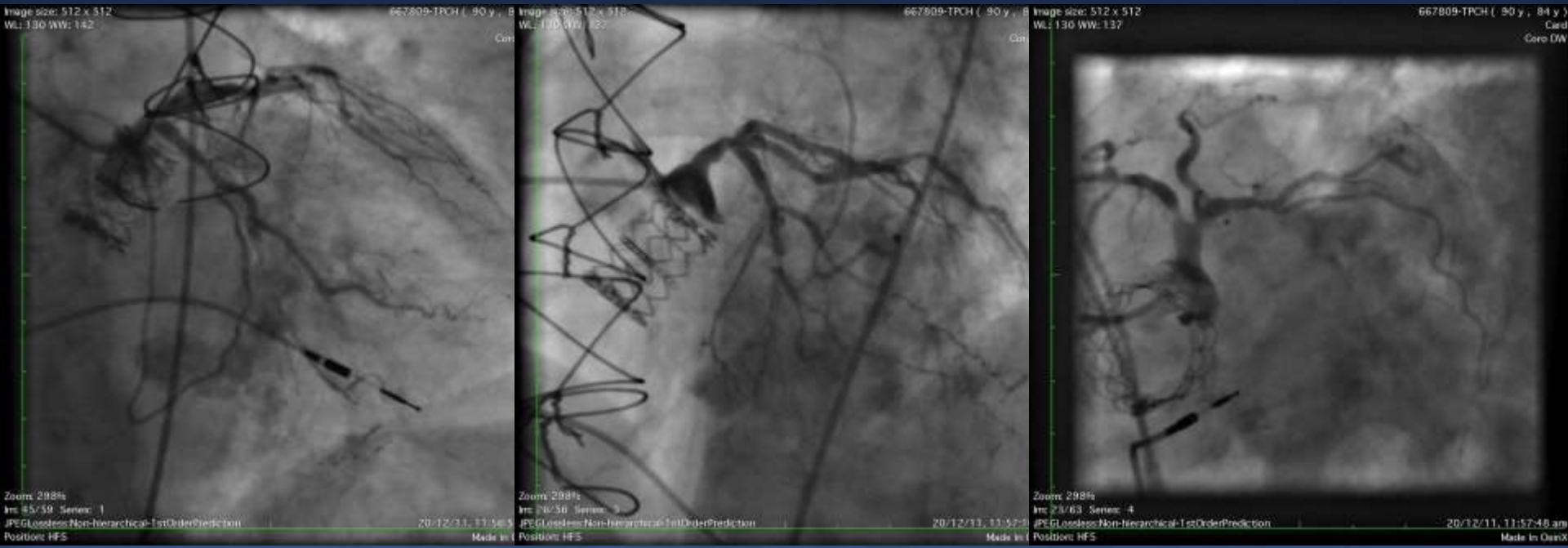
If Commissural post in front of Ostium

- Use adjacent cell or come from above frame
- Rail guide using: Guide wire/Balloon/Guide Extension

If high implant +/- bulky native leaflets

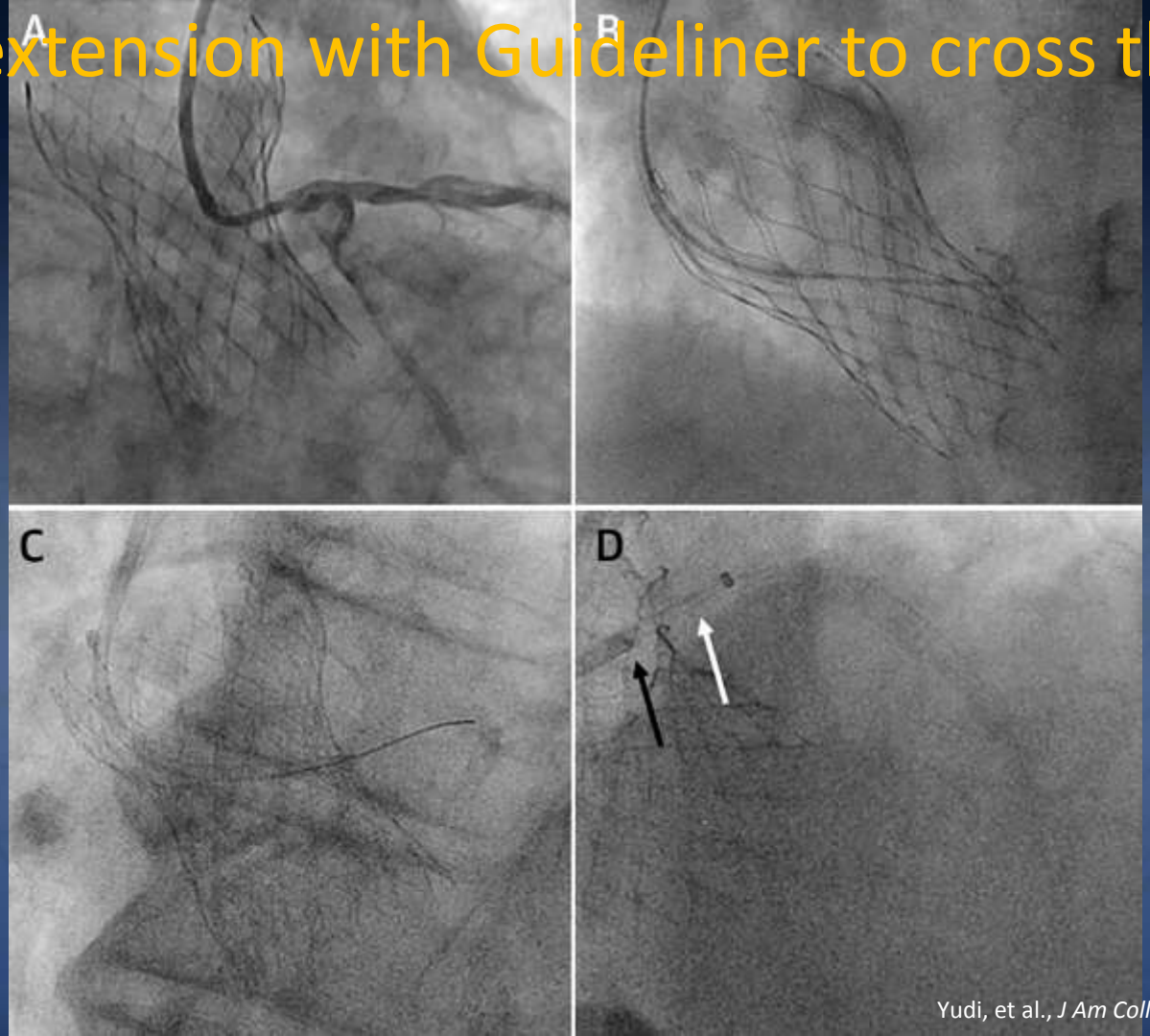
- Pre-wire and rail guide.
- May need double wire support/semi selective engaged guide for PCI.

LCA diagnostic with JL4



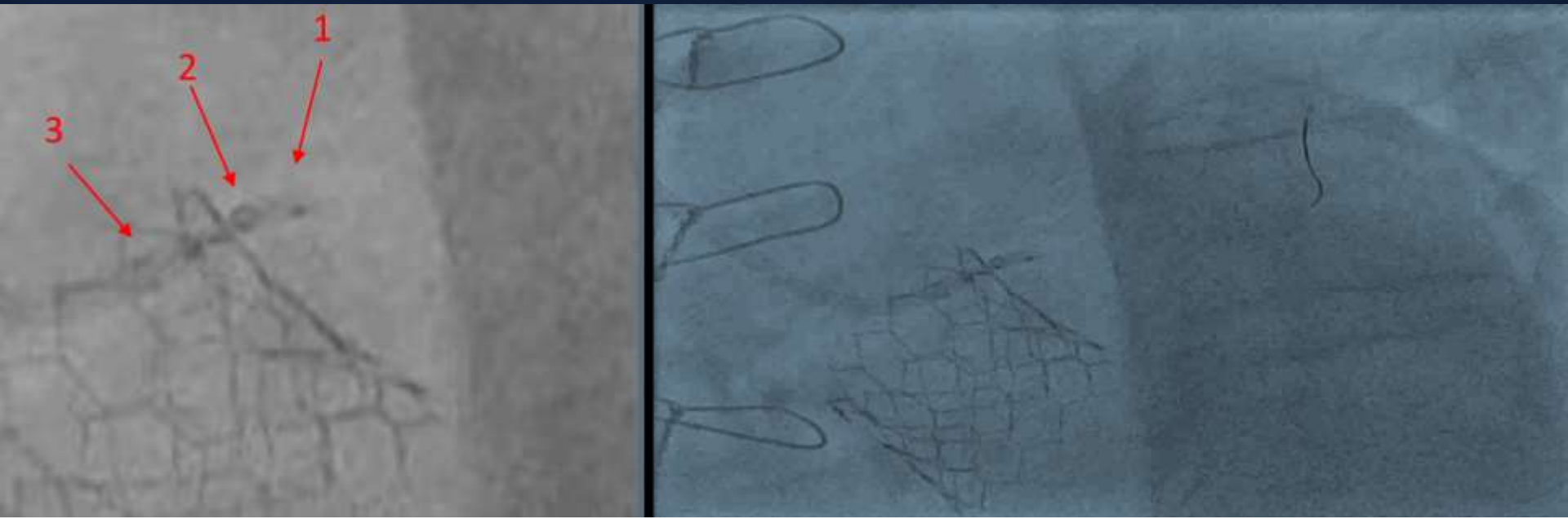
ROTA-PCI of Cx . EBU 3.5 guide

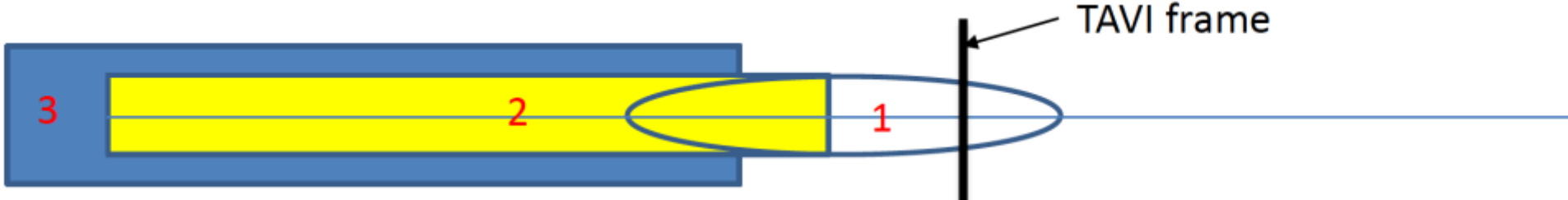
Guide extension with Guideliner to cross the frame cell



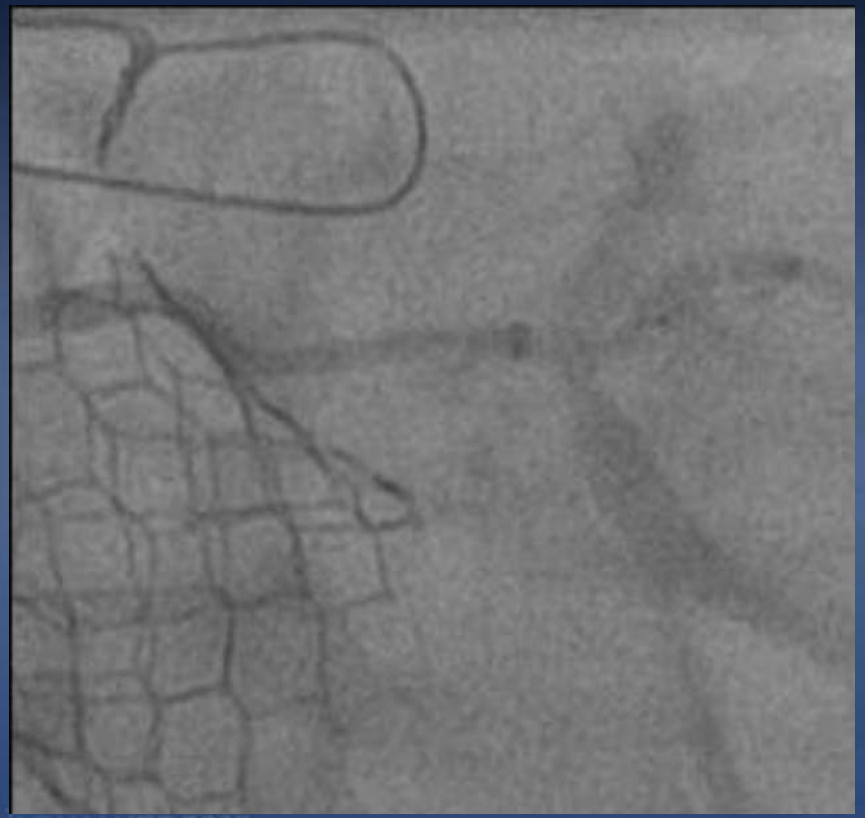
Yudi, et al., *J Am Coll Cardiol* 2018; 71(12):1360–78

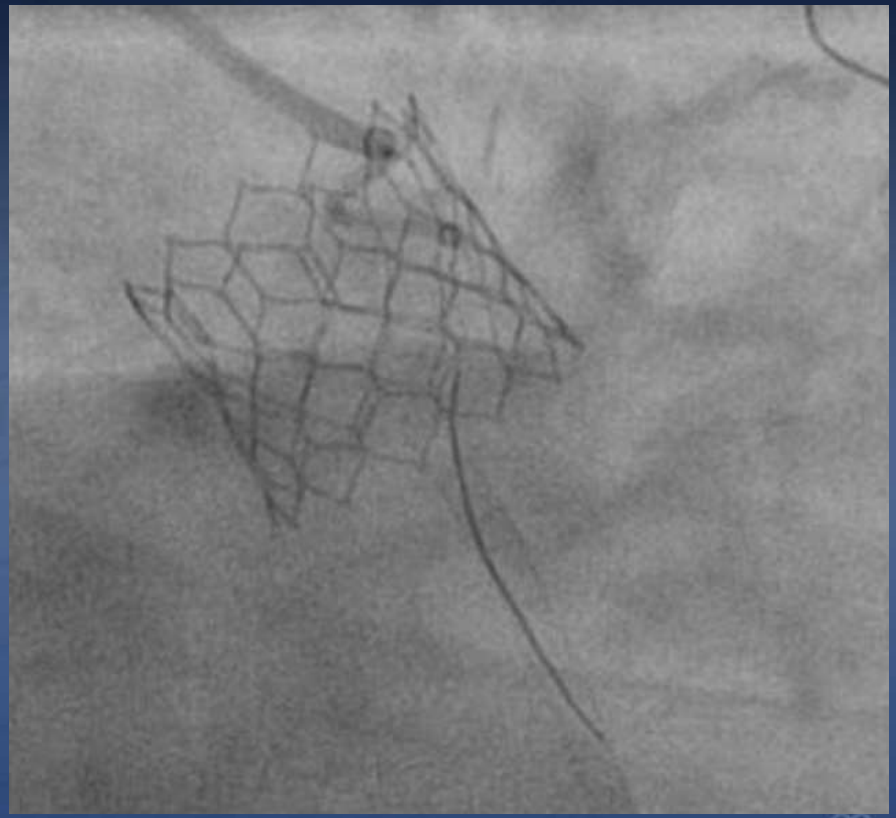
Guide extensions – balloon assisted tracking





Guide extensions – balloon assisted tracking



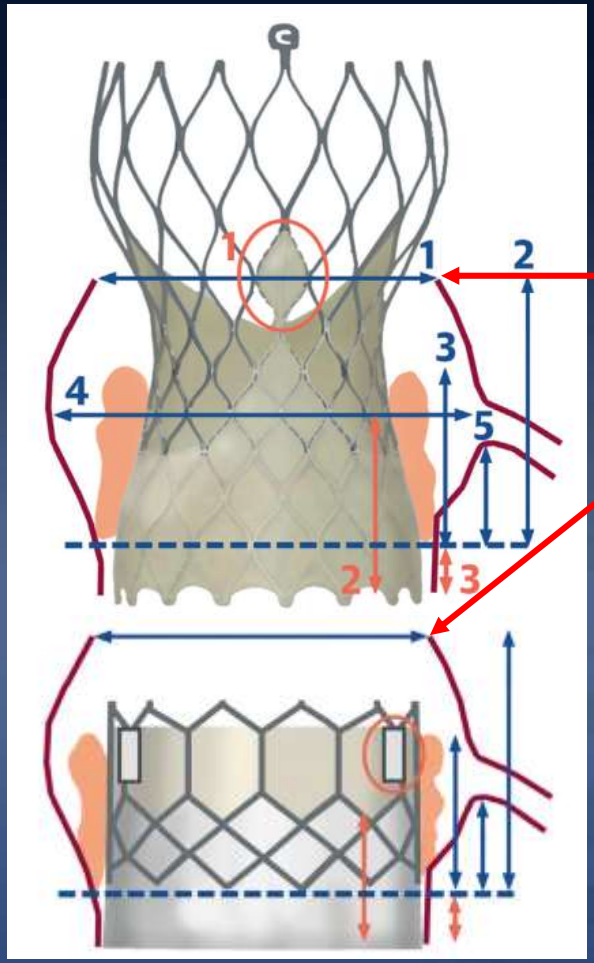


In Summary

- PCI post TAVI will become more common
- Generally high success rate
- Important to understand the characteristics of the TAVI device and how it is interacting in the specific patient (patient anatomy & deployment characteristics)
- Catheter selection 0.5 size smaller curve for long stent self-expanding TAV. More liberal use of wire & balloon tracking and guide extension devices.

Coronary Access & PCI After TAVI

- Anatomical factors
- TAV type
- Implant depth

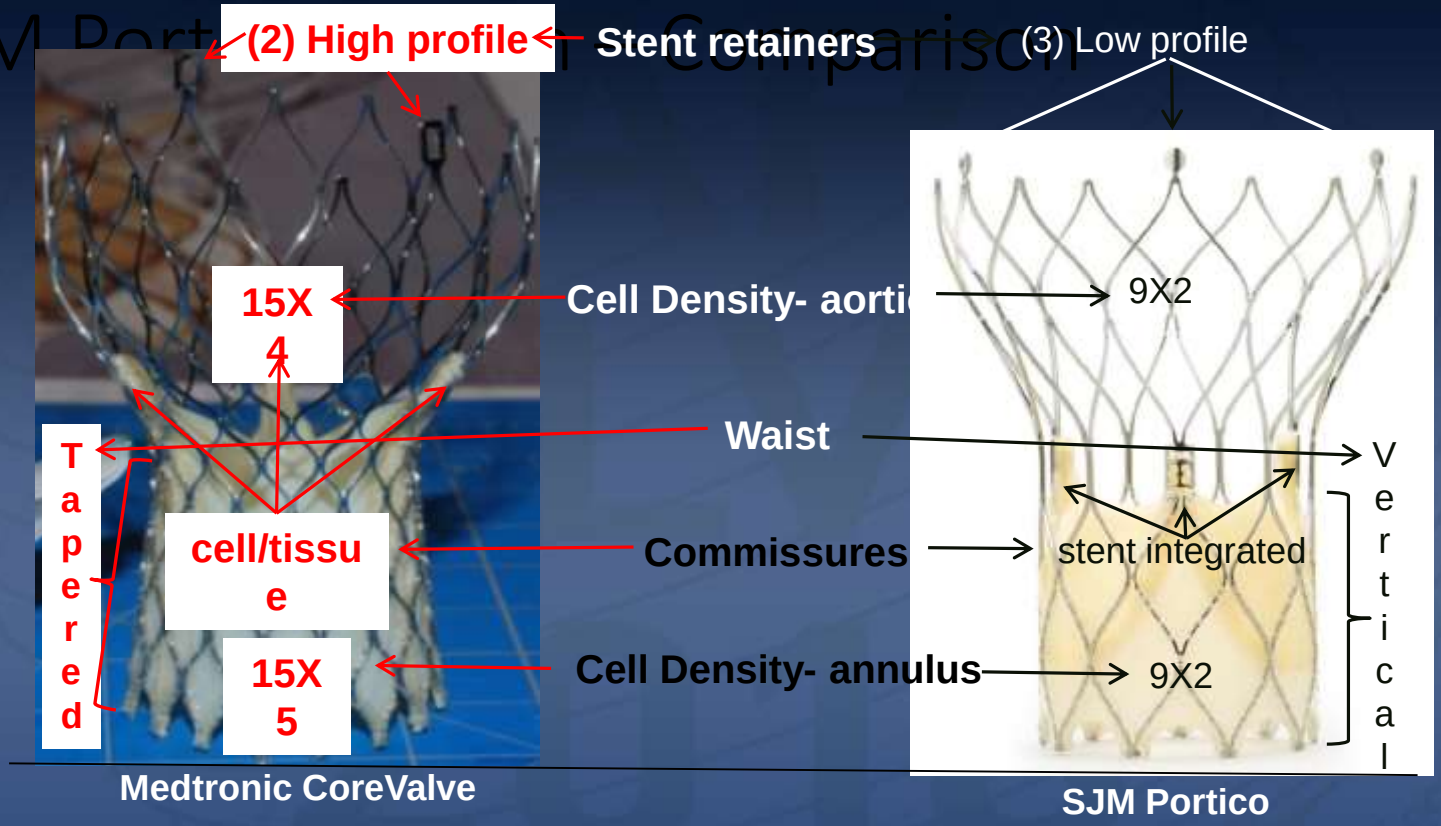


Anatomical

1. Sinotubular junction dimensions
2. Sinus height
3. Leaflet length and bulkiness
4. Sinus of Valsalva width
5. Coronary height

CoreValve vs Portico

SJM Portico Comparison



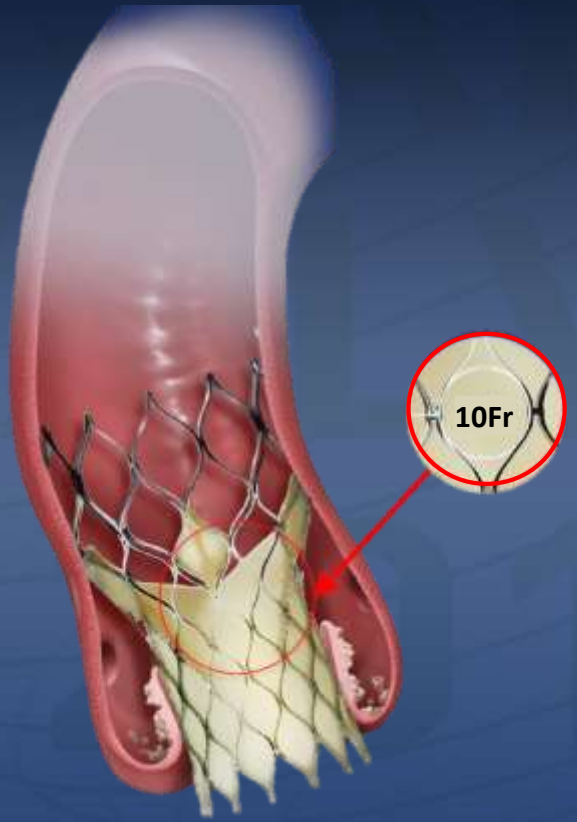
CAD in TAVI: Background

- High prevalence in TAVI population.
- AUC suggests pre-TAVI revascularization appropriate; but not universally practiced.
- Post TAVI coronary intervention uncommon but likely to increase in incidence.
- Provide some challenges unique to TAVI; variable implant height, presence of native valve, self-expanding TAV frame.

Coronary Access After TAVI

- Anatomical factors
- TAV type
- Implant depth

CoreValve: Cell Geometry

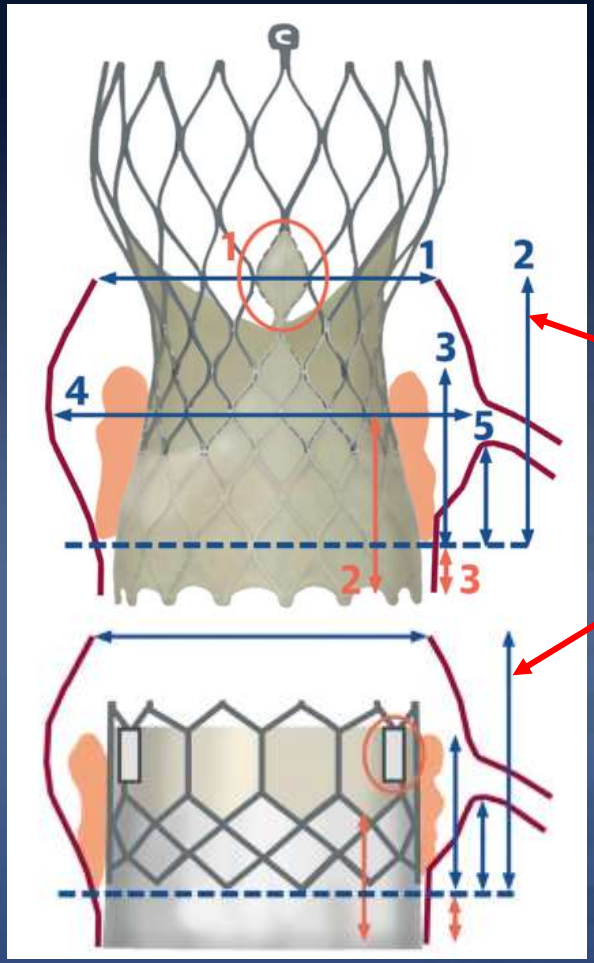


Coronary Access

- Cell geometry preserves coronary access
- Will allow 8F guides (10F)
- However, with angulation and space between frame and root guide – frame interaction occurs. Insert & remove over guidewire.

	Kerckhoff-Klinik	Segeberg Registry	UK Registry	TAVR-LM Registry
Incidence	**35 / 1,000 (3.5%)**	**17 / 296 (5.7%)**	**18 / 2,588 (0.7%)**	**9 / 6,405 (0.1%)**
ACS Indication	11.4%	37.5%	65%	78%
Time to Intervention Post-TAVR	233 ± 158 days	17.7 months (range: 1-72)	136 days (range: 1-1092)	368 days (IQR: 204-534)
Type of TAV Implanted			Not Reported	
CoreValve	29%	100%		44%
SAPIEN XT	54%			55%
JenaValve	3%			
Symetis	11%			
Portico	3%			
Procedural Success	74%	95.8%	Not Reported	100%

[1]Blumenstein, et al., *Clin Res Cardiol* 2015; 104:632-39; [2]Allali, et al., *Cardiovasc Revasc Med* 2016; epub ahead of print; [3]Snow, et al., *Int J Cardiol* 2015; 199:253-60; [4]Chakravarty, et al., *J Am Coll Cardiol* 2016; 67:951-60



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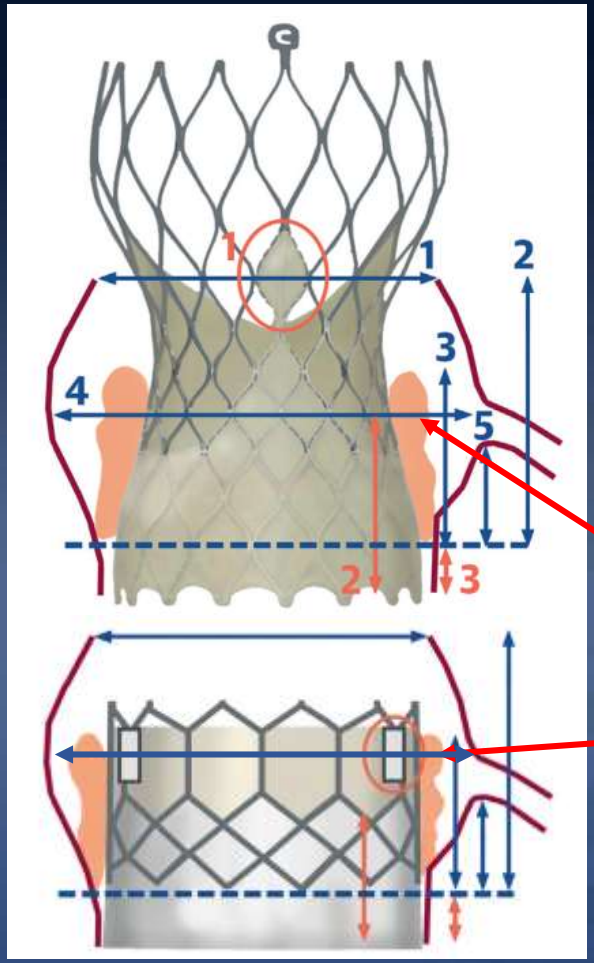
Modified from Yudi, et al., *J Am Coll Cardiol* 2018; 71(12):1360–78



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