

# Valve in Valve for Treatment of Degenerated Surgical Bioprostheses

HYGEIA Hospital Experience

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## **Disclosures**

I and the HYGEIA Hospital «Heart Team» have received research and/or travel grants and/or lecture fees from:

- Edwards Lifesciences
- Medtronic
- St Jude, Europe
- ABBOTT Vascular, Europe

### **HYGEIA Hospital Heart Team**

Cardiologists: A Chalapas, M Chrissoheris, K Spargias

CT Surgeons: N Bouboulis, S Skardoutsos, A Tsolakis, S Pattakos

Congenital Heart Disease: A Tzifa

Anesthesiologists: C Nastoulis, I Nikolaou

Vascular Surgeons: I Belos, S Kaliafas

Radiologists: F Laspas, C Mourmouris

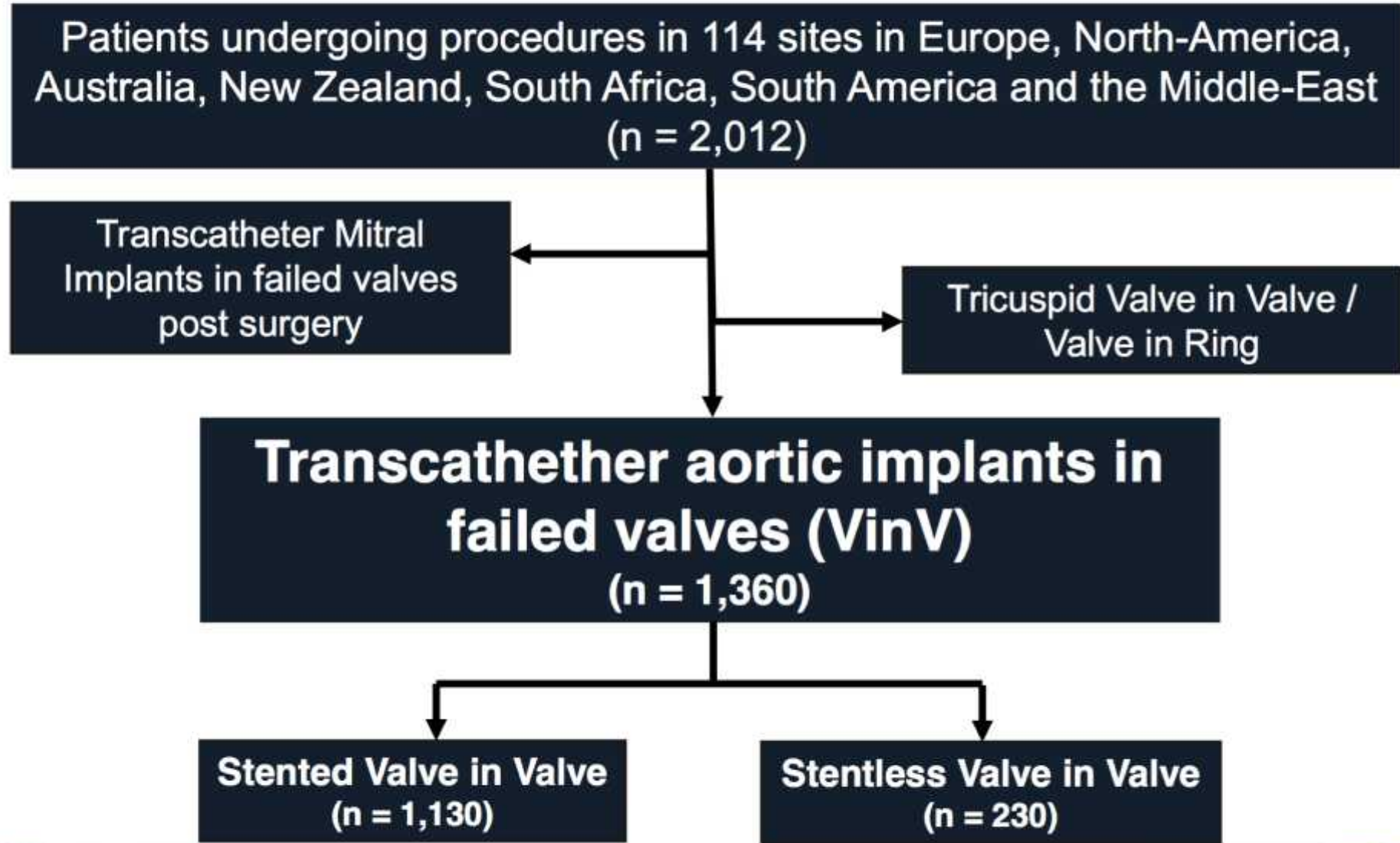
Electrophysiologists: L Papavasileiou, G Zervopoulos, T Apostolopoulos

# Degeneration of Surgical Bioprostheses

- >200.000 sAVR worldwide / per year, ↑ use of bioprosthetic valves
- Limited durability, expected to fail within 10-15 years
- Standard therapy is surgical redo, but risk is high
  - Redo
  - Elderly
  - Multiple comorbidities
- Alternative: Transcatheter valve-in-valve implantation

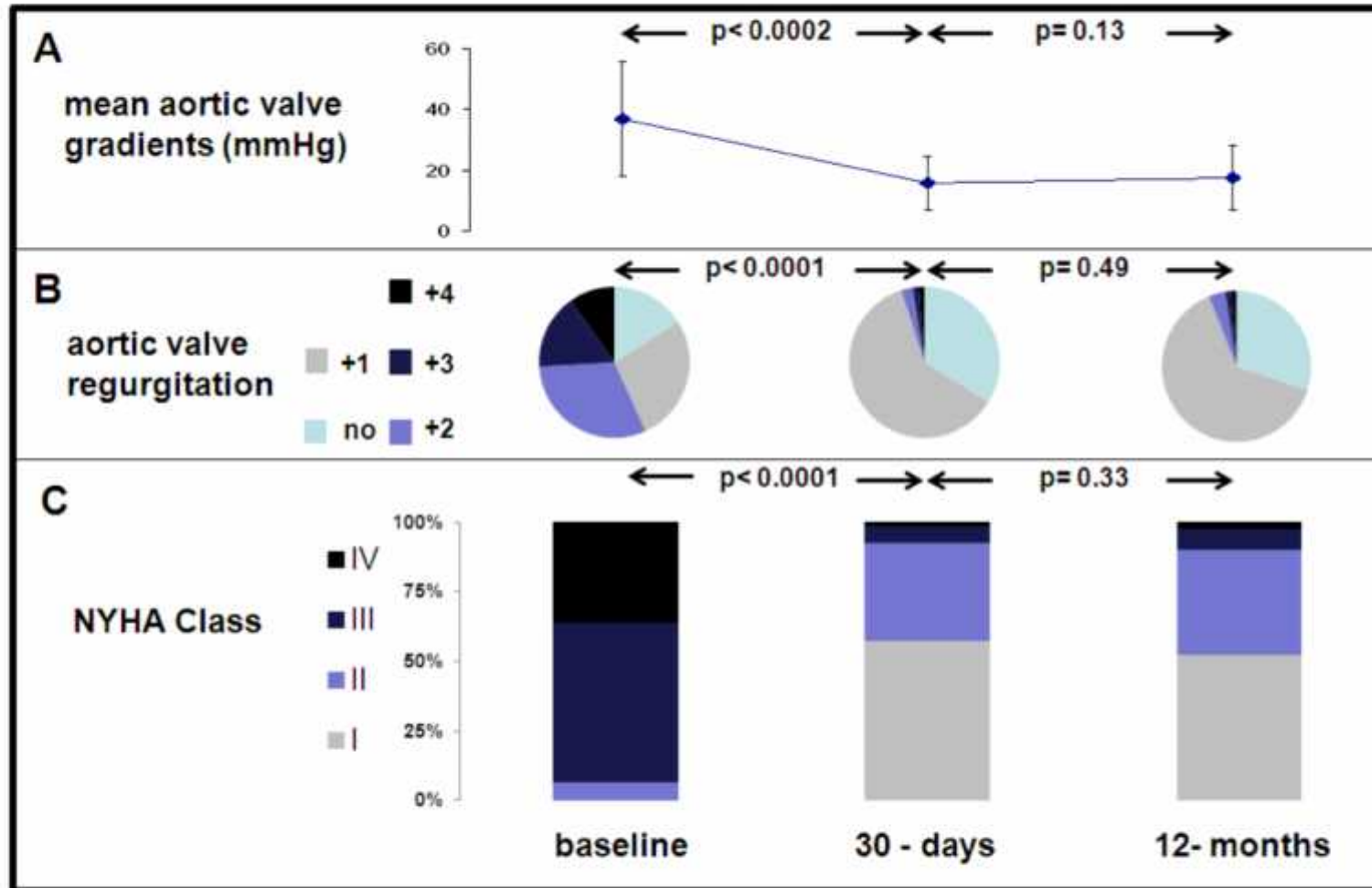


# VIVID Registry





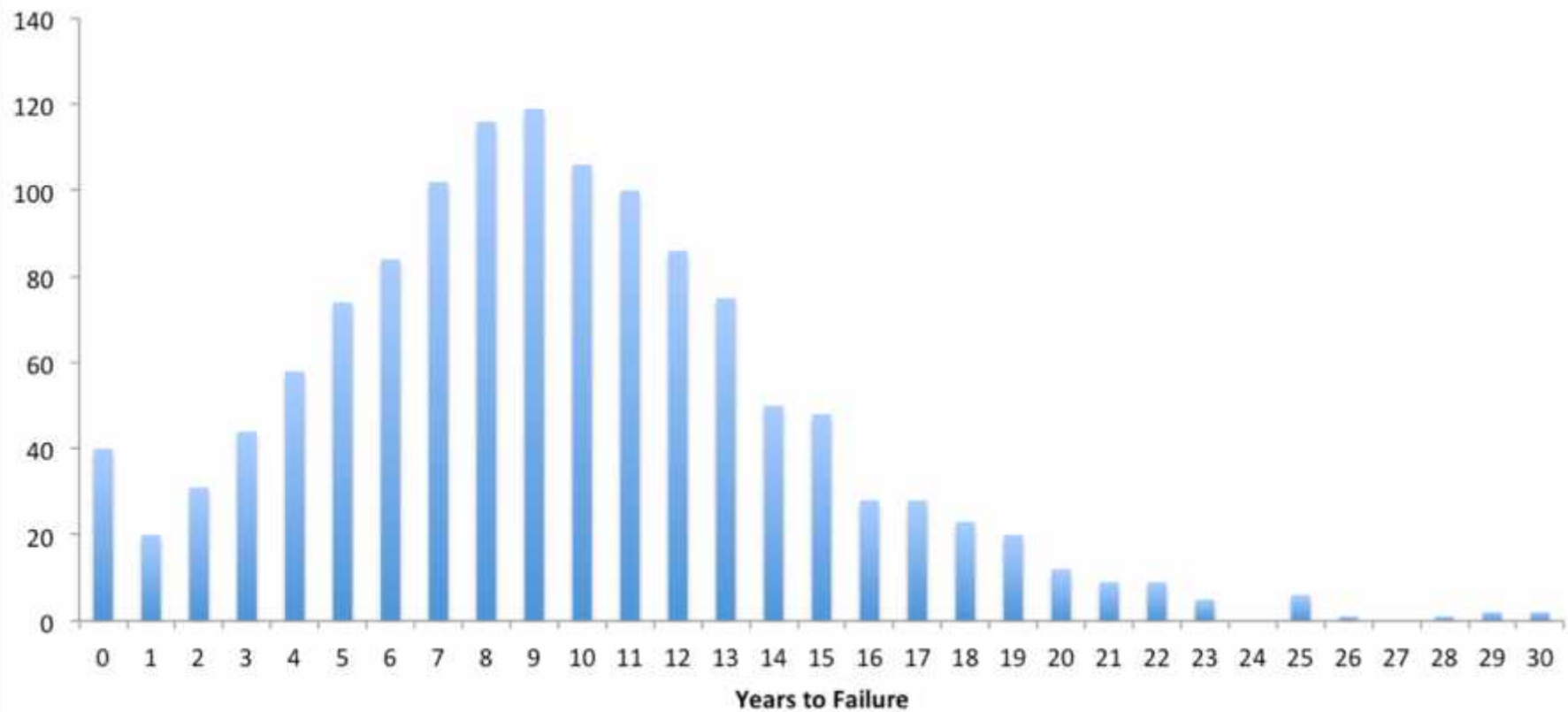
# Aortic Valve-in-Valve is an effective procedure



*Dvir D et al. Circulation. 2012;126:2335-2344.*



### Time to Failure - All aortic VIVID Cases (n = 1304)



# Types of Surgical Valves in our ViV THV program (14 out of 441 TAVIs=3.2%)

	Aortic 11, Mitral 3
Stented	8
	Perimount Edwards 3 Pericardial Baxter 2 Magna Edwards 2 Mitraflow Medtronic 1
Stentless	5
	Solo Freedom Sorin 2 Freestyle Medtronic 1 Toronto St Jude 1 Homograft 1
Ring	1
	Cosgrove incomplete band

## Types of TAVI devices in our ViV THV program

	<b>n=14</b>
CoreValve	4 (all TF)
Evolut R	4 (3 TF, 1 TAO)
Sapien XT	4 (3 TA, 1 TAO)
Sapien 3	1 (TF)
Portico	1 (TF)



# Patient Characteristics

Clinical Characteristics	HYGEIA THV (n=13)	Global ViV Reg. (n=202)
Age, years	74.9±11.4	77.7±10.4
Male, (%)	7 (53.8)	106 (52.5)
Log. Euroscore	31.5±13.7	31.1±16.4
STS score	6.6±4.8	11.8±9.9
Diabetes Mellitus, n(%)	6 (46.2)	59 (29.2)
Peripheral vascular disease, n (%)	4 (30.8)	41 (20.3)
Chronic renal failure, n(%)	4 (30.8)	94 (46.5)
Previous stroke, n(%)	0	25 (12.4)
NYHA functional class III/IV, n (%)	13 (100)	190 (94.1)
Left ventricular ejection fraction,%	49.5±8.5	50.5±12.2

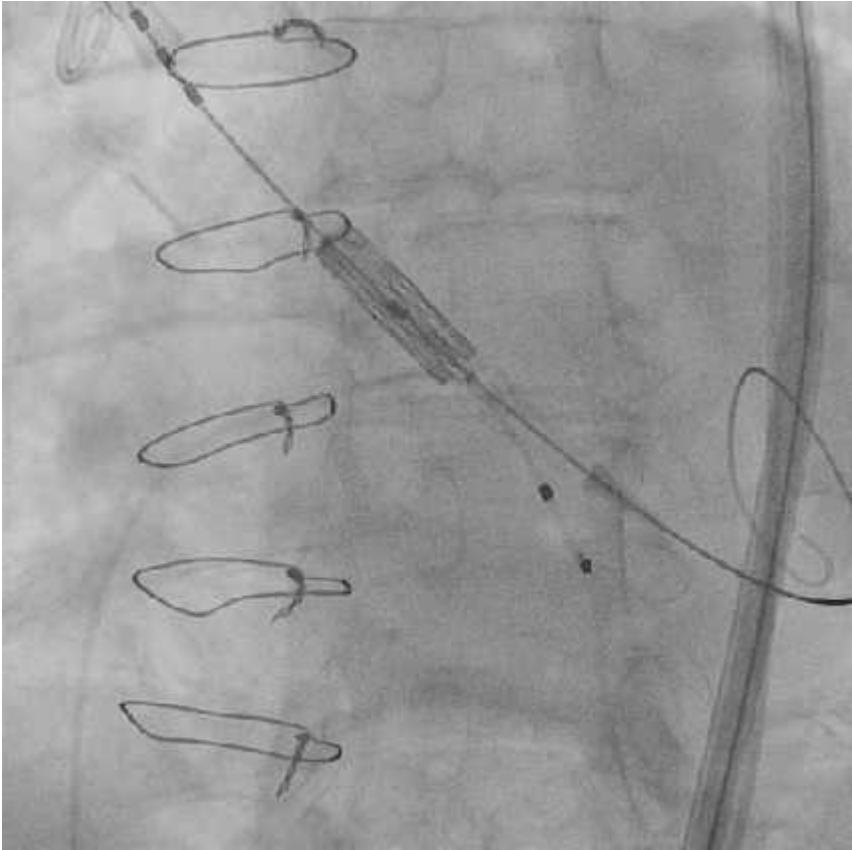
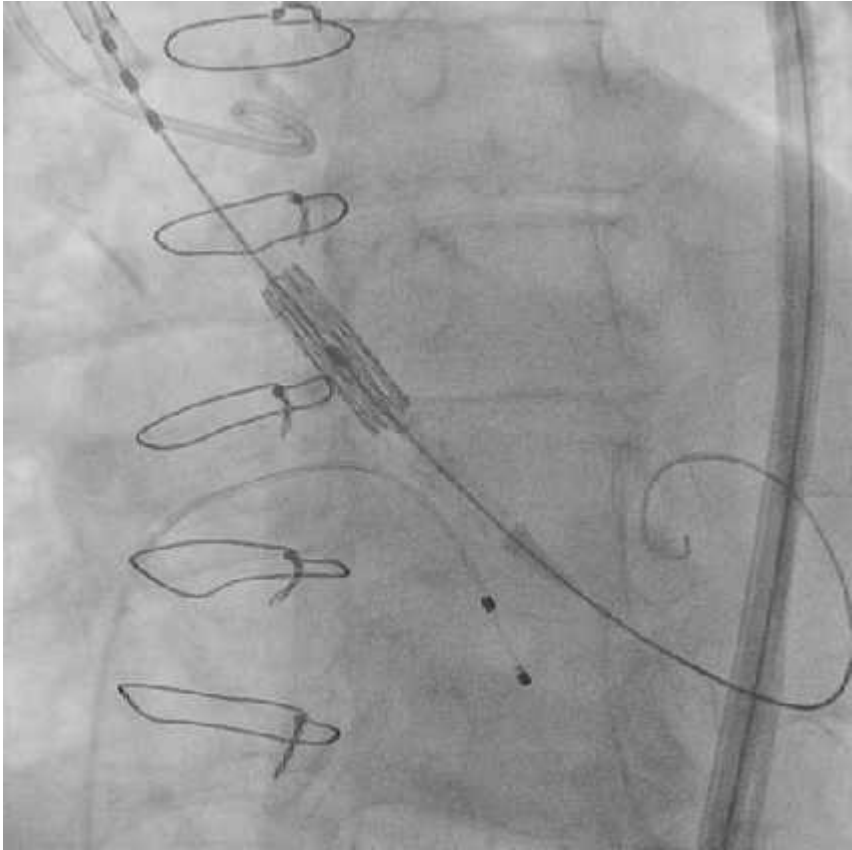
# Surgical Valves Characteristics

Bioprosthetic Valve	HYGEIA THV (n=13)	Global VIV Registry (n=202)
Time since last surgery, y	10.6 [1,19]	9 [6,13]
Type, n(%)		
Stented	8 (61.5)	155 (76.7)
Stentless	5 (38.5)	47 (23.3)
Size (internal diameter), n(%)		
<20mm	1 (7.6)	52 (25.7)
≥20 and <23mm	2 (15.3)	102 (50.5)
≥23	10 (76.9)	40 (19.8)
Mechanism of Failure, n(%)		
Stenosis	4 (30.7)	85 (42.1)
Regurgitation	4 (30.7)	68 (33.7)
Both	5 (38.4)	49 (24.3)

# Procedural Characteristics

Procedural Characteristics	HYGEIA THV (n=13)	Global VIV Registry (n=202)
Device size, mm, n(%)		
23	7 (53.8)	62 (30.7)
26	2 (15.3)	115 (56.9)
29	4 (30.7)	25 (12.4)
Access, n(%)		
Transfemoral	8 (61.5)	137 (67.8)
Other (TAo, TA)	5 (38.5)	65 (32.2)
General anesthesia, n(%)	9 (69.2)	132 (65.3)
Transesophageal Echo, n(%)	8 (61.5)	105 (52)

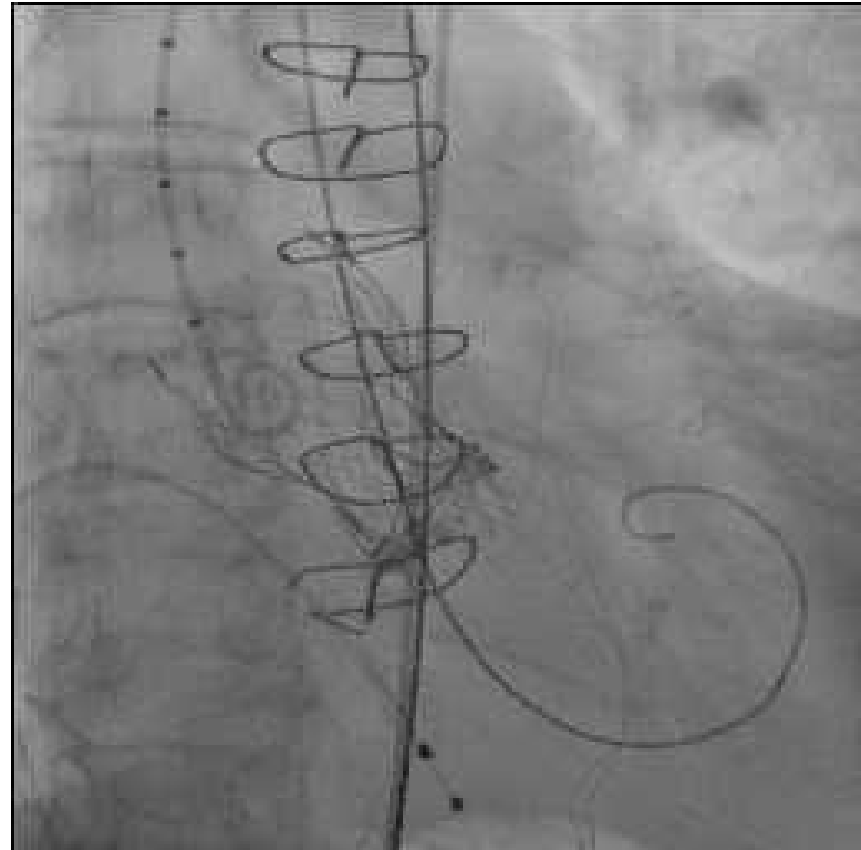
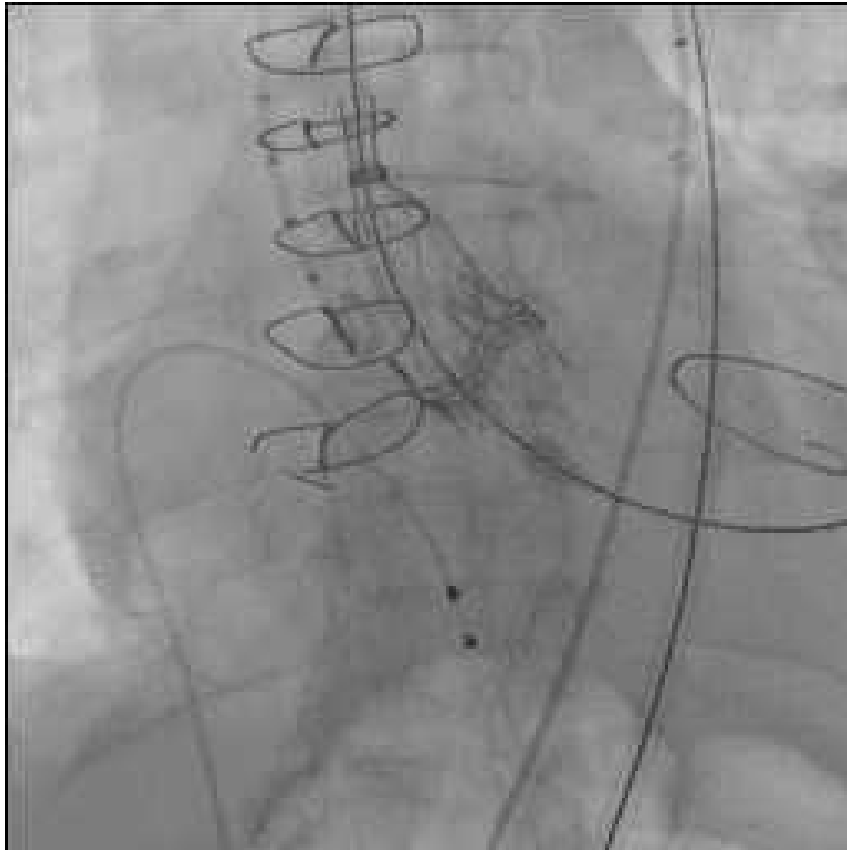
Sapien 3 23mm Valve  
in Valve within  
Homograft 23mm



# Echocardiography after valve in valve

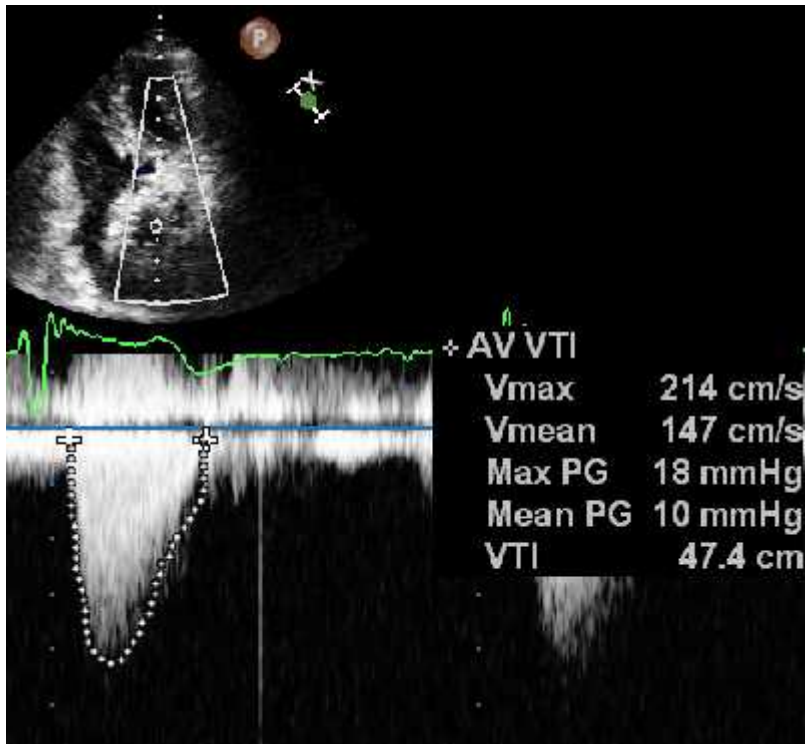


# Evolut R 23 Valve in Valve in a Perimount 21mm

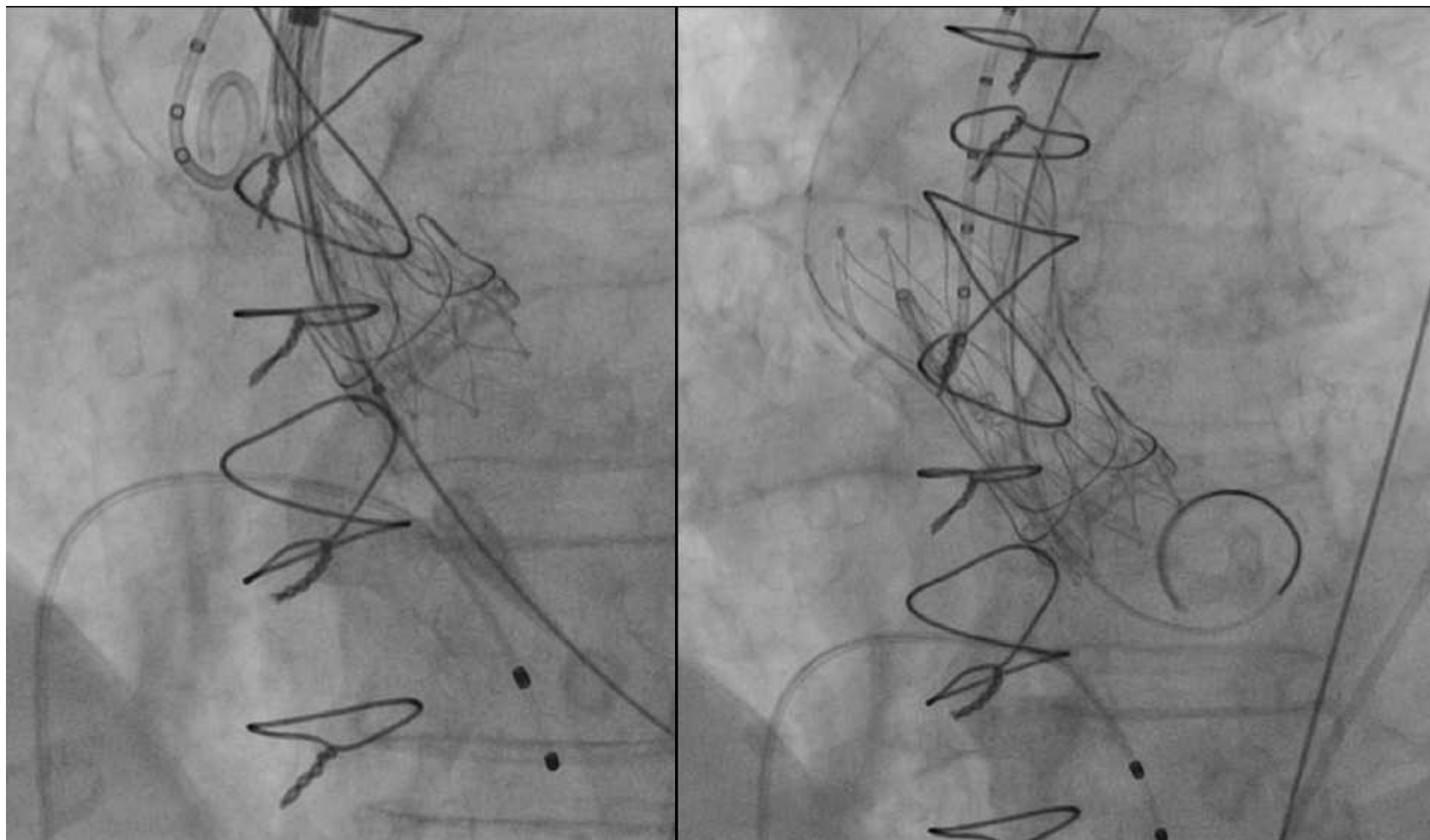


# Aortic VIV: One year later...

- NYHA I
- No readmissions to the hospital
- Ambulatory

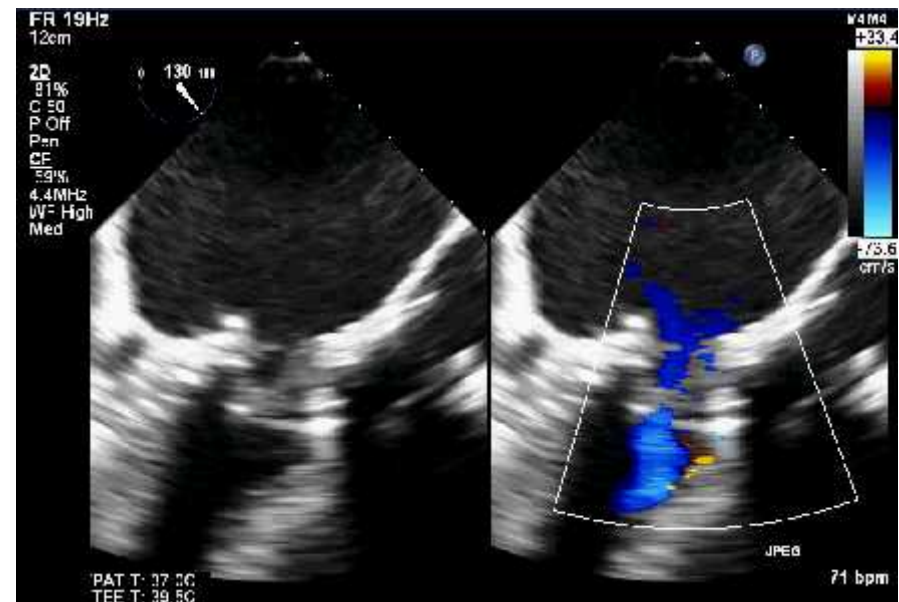
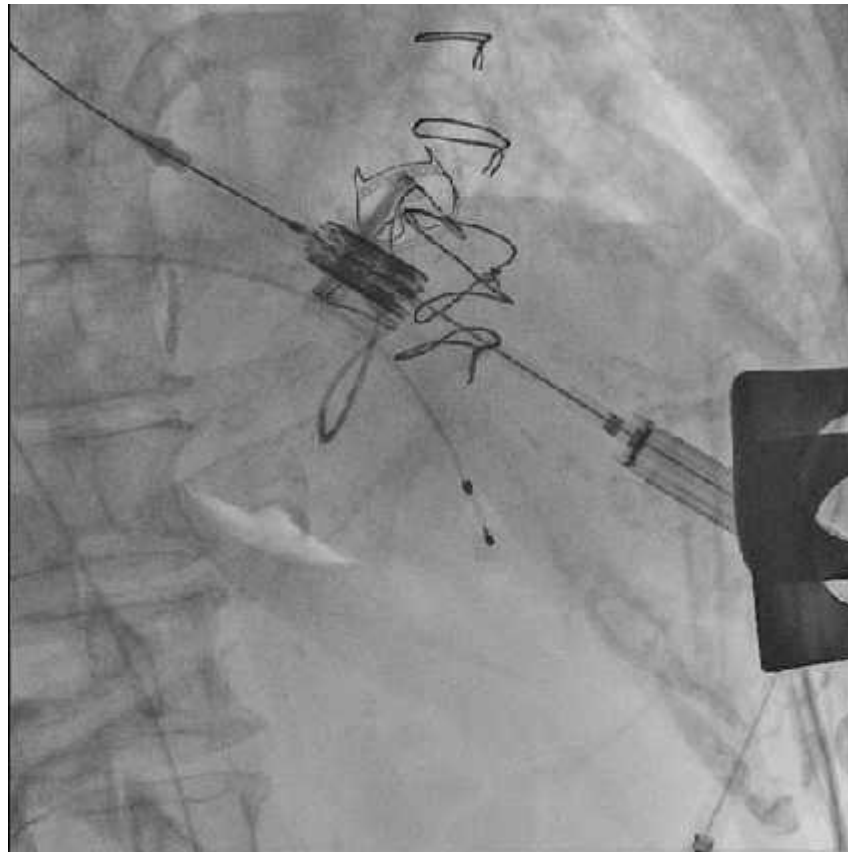


Portico 23mm in an Edwards Magna 21mm





# Mitral Valve in Valve Sapien XT 29mm



Hellenic J Cardiol 2015; 56: 347-350

# Procedural Results

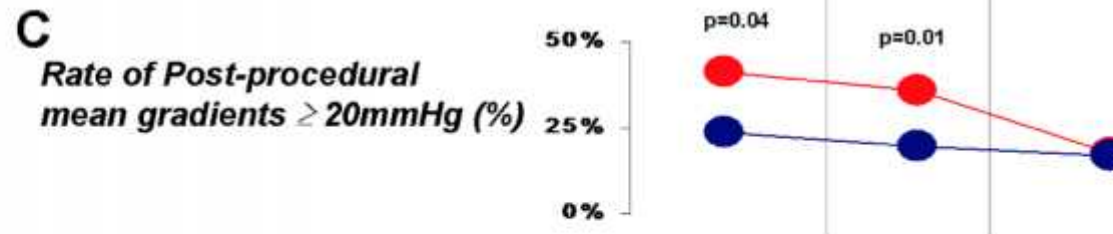
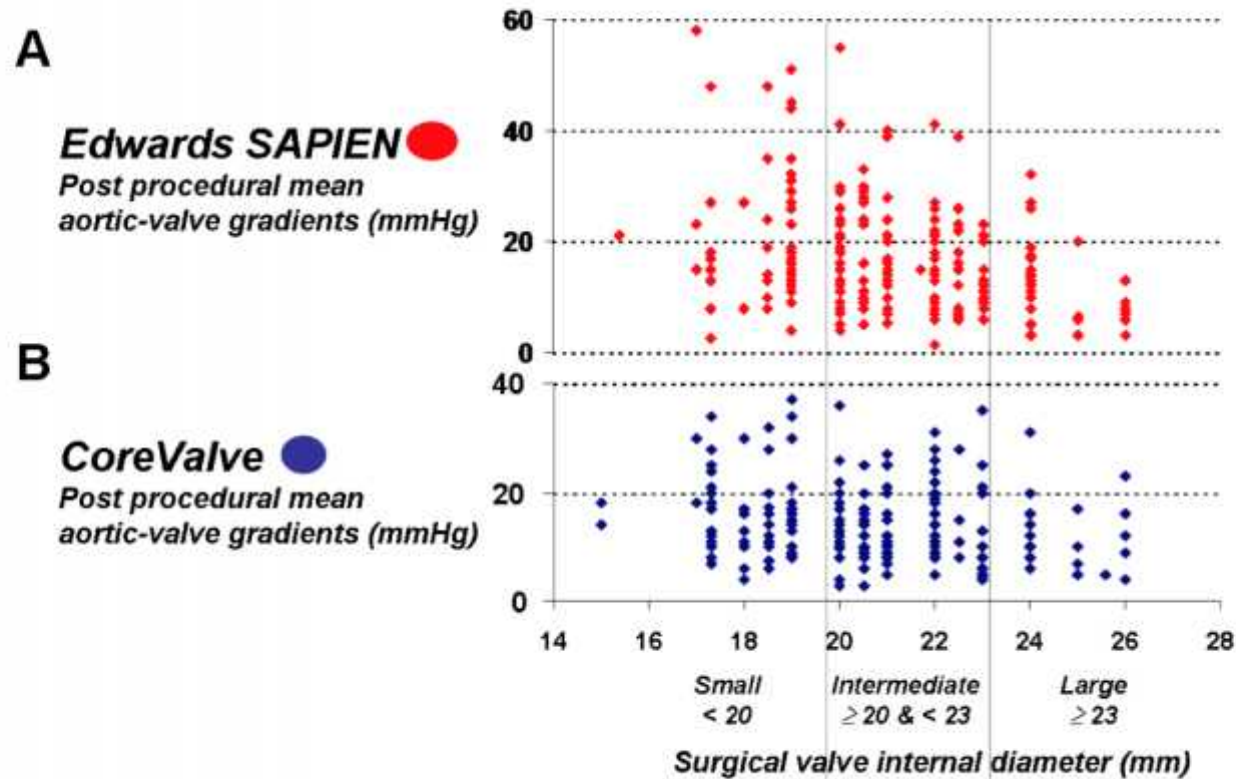
Procedural Results, n(%)	HYGEIA THV (n=13)	Global VIV Registry (n=202)
Procedural success	12 (92.3)	188 (93.1)
Balloon pre-dilatation	0	56 (27.7)
Attempted device retrieval	1 (7.6)	11 (5.4)
Need for 2 <sup>nd</sup> TAVR valve	1 (7.6)	17 (8.4)
Post-dilatation	0	2 (12.4)
Ostial coronary obstruction	0	7 (3.5)
Emergent surgery	1 (7.6)	4 (2)

# Thirty-day Outcomes

Thirty-day outcomes	HYGEIA THV (n=13)	Global VIV registry (n=202)
Death, n(%)	1 (7.6)	17 (8.4)
Major stroke, n(%)	0	4 (2)
Death or major stroke, n(%)	1 (7.6)	20 (10.4)
Major vascular complication, n(%)	0	7 (3.5)
Need for perm. pacemaker, n(%)	0	15 (7.4)
Aortic valve max. gradient, mmHg	31.8±13.3	28.4±14.1
Aortic valve mean gradient, mmHg	17.4±8.3	15.9±8.6
Aortic regurgitation ≥2, n(%)	1 (10)	10 (5)
NYHA class ≤2, n(%)	11 (84.6)	170 (84.1)
Ejection fraction, %	48.5	51.3±11.8

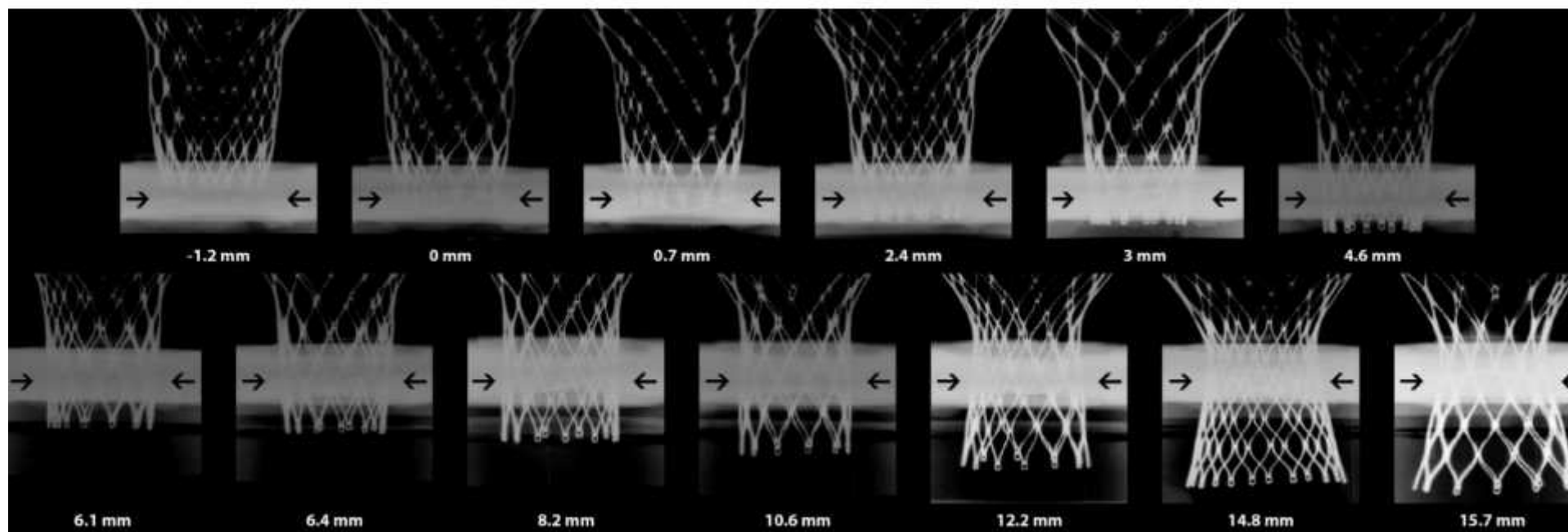


# Residual stenosis: the “Achilles’ heel” of VinV procedures





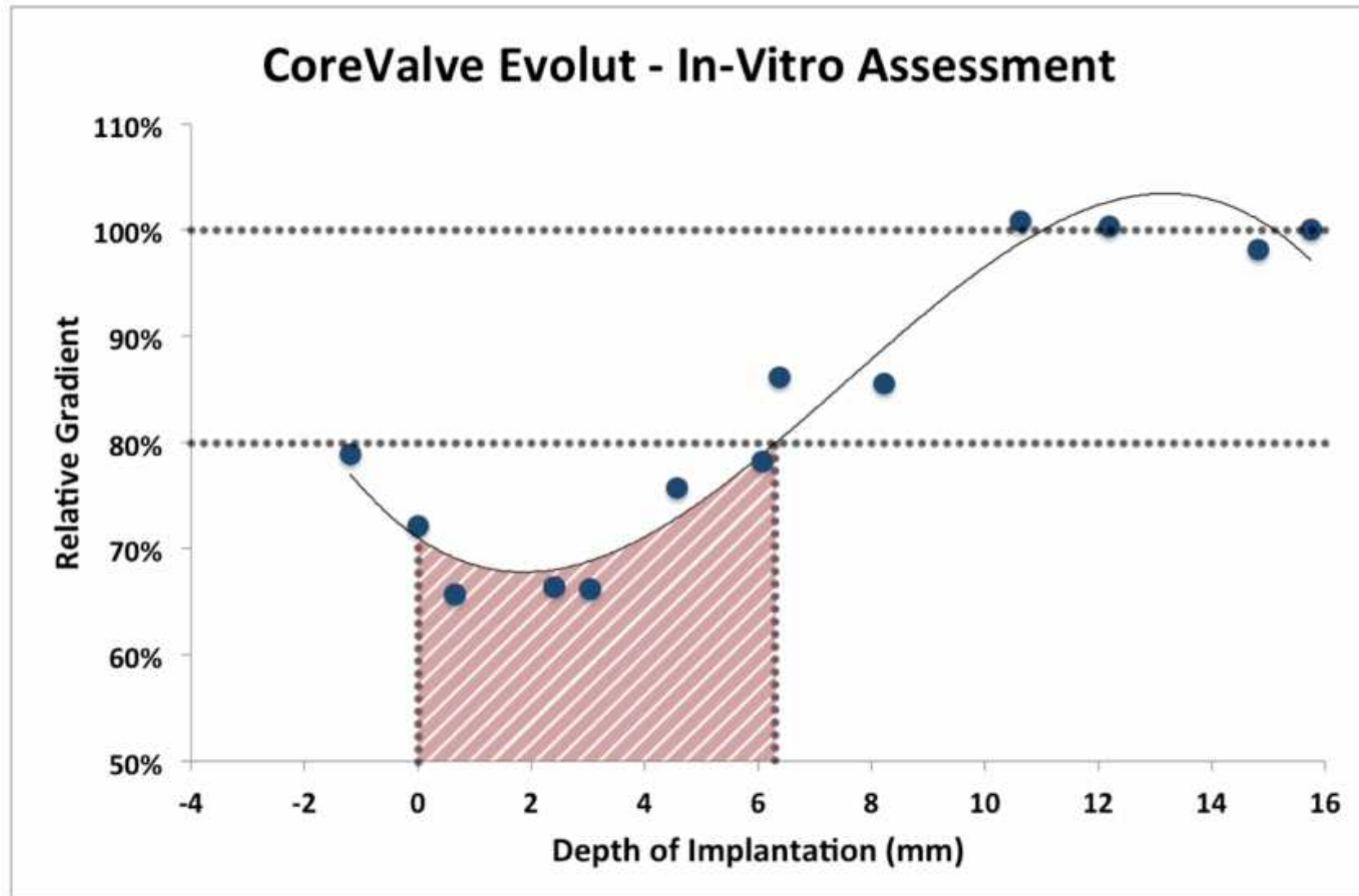
# CoreValve Evolut In-Vitro Assessment



**CoreValve Evolut 23mm in Epic 19mm**

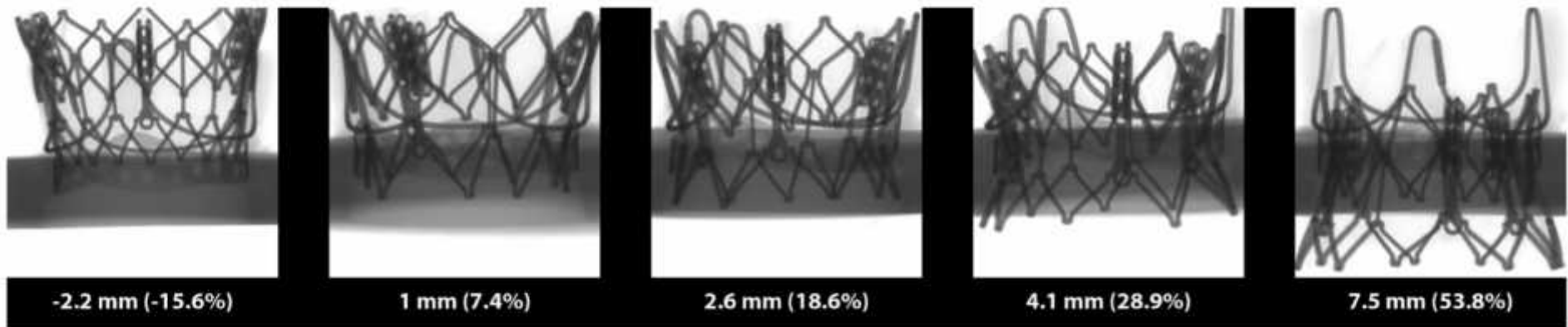


## CoreValve Evolut 23mm in Epic 19mm





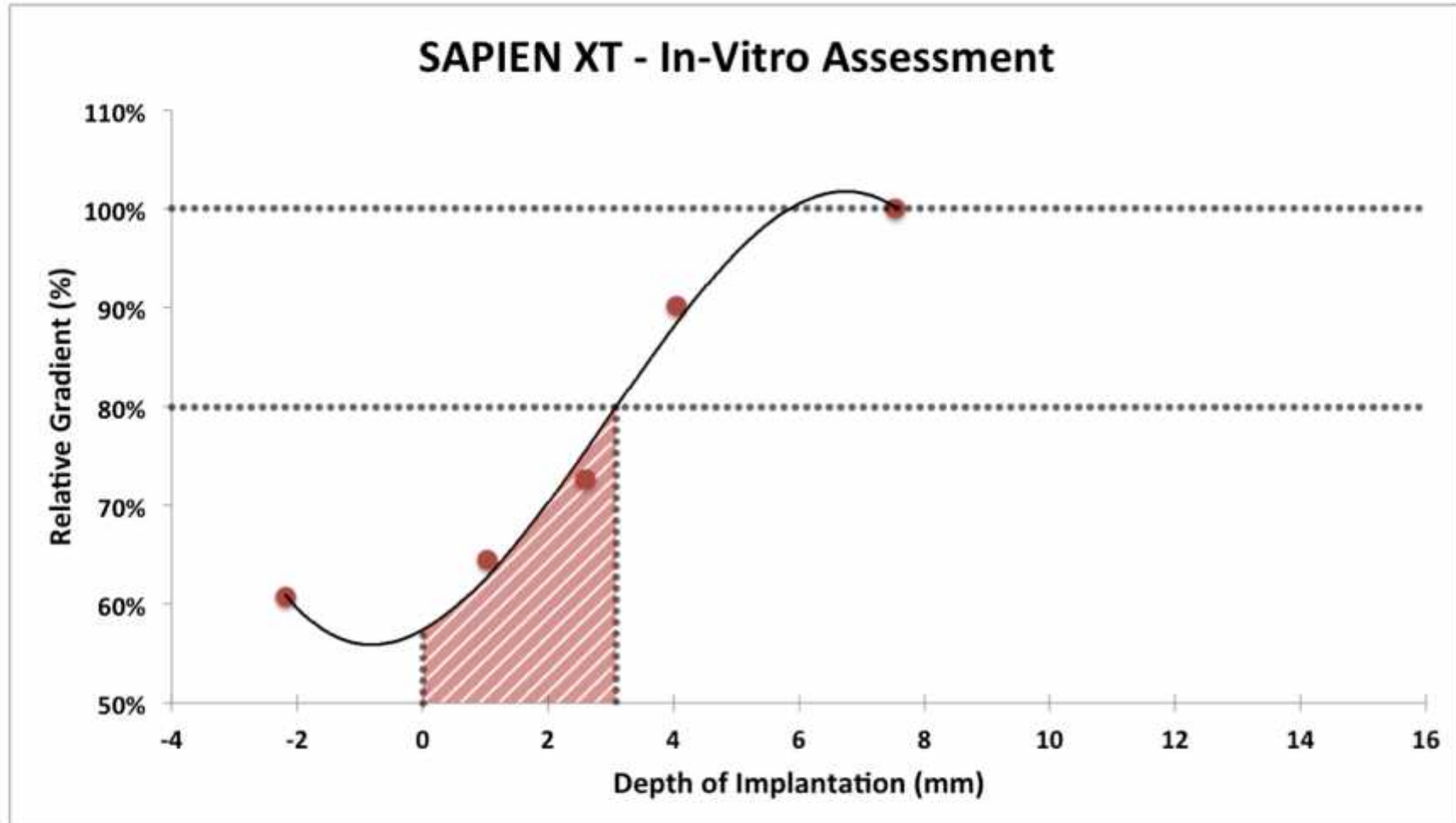
# SAPIEN XT In-Vitro Assessment



**SAPIEN XT 23mm in Perimount 19mm**



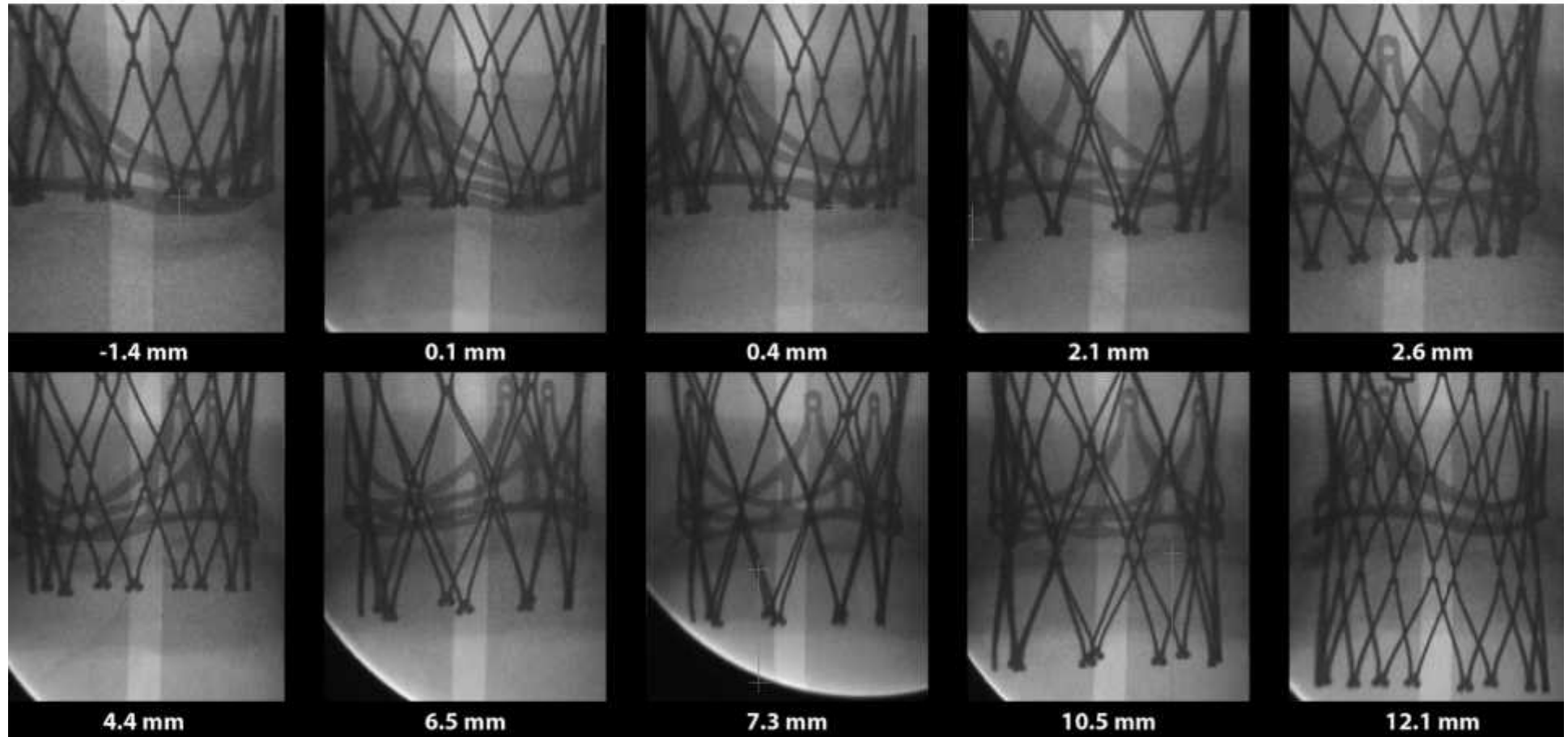
## SAPIEN XT 23mm in Perimount 19mm







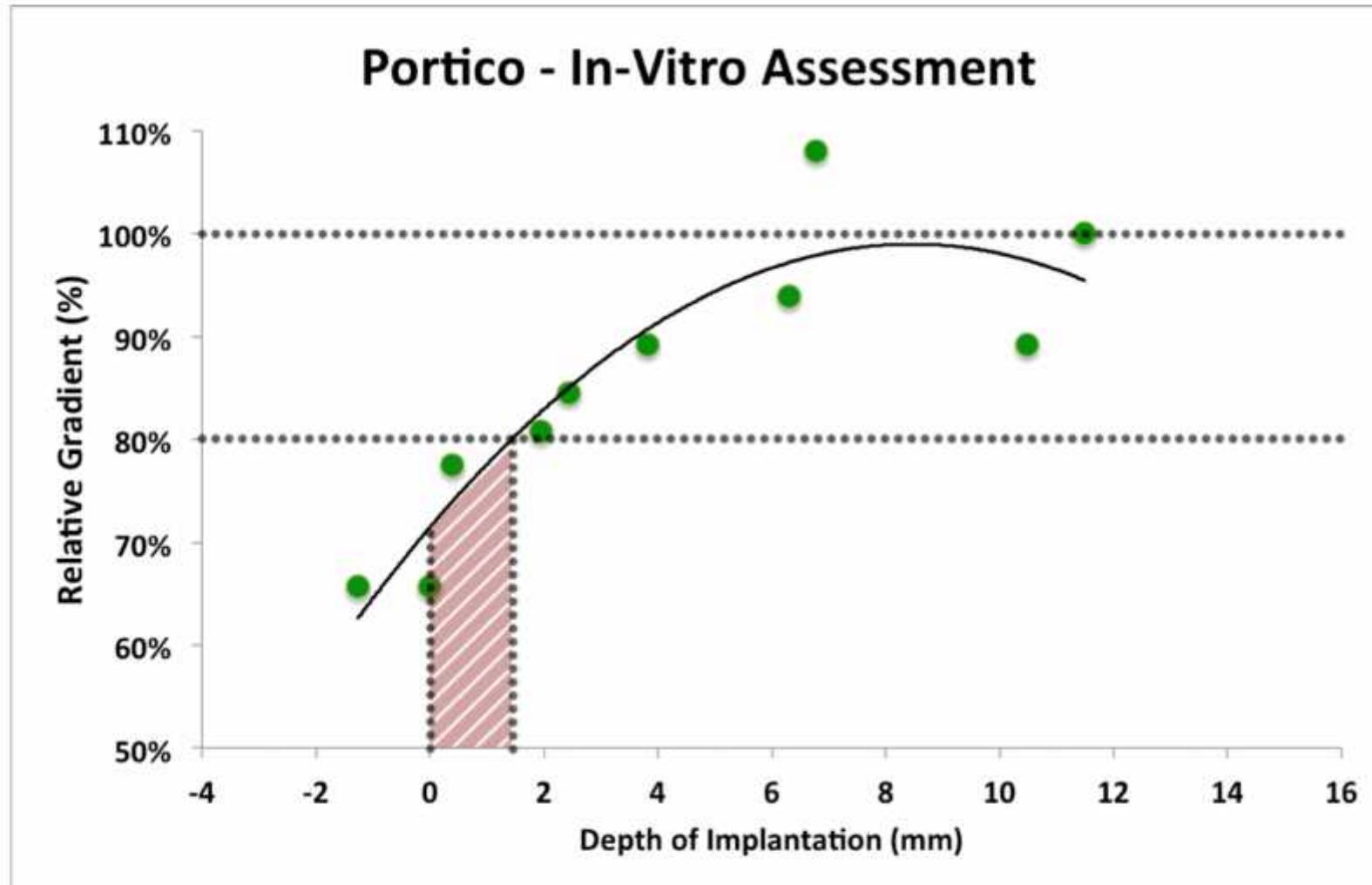
# Portico In-Vitro Assessment



**Portico 23mm in Trifecta 19mm**



## Portico 23mm in Trifecta 19mm



# Challenges to VIV

- Higher risk of coronary ostial obstruction (3.5%) and device malposition (8.4%) with certain bioprosthetic valve designs (stentless)
- Elevated post procedure gradients: PPM

But less

- Paravalvular regurgitation ( $\geq 2+$  in 5.4%) and risk for permanent pacemaker (8.3%)

# Summary

- Clinical results are worse in small and stenotic surgical valves
- Stentless bioprostheses are associated with higher malposition rate and coronary obstruction but with lower gradients after ViV
- Cases at risk for coronary obstruction could be identified pre-procedure and planned accordingly
- Severe PPM is the Achilles' Heel of aortic ViV procedures. Risk for elevated gradients could be reduced with higher device implantation
- Thrombosis after aortic ViV seems to be more common and should be studied further
- Implications for SAVR: bioprosthesis > mechanic, larger valve, specific surgical valves