



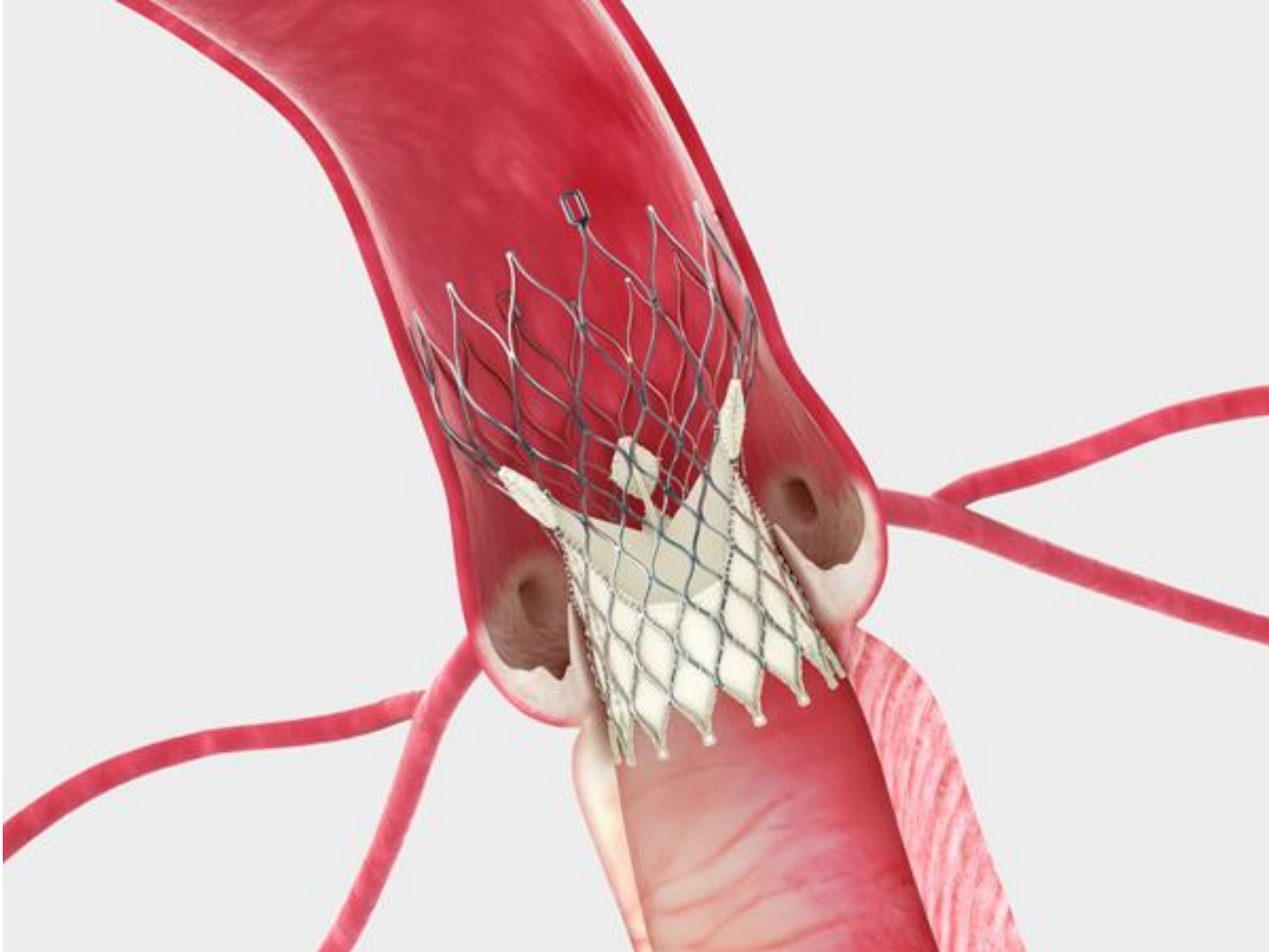
# Analisi agli elementi finiti di Impianto Valvolare Aortico Transcatetere in annuli ellittici idealizzati: CoreValve vs. Portico

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Correlatore: **Dott. Alice Finotello**

A.A. 2017/2018





## CoreValve vs Portico

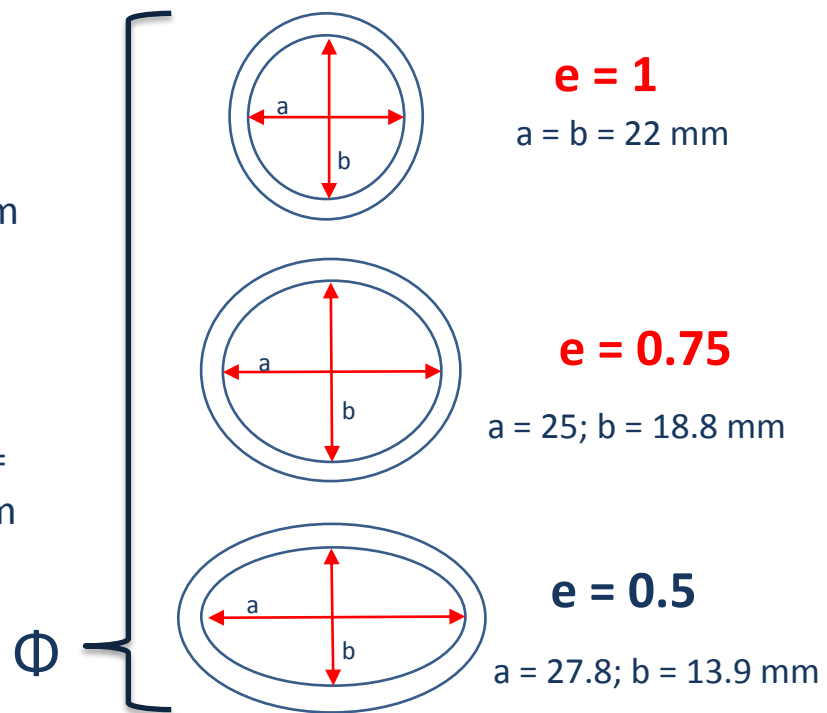
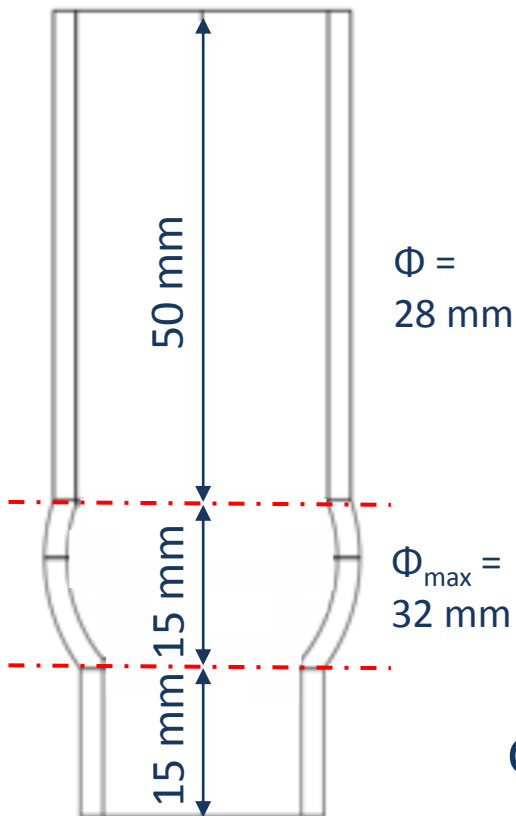
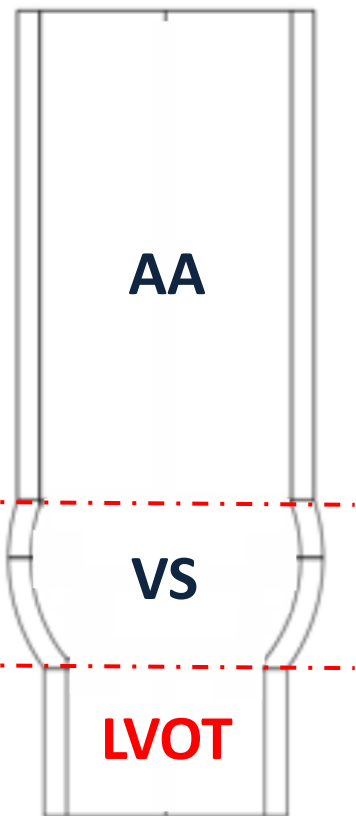
Annuli  
ellittici

Presenza di  
calcificazioni

Geometrie  
idealizzate



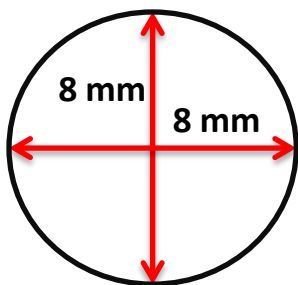
# Radice aortica idealizzata



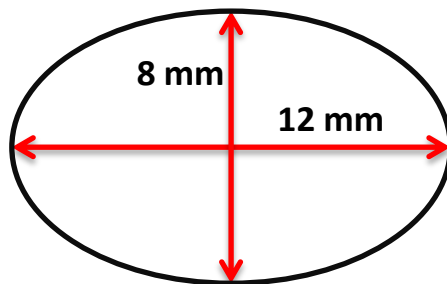


# Calcificazioni

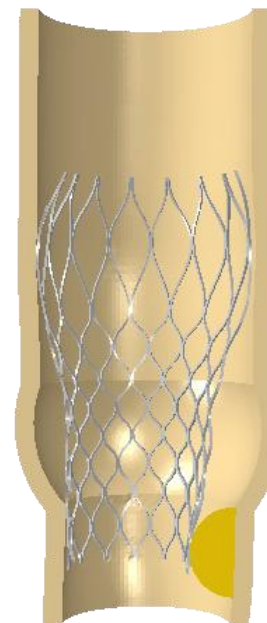
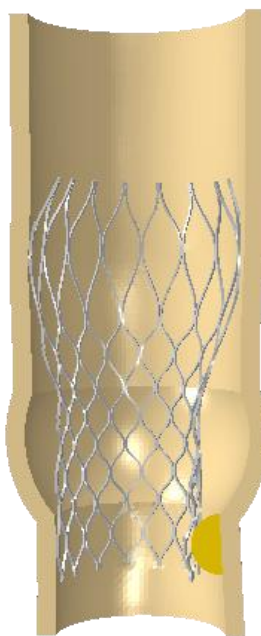
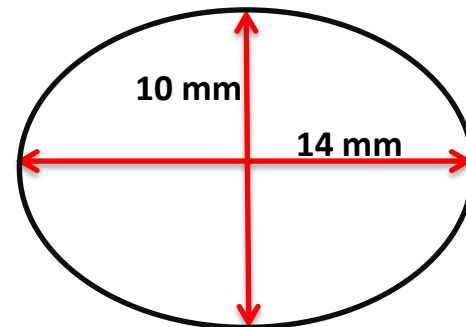
**Calcio 1**



**Calcio 2**



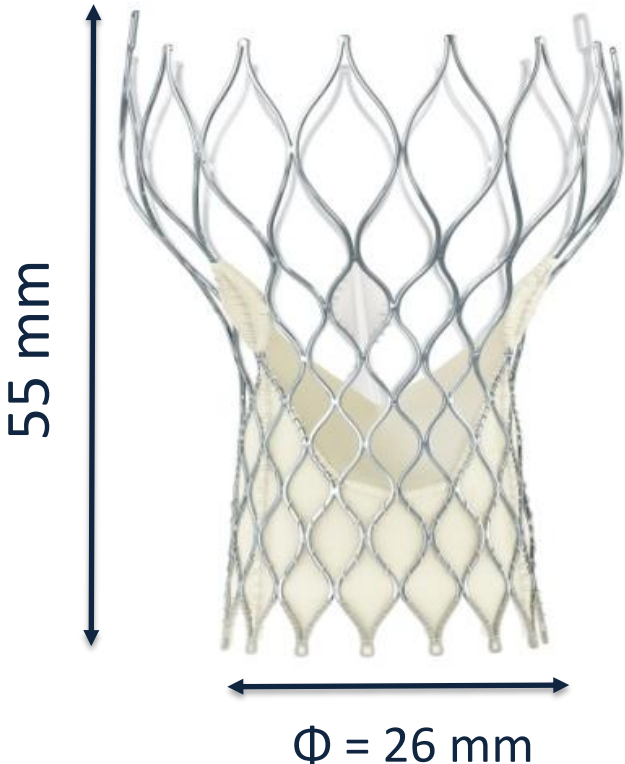
**Calcio 3**



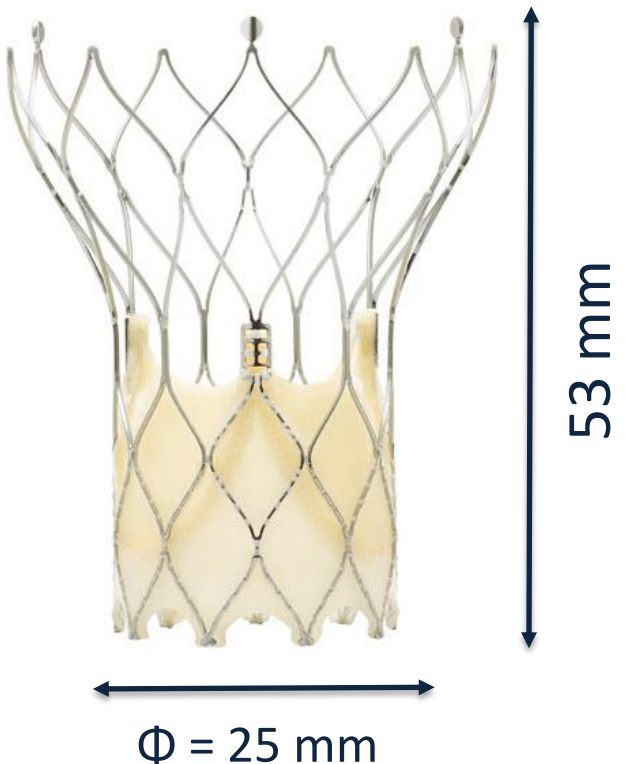
**CoreValve, eccentricità = 1**



# CoreValve vs Portico



**Medtronic CoreValve**



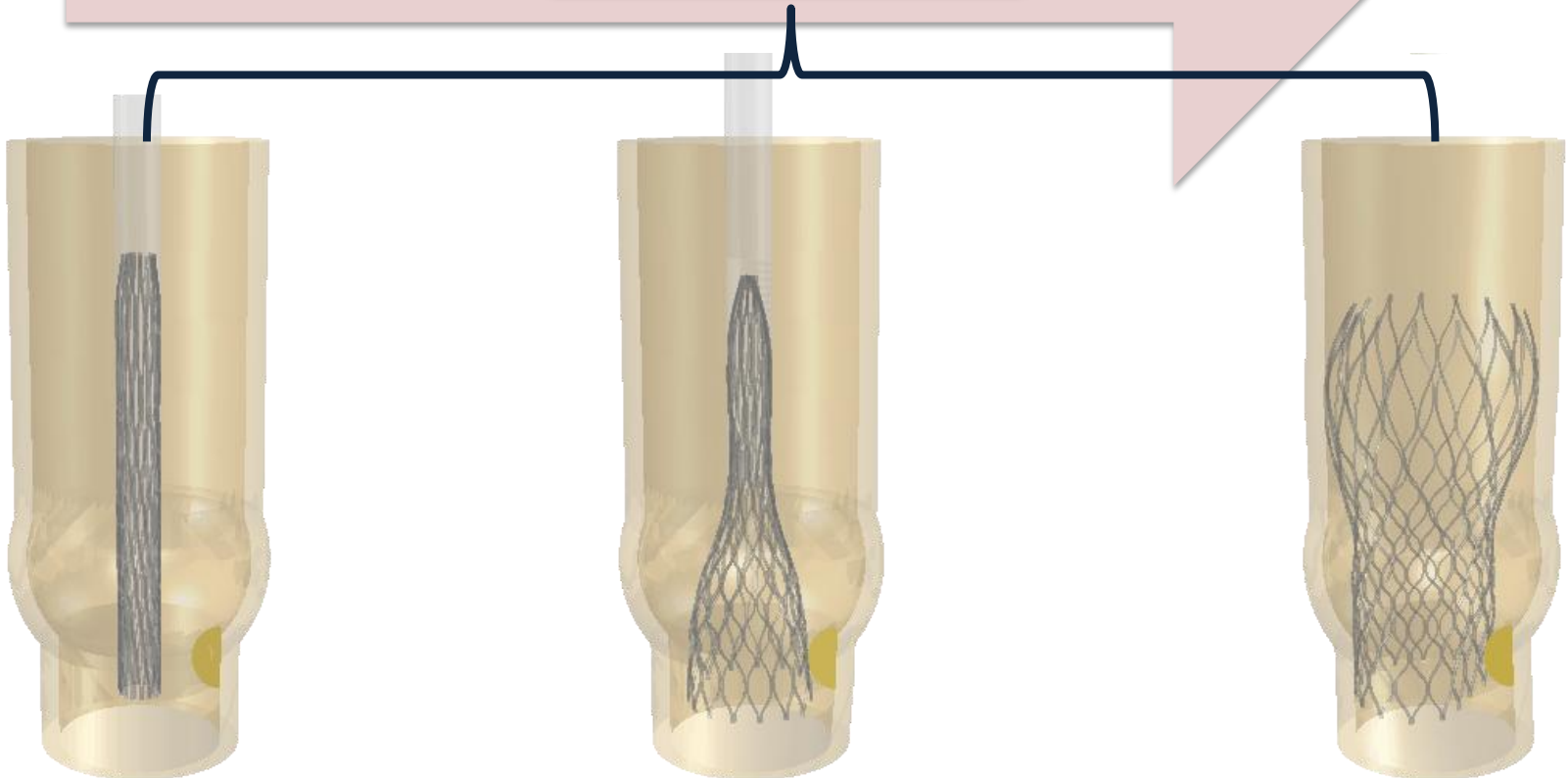
**St. Jude Medical Portico**



**PRE-  
PROCESSING**

**ANALISI FEM**

**POST-  
PROCESSING**



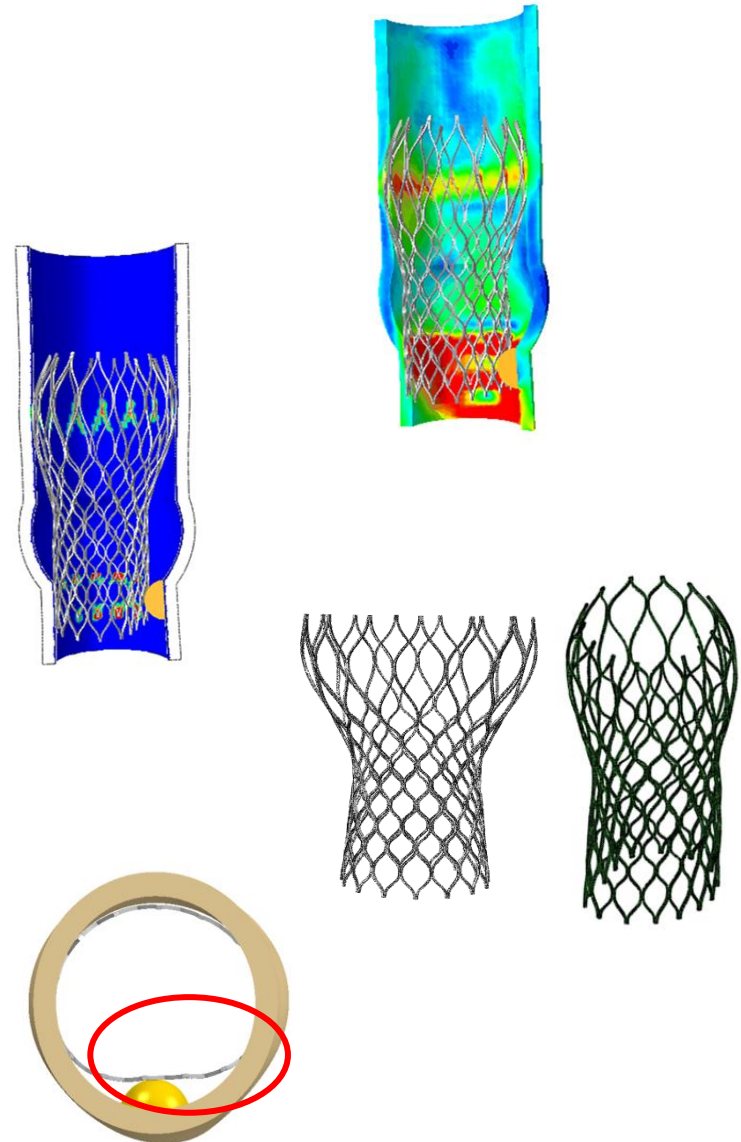


Stress di Von Mises

Area di contatto

Deformazione stent

Leak paravalvolare







# Area di contatto



**CoreValve**  
(e=1, calcio 2)

vs.



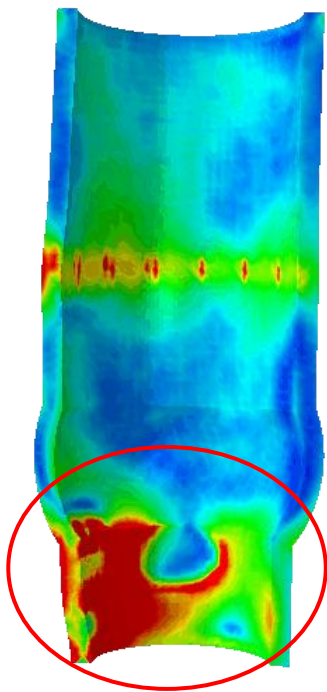
**Portico**  
(e=1, calcio 2)

Stent-root interaction area [ $mm^2$ ] – eccentricità 1		
Calcio	CoreValve	Portico
-----	742	237
Calcio 1	522	290
Calcio 2	603	255
Calcio 3	498	281

**CoreValve >> Portico**

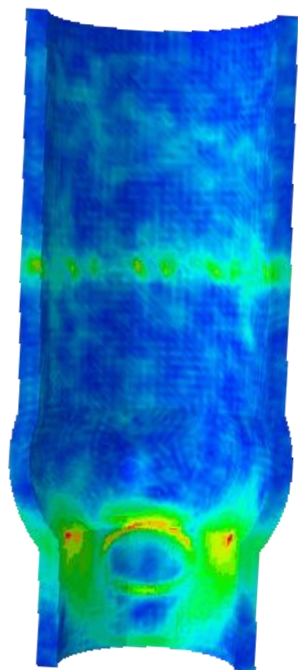


# Stress di Von Mises



**CoreValve**  
(e=1, calcio 2)

vs.



**Portico**  
(e=1, calcio 2)

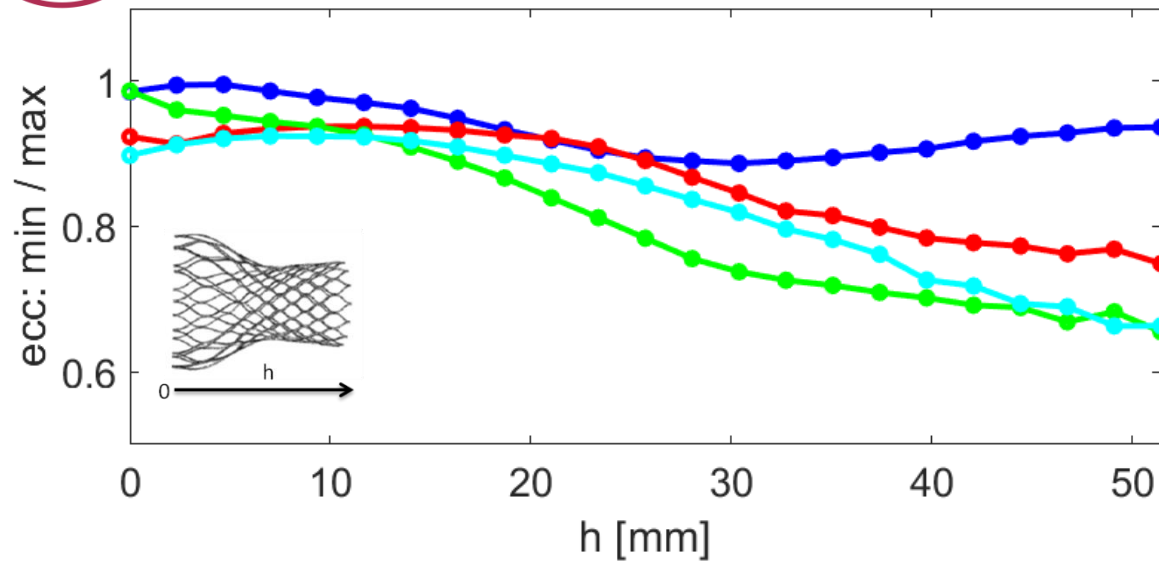
Von Mises stress [kPa/kPa] – eccentricità 1		
Calcio	CoreValve	Portico
-----	29/134	10/174
Calcio 1	62/237	21/185
Calcio 2	56/360	20/166
Calcio 3	56/243	23/237

**CoreValve > Portico**



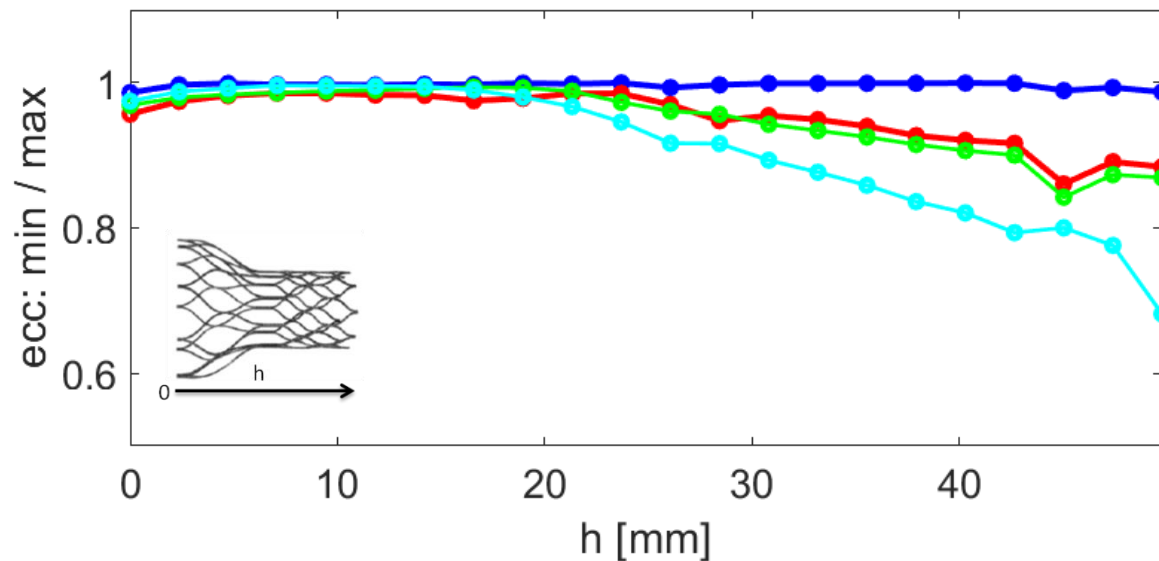
# Deformazione dello stent

CoreValve - eccentricità 1



- No calcio
- Calcio 1
- Calcio 2
- Calcio 3

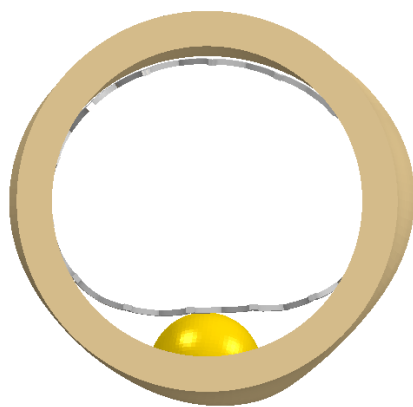
Portico - eccentricità 1





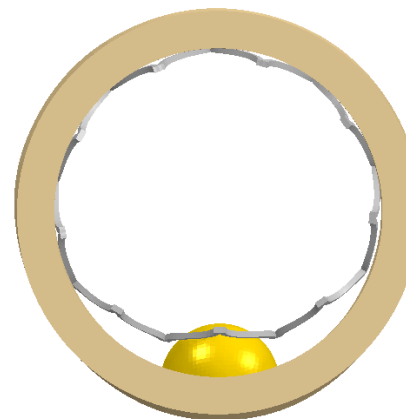
# Leak paravalvolare

Paravalvular leakage [ $mm^2$ ] – eccentricità 1		
Calcificazione	CoreValve	Portico
-----	0	0
Calcio 1	21	22
Calcio 2	35	23
Calcio 3	39	39



**CoreValve**  
(e=1, calcio 1)

vs.



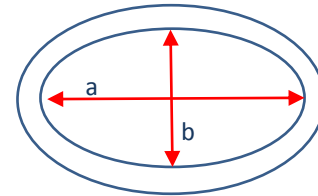
**Portico**  
(e=1, calcio 1)



- Area di contatto & Stress di Von Mises: **CoreValve** vs. Portico
- Deformazione dello stent: CoreValve vs. **Portico**
- Leak paravalvolare: CoreValve vs. **Portico**



$e=0.5$

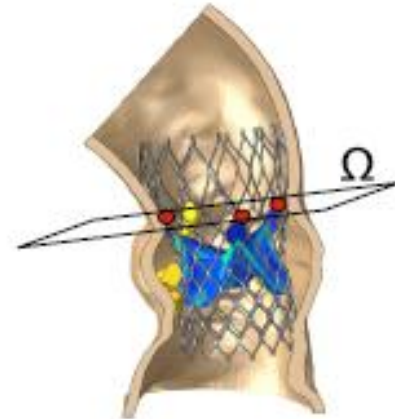


$e = 0.5$

$a = 27.8; b = 13.9 \text{ mm}$



Simulazioni  
patient-specific





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Grazie