

MEET - 2008

Technical Aspects: Pro & Against:
Why I prefer open cell stents

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Choice of Stent

- **radial force**
- **conformability**
- **precision**
- **tapering**
- **plaque prolaps**
- **visibility**

Radial Force

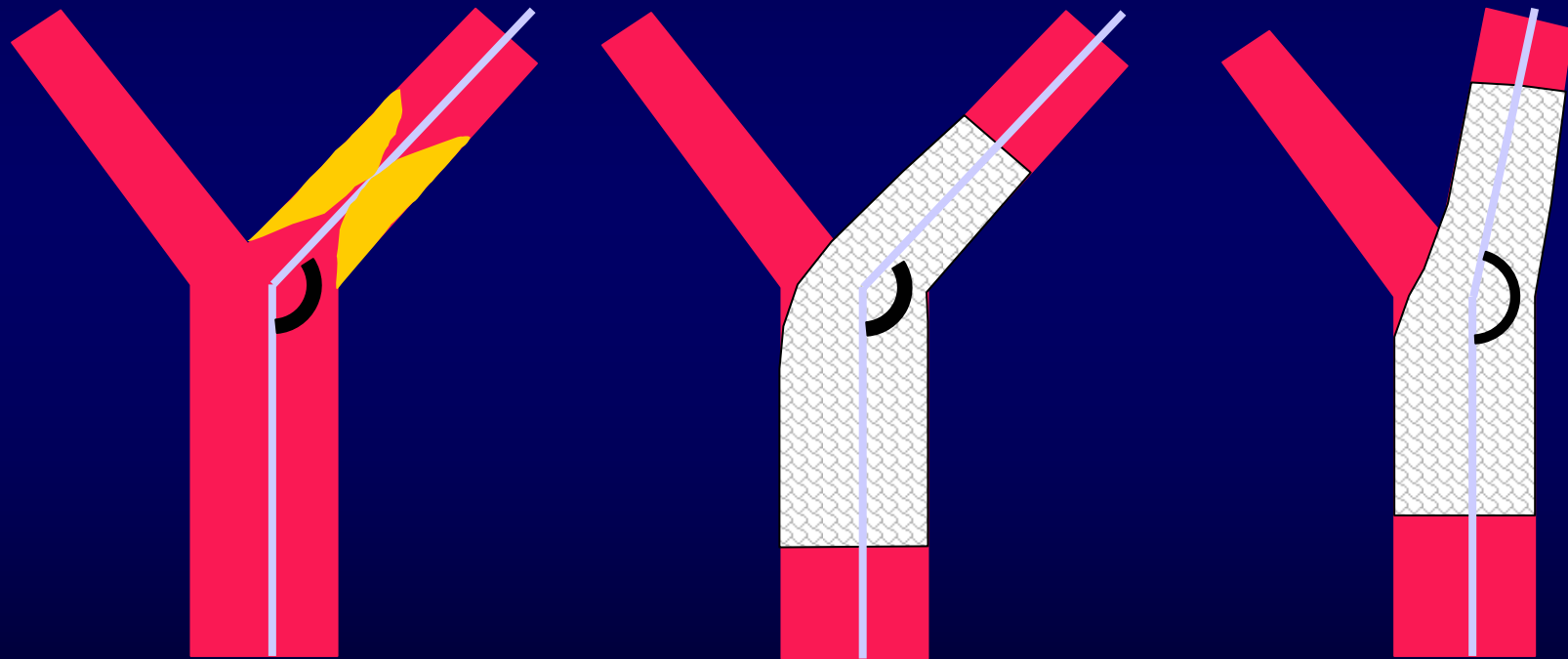
- stent should resist external compression
- high radial force will lead to impaction of the stent in the plaque
- stent impaction means plaque protrusion
- open cell stents have the strongest radial force because their cells can freely open

Choice of Stent

- **arterial anatomy and lesion characteristics**
- **personal preference**
experience and familiarity
- **mechanical stent properties**
- **dimensions**

Conformability

Remodelling versus Conformability



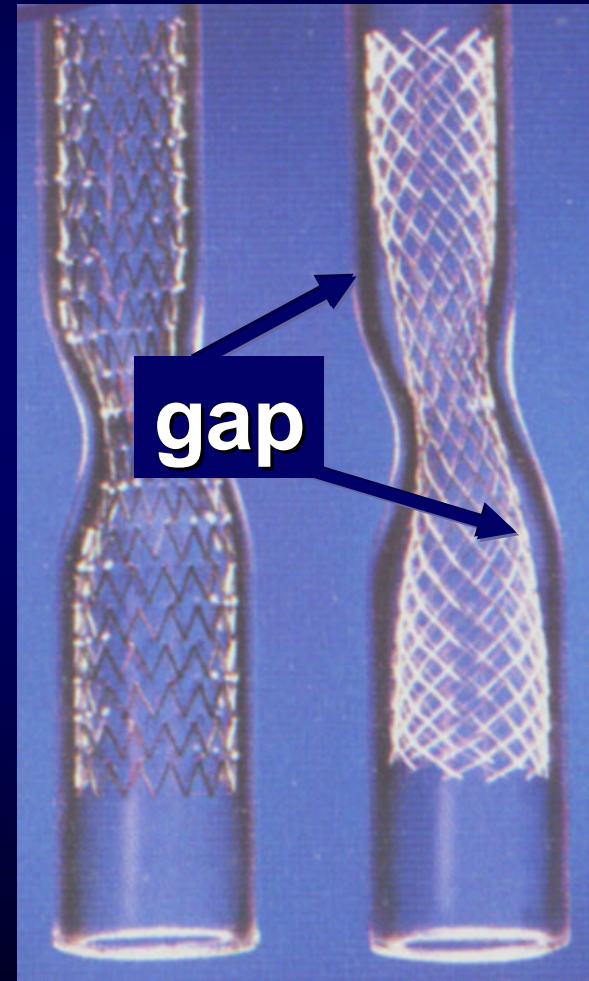
open cells

closed cells

Conformability

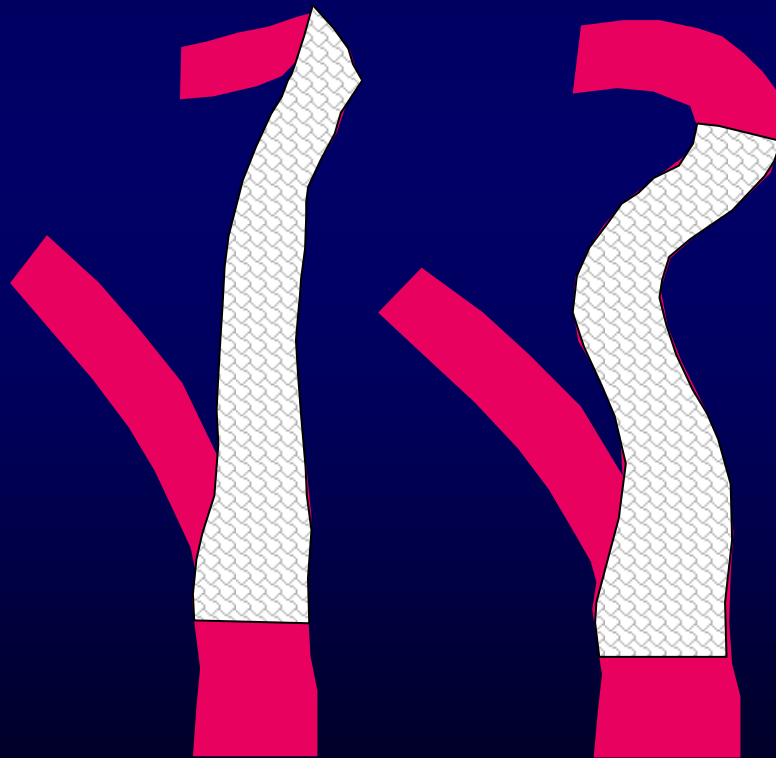
Smart Stent:
good apposition to
the vessel wall

Wallstent:
poorer apposition to
the arterial wall ...



Conformability in Tortuous ICA

Risk of kinks

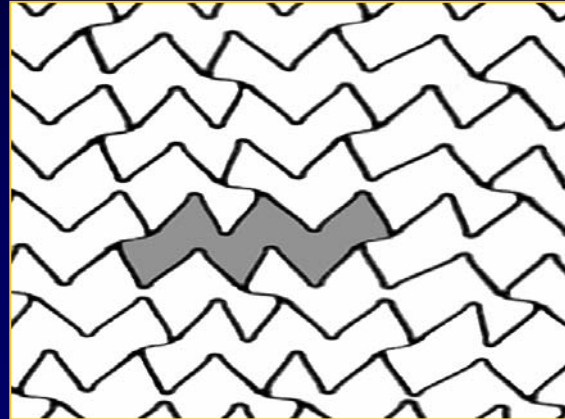
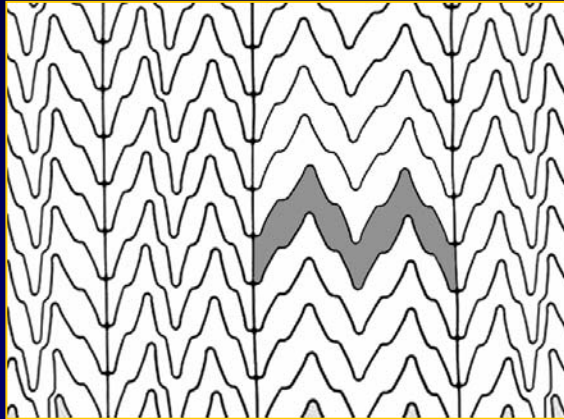


- Choice of stent
- Positioning of stent

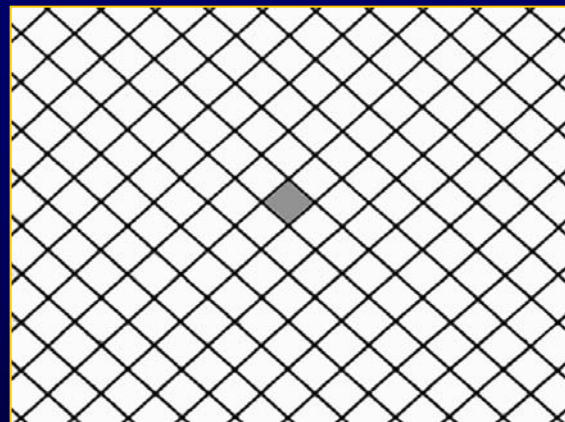
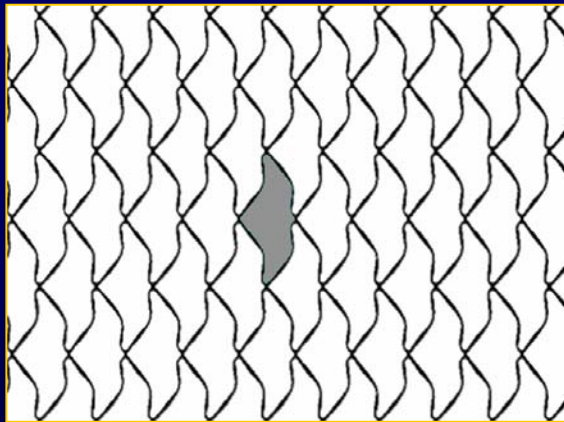
Lesion Characteristics

- **soft plaque**
- **ulceration**
- **thrombus**
- **calcification**
- **post-CEA fibrosis**

Mesh Size



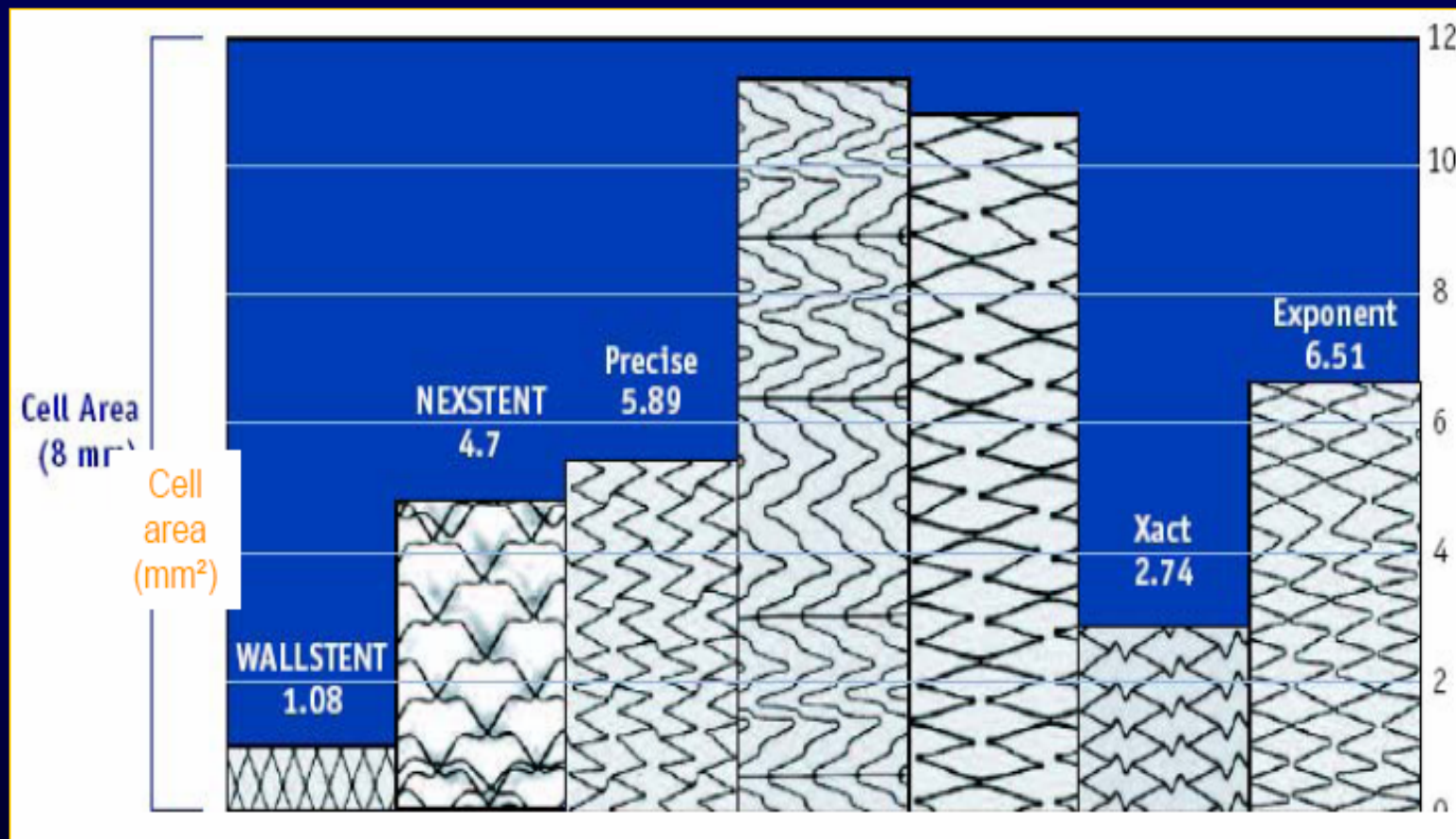
Open cells



Closed cells

Stent meshes should be narrow enough to prevent plaque material from protruding through the meshes!

Free Cell Area



Delayed Ischemic Complications

- about 3% in all series
- other sources of stroke: heart disease
- other factors related to CAS
 - atherosclerosis of the aortic arch
 - clopidogrel resistance
 - **stent design**

Scaffolding

Wall Coverage

Amount of support a stent gives to a vessel wall

Ratio between quantity of stent material in comparison to amount of vessel tissue

**more scaffolding = more wall coverage
open cell versus closed cell stents**

Straight versus Tapered

- Foreshortening
- Conformability
- **Vessel wall adaptability**
- Scaffolding and wall coverage
- Radial stiffness

Nitinol Stents

Straight



Tapered



Straight



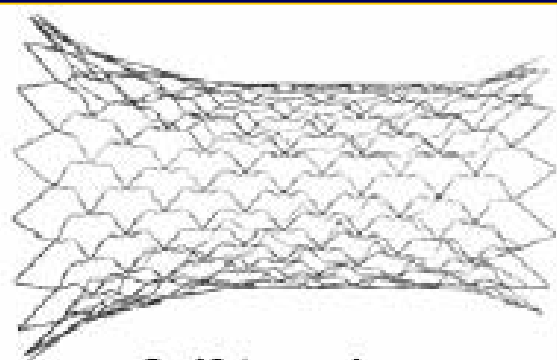
Tapered



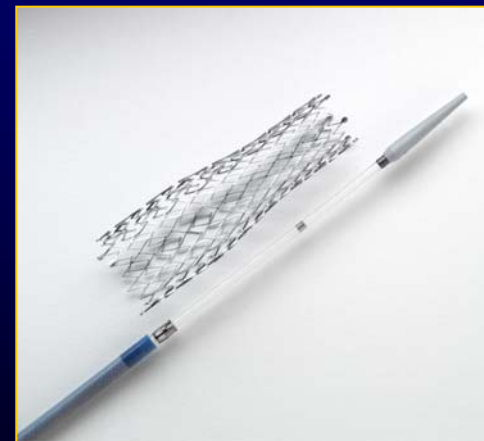
Straight



Tapered



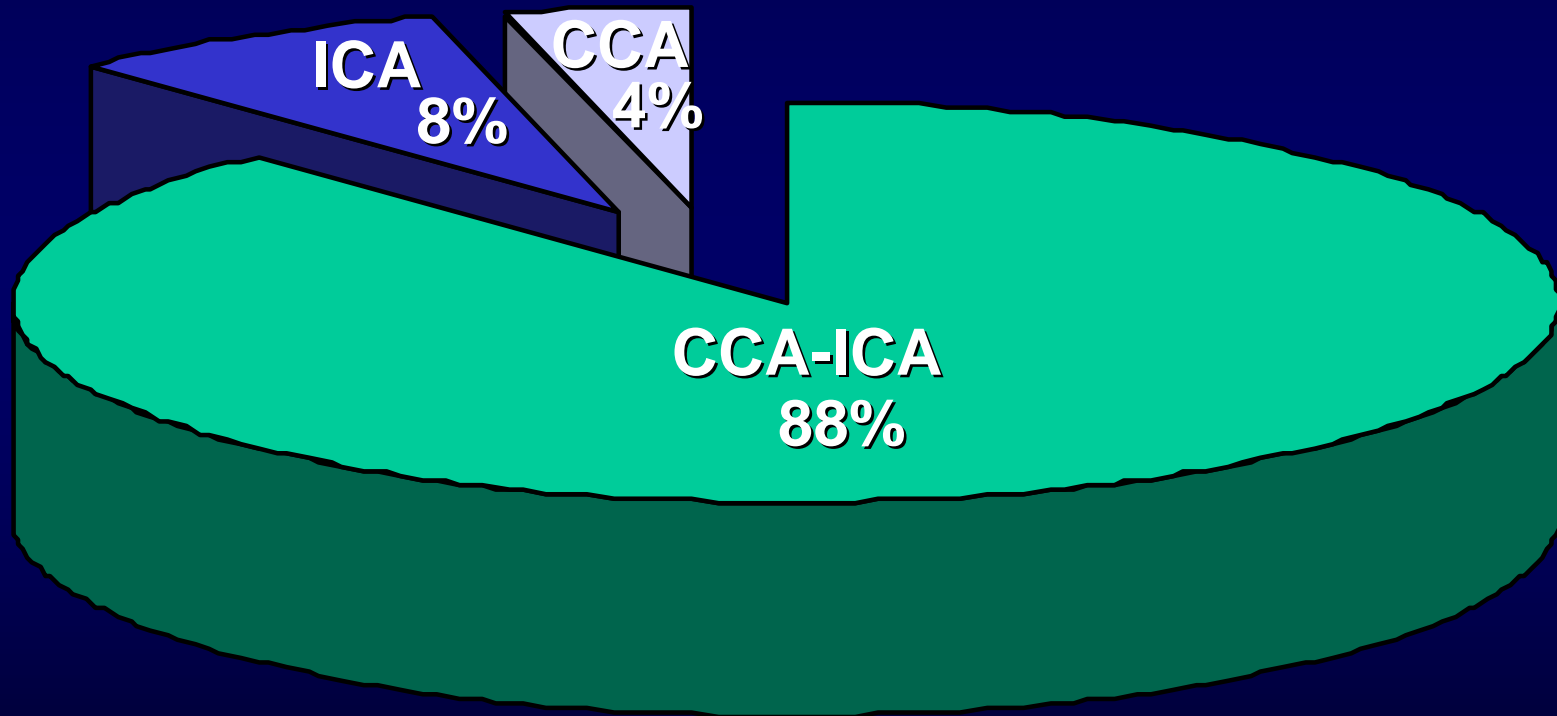
Self-tapering



The Rationale for a Tapered Stent

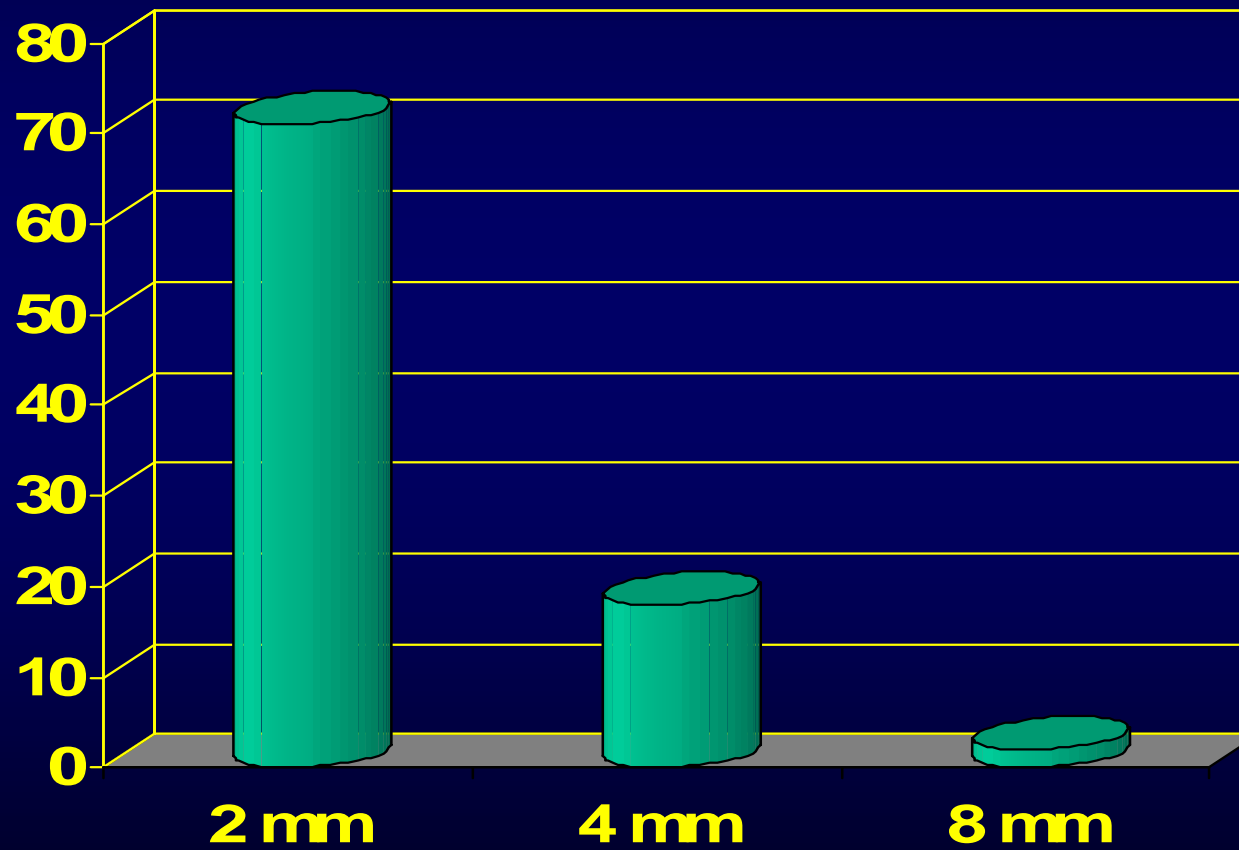
- **most stents positioned in the CCA-ICA**
- **adaptability to CCA-ICA anatomy**
- **homogenous radial force along the stented segment**
- **homogenous mechanical stress during neck movements**
- **homogenous stent-arterial wall ratio**

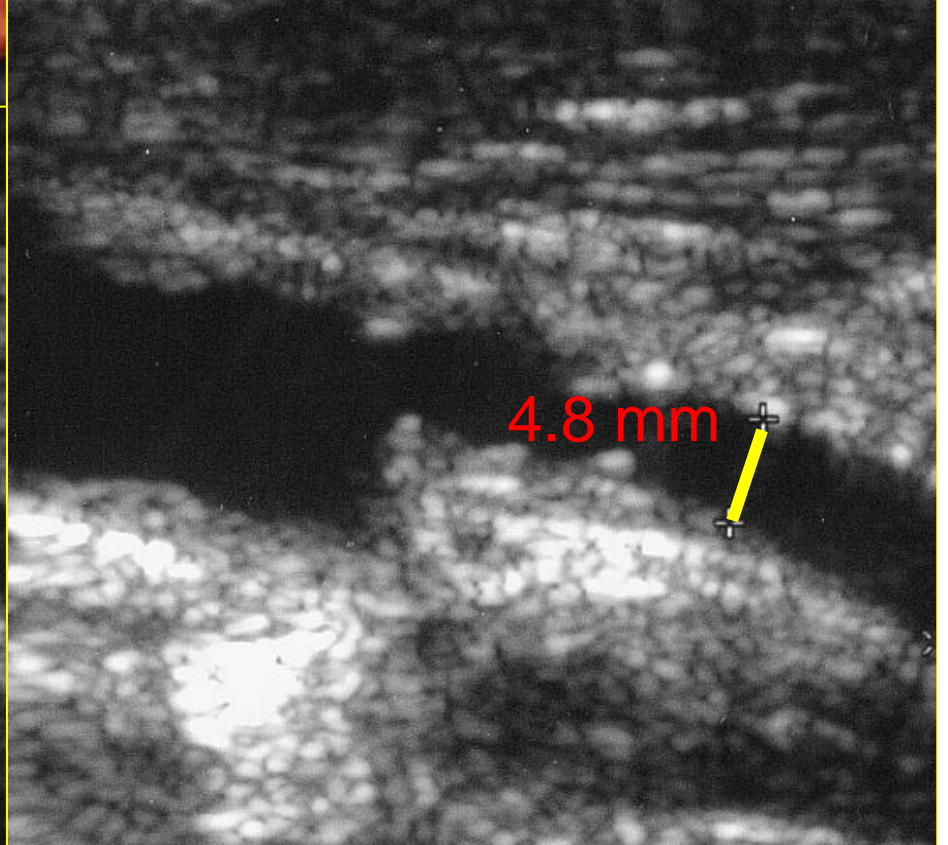
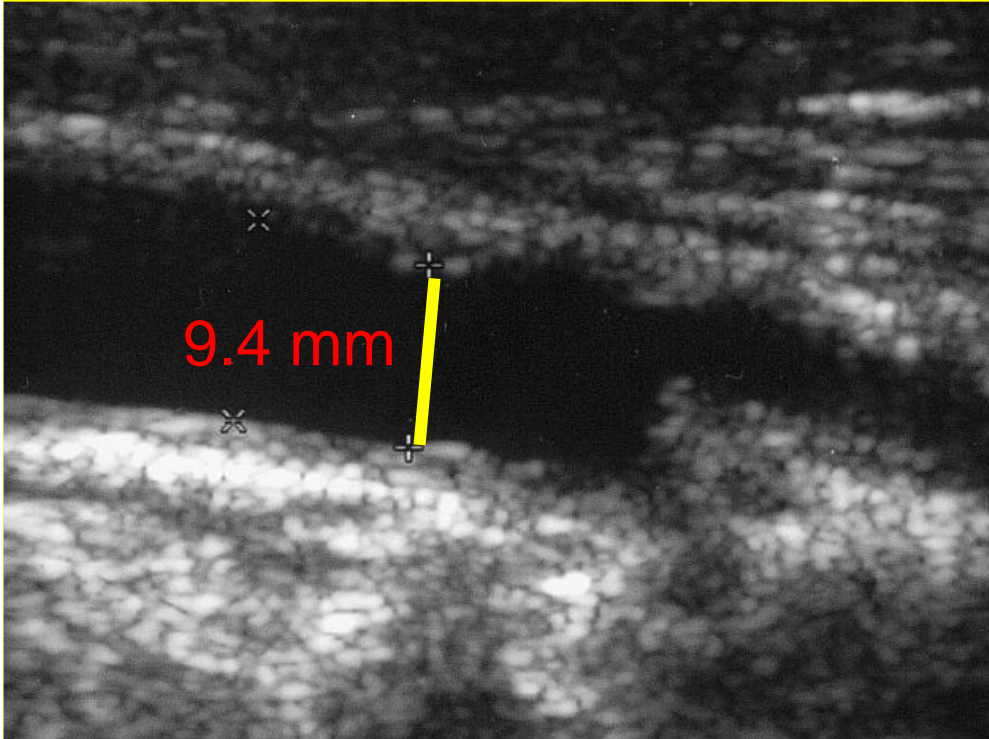
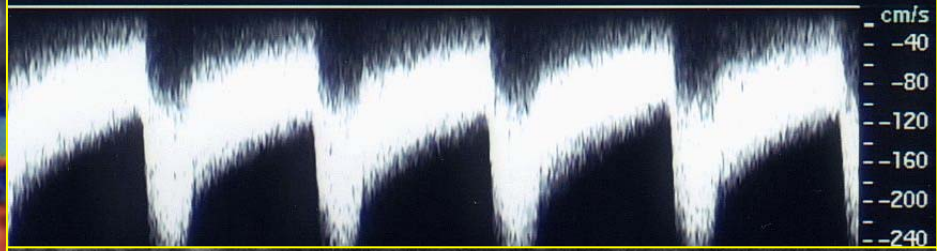
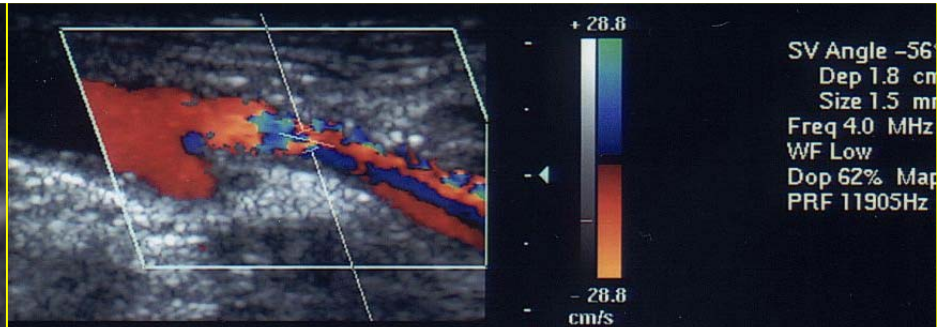
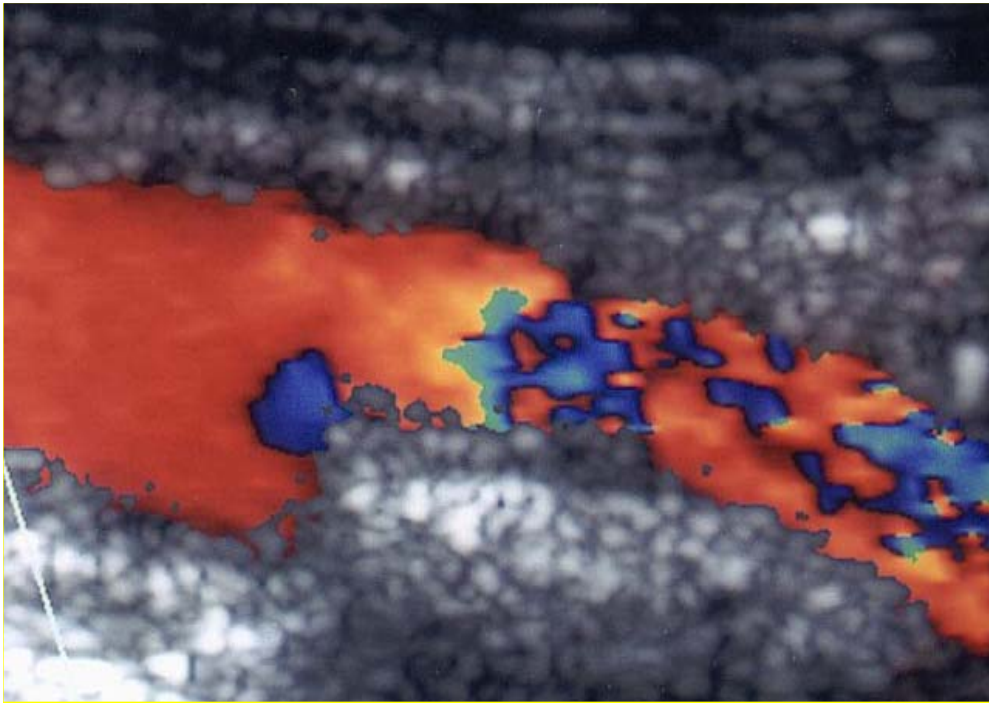
Stented Segment*



* ProCAS Registry

Diameter Difference between CCA and ICA





Intimal Proliferation

Mechanical Factors

- **unfavourable metal-tissue ratio**
 - **excessive radial force**
 - **head movements**
-

The Optimal Stent for the Individual Lesion

- **for asymptomatic patients the stent design seems not to matter**
- **for symptomatic patients closed cell stents propably have a lower complication rate**

Results from different centers in Europe:

M. Bosier, A. Cremonesi, E. Houdart, K. Mathias, H. Sievert

Tapered Stent in CAS

A tapered stent is preferable from a theoretical point of view, ...

... but we need more data to consider the tapered stent a must for any CAS

Dimensions

- **extended disease**

Wallstent

after radiotherapy

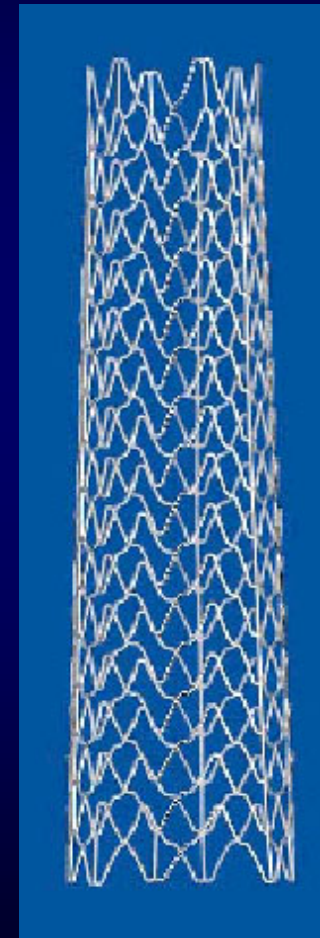
- **CCA > 10 mm**

Vivexx 12 mm

- **mismatch of CCA and ICA**

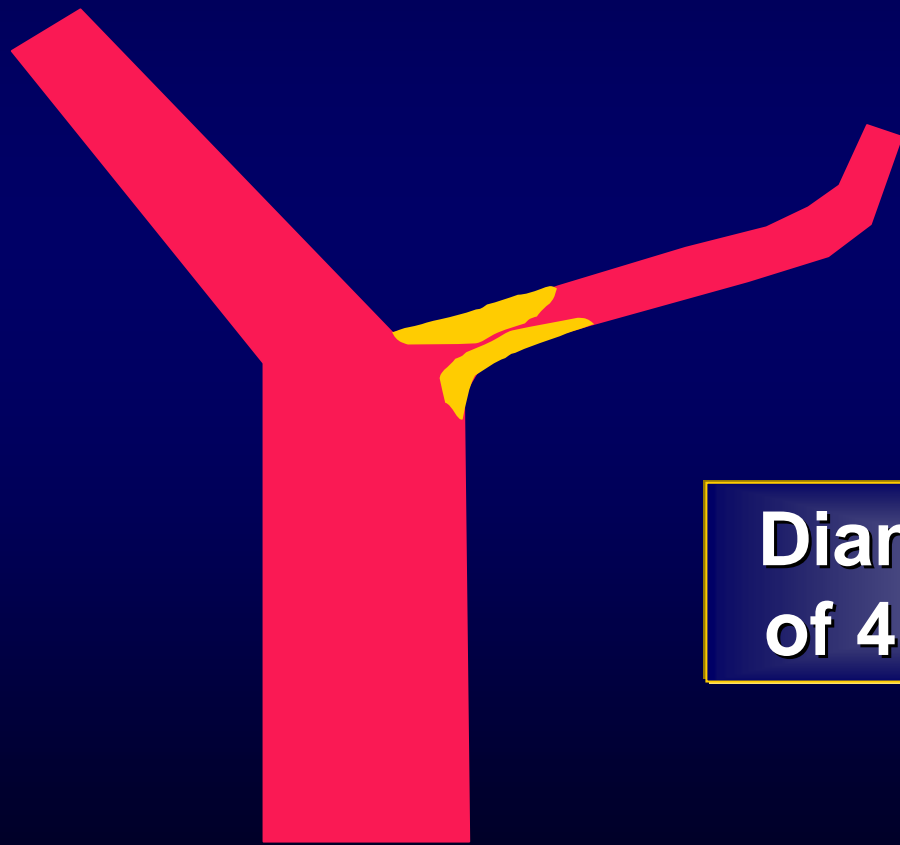
Variety of
tapered stents

Mismatch of CCA - ICA Diameters



Acculink tapered 7-10 mm

Tapering

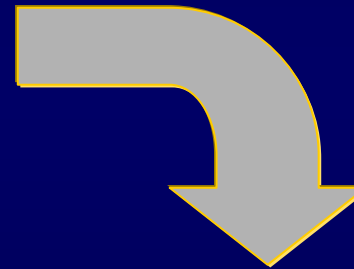


**Diameter differences
of 4 to 10 mm occur**

Tapering

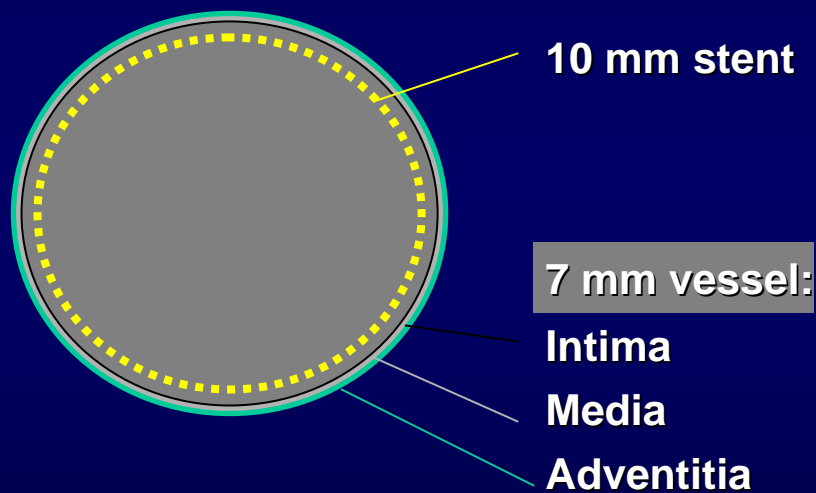
Arguments Pro

- wall scaffolding
- radial force

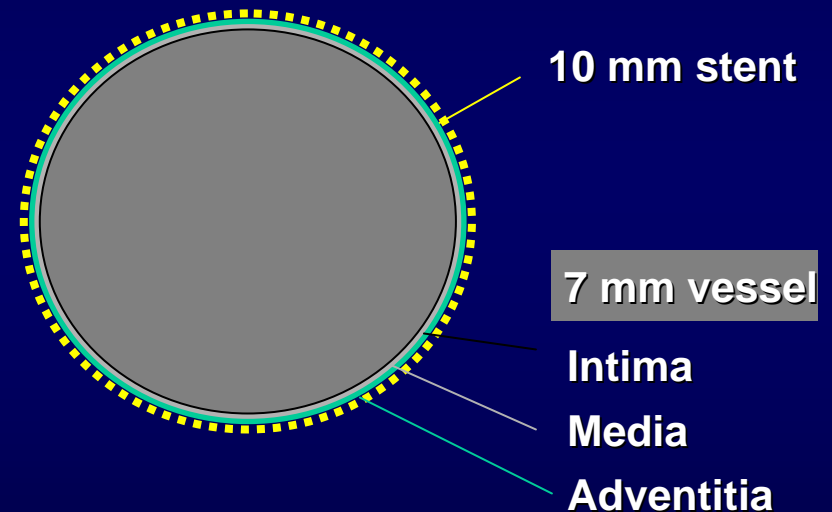


more equal distribution

Every stent will ultimately reach its nominal diameter

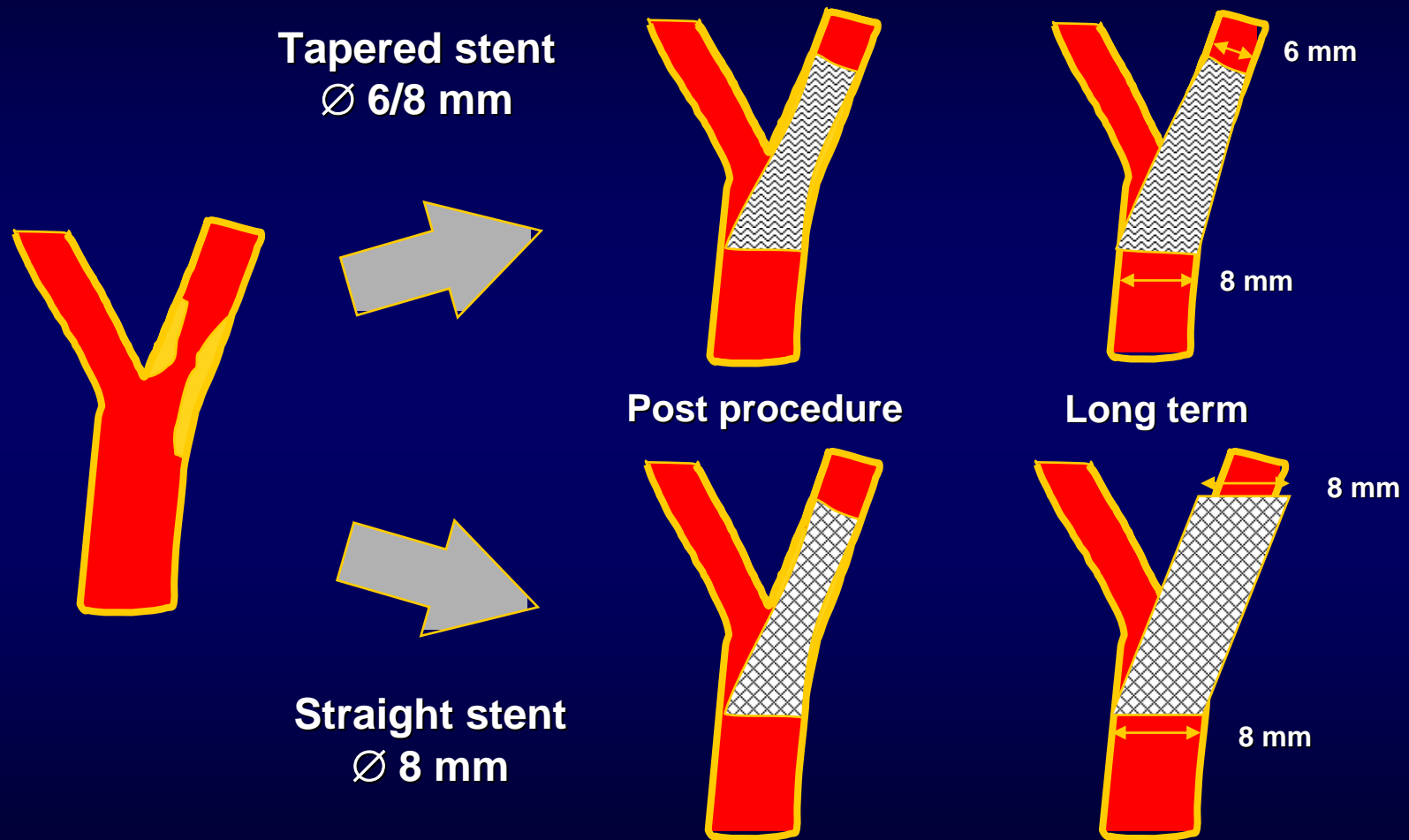


T_0



Long Term

Long Term Effects



Continuous radial force of SE stents will cause strut migration until force is relieved at stent's given dimensions – this might not occur with calcifications and fibrotic tissue

The Optimal Stent for the Individual Lesion

- for a tortuous CCA-ICA: open cell stent
- for a straight CCA-ICA: close cell stent
- for a CCA-ICA mismatch: tapered stent