

Drug Eluting Stents:  
Pre & Post DES Vessel Treatment

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*Angioplasty Summit*

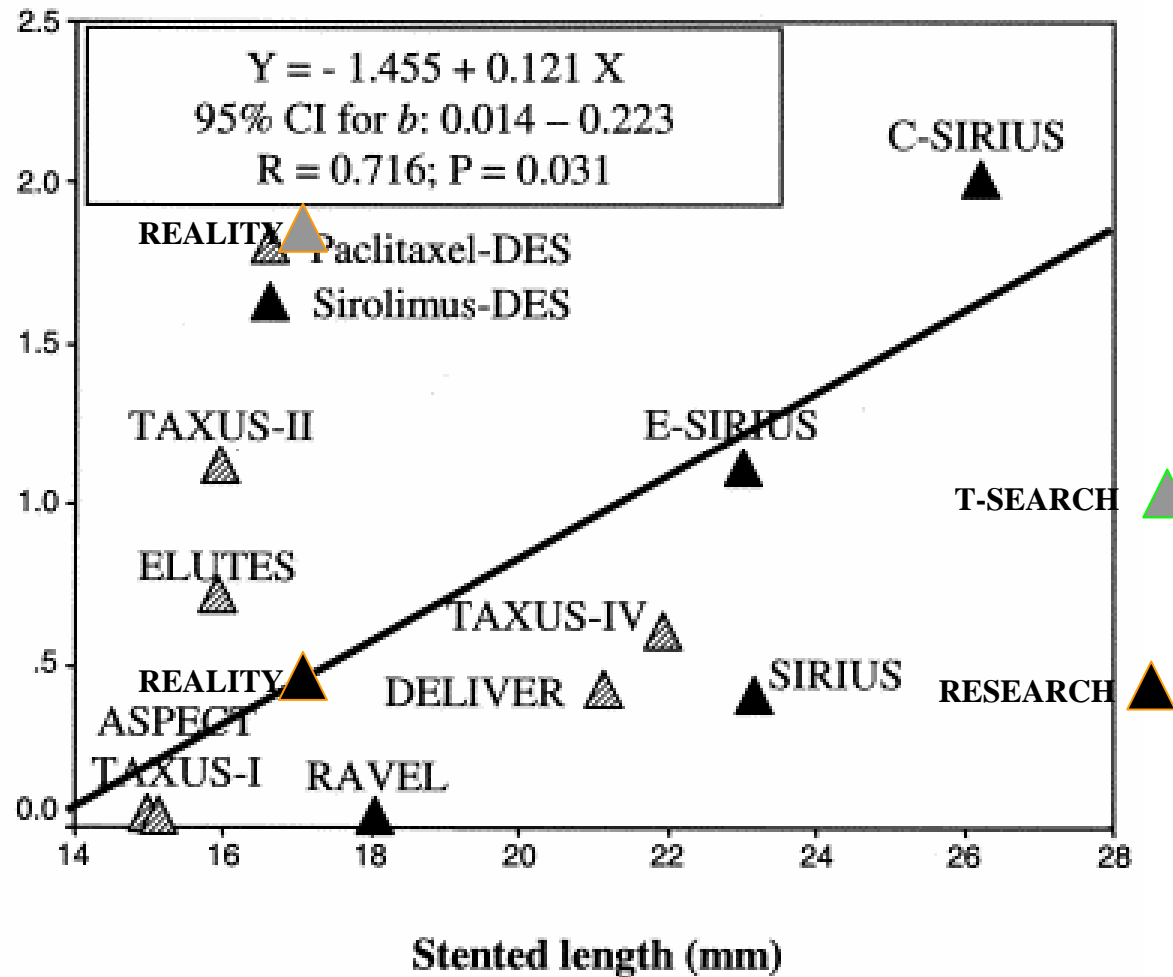
*Seoul, Korea*

- Malapposition vs residual stenosis
  - SAT vs restenosis
- Pre-treatment
- Stent deployment
- Post-dilatation
- IVUS

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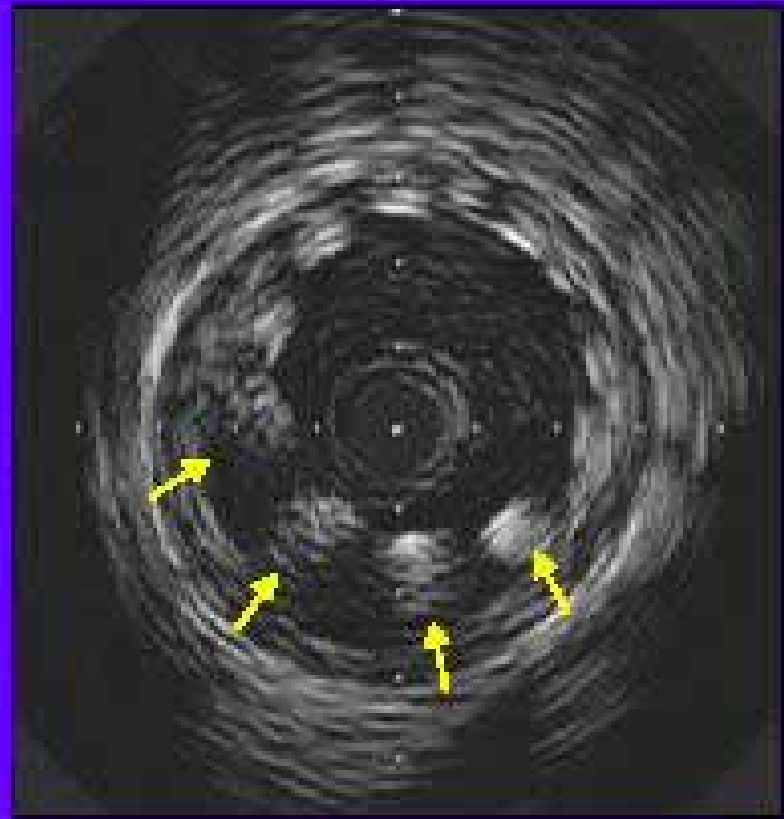
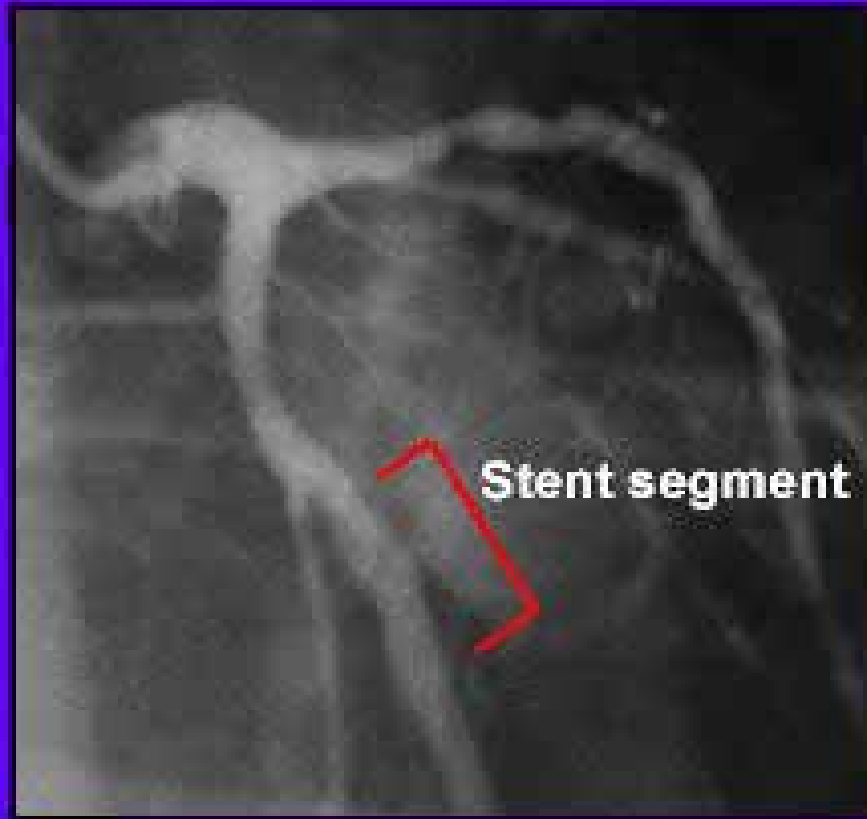
# Drug-eluting stent thrombosis

Thrombosis rate (%)



# SIRIUS – IVUS Analysis

## Incomplete Stent Apposition



No associated clinical events in any patient with incomplete apposition at baseline or follow-up

# Stent underexpansion & residual stenosis vs stent thrombosis after sirolimus-eluting stent implantation

n= 15 SAT after successful SES implantation vs 45 matched controls

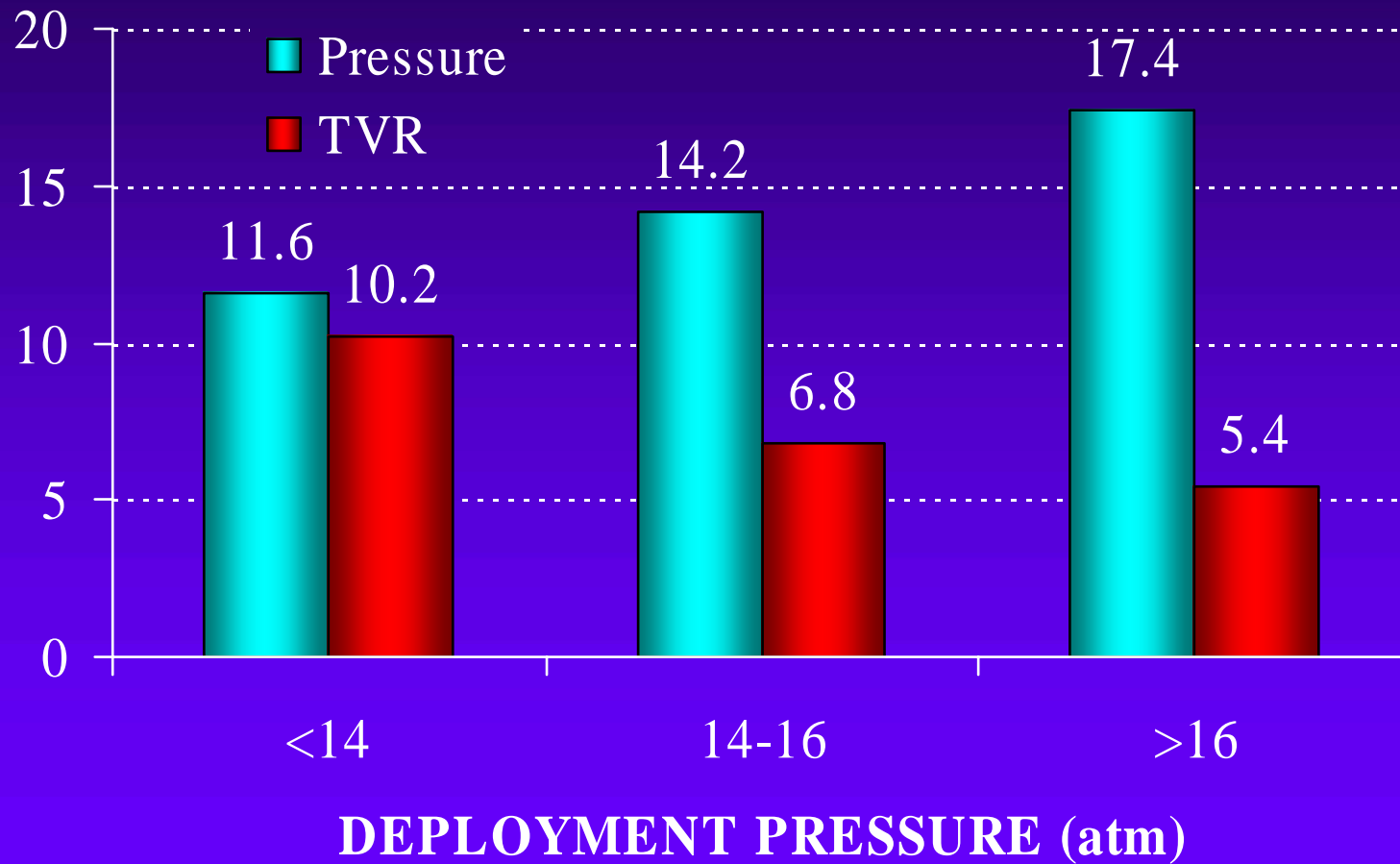
	<b>SAT</b>	<b>No SAT</b>	p
MSA	4.3mm <sup>2</sup>	6.2mm <sup>2</sup>	<.001
Stent expansion	.65	.85	<.001
Residual stenosis	67%	9%	<.001
Plaque burden	62%	46%	<.001
Malapposition	13%	16%	.8

Independent predictors: underexpansion (p = 0.03) and residual stenosis (p = 0.02).

*Kenichi Fujii JACC 45: 995-998, 2005*

# Deployment Pressure vs TVR

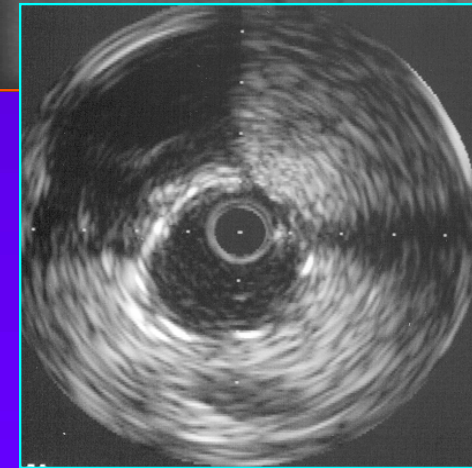
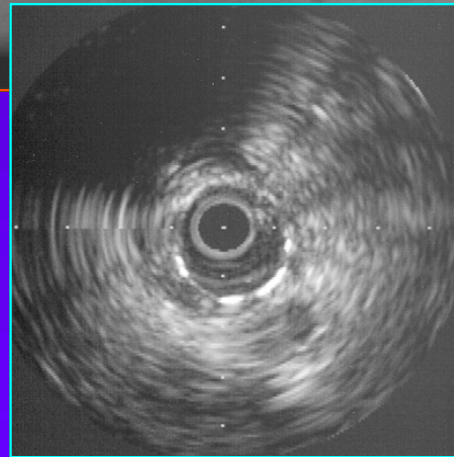
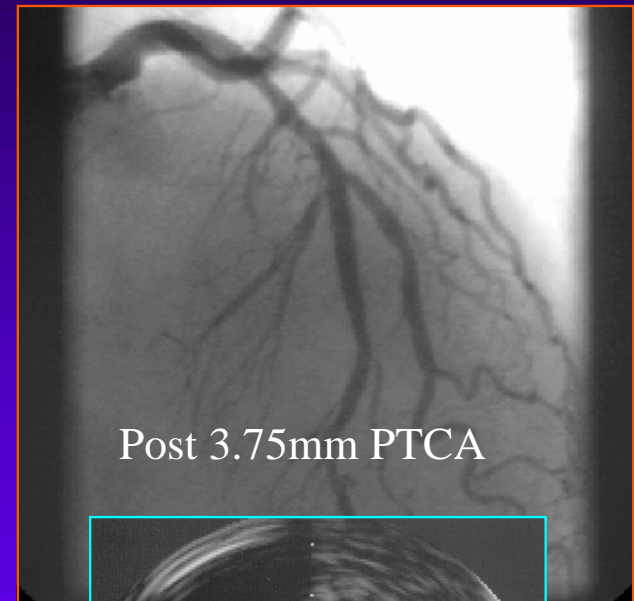
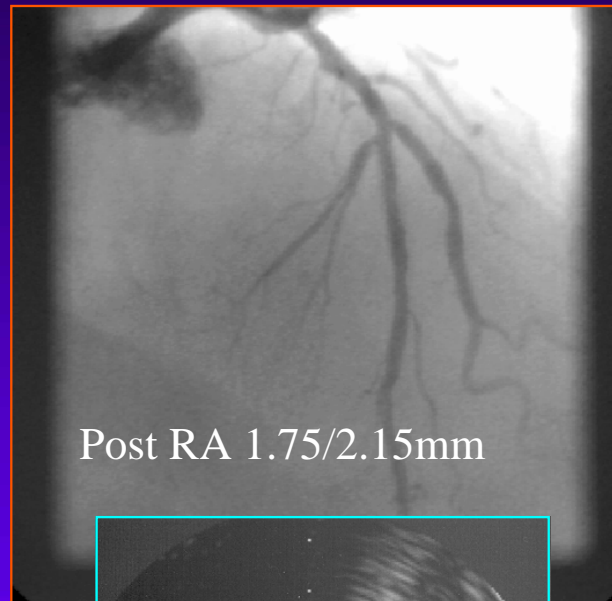
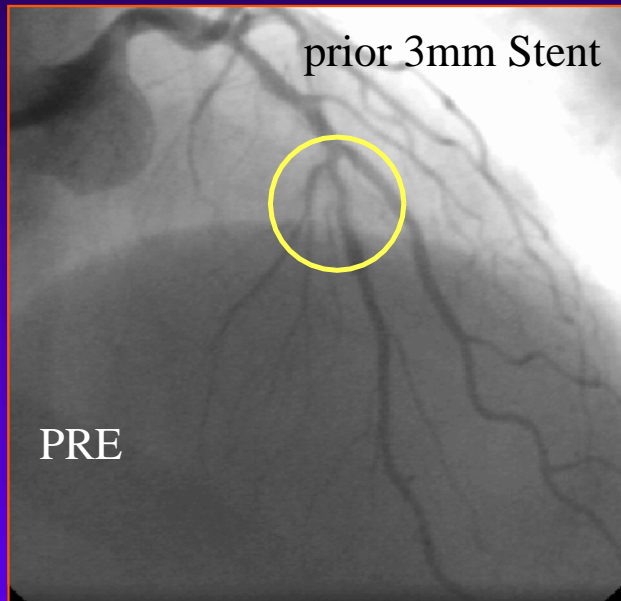
## TAXUS IV



*Kutcher et al AJC 94(6A) 2004*

# In-Stent Restenosis

## Inadequate Initial Stent Expansion





- Malapposition vs residual stenosis
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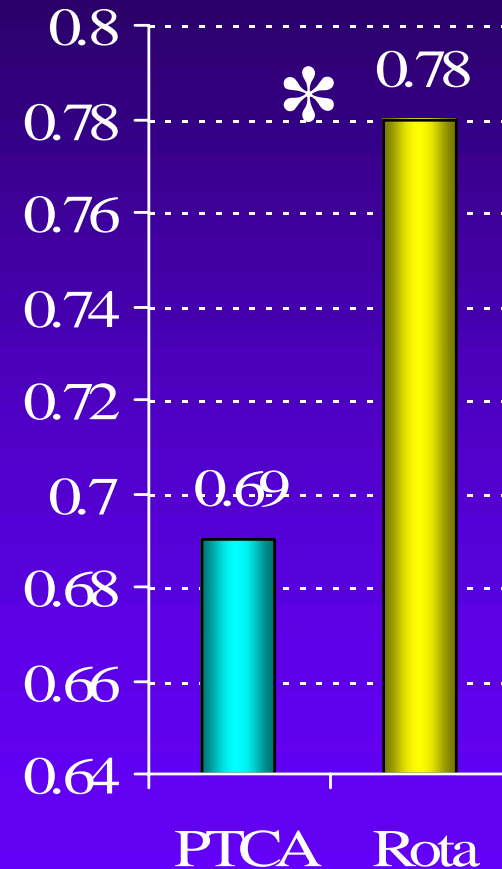
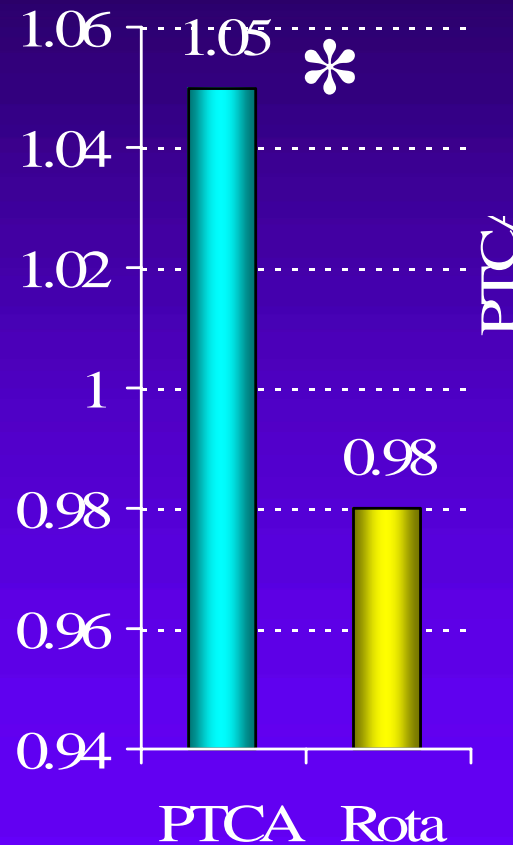
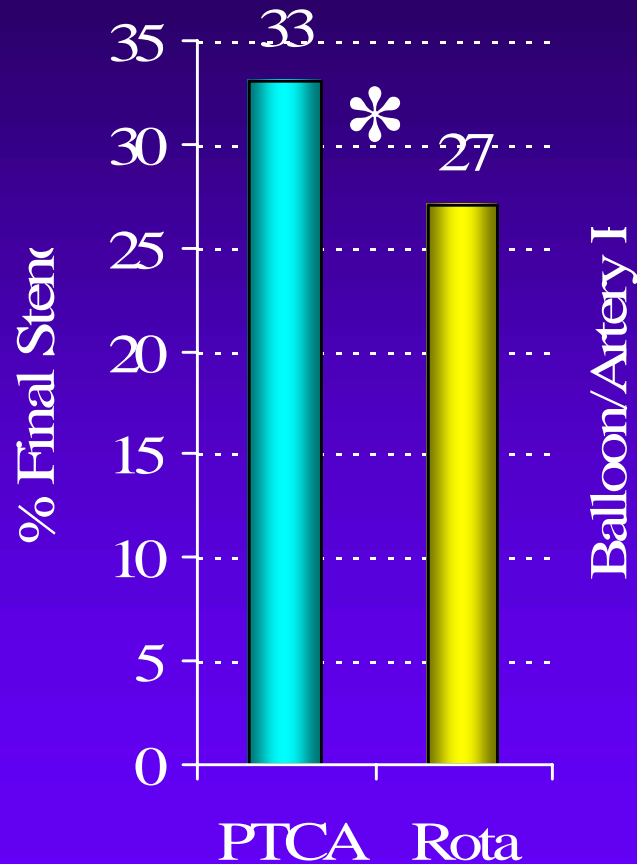
# Vessel vs Device Considerations



As you go through life  
Whatever be your goal  
Keep your eye upon the donut  
And not upon the hole

# Facilitated Angioplasty

## Vessel vs Balloon Compliance



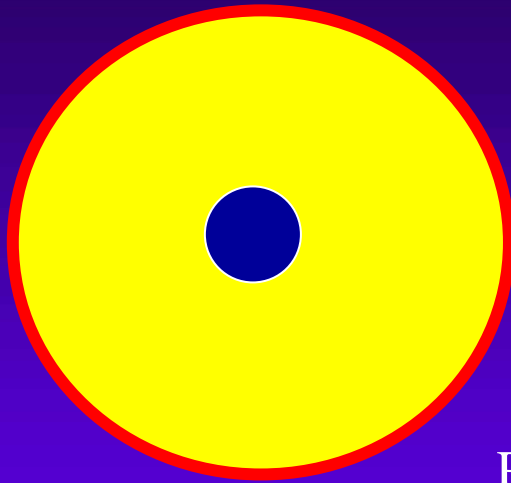
Efficiency =  
Final Lumen/Balloon Diameter

*JACC 27:552,1996*

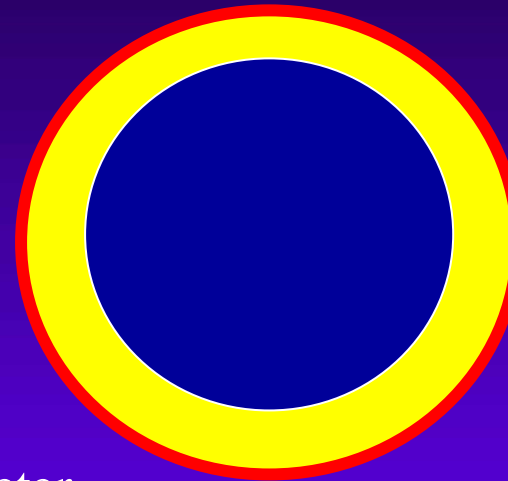
# Low Pressure Balloon Inflation

PTCA

3.2mm Vessel  
90% Stenosis



2.5mm Burr



$$F = \frac{\text{Pressure} \times \text{Diameter}}{2 \times \text{Wall Thickness}}$$

$$\frac{6 \text{ atm} \times 0.32\text{mm}}{2 \times 1.44\text{mm}}$$

=F=

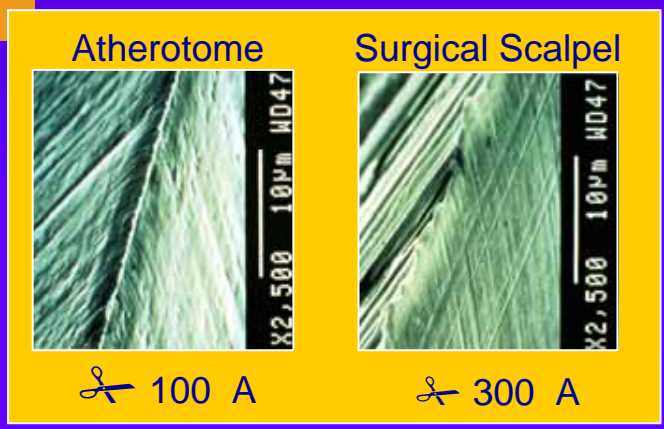
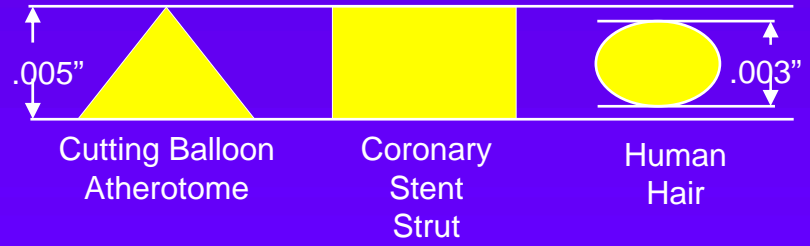
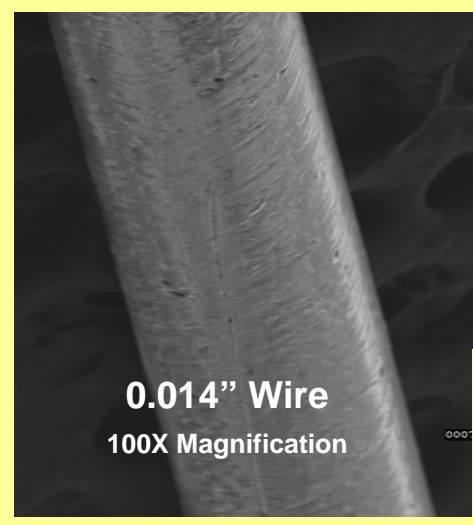
$$\frac{6 \text{ atm} \times 2.5\text{mm}}{2 \times 0.35\text{mm}}$$

0.67 atm

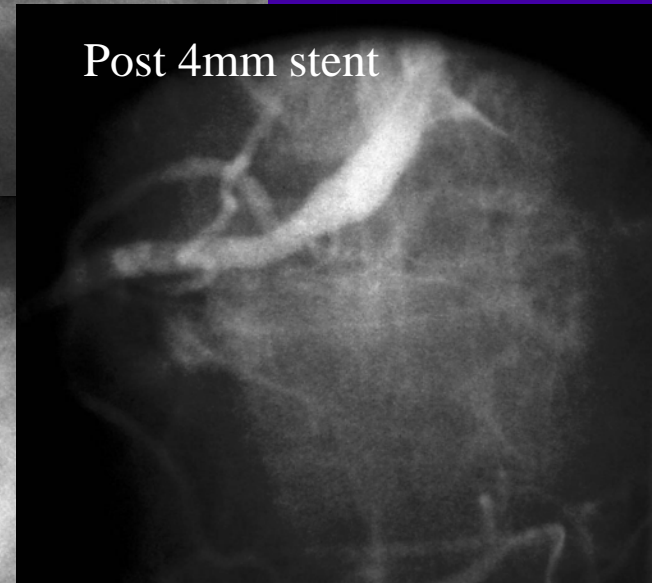
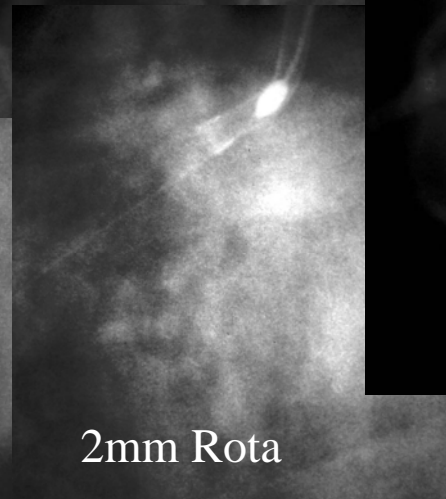
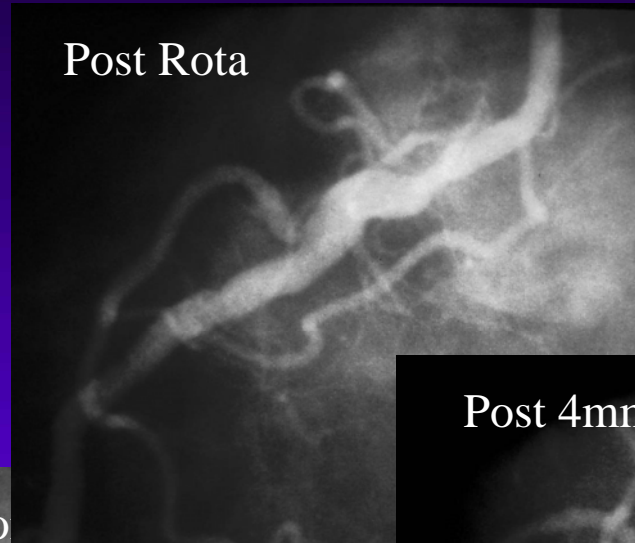
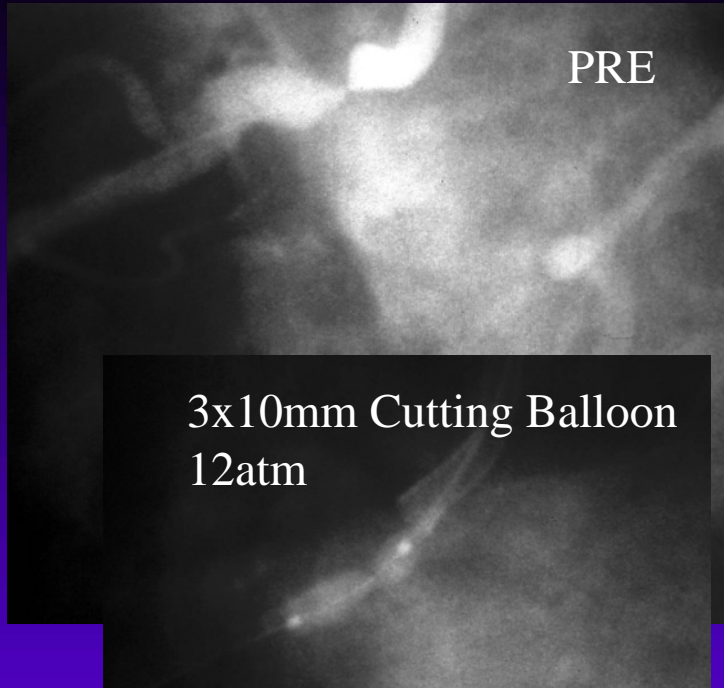
=F=

21.43 atm

# Cutting Balloon



# Ostial RCA



# Effects of focused force angioplasty: *pre-clinical experience*

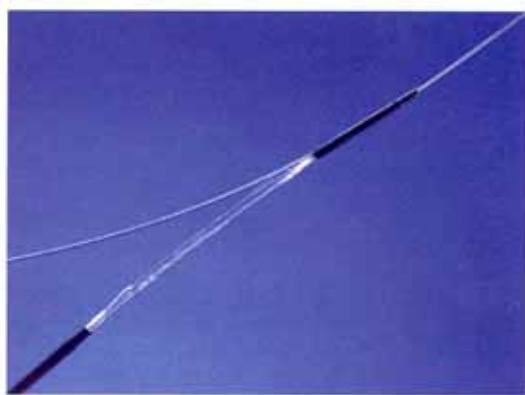


Figure 1. Picture of the FX miniRAIL balloon.

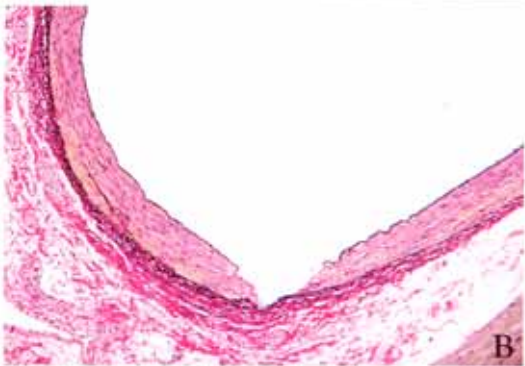
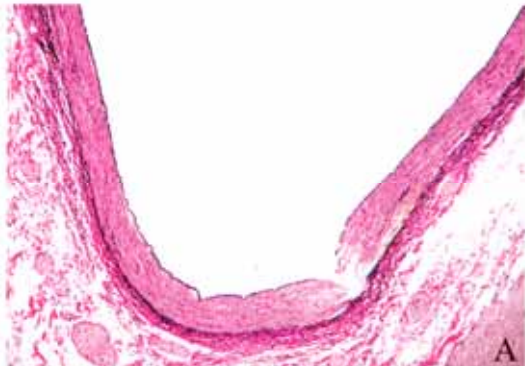
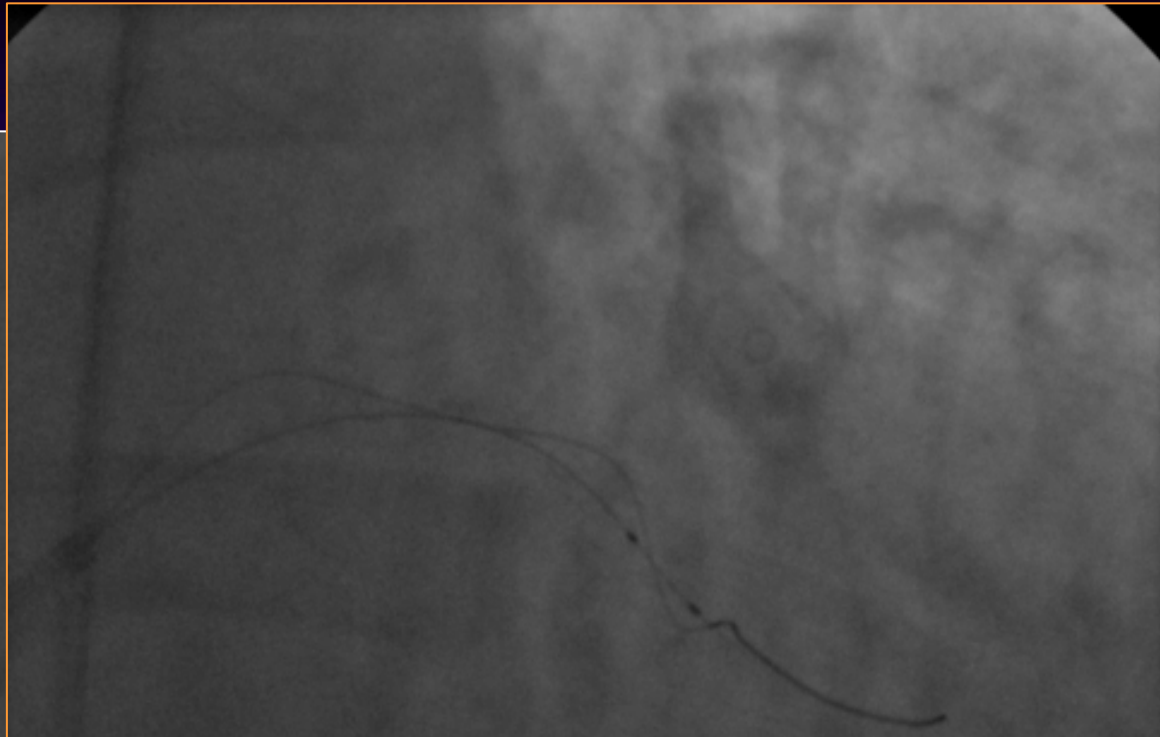


Figure 2. (A) and (B). FX minimal histology demonstrating localized vessel wall injury due to compression of wire by the balloon into the wall.

*Meerkin DS, Lee SH, Tio FO, Grube E, Wong SC, Hong MK*

*J Invas Cardiol 2005;17:203-206*

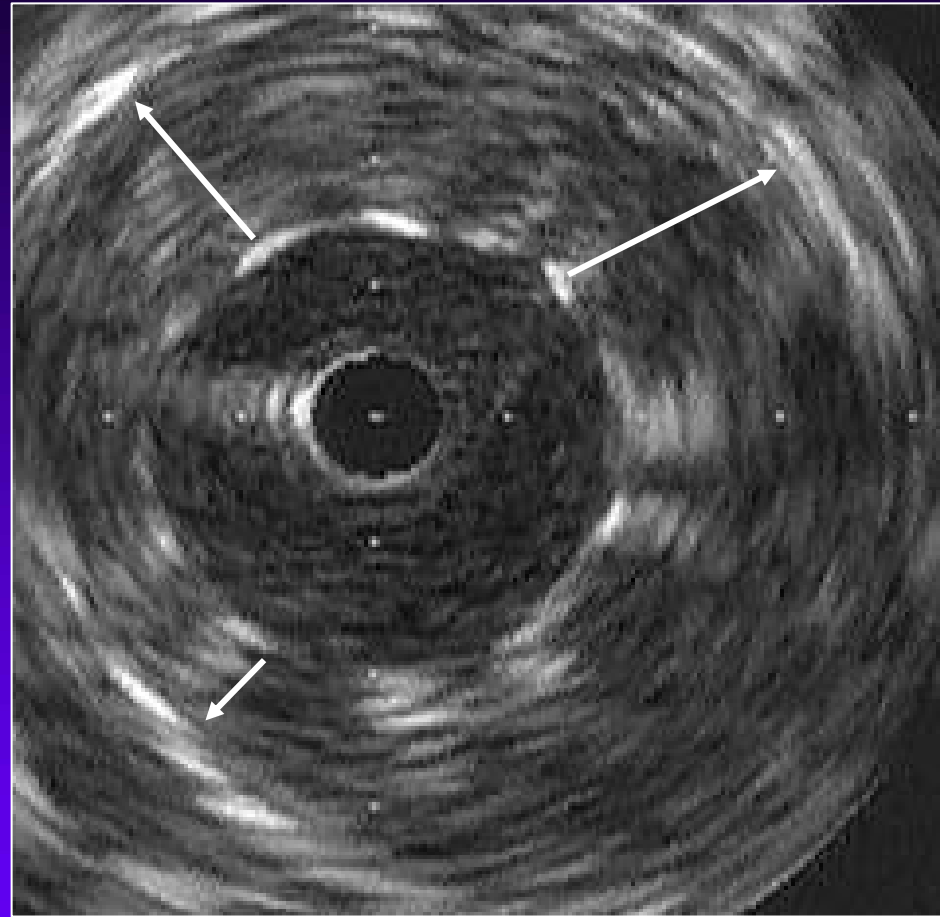






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# Under Expansion Routinely Occurs (POSTIT)



Optimal stent deployment is only achieved in 29% of patients with current stent delivery systems

With post dilatation, the frequency of achieving optimum stent deployment doubled from 21% to 42%

Minimal stent area increased from  $6.6 \pm 2.2$  to  $7.8 \pm 2.3 \text{mm}^2$  with post dilatation

In-vitro Information

**Cypher**

**Table 12-1 Inflation Pressure Recommendations**

Inflation Pressure atm (kPa)	2.50	2.75	3.00	3.50
6 (608)	2.20	2.44	2.71	3.20
7 (709)	2.27	2.51	2.78	3.27
8 (811)	2.33	2.58	2.84	3.33
9 (912)	2.39	2.64	2.90	3.39
10 (1013)	2.45	2.70	2.95	3.45
11 (1115)	2.50	2.75	3.00	3.50
12 (1216)	2.55	2.80	3.05	3.55
13 (1317)	2.59	2.84	3.09	3.60
14 (1419)	2.62	2.88	3.13	3.64
15 (1520)	2.66	2.92	3.16	3.69
16 (1621)	2.69	2.95	3.19	3.73

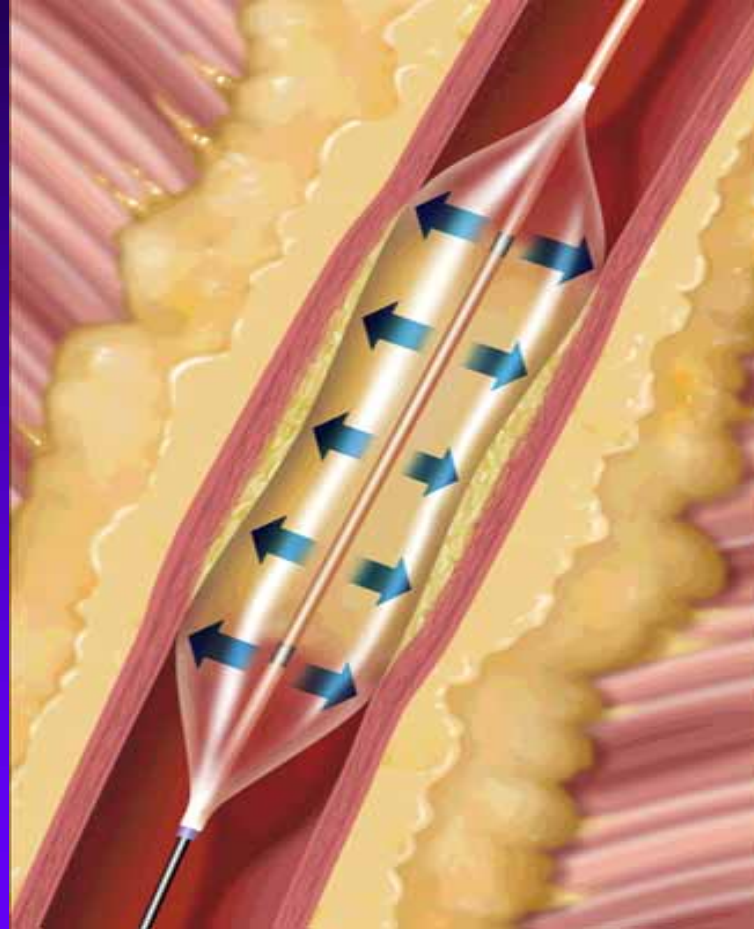
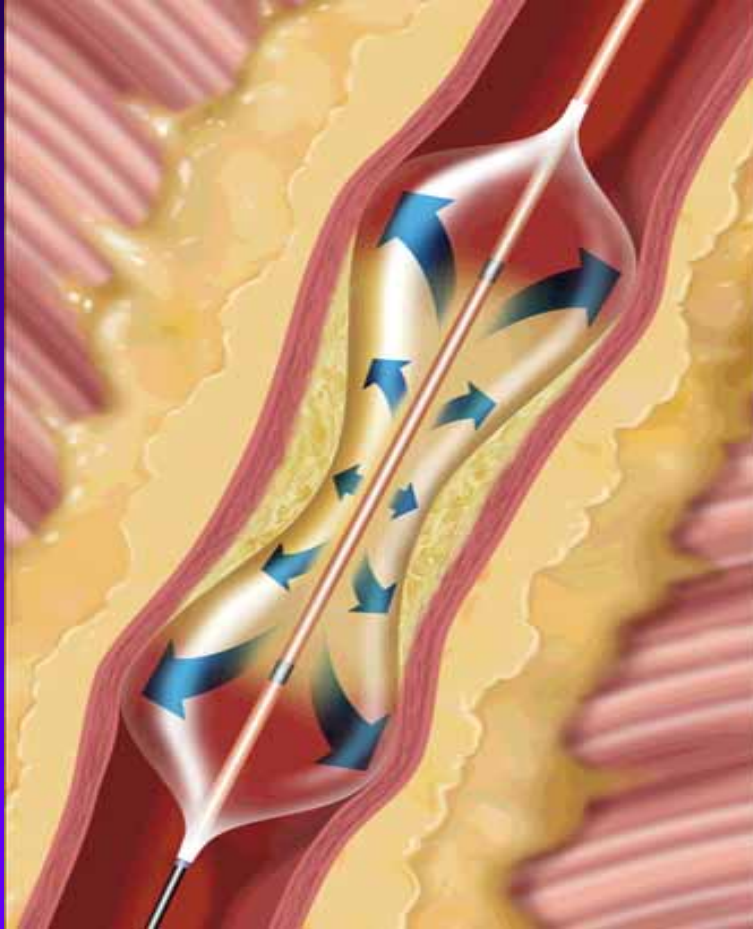
17 (1723)  
18 (1824)  
19 (1925)  
20 (2026)

**Table 14-1: Typical TAXUS Express Stent and Balloon Compliance**

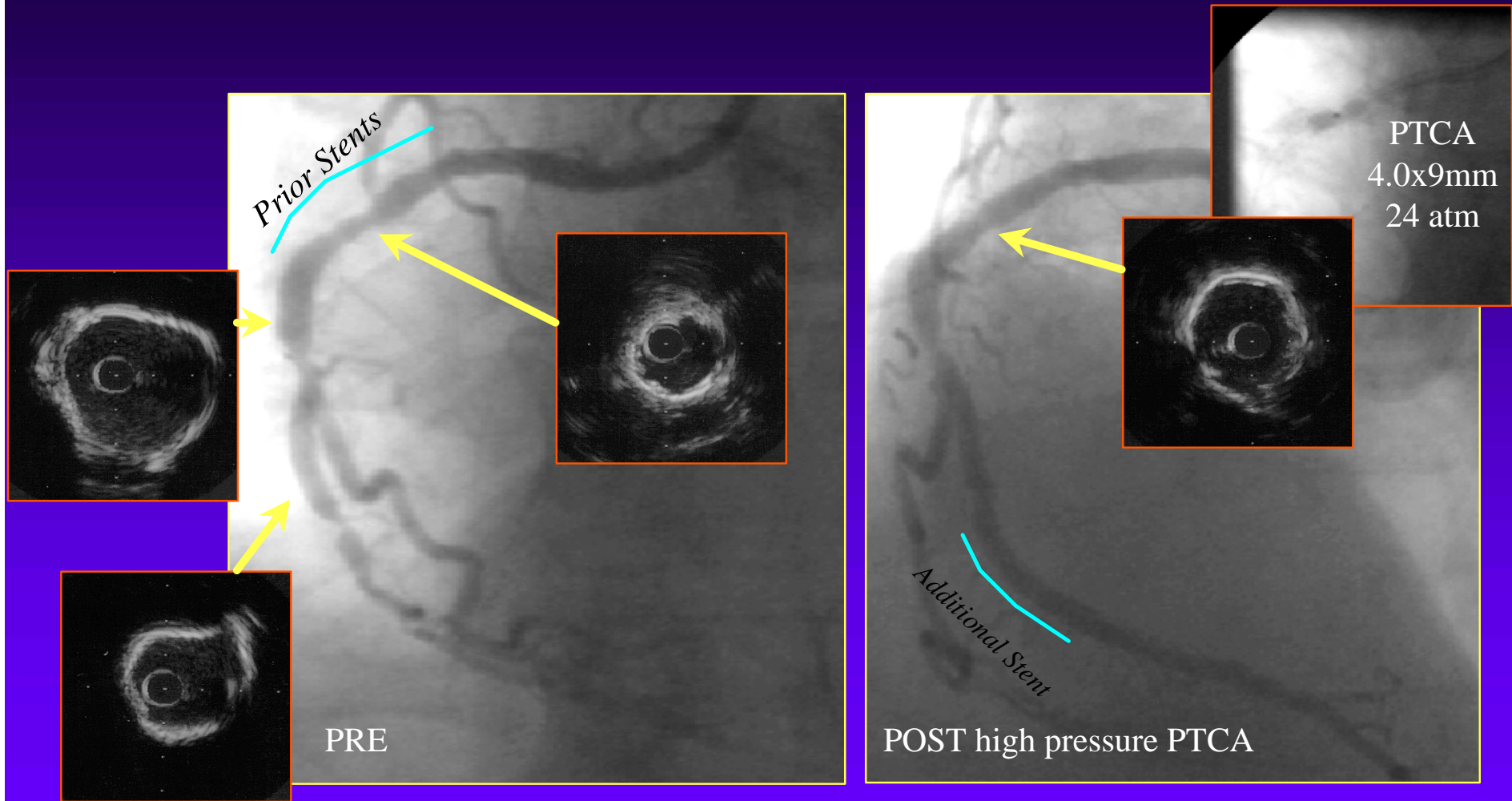
Pressure (Atm)	2.50 mm Stent I.D. (mm)	2.75 mm Stent I.D. (mm)	3.00 mm Stent I.D. (mm)	3.50 mm Stent I.D. (mm)
9.0	Stent Nominal	2.50	2.75	3.00
10.0		2.55	2.81	3.06
11.0		2.60	2.86	3.12
12.0		2.65	2.91	3.17
13.0		2.69	2.95	3.21
14.0		2.72	2.99	3.26
15.0		2.76	3.03	3.30
16.0		2.79	3.06	3.33
17.0		2.82	3.10	3.37
18.0		2.85*	3.13*	3.40*

\* Rated Burst Pressure. DO NOT EXCEED.

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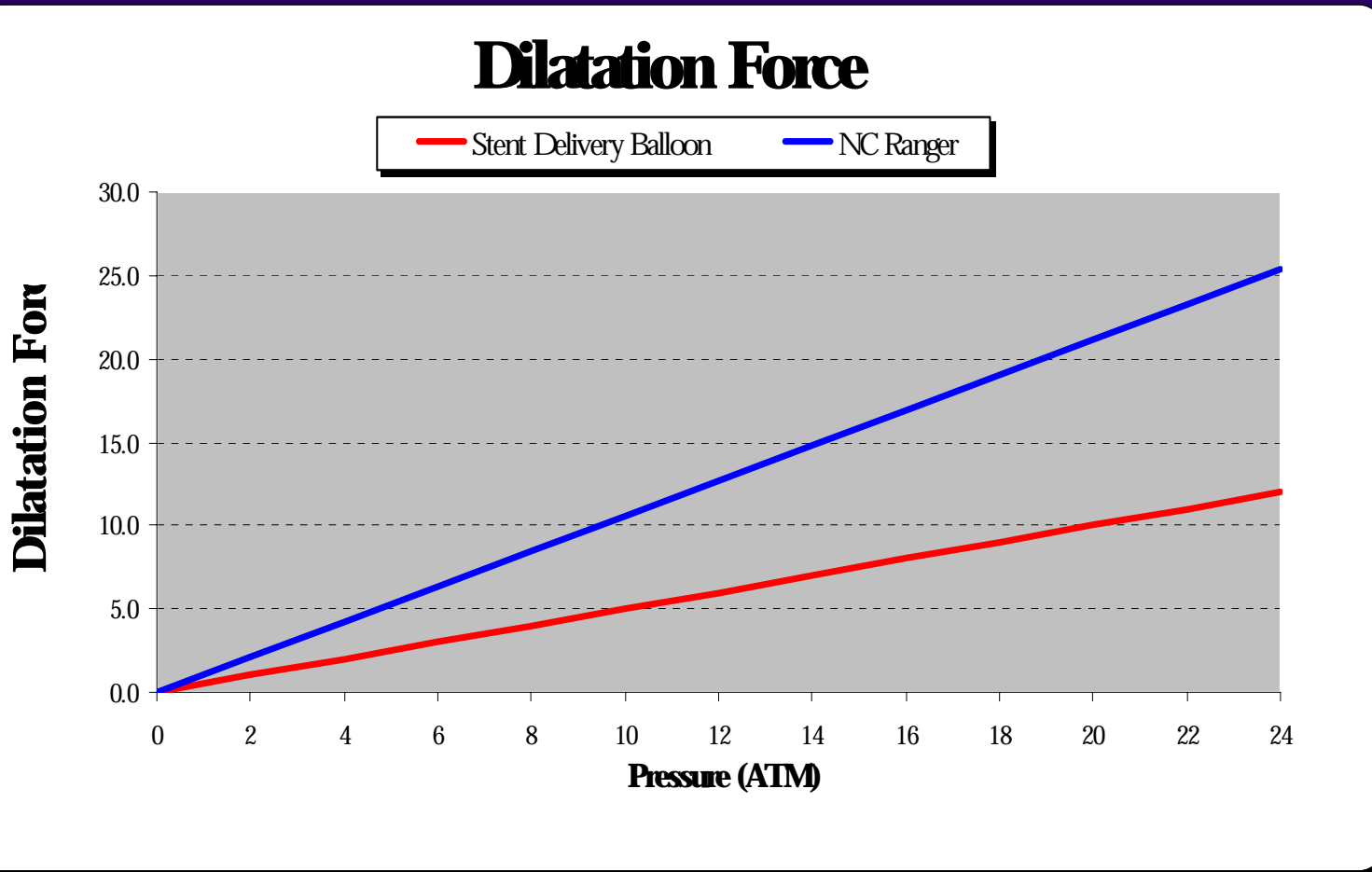
# Calcified Vessel



# Pressure $\neq$ Dilatation Force



# Pressure vs Dilatation Force





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