

# **PCI for Chronic Total Occlusion**

*Seung-Jung Park, MD, PhD, FACC*

**Asan Medical Center, University of Ulsan,  
Seoul, Korea**

# Chronic Total Occlusions

*20-40% of patients with CAD*

- Lower Procedural Success Rate
- High Clinical and Angiographic Restenosis Rate

# **Before the procedure...**

We should ask ourselves  
“ Why do we have to do this ? ”

# Indications

## of Angioplasty in CTO

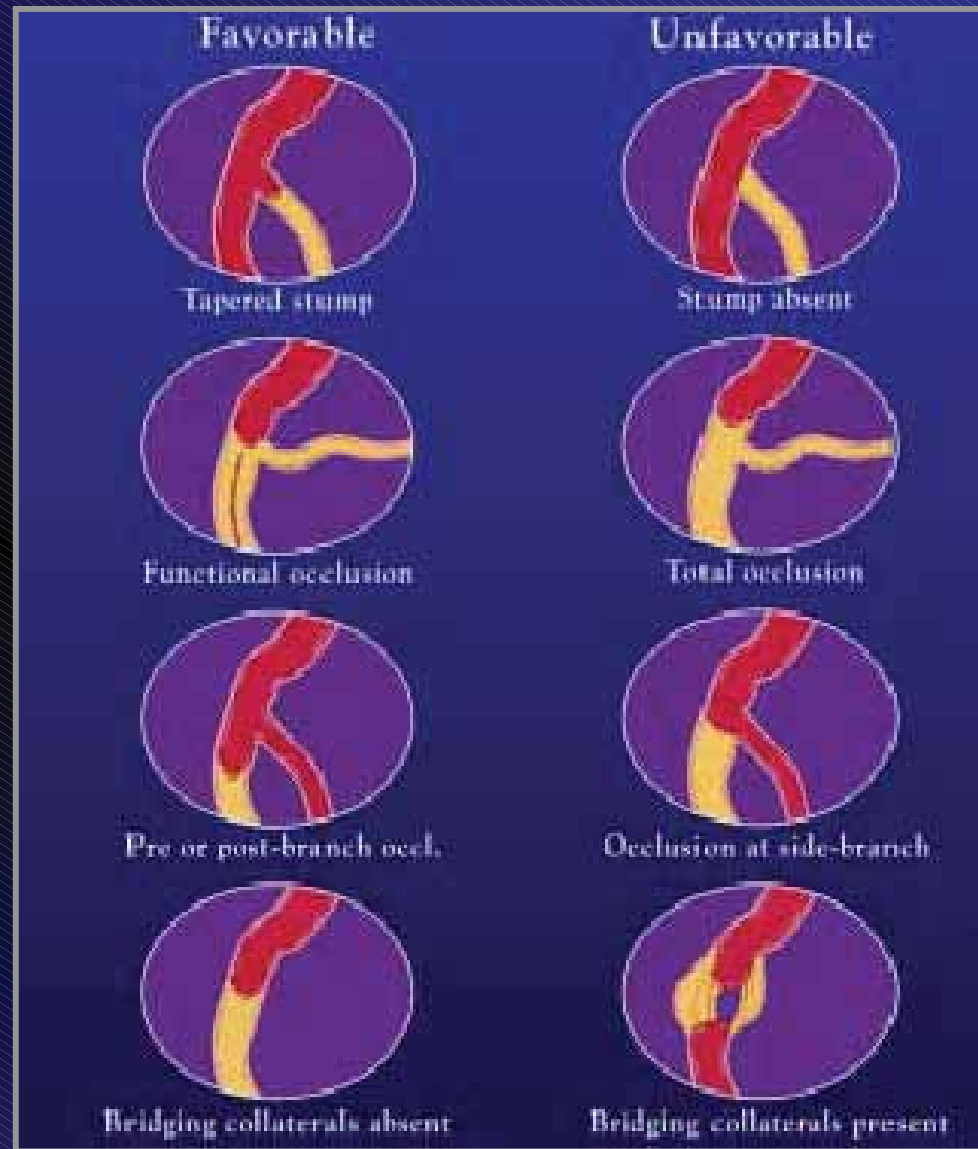
- Balanced benefits ?
- Amount of viable myocardium

# Factors ?

for Success or Failure

- Duration of occlusion
- Length of occluded segment
- Absence of stump
- Bridging collaterals
- Occlusion in bypass graft

# Factors ? for Success or Failure





# Predictors of Procedural Failure

-Multivariate analysis-

<b>Variables</b>	<b>Coefficient</b>	<b>p</b>
<b>Calcification</b>	<b>0.93</b>	<b>&lt;0.01</b>
<b>Multivessel disease</b>	<b>0.75</b>	<b>&lt;0.01</b>
<b>Length of occlusion &gt;20mm</b>	<b>0.42</b>	<b>&lt;0.05</b>
<b>Duration of occlusion</b>	<b>0.0004</b>	<b>0.96</b>

*Nou\guchi et al, CCI 2000:49;258-264*

# **STENT vs PTCA**

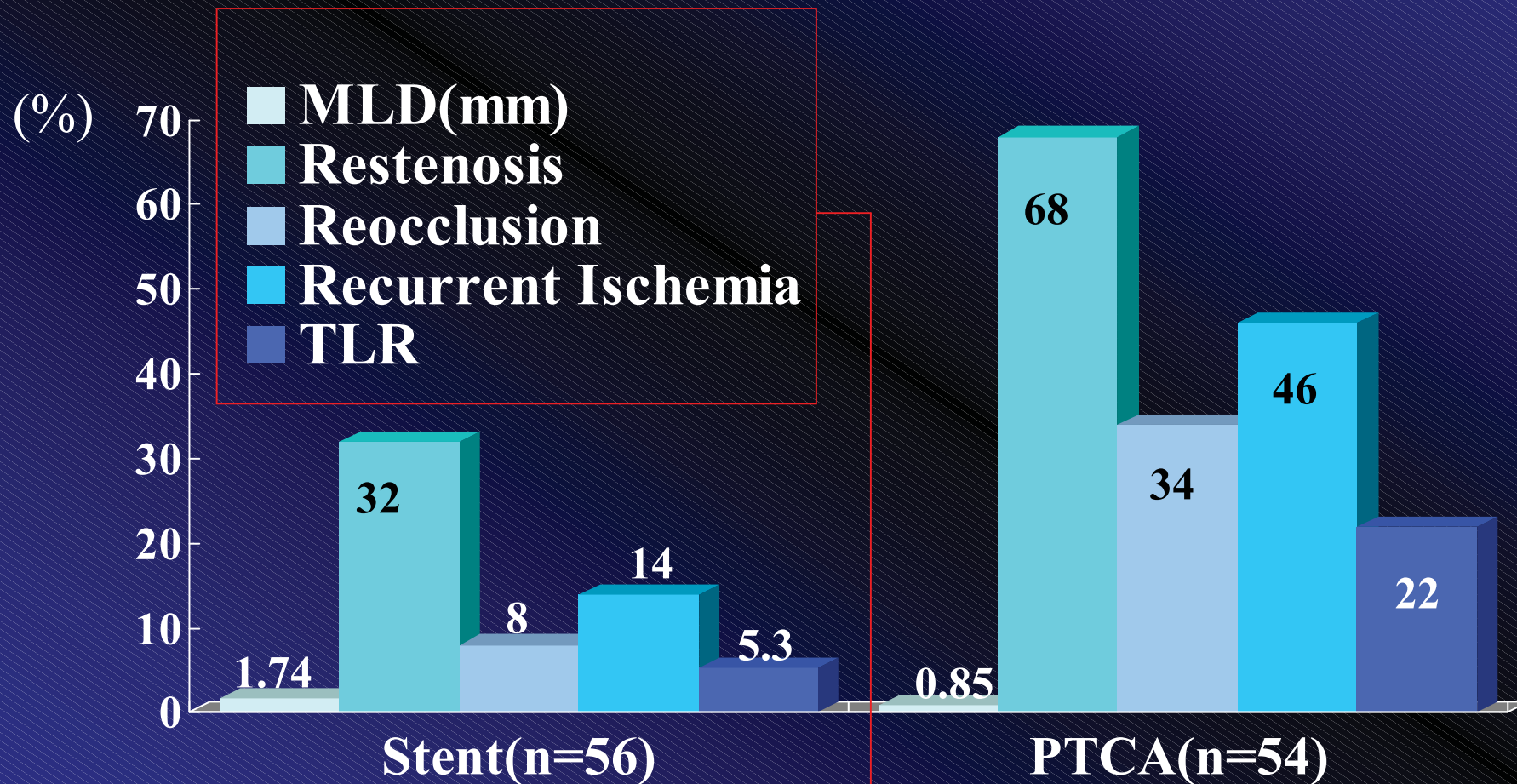
For CTO



# Stent *vs* Balloon PTCA in CTO (*n=110*)

**GISSOC**

*Rubastilli et al. JACC 1998;32:90-96*

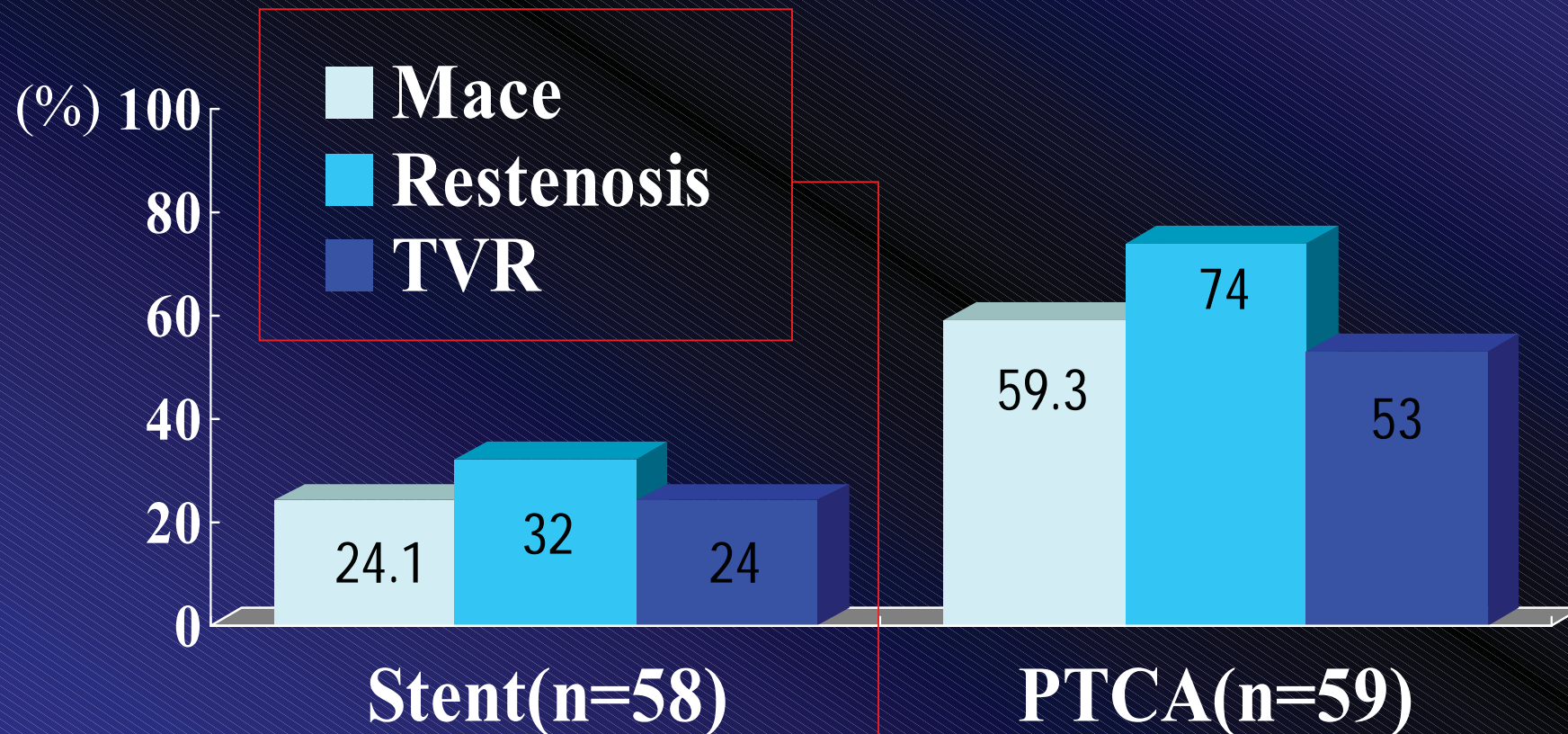


**P < 0.05 between two groups**

# Long Term Clinical Follow-up of Stenting in CTO ( $n=107$ )

Mean F/U:  $33 \pm 6$  months

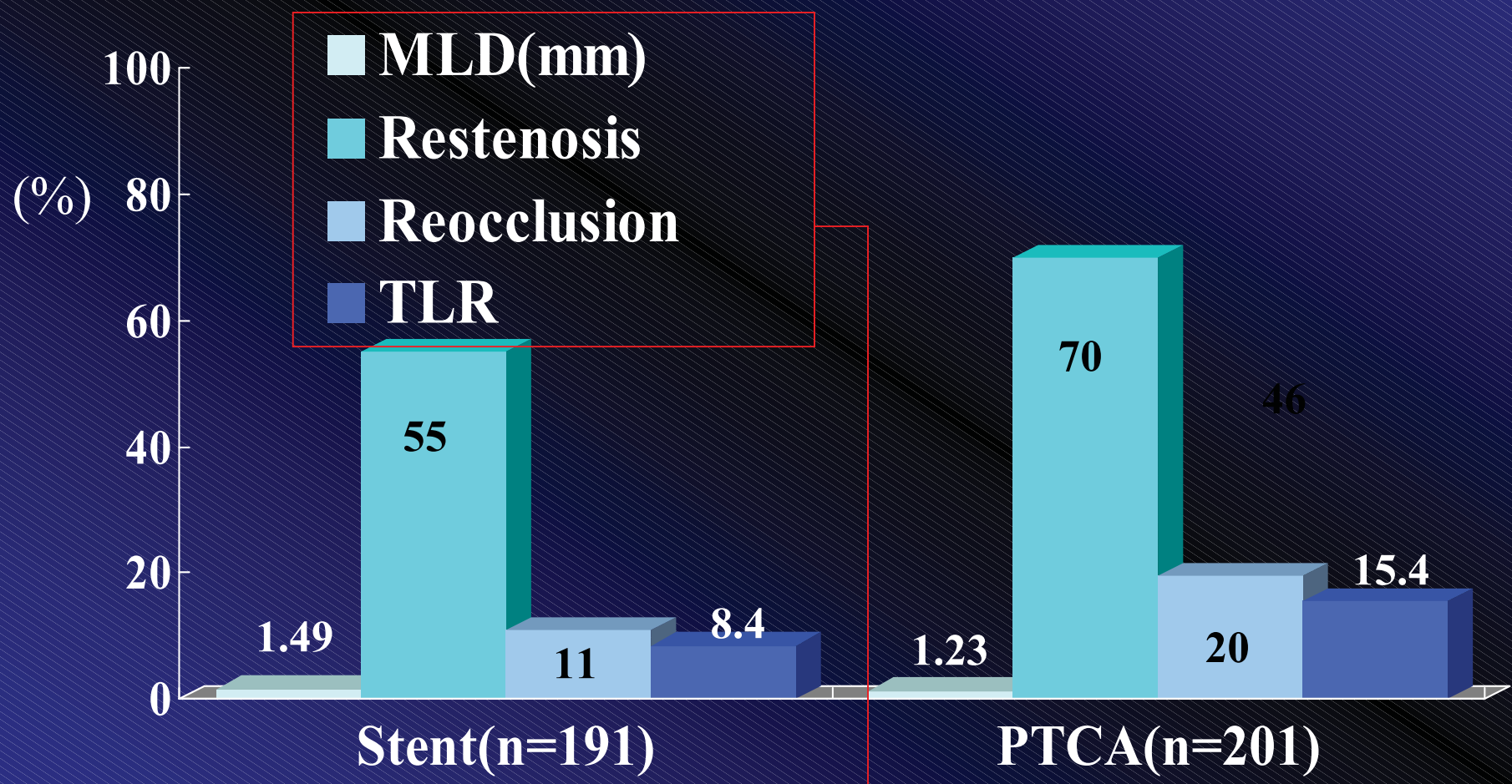
*Sirnes et al. JACC 1998;32:305-310*



**P<0.005 between two groups**

## Primary Stenting vs. Balloon in CTO (n=410)

*Buller et al. Circulation 1999;100:236-42*



**P<0.05 between two groups**

# Laser Wire ?

## For CTO

<b>Procedural Success</b>	<b>50-59 %</b>
<b>Coronary Perforation</b>	<b>1-21 %</b>
<b>Restenosis at 18 weeks</b>	<b>20-31 %</b>
<b>Improved Angina Status(24 weeks)</b>	<b>66%</b>
<b>Death, MI, CABG (24 weeks)</b>	<b>0%</b>

*Hamburger JN, et al. AJC 1997;80:1419-1423*

*Hamburger, et al. JACC 1997;30:649-656*

*Schofer et al. JACC 1997;30:1722-1728*

**New Devices ?**

For CTO

# Frontrunner™ CTO Catheter

Controlled blunt micro-dissection

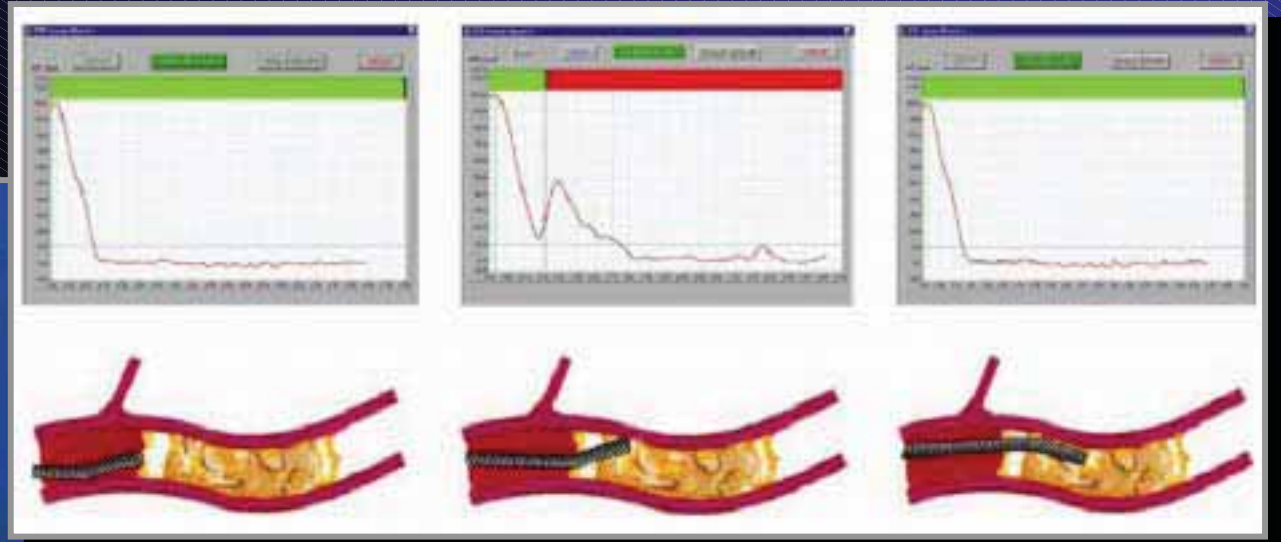
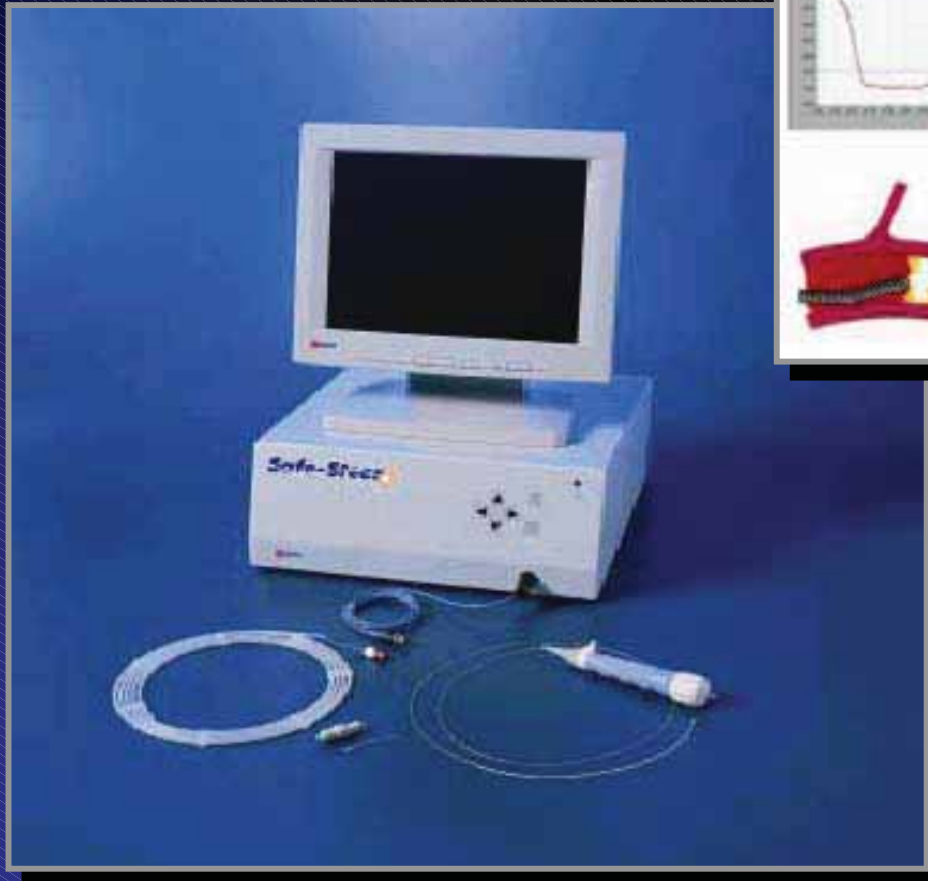


Possible advantages for:

- Blunt occlusion
- Bridging collaterals
- Side branch presence
- Long lesions



# Safe-Steer™ System



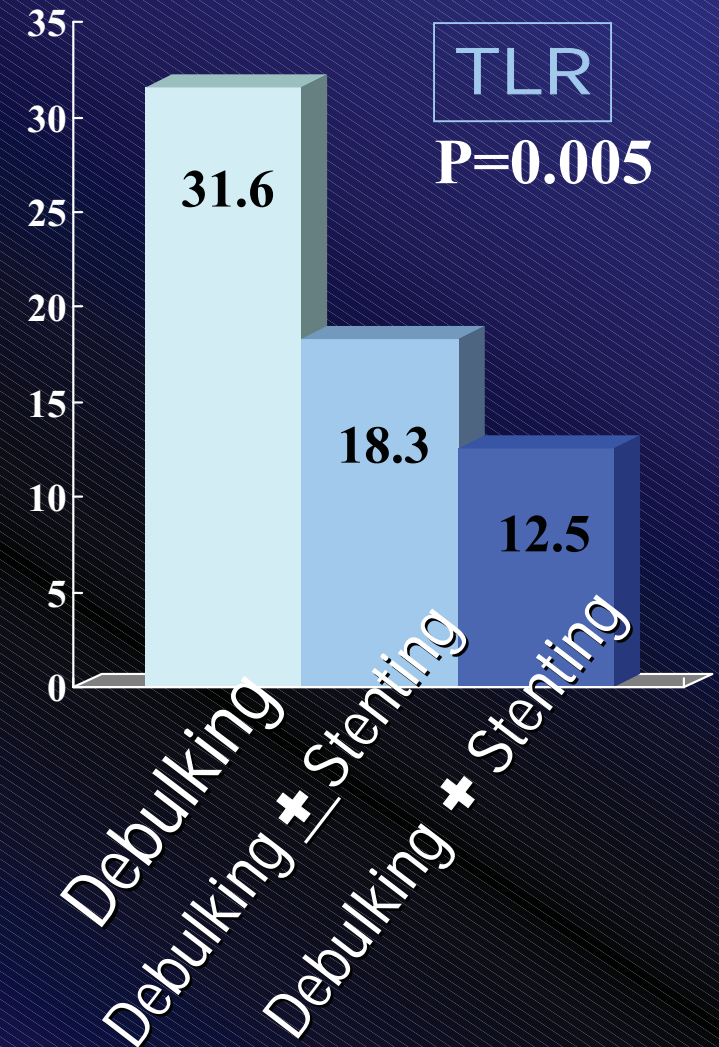
- Deflecting tip positions and supports guide wire for advancement
- Provides controlled guide wire advancement

**Debulking ?**

For CTO

# Debulking alone or Debulking<sub>±</sub> (and/or) Stenting **for CTO**

	Debulking Alone	Stent	p
Ref Dia (mm)	2.48	2.96	0.0001
Final MLD (mm)	1.72	2.54	0.0001
Any Event (%)	39.6	22.9	0.0002
Death (%)	1.0	0.9	NS



- **Debulking prior to stenting reduces TLR**

*Mehran, AHA 1997*

# Debulking with Stent in Chronic Total Occlusion

%	POBA	Stent	D	<b>D+Stent</b>	p value
<b>Number</b>	<b>224</b>	<b>96</b>	<b>31</b>	<b>47</b>	
<b>RD &gt;2.5mm</b>	<b>52</b>	<b>57</b>	<b>61</b>	<b>55</b>	NS
<b>OL &gt;20mm</b>	<b>29</b>	<b>24</b>	<b>23</b>	<b>19</b>	NS
<b>Post MLD &gt;2.0mm</b>	<b>27</b>	<b>67</b>	<b>52</b>	<b>94</b>	<0.0001
<b>Restenosis</b>	<b>50</b>	<b>44</b>	<b>52</b>	<b>26</b>	<0.05
<b>Reocclusion</b>	<b>12</b>	<b>4.2</b>	<b>13</b>	<b>2.1</b>	<0.05
<b>longterm Patency</b>	<b>93</b>	<b>100</b>	<b>94</b>	<b>100</b>	<0.05

*Tsuchikane E, 1008-171, ACCIS 2000*

# Debulking using Rotational Atherectomy of CTO lead to high initial success and very low restenosis rate (n=139)

<b>Q-MI</b>	<b>0 %</b>
<b>Non-Q MI</b>	<b>7.5 %</b>
<b>Emergency CABG</b>	<b>1.6 %</b>
<b>Death</b>	<b>1.6 %</b>
<b>Clinical Restenosis during 4 yr F/U</b>	<b>19 %</b>

*Braden GA, ACC 2001, 1158-40 (Abstr)*



**DCA atherectomy ?**

For CTO



# DCA and Stent vs. Stent in CTO

**AMIGO**

	DCA + Stent	Stent only	P
Late loss (mm)	<b>0.79</b>	<b>0.69</b>	<b>NS</b>
Loss index	<b>0.44</b>	<b>0.39</b>	<b>NS</b>
Restenosis (%)	<b>26.9</b>	<b>22.1</b>	<b>NS</b>
12 Mo TVF (%)	<b>23.9</b>	<b>21.5</b>	<b>NS</b>

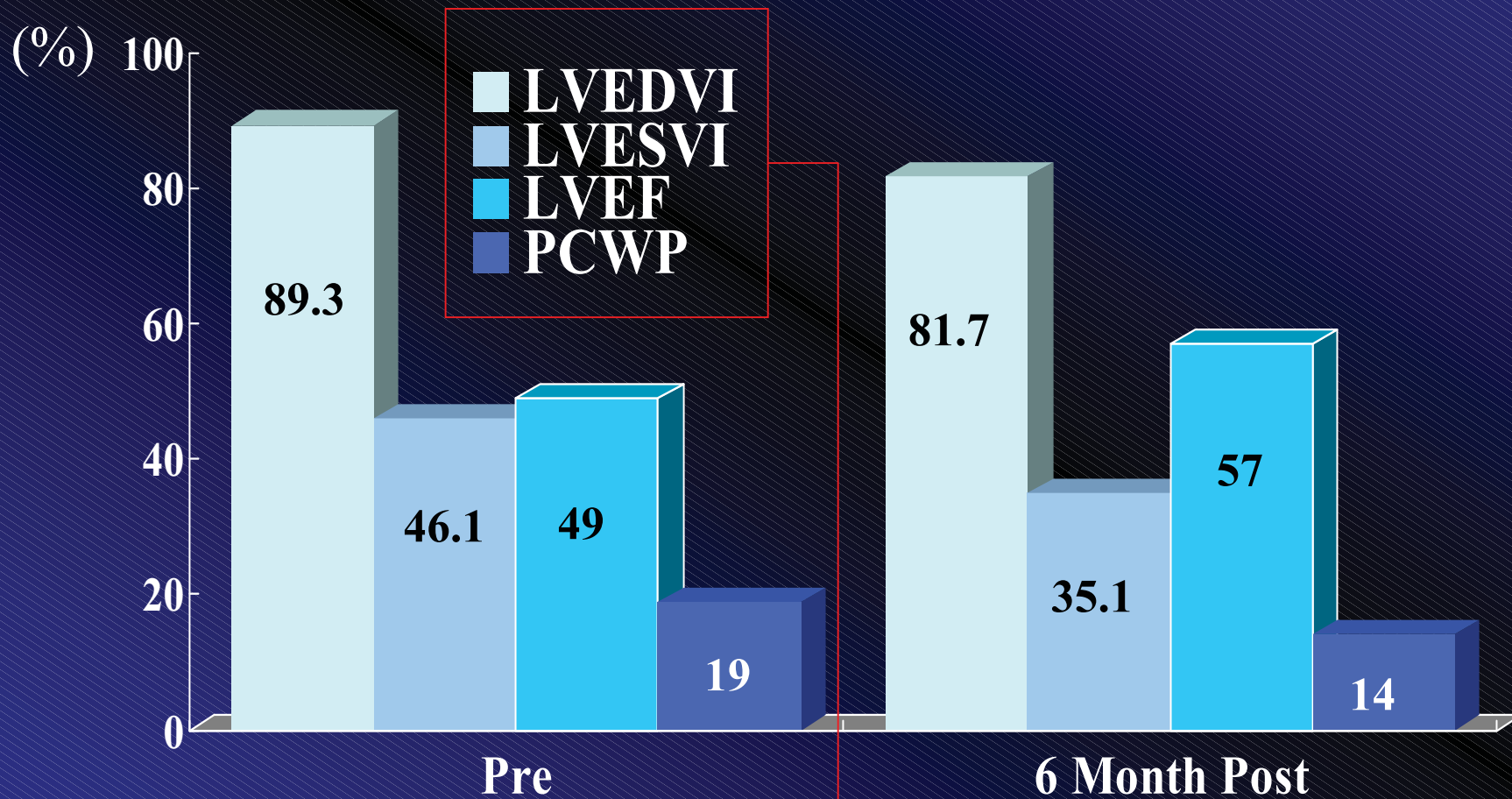
*Colombo, Euro PCR 2002*

What is the clinical benefit of PCI in CTO ?

# Effect on LV function

## Stenting of Total Occlusions

*Van Belle E, et al. AJC 1997;80:1150-1154*



**P < 0.005 between two groups**

# PCI in CTO

- Successful PTCA of CTO improves long-term clinical outcome in terms of reduced overall and cardiac mortality

*Shizuta S, ACCIC 2000 1040-79*

# Predictors for Late Death of patients with CTO

- Age
- Poor LV function (EF < 40%)
- DM
- Creatinine > 1.5
- CVA
- Unopened CTO

*Shizuta S, ACCIC 2000 1040-79*