

Current DES Systems are Sufficient ?

Yes current DES are enough

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A good debate requires one ...

- ♥ Define the topic so ... we are all on the “same page”
- ♥ Set the limitations and boundaries to focus on the principal issue (once defined)
- ♥ Accept that there are no right answers ... Just good arguments
- ♥ Be equally capable of arguing either side

My Problem

The poor, jet-lagged fisherman with but a scant knowledge of the DES business ...



My Challenge ...

The formidable and
incomparable “Superman”
of Interventional
Cardiology

Arguing the popular side!!



He is a great scientist and athlete



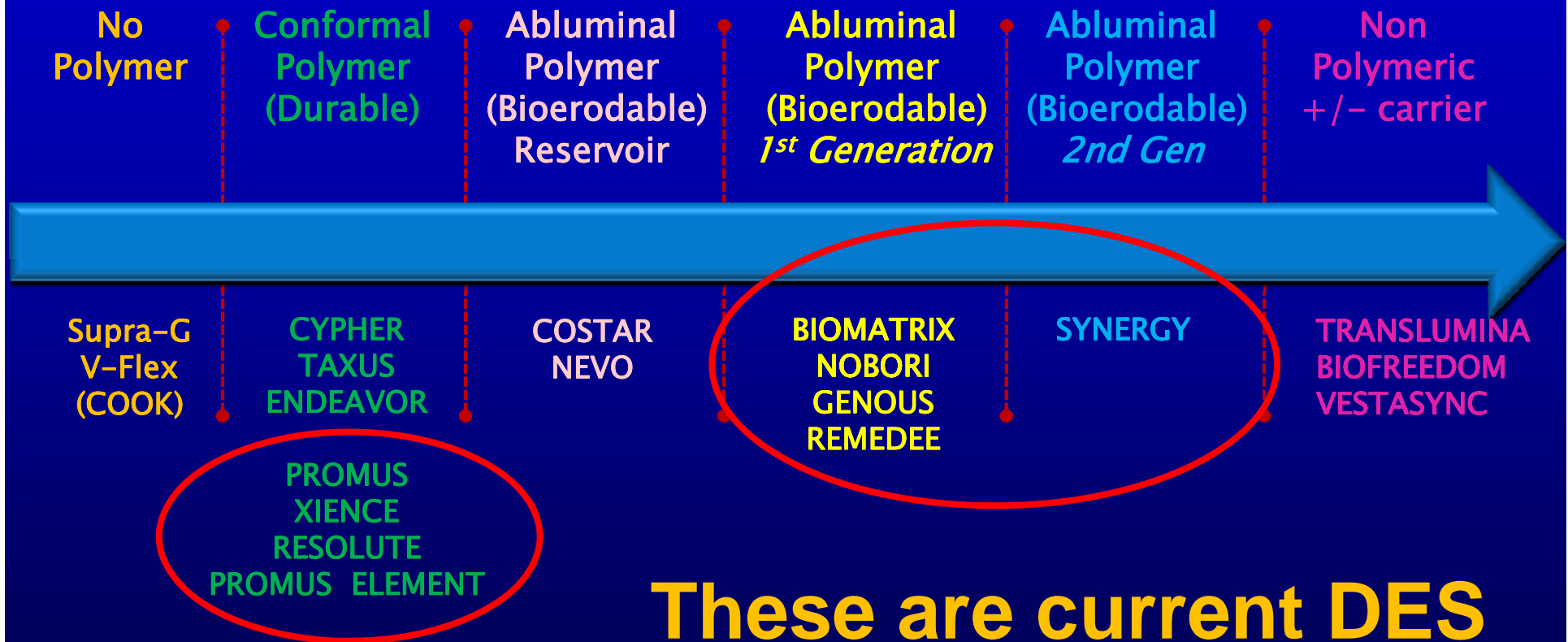
Current DES Systems are Sufficient

- ♥ What do we mean by “Current”
- ♥ What do we mean by “Sufficient” or “Enough”

Current DES Systems are Sufficient

- ♥ **What do we mean by “Current”**
- ♥ **What do we mean by “Sufficient” or “Enough”**

What do we mean by “Current” DES



**These are current DES
Not fully bioerodable**

Current DES Systems are Sufficient

- ♥ What do we mean by “Current”
- ♥ What do we mean by “Sufficient” or “Enough”

When is enough enough with DES ?

- Easy to deliver ✓✓✓
- Low profile but visible ✓✓✓
- Good radial strength ✓✓✓
- Flexible, conformable adaptable ✓✓✓
- Minimal vessel and intimal injury ✓✓
- Complete apposition ✓✓
- Thromboresistant materials ✓✓
- Functional endothelial layer ✓✓
- Minimal inflammation ✓
- No persistent response ✓✓✓

When is enough enough with DES ?

- Proven efficacy in wide range of patients, vessels and lesions ✓✓✓
- Inexpensive ✓✓
- Safe ✓✓✓

Current DES Safety

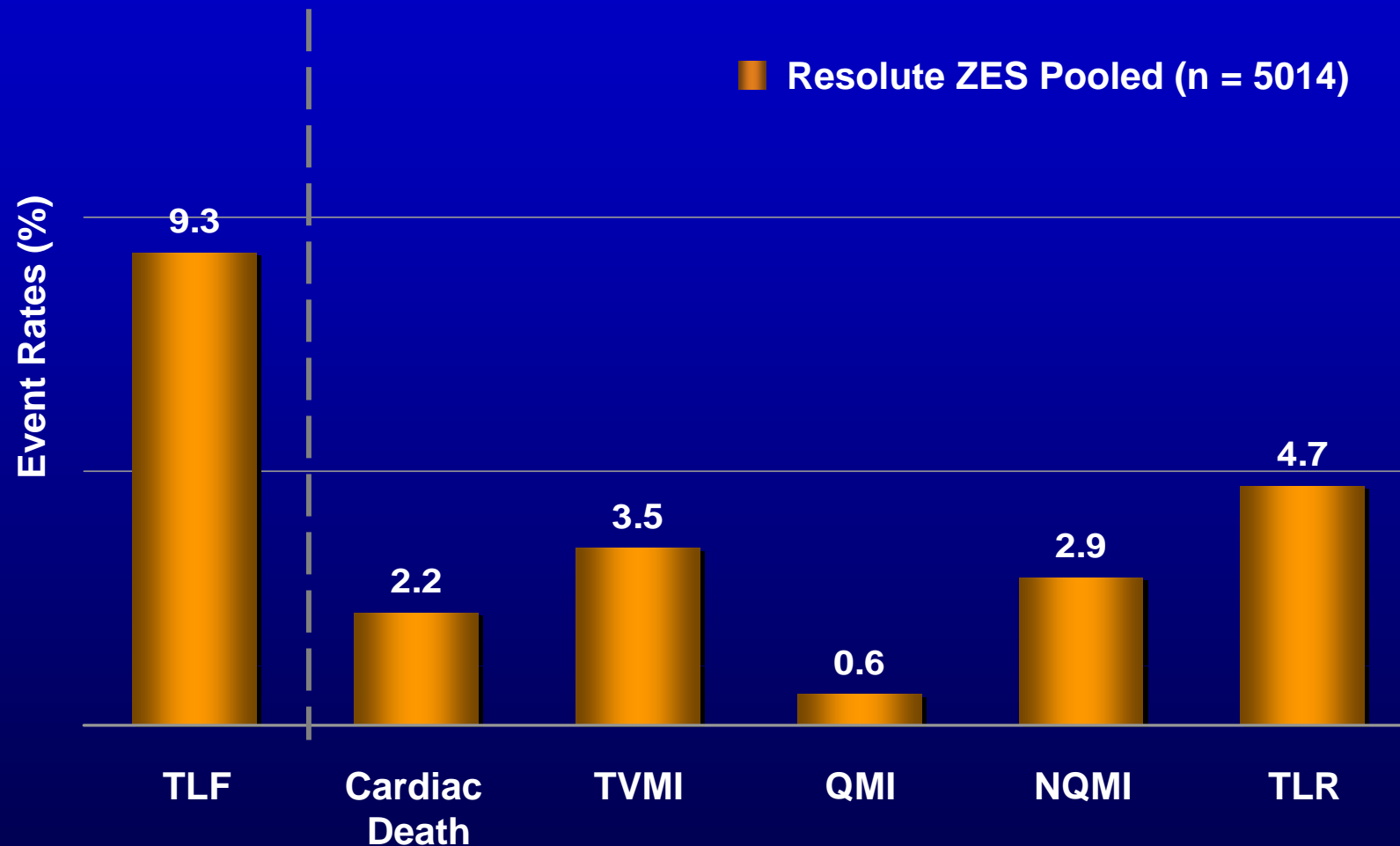
- ♥ The incidence of LST/ VLST following first gen DES implantation has resulted in a “less is more” approach
- ♥ More recent iterations in DES have focussed more biocompatible polymers durable polymers, reduced drug and polymer load, abluminal bioerodable polymers and non polymeric platforms

Current DES Systems are Sufficient

- ♥ Are these current DES efficacious ?
- ♥ Are they safe ?

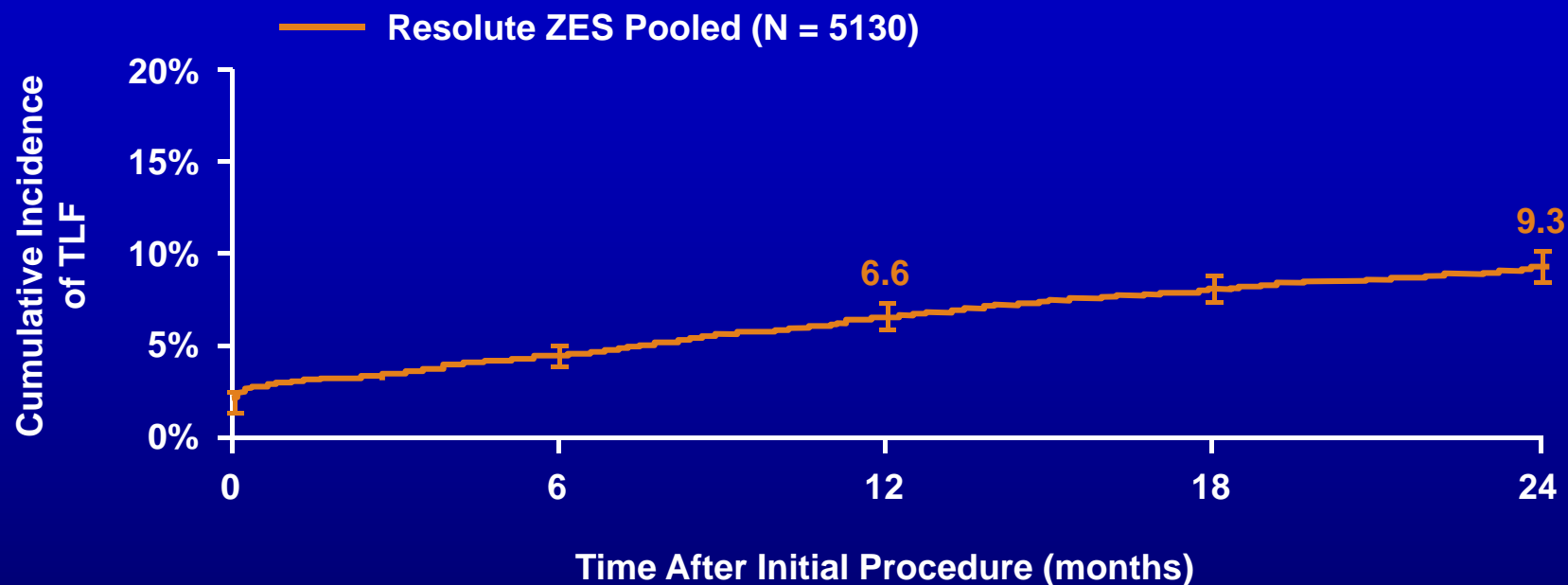
RESOLUTE Pooled

TLF and Components at 2 Years



RESOLUTE Pooled

Target Lesion Failure (TLF) to 2 Years

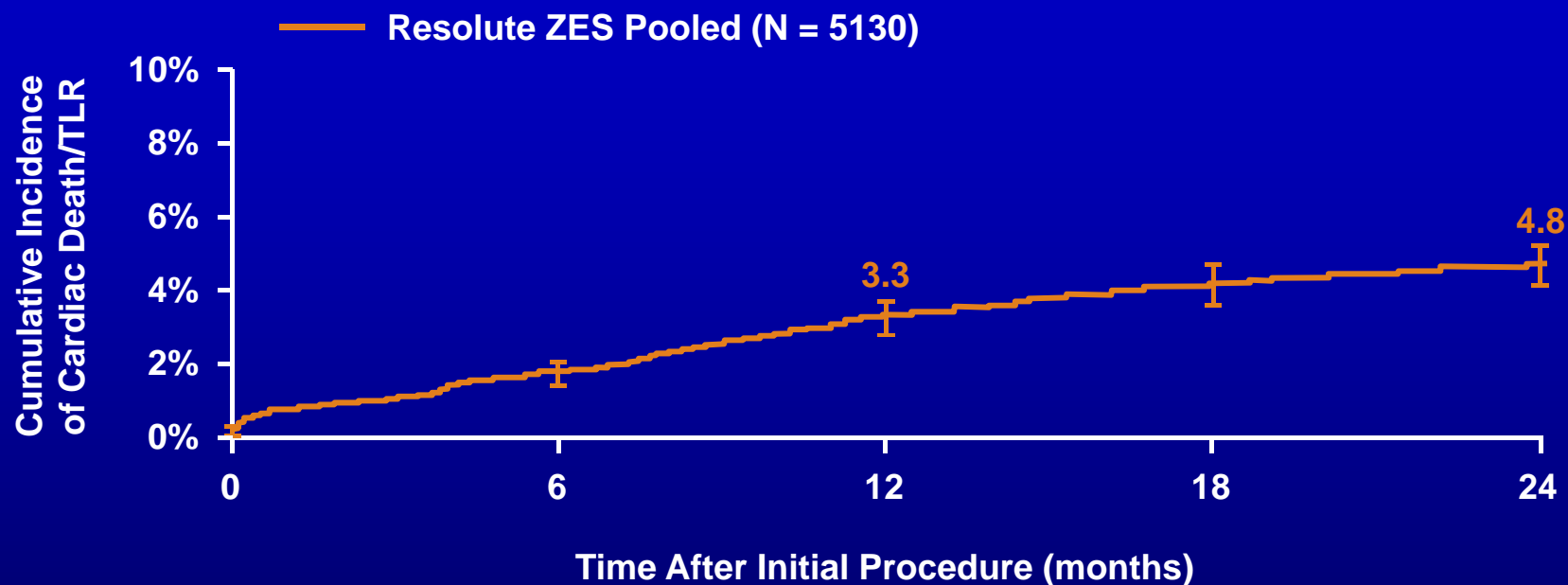


No. at risk

R-ZES	5130	5058	4846	4687	4543
% CI	1.4	4.5	6.6	8.1	9.3

RESOLUTE Pooled

Target Lesion Revascularization to 2 Years

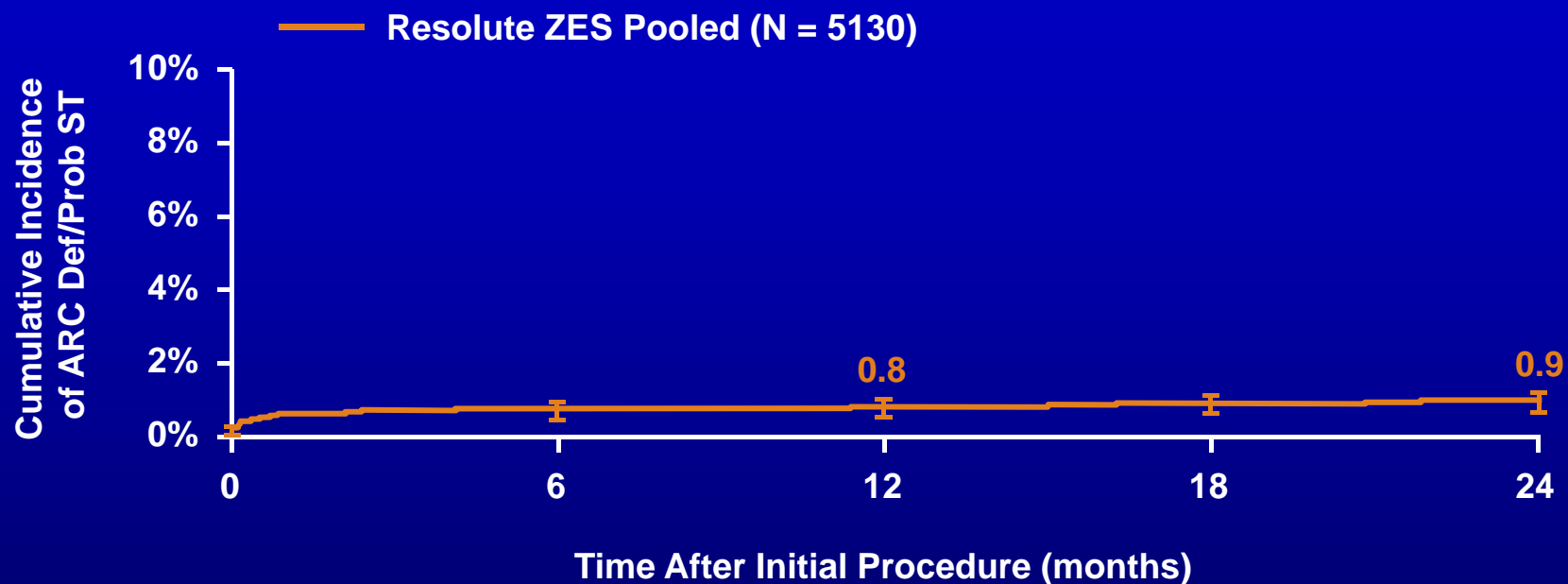


No. at risk

R-ZES	5130	5121	4953	4801	4659
% CI	0.1	1.7	3.3	4.2	4.8

RESOLUTE Pooled

Stent Thrombosis ARC Definite/Probable to 2 Years

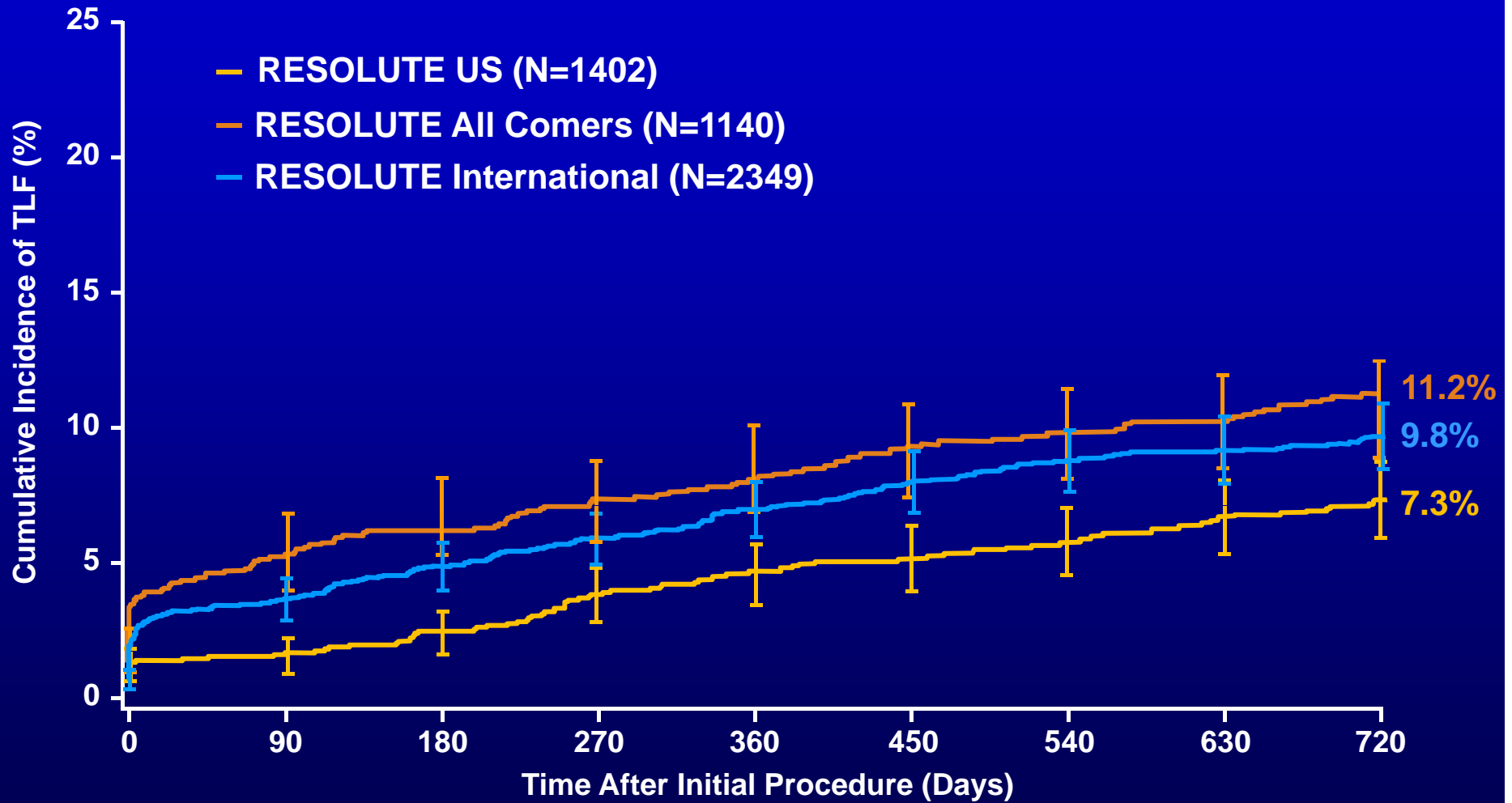


No. at risk

R-ZES	5130	5122	5013	4934	4833
% CI	0.12	0.72	0.78	0.86	0.93

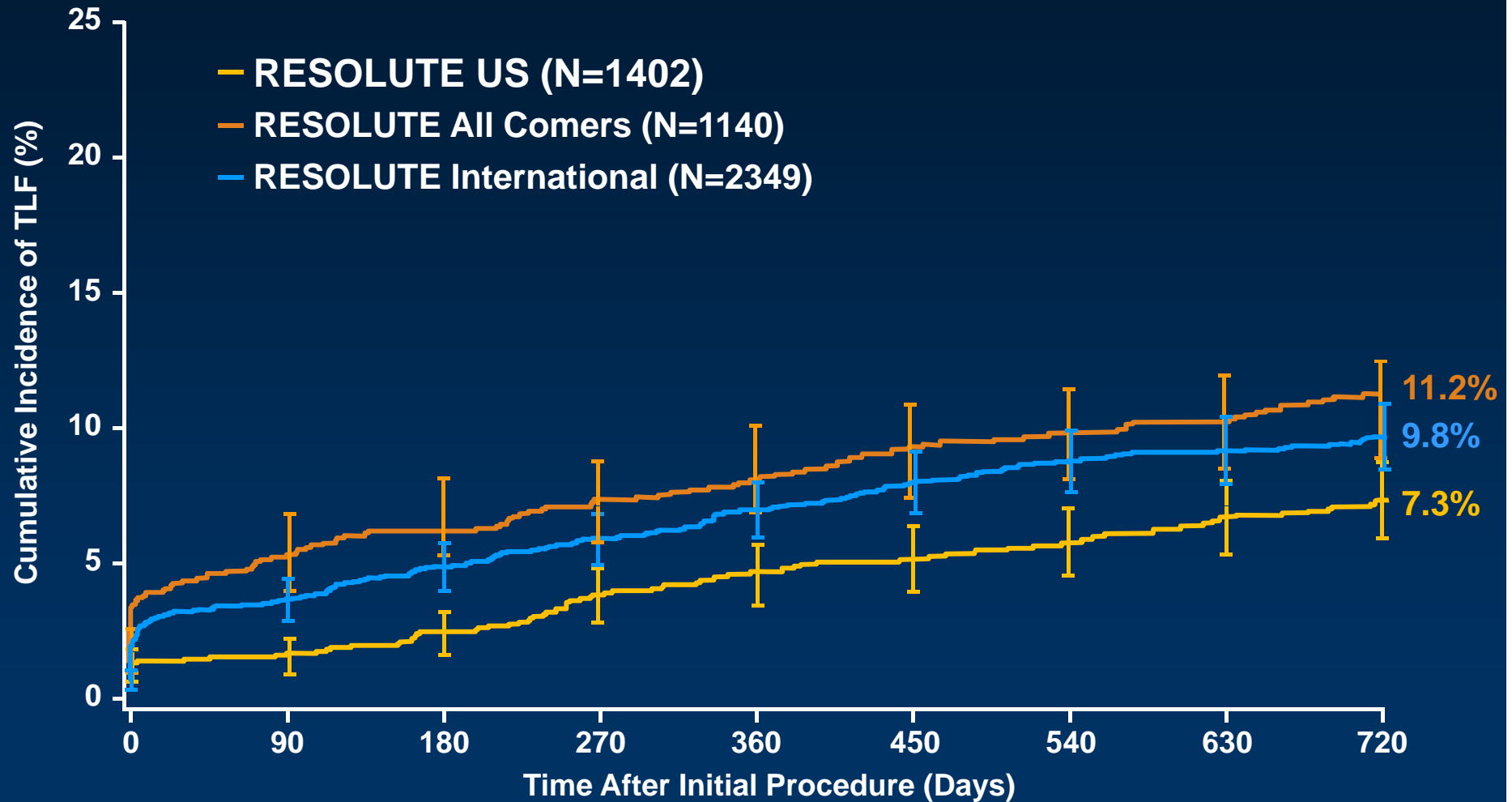
RESOLUTE US – All Patients

Target Lesion Failure to 24 Months



RESOLUTE US – All Patients

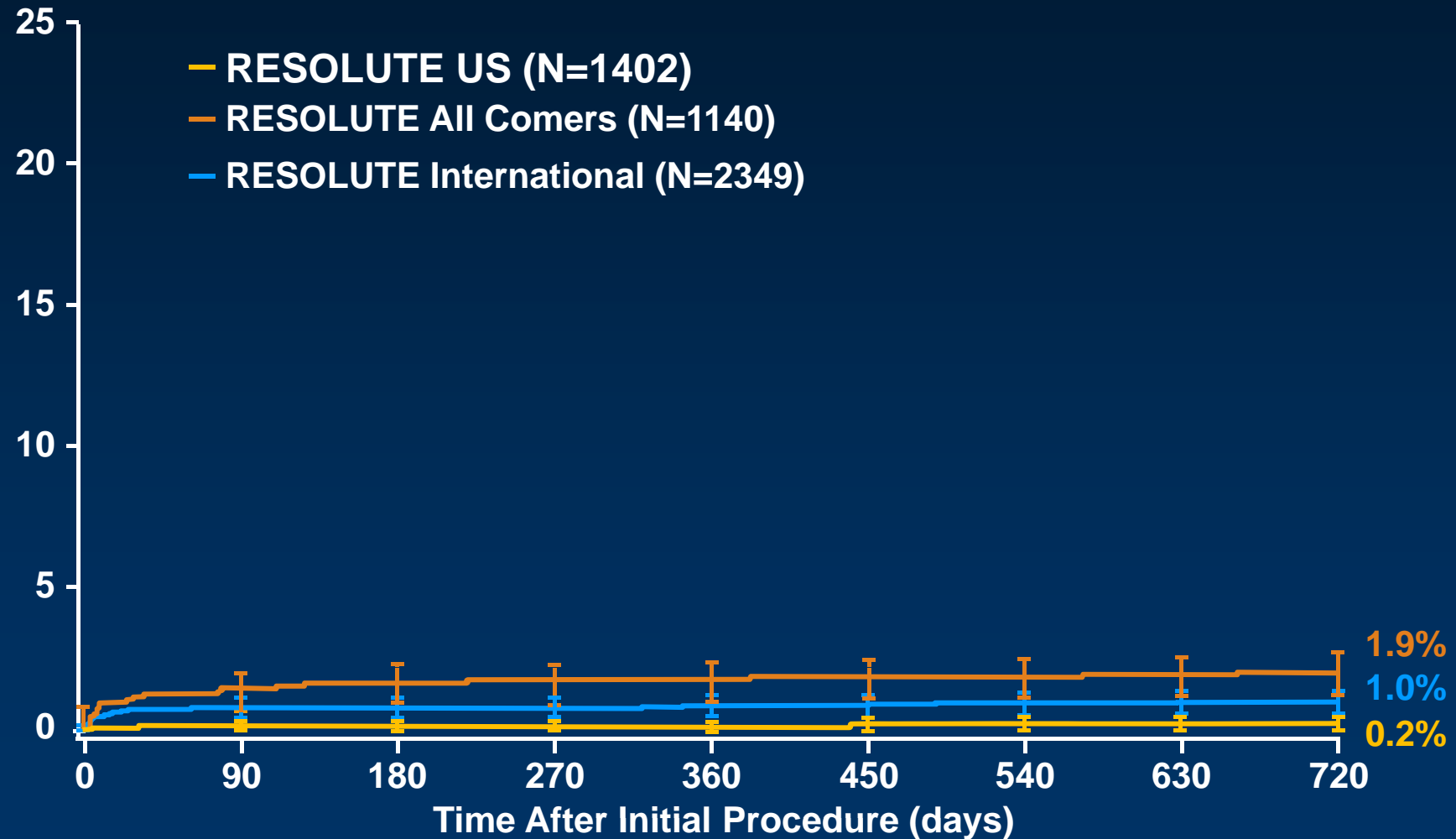
Target Lesion Failure to 24 Months



Error bars indicate a point-wise two-sided 95% confidence interval ($\pm 1.96 \cdot SE$).
Standard Error based on the Greenwood Formula.

Def/prob Stent Thrombosis to 24 Months

RESOLUTE US, All Comers, International Trials

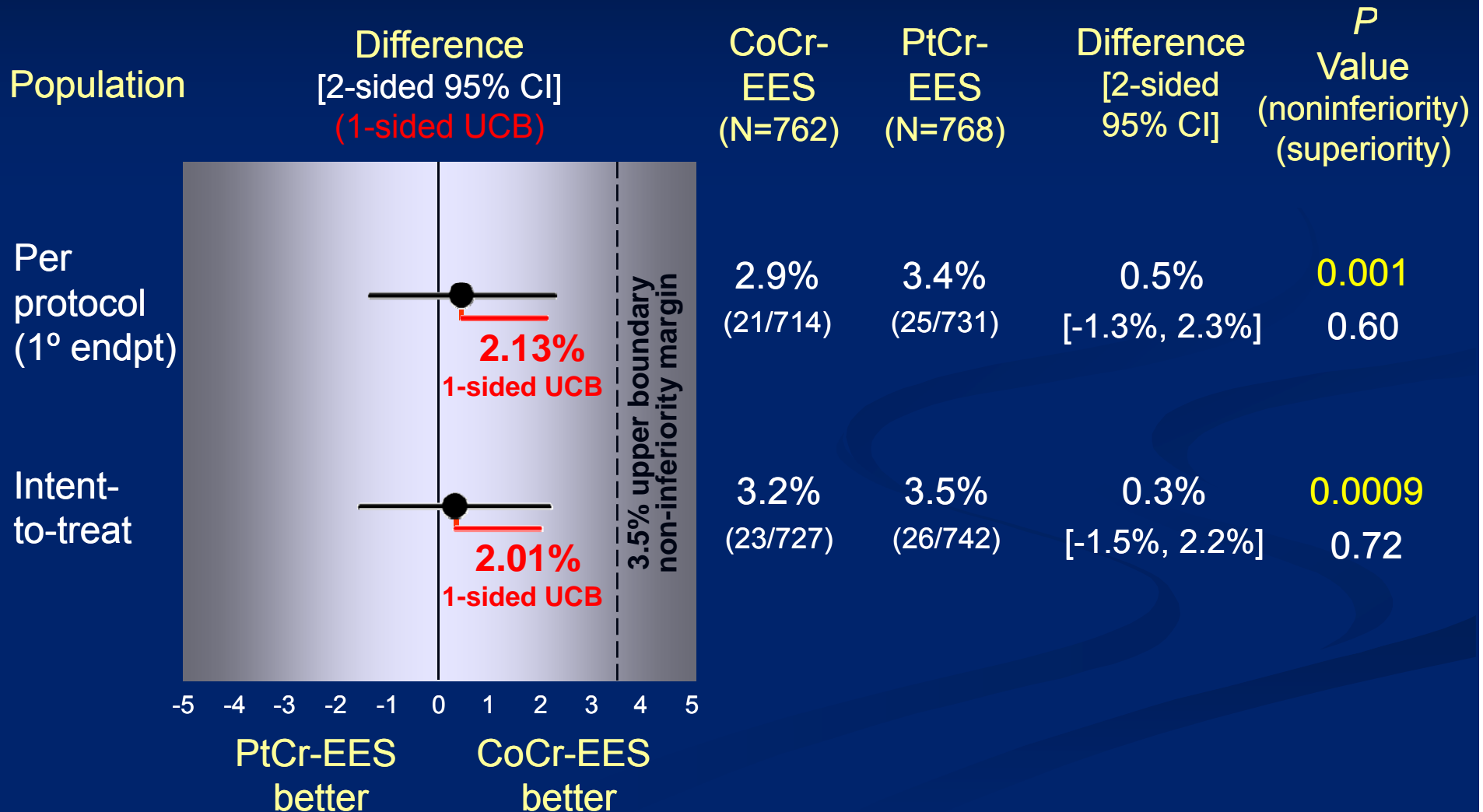


Error bars indicate a point-wise two-sided 95% confidence interval ($\pm 1.96 \cdot SE$).
Standard Error based on the Greenwood Formula.

Primary Endpoint



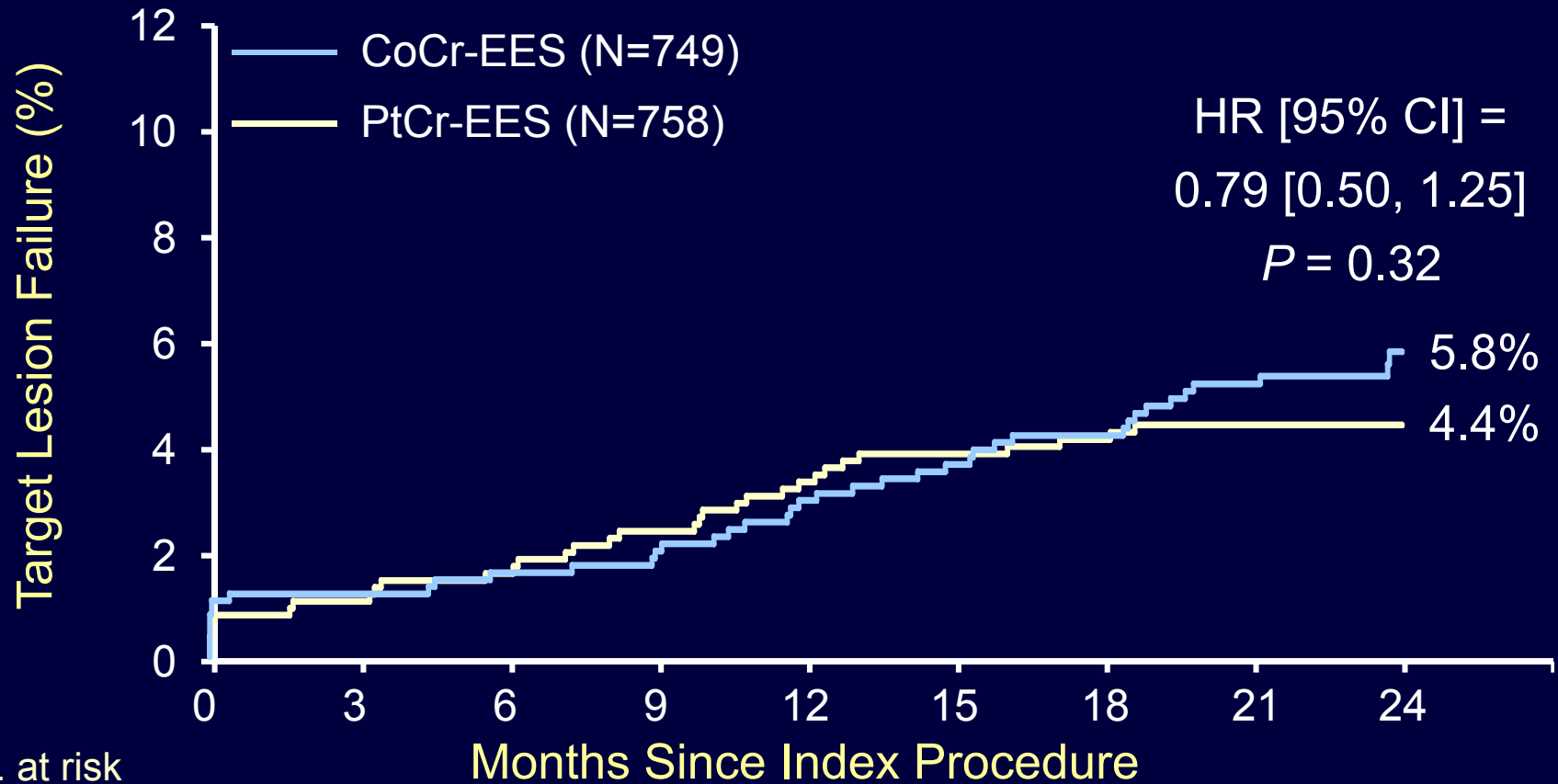
Target Lesion Failure at 12 Months



UCB=upper confidence bound

Target Lesion Failure

2-Year Follow-up



No. at risk

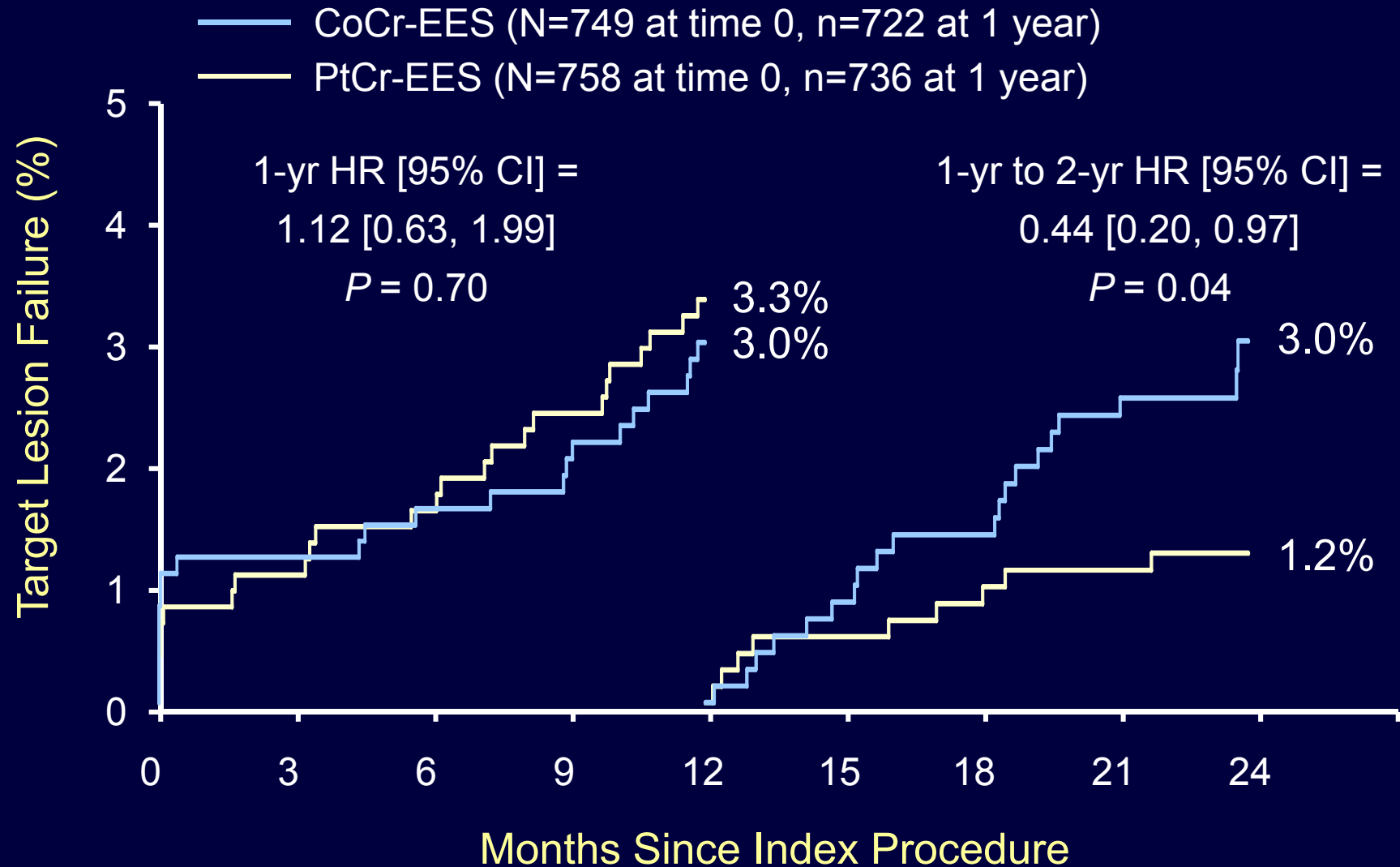
CoCr-EES	749	738	737	729	717	703	685
PtCr-EES	758	747	742	739	727	718	700

TLF = cardiac death or MI related to the target vessel or ischemia-driven TLR

Target Lesion Failure



2-Year Landmark Analysis

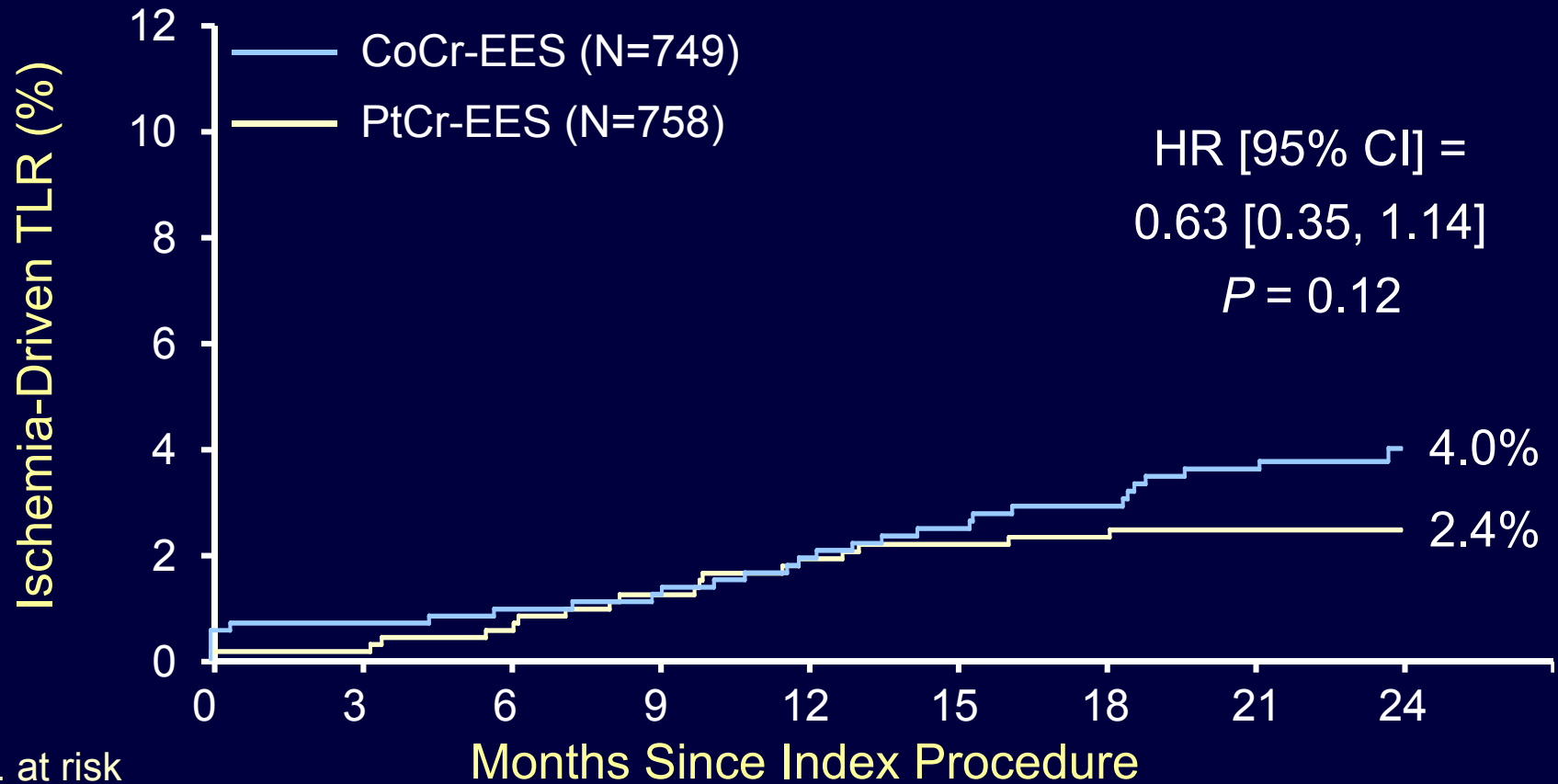


TLF = cardiac death or MI related to the target vessel or ischemia-driven TLR; Patients with Study Stents.

Ischemia-Driven TLR



2-Year Follow-up



No. at risk

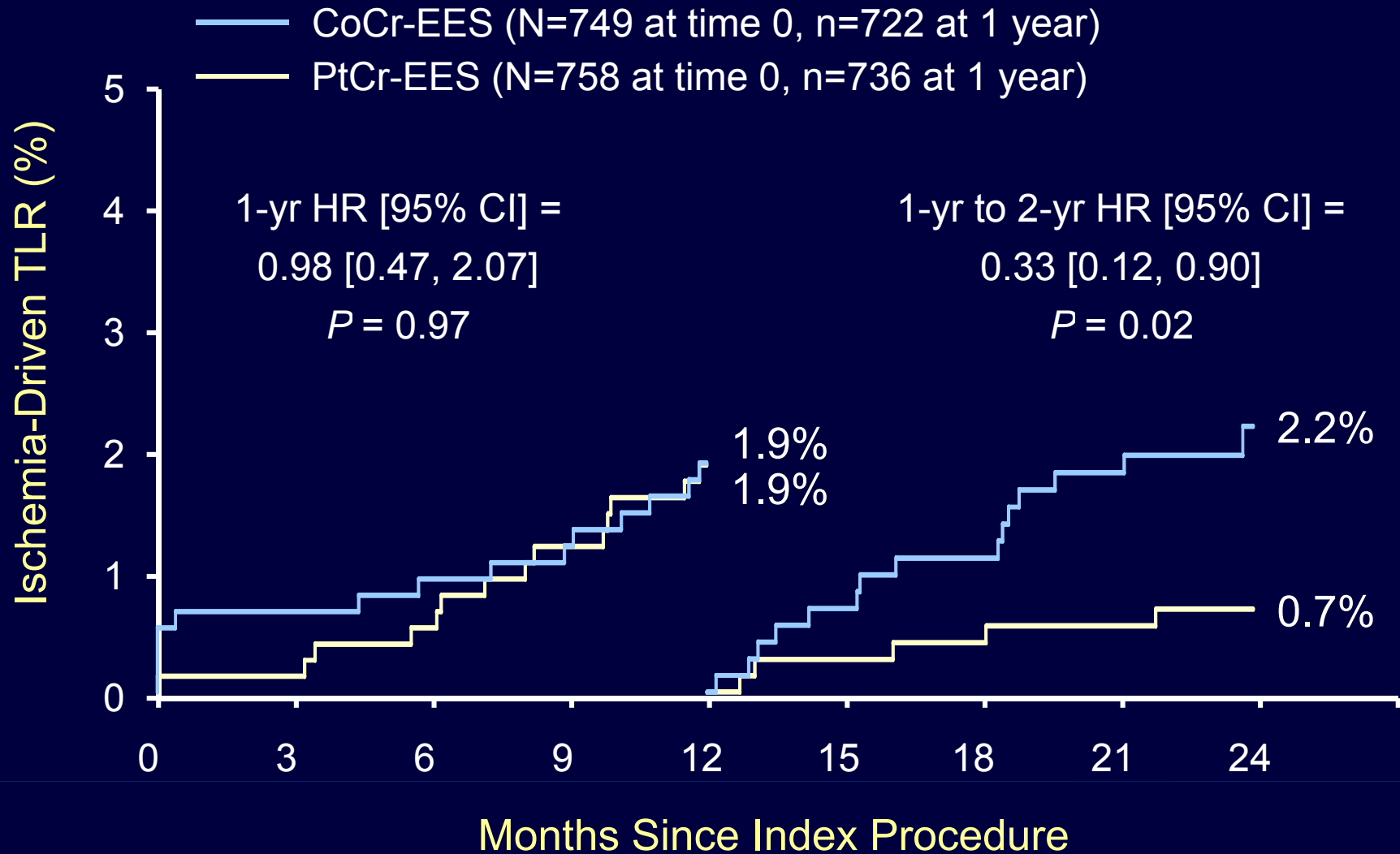
	0	3	6	9	12	15	18	21	24
CoCr-EES	749	742	741	733	721	708	708	690	690
PtCr-EES	758	751	746	743	732	723	723	708	708

TLR = target lesion revascularization

Ischemia-Driven TLR



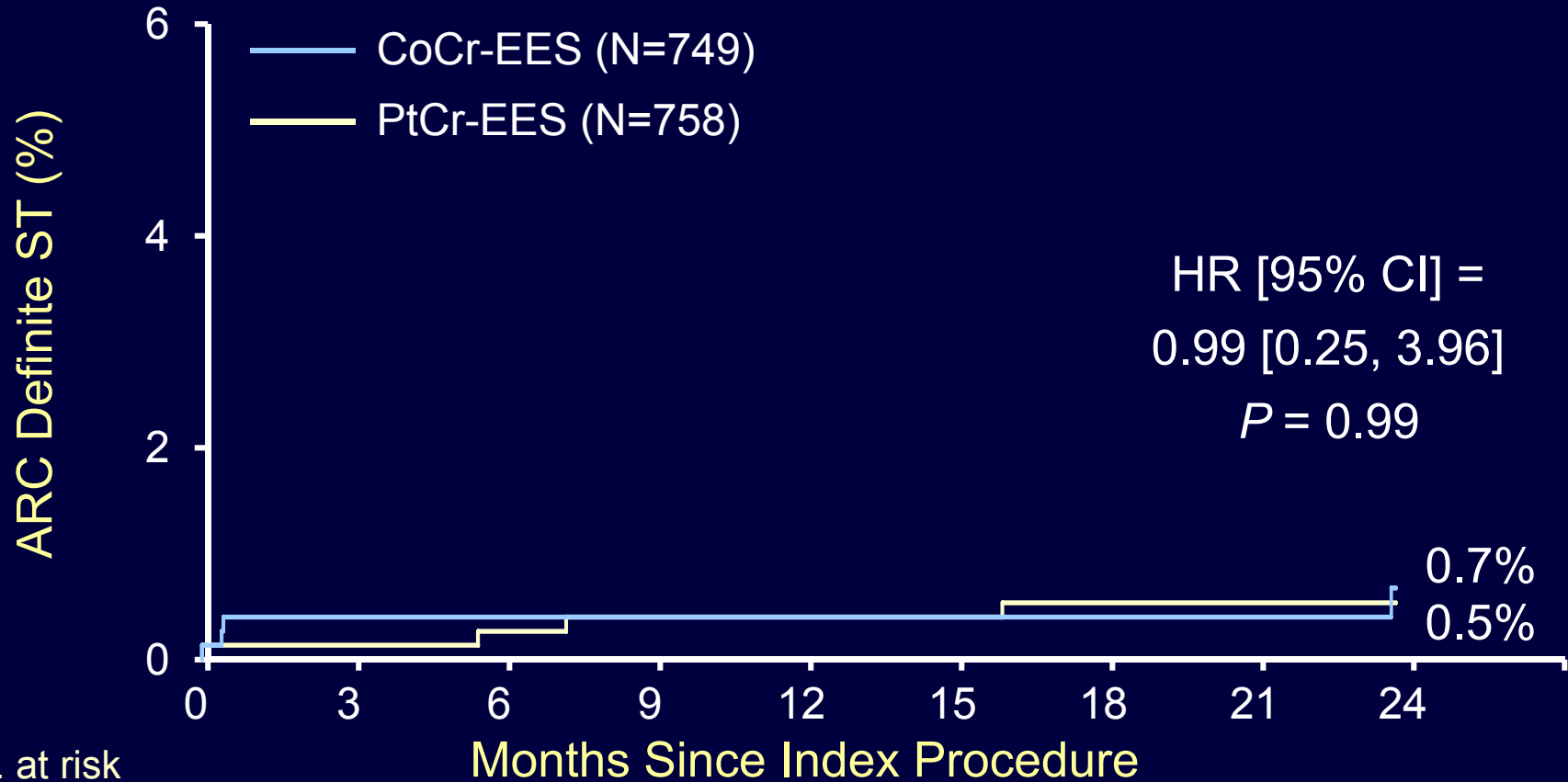
2-Year Landmark Analysis



TLR = target lesion revascularization

Stent Thrombosis - ARC Definite

2-Years



No. at risk

CoCr-EES	749	744	743	737	726	719	708
PtCr-EES	758	751	748	745	737	733	720

Note: There were no adjudicated ARC probable ST events through 2 year follow-up

ARC Definite Stent Thrombosis



■ Early (<30 days) ■ Late (30 days – 1 year) ■ VLST (1-2 years)



There were no adjudicated ARC probable ST events through 2 year follow-up

Emerging DES Technologies

- ♥ **Bioabsorbable polymers**
- ♥ **Polymer free drug delivery**
Without and without a carrier
- ♥ **Fully bioabsorbable stents**

Bioreabsorbable Stents

Igaki-Tamai



PLA

BVS



PLA

REVA



**Tyrosine-
Polycarbonate**

BTI



PAE-Salicylate

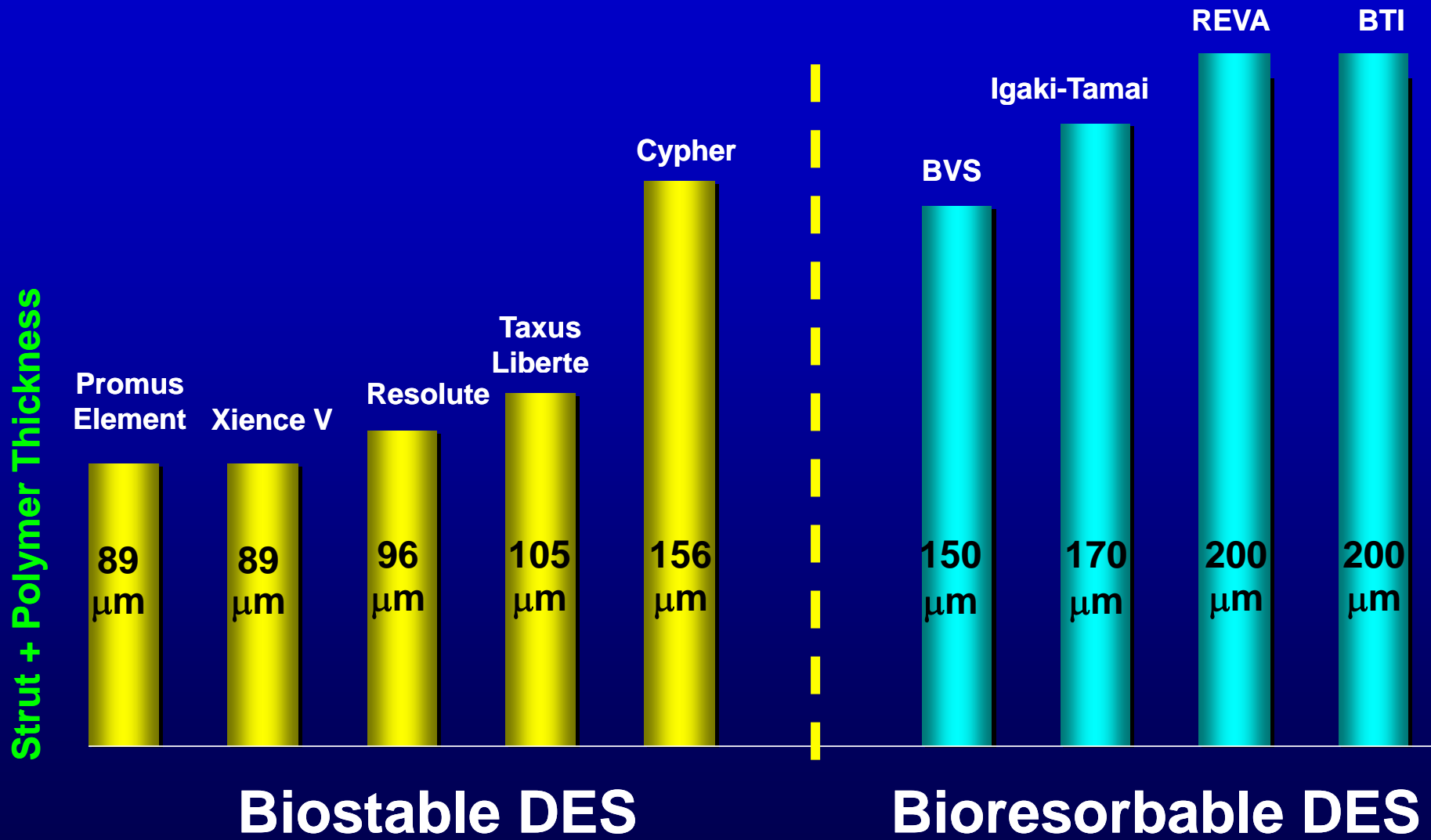
Biotronik



Magnesium

Drug Eluting Stents

Comparative Strut/Polymer Thickness



And what about performance and deliverability?

Still numerous unanswered questions!

Performance, deliverability and utility largely untested in real world patients!

No knowledge or experience in anything other than the very simplest, type A or B1 lesions in vessels 3.0-3.5mm in size.

Tightly regulated clinical trials with very limited inclusion criteria. No data in long lesions, small vessel, calcified or angulated lesions, bifurcations

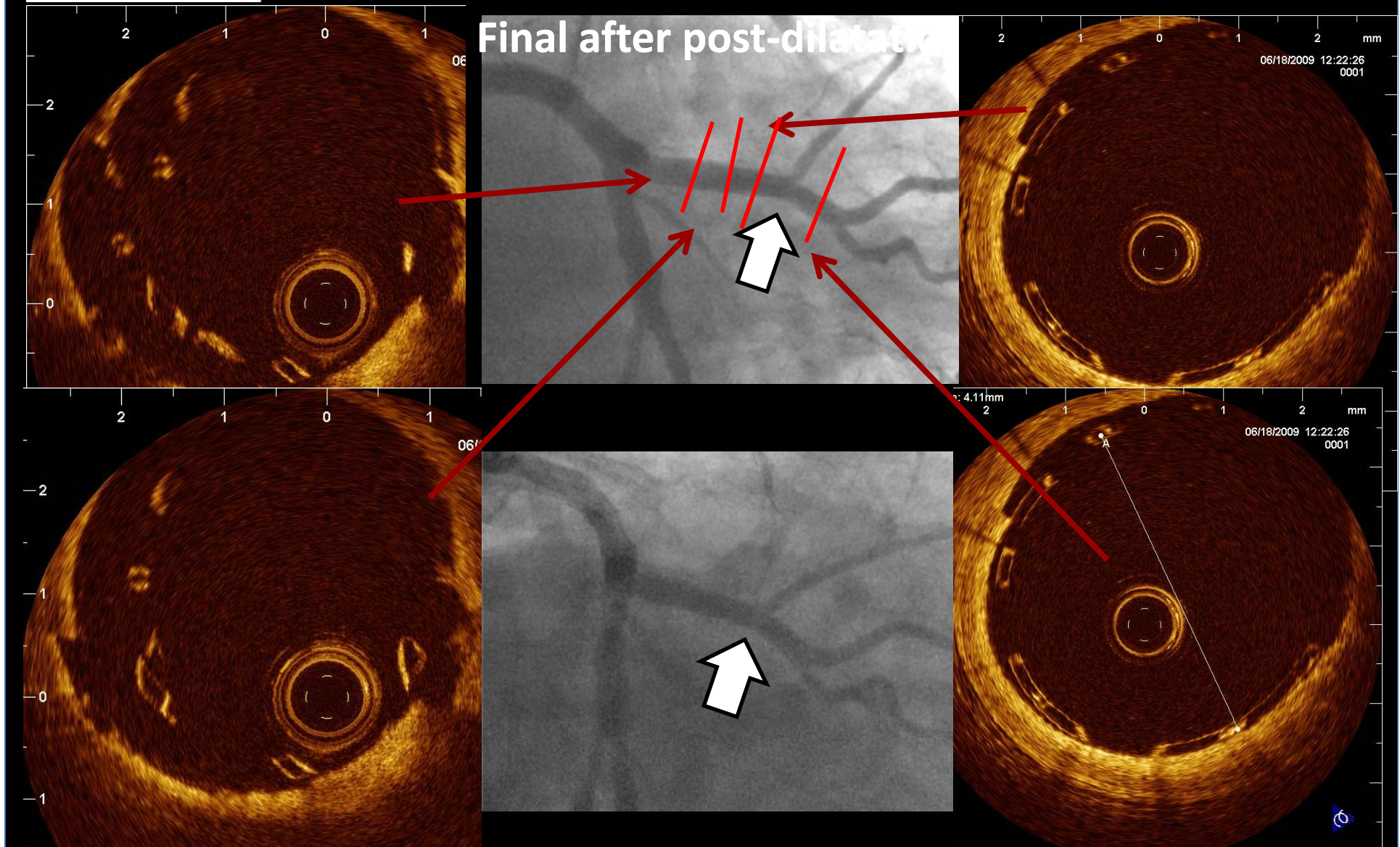
Proving a Safety Advantage for Bioresorbable Scaffolds / Stents

Difficult!

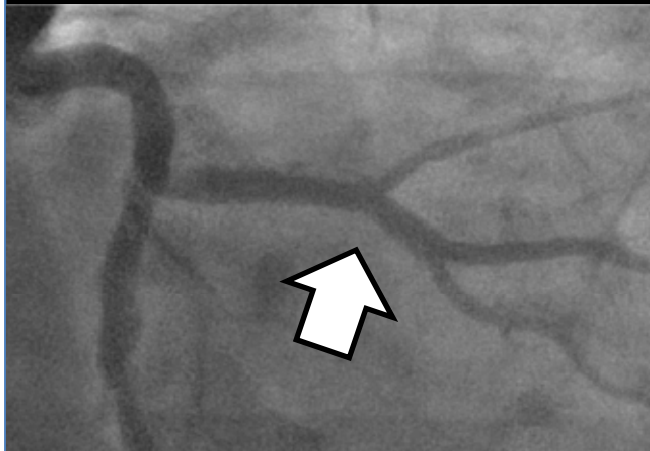
Very large scale trials with long duration follow up. At best likely to show non-inferiority

No or little prospect of proving shorter duration DAPT in the foreseeable future

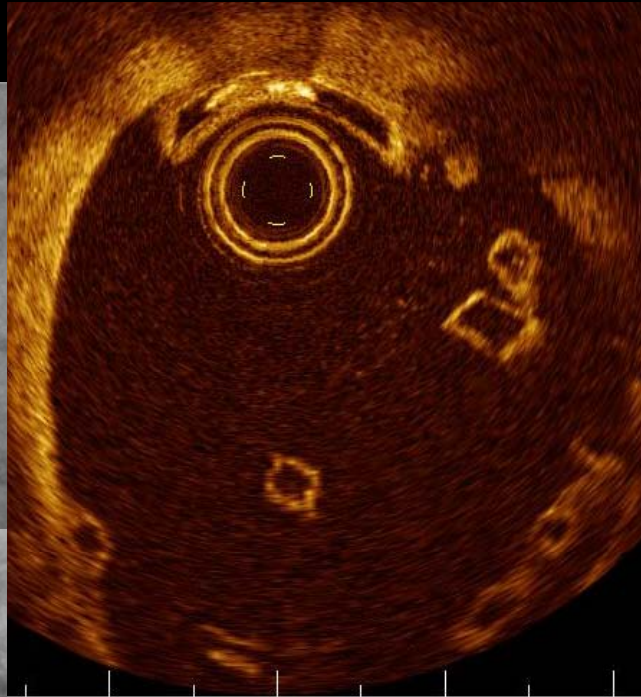
Cohort B pt 02 after post-dilatation with 3.5 at higher pressure
Strut fracture proximally was unsuspected on angiography



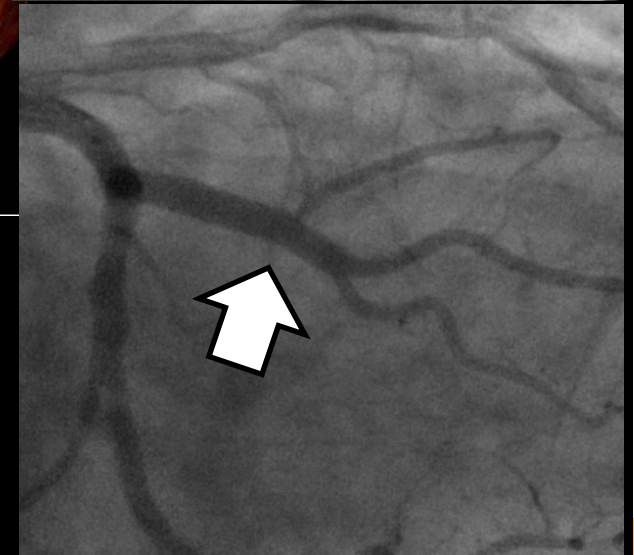
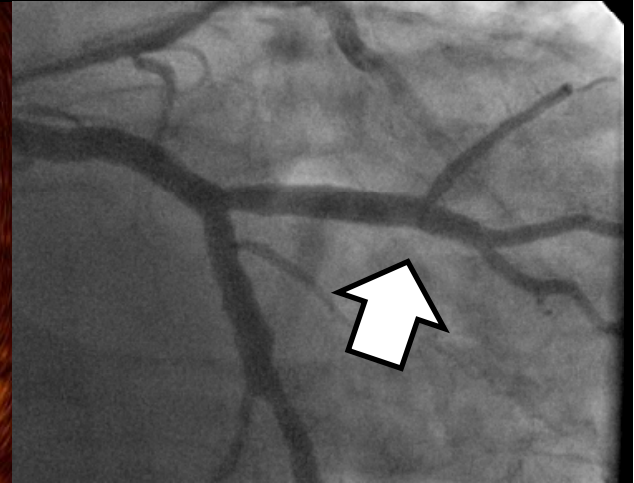
**Chest pain recurred
Readmitted 1 month
On angio the artery
appears widely patent**



**However, OCT again
shows strut fracture
and disordered stent**



**After 3.5 mm
Xience post-dil
4mm balloon**



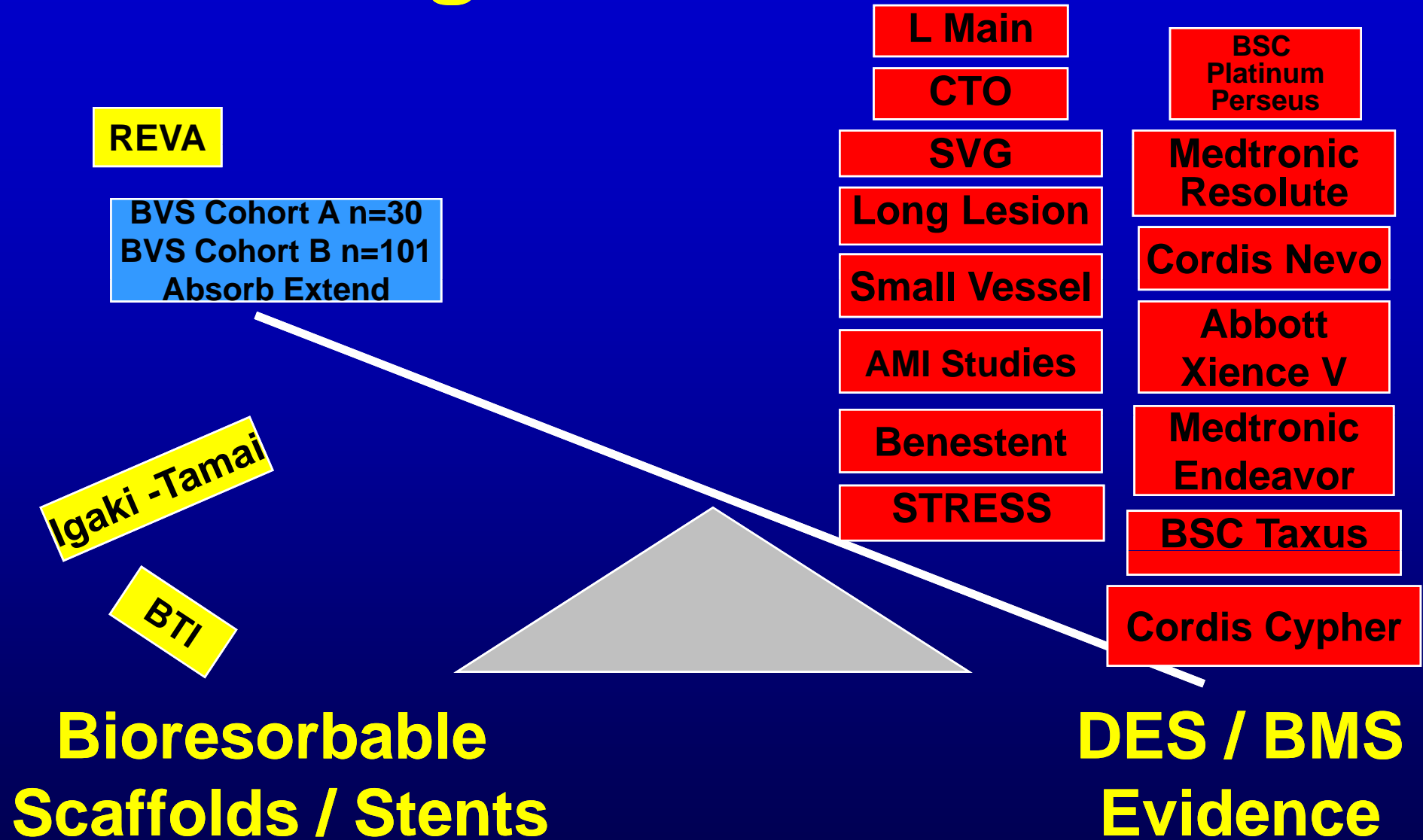
Ormiston

Current DES or Bioresorbable Scaffold

Bioresorbable Stent

- | | |
|-------------------------------------|--------|
| ■ Easy to deliver | ??? |
| ■ Low profile but visible | XX |
| ■ Flexible and conformable | XX |
| ■ Minimal vessel and intimal injury | ??? |
| ■ Complete apposition | ??? |
| ■ Thromboresistant materials | ?? |
| ■ Functional endothelial layer | May be |
| ■ Minimal inflammation | ?? |
| ■ No persistent response | ? |
| ■ Inexpensive | XXX |

The Weight of Trial Evidence



The Weight of Trial Evidence

<750 patient.yrs

> 40 million patient
years of experience

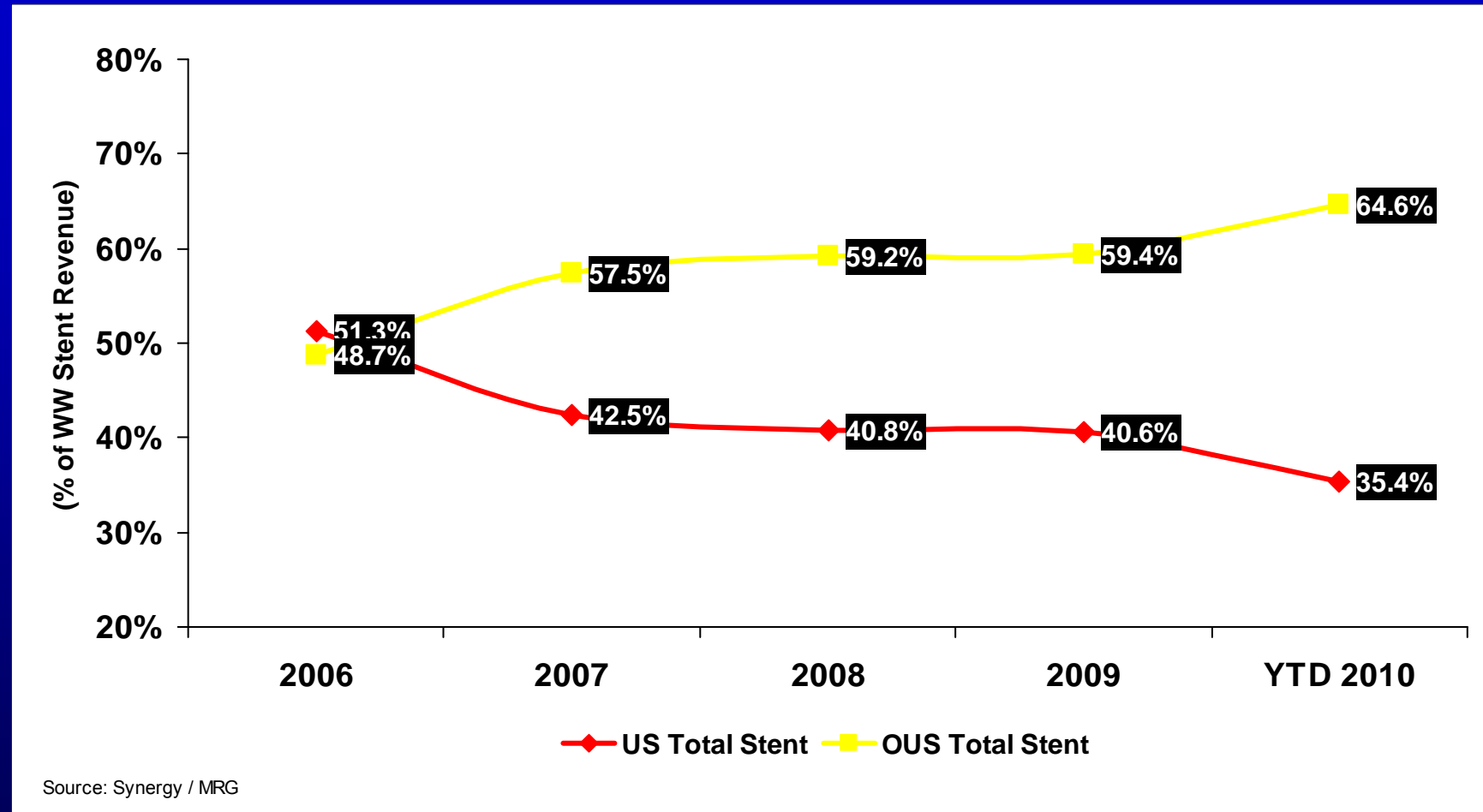
**Bioresorbable
Scaffolds / Stents**

**DES / BMS
Evidence**

Combined Coronary/Peripheral Market

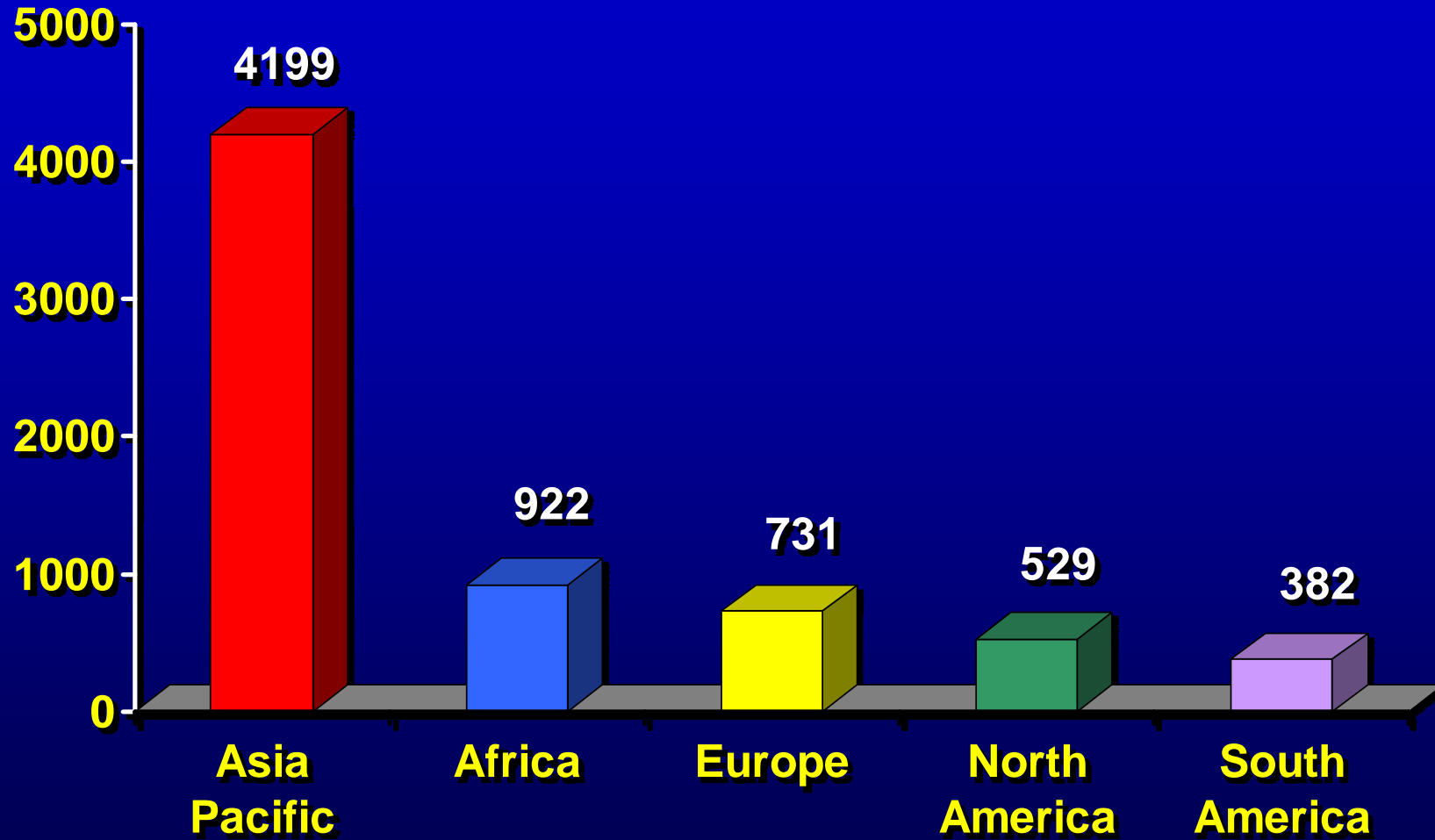
Market	FY11	FY12	FY13	FY14	FY11-14 CAGR
Coronary Market	\$8,186.4	\$8,218.2	\$8,107.2	\$8,208.8	0.1%
Peripheral Market	\$1,973.0	\$2,026.4	\$2,280.0	\$2,464.3	7.7%
Total	\$10,159.4	\$10,244.5	\$10,387.2	\$10,673.1	1.7%

Split of the WW Coronary Stent Market (DES + BMS) Revenue

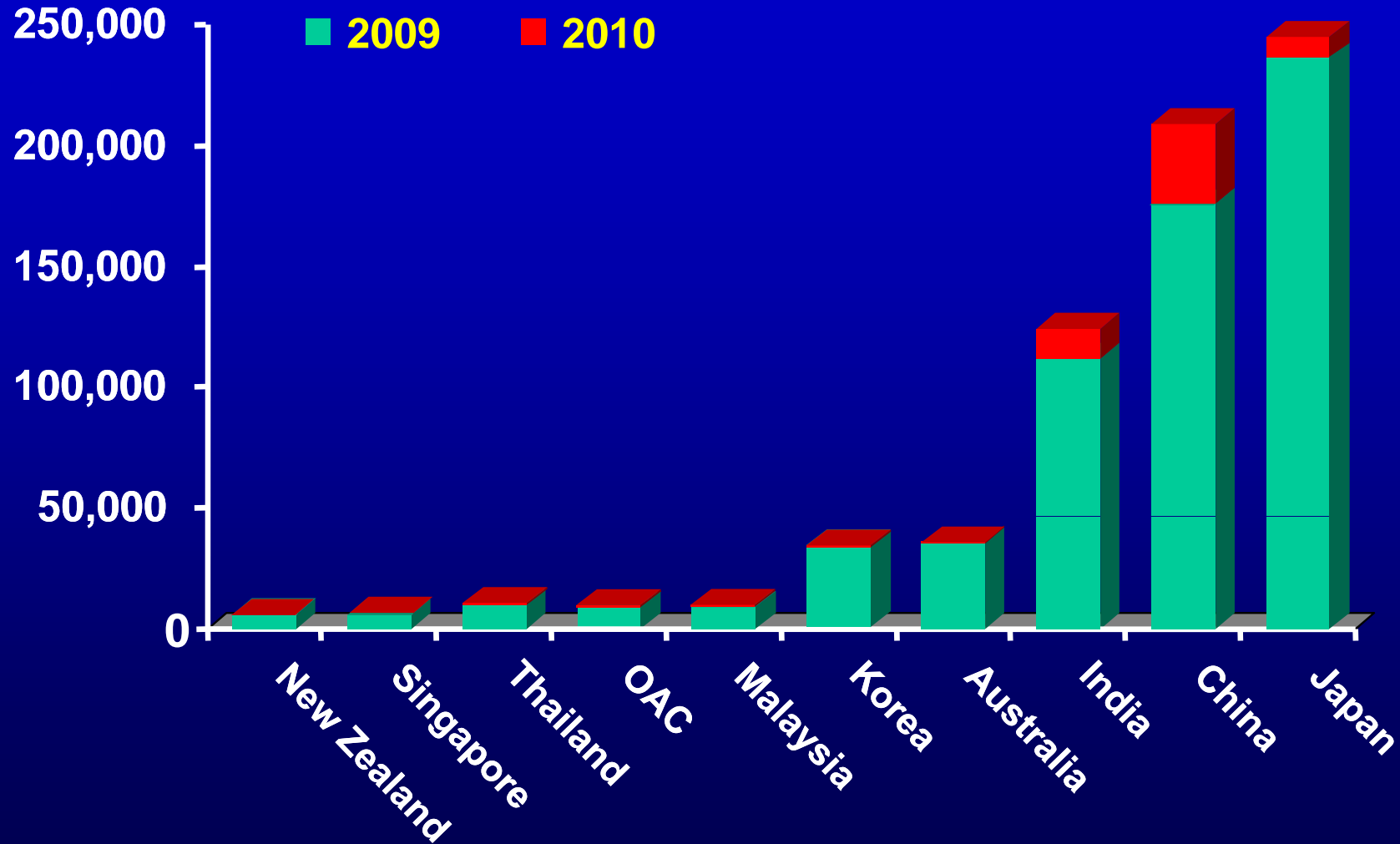


World Population

Million

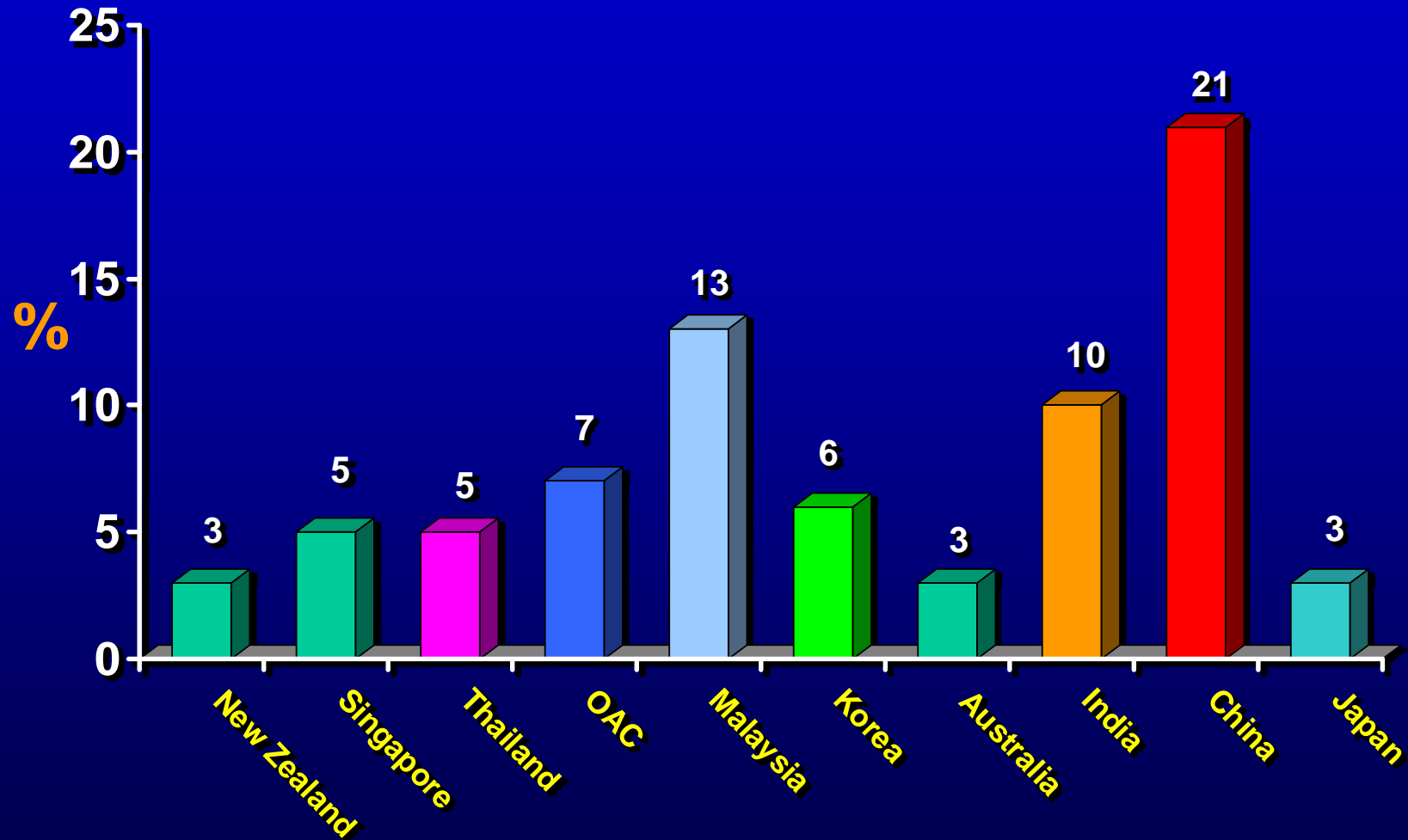


AP PCI's by Country Per Annum



Asia Pacific PCI's by Country

Annual % Growth



Current DES Systems are Sufficient

- ♥ Need low cost safe reliable and available to all people
- ♥ When is enough enough –when valuable health care dollars should be directed to other CV conditons