The BASE-ACS Trial

A Randomized Comparison of a TITAN-2 BAS with XIENCE-V-EES Stent in Acute Coronary Syndrome

24 months Follow-up results

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on behalf of the Investigators

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EuroPCR 2012 17-May-2012

Potential conflicts of interest

Speaker's name: **PASI P KARJALAINEN**

☒ **I have the following** potential conflicts of interest to report:

- ☐ Research contracts
  + Consulting:
    Biotronik, Stentys, Boston sc, St Jude Medical
- ☐ Employment in industry
- ☐ Stockholder of a healthcare company
- ☐ Owner of a healthcare company
- ☐ Other(s)

☐ **I do not have any potential conflict of interest**

BASE-ACS

Patients presenting with Acute Coronary Syndrome (ACS)

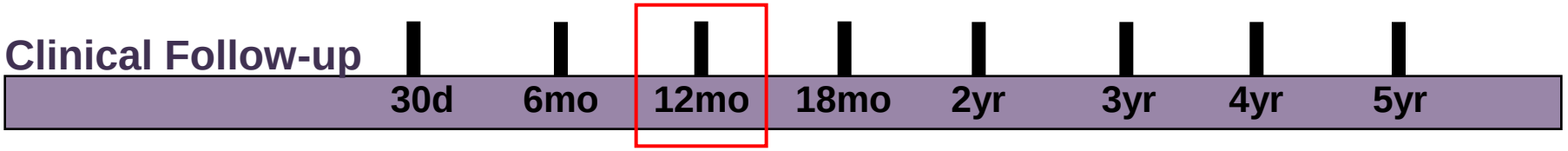
N = 827
14 International Sites
Randomisation 1:1

TITAN-2® stent

Titanium-Nitride-Oxide Coated Bio-Active Stent (BAS)
417 Patients

XIENCE-V™/PROMUS™ stent

Everolimus-Eluting Stent (EES)
410 Patients



Primary Endpoint: MACE (MI, TLR and Cardiac Death) at 12 months

Secondary Endpoints: All Cause Death; Cardiac Death/Non-Fatal MI, Stent Thrombosis

Investigators: P Karjalainen (Finland), Principal Investigator (PI)
A Ylitalo (Finland), co-PI
O Hess† (Switzerland), co-PI
KEJ Airaksinen (Finland), co-PI
M Niemelä (Finland), co-PI

Clinical Sites

BASE-ACS

Investigators	Hospital	Patients
P Karjalainen, A Ylitalo, J Mikkelsson	Satakunta Central Hospital, Pori, Finland	270
M Niemelä, K Kervinen, H Romppanen	Oulu University Hospital, Oulu, Finland	151
F Rivero, J Salamanca	Hospital Universitario de la Princesa, Madrid, Spain	69
J Airaksinen, M Pietilä	Turku University Hospital,Turku, Finland	60
J Sia	Kokkola Central Hospital, Kokkola, Finland	49
J Lalmand, A Aminian, D Dolatabadi, P Lefebvre	C.H.U. de Charleroi, Charleroi, Belgium	46
O Hess, B Meier	Bern University Hospital, Bern, Switzerland	36
B De Bruyne, W Wijns	Cardiovascular Center Aalst, Aalst, Belgium	32
M Carlier, S Fasseaux, C Mortier, Y Dascotte	Grand Hôpital de Charleroi, Charleroi, Belgium	26
A deBelder	Royal Sussex County Hospital, Brighton, UK	25
J R López-Minguez, J M Nogales Asensio	Infanta Cristina University Hospital, Badajoz, Spain	20
M Laine	Helsinki University Hospital, Helsinki, Finland	19
P Tedjokusumo, A F Yahya,C Ahmad,J W Marta	Dr. Hasan Sadikin Hospital, Bandung, Indonesia	19
K Nyman	Jyväskylä Central Hospital, Jyväskylä, Finland	5

BASE-ACS: Devices

	Titanium-Nitride-Oxide coated Bio-Active-Stent (Titan-2® BAS)	Everolimus-Eluting Stent (Xience-V™ /Promus™ EES)
Stent Platform	Stainless Steel BMS Helicoidal Design Strut Thickness 91 µm	Cobalt Alloy BMS Slotted Tube Strut Thickness 81 µm
Drug	---	Everolimus
Drug Density	---	1.0 µg/mm^2
Coating	Titanium-Nitride-Oxide (TiNoX)	---
Polymer	---	Fluoropolymer Polyvinylidene fluoride
Manufacturer	Hexacath, France	Abbott vascular

BASE-ACS

Statistical Assumptions

- **TITAX-AMI trial** (Karjalainen P et al. Eurointerv 2008;4:234-241)
  - Inclusion: Patients presenting with myocardial infarction (nstemi/stemi)
  - MACE at 12 months

    ➔ TITAN-2® BAS 10.3% versus TAXUS-Liberte 12.8%

- **No randomized trials with Xience-V EES in ACS or acute MI**

- **BASE-ACS trial**

Primary Endpoint: MACE at 12 Months

- Expected MACE in both study groups ~ 9.2%

- Non-inferiority margin (Δ) = 5.0%

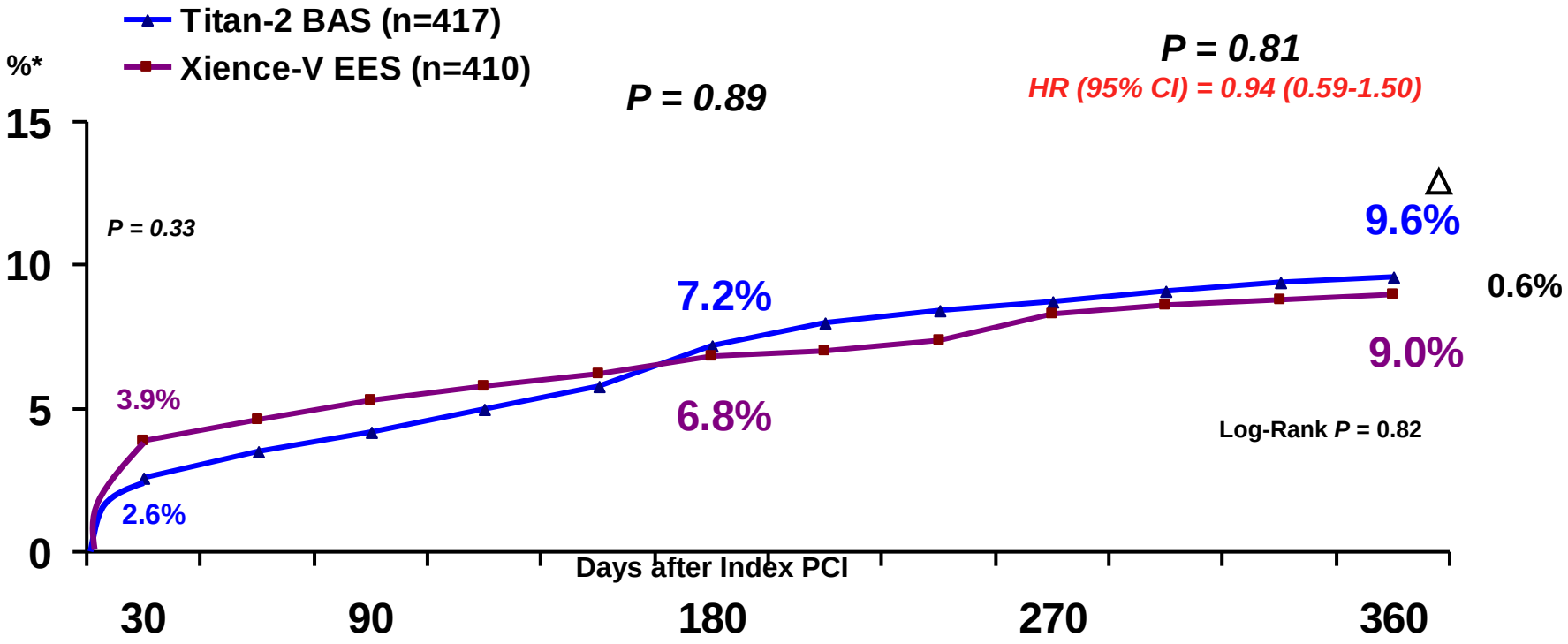
- Significance level (α) = 0.05 (1-sided)

- 400 patients per group would yield > 90% power to detect non-inferiority

BASE-ACS: background

MACE at 12 months

(late breaking clinical trial; EuroPCR2011)



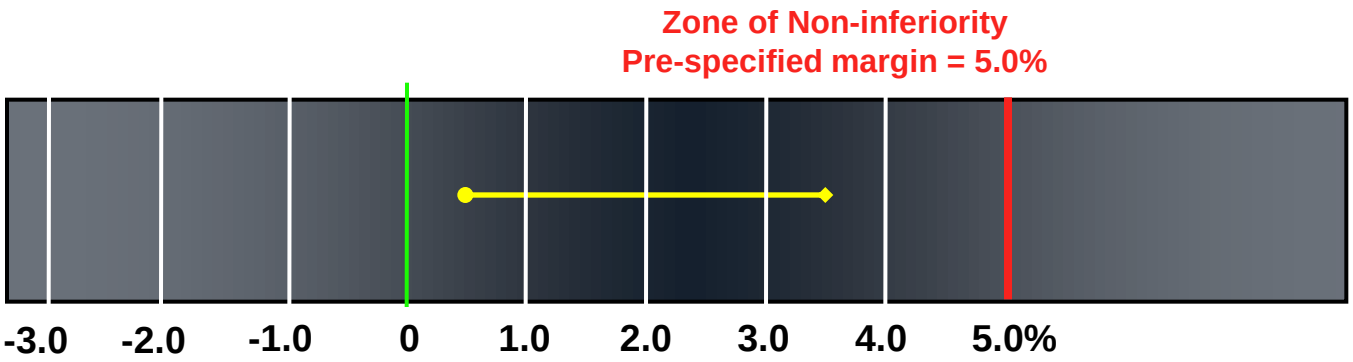
* Cumulative incidence of events (%)

Primary Endpoint

MACE at 12 Months

Titan-2 BAS (n=427)	Xience-V EES (n=410)	Difference : 0.6% (Upper 1-sided 95% CI)	*P* Value (Noni-nferiority)
9.6%	9.0%	0.6% + 95% CI = 3.5%	0.001

Primary Non-Inferiority Endpoint Met



BASE-ACS 24 months FU

Background

- Premature discontinuation of thienopyridine therapy is recently recognized as the most important predisposing factor for late and very late ST following DES implantation.

BASE-ACS trial

- Clopidogrel treatment beyond 12 months was discouraged

➔ Duration of DAPT was 9 (BAS) and 10 (EES) months

- 99% of patients in the EES group on clopidogrel at 6-months; 68% at 12 months
  90% of patients in the BAS group on clopidogrel at 6-months, 51% at 12 months

- We sought to examine whether clopidogrel diacontinuation will predispose late thrombostic events?

euro PCR 2012 YEAR OF THE TEXTBOOK

BASE-ACS trial

Patient Eligibility

Inclusion Criteria:

- Written informed consent
- Age > 18 years
- Patient with acute coronary syndrome (ACS) requiring PCI
- ACS:
  - Unstable angina
  - Non-ST-elevation myocardial infarction
  - ST-elevation myocardial infarction

Exclusion Criteria:

- Prior PCI on target vessel (ISR)
- Unprotected LM disease
- Aorto-ostial lesion
- Contraindication to:
  - aspirin, heparins, clopidogrel
- Life expectancy < 12 months
- Stent length needed > 28 mm

BASE-ACS trial

Stent Thrombosis

Academic Research Consortium (ARC) definition:

(Circulation 2007;115:2344-51)

Definite:

- Acute coronary syndrome and angiographic (or autopsy) confirmation of stent thrombosis

Probable:

- Any unexplained death within the first 30 days
- Target vessel related acute MI

Possible:

- Any unexplained death from 30 days after PCI

Baseline Demographics

	Titan-2 BAS (n=417)	Xience-V EES (n=410)	*P value*
Age (years)	63 ± 12	63 ± 12	0.93
Male	76.0%	76.1%	0.94
Diabetes	15.6%	18.3%	0.31
- Insulin treated	4.6%	4.1%	0.87
Hyperlipidemia	45.8%	48.0%	0.53
Hypertension	48.2%	51.7%	0.33
Current smoker	34.5%	32.7%	0.61
Prior myocardial infarction	13.4%	9.8%	0.10
Prior PCI	9.6%	10.5%	0.73
Prior CABG	4.8%	4.1%	0.74
NSTEMI	49.4%	45.6%	0.30
STEMI	38.8%	38.8%	1.0

Lesion Characteristics

	Titan-2 BAS (n=417pts) (n=480 lesions)	Xience-V EES (n=410pts)(n=484 lesions)	*P* value
Number of treated lesions	1.15 ± 0.42	1.18 ± 0.44	0.33
2 or 3 vessels treated	10.8%	14.6%	0.12
RVD[a] (mm)	3.13 ± 0.43	3.14 ± 0.43	0.65
Lesion length (mm)	14.4 ± 5.4	14.3 ± 6.5	0.73
Culprit lesion location			
- Left anterior descendens	41.7%	47.8%	0.08
- Left circumflex	23.3%	21.5%	0.56
- Right coronary artery	32.6%	27.6%	0.13
B1/B2 type complex lesion	71.2%	73.9%	0.39
C type complex lesion	18.2%	13.4%	0.07
Thrombus in culprit lesion	46.3%	41.7%	0.21

[a] Reference vessel diameter

Procedural Characteristics

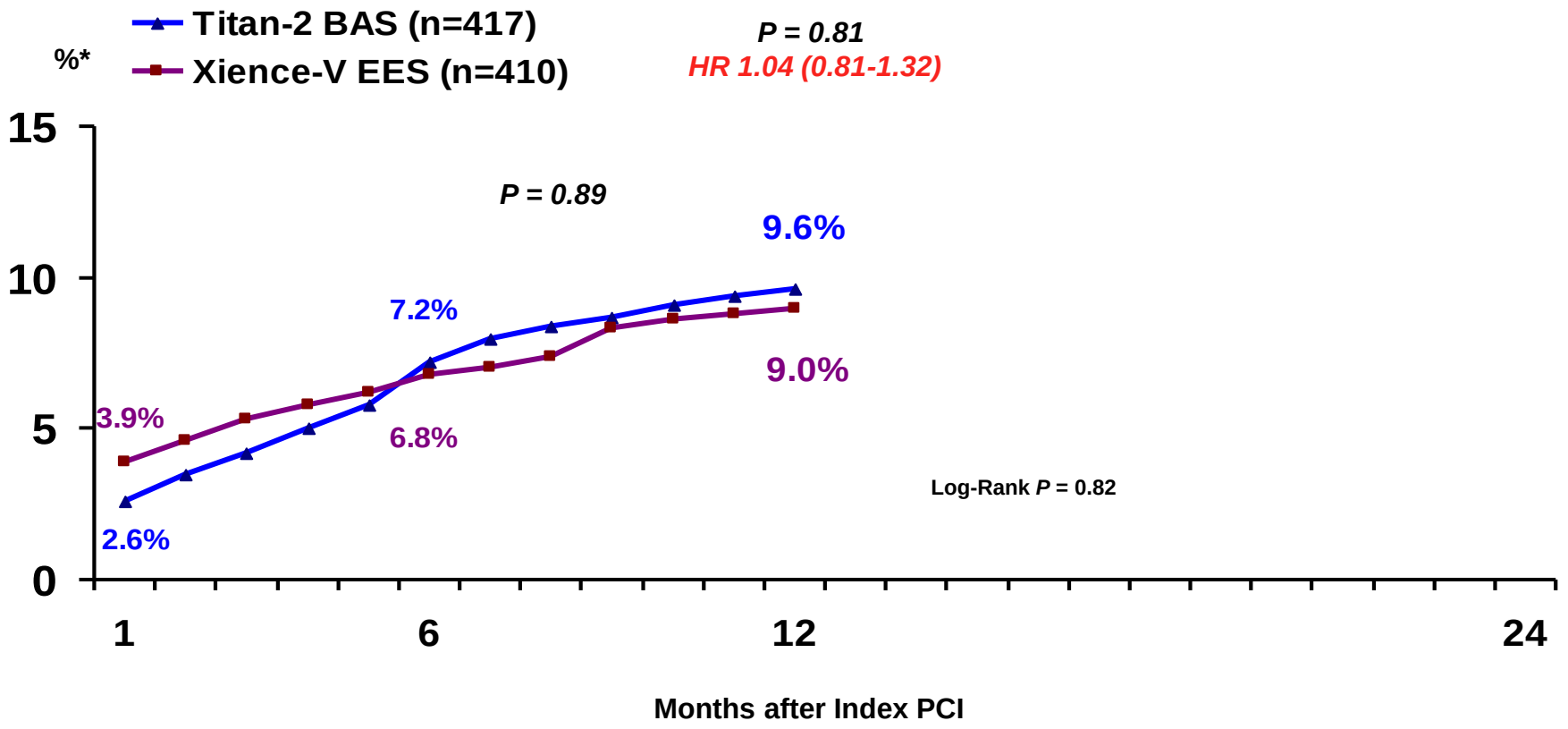
	Titan-2 BAS (n=417pts) (n=480 lesions)	Xience-V EES (n=410pts) (n=484 lesions)	*P value*
Stents per culprit lesion	1.15 ± 0.38	1.14 ± 0.36	0.64
- Stent diameter (mm)	3.15 ± 0.44	3.15 ± 0.45	0.97
- Stent length (mm)	18.0 ± 5.2	18.5 ± 5.6	0.18
- Total stent length per lesion (mm)	20.8 ± 9.4	20.6 ± 8.2	0.70
Thrombus aspiration	19.7%	17.6%	0.48
Post-Dilatation	42.2%	43.9	0.67
Stent failure	0%	1.0%	0.03
Procedural success	99.8%	99.8%	0.99

Antiplatelet Agent Utilization

	Titan-2 BAS (n=417)	Xience-V EES (n=410)	*P* value
Aspirin			
- At 6 months	99.8%	99.5%	NS
- At 12 months	99.5%	99.3%	NS
- At 24 months	97.6%	97.6%	NS
Clopidogrel			
- At 6 months	89.7%	99.3%	< 0.001
- At 12 months	51.3%	68.3%	< 0.001
- At 24 months	2.6%	3.7%	NS
Mean duration of Clopidogrel (months)	8.7 ± 3.6	10.2 ± 3.0	< 0.001

BASE-ACS

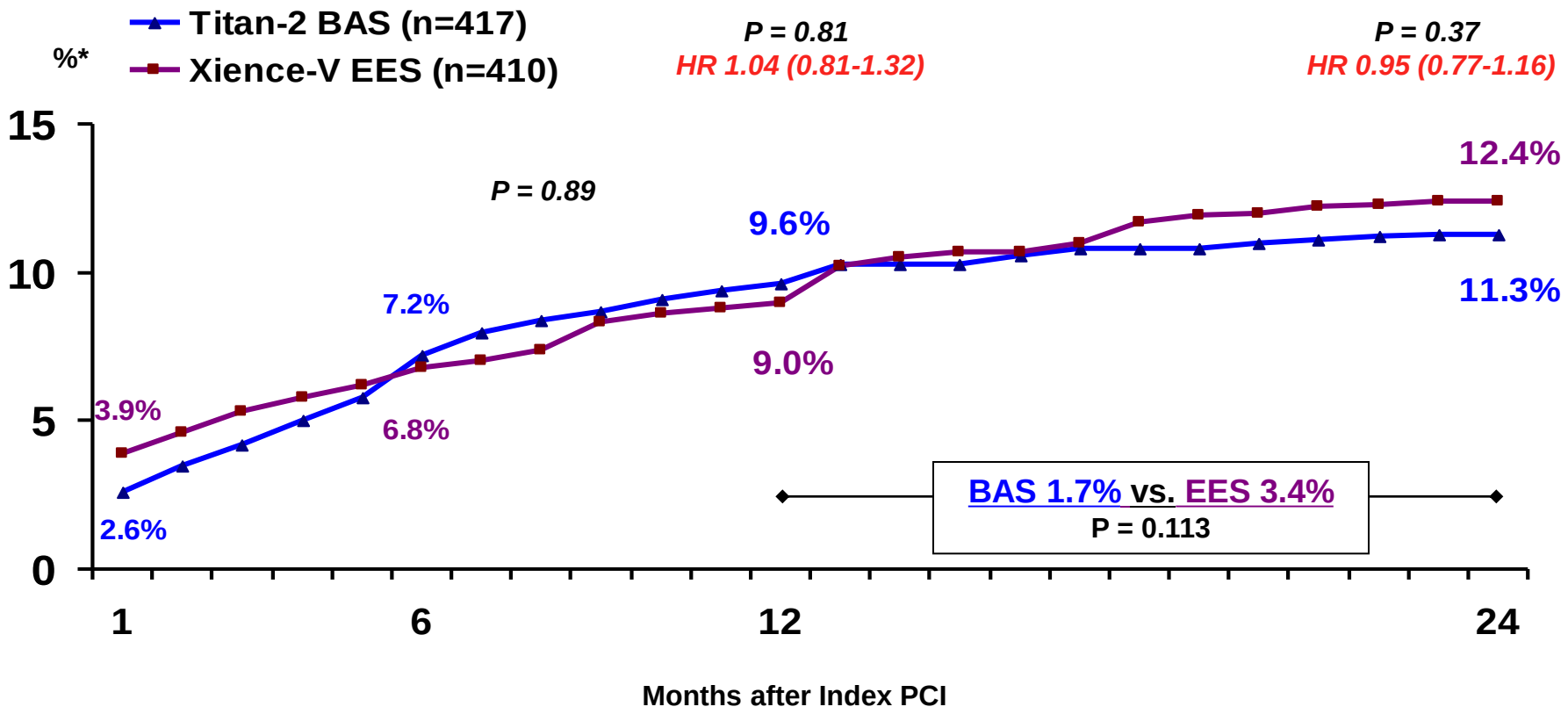
MACE at 12 Months



* Cumulative incidence of events (%)

BASE-ACS

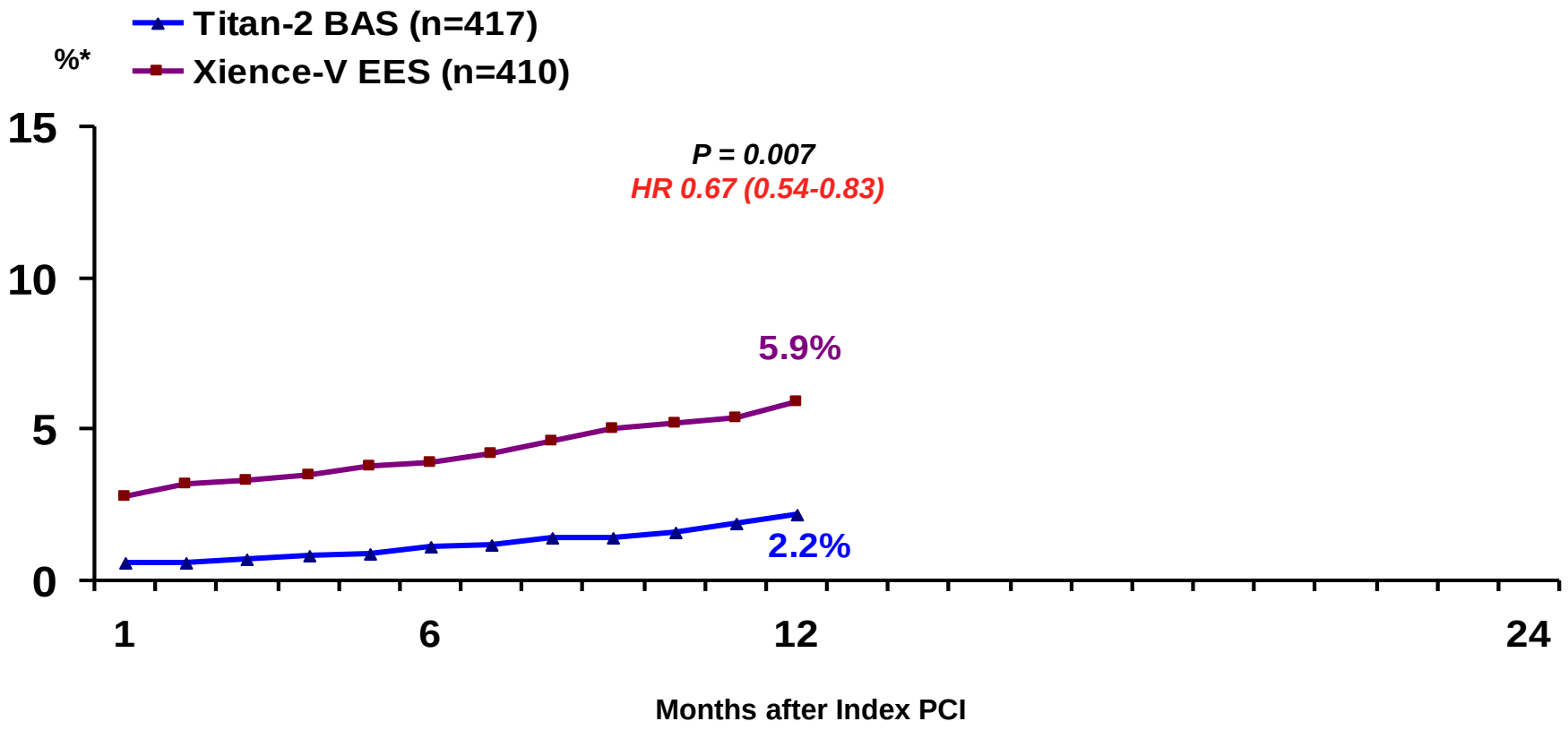
MACE at 24 Months



* Cumulative incidence of events (%)

BASE-ACS

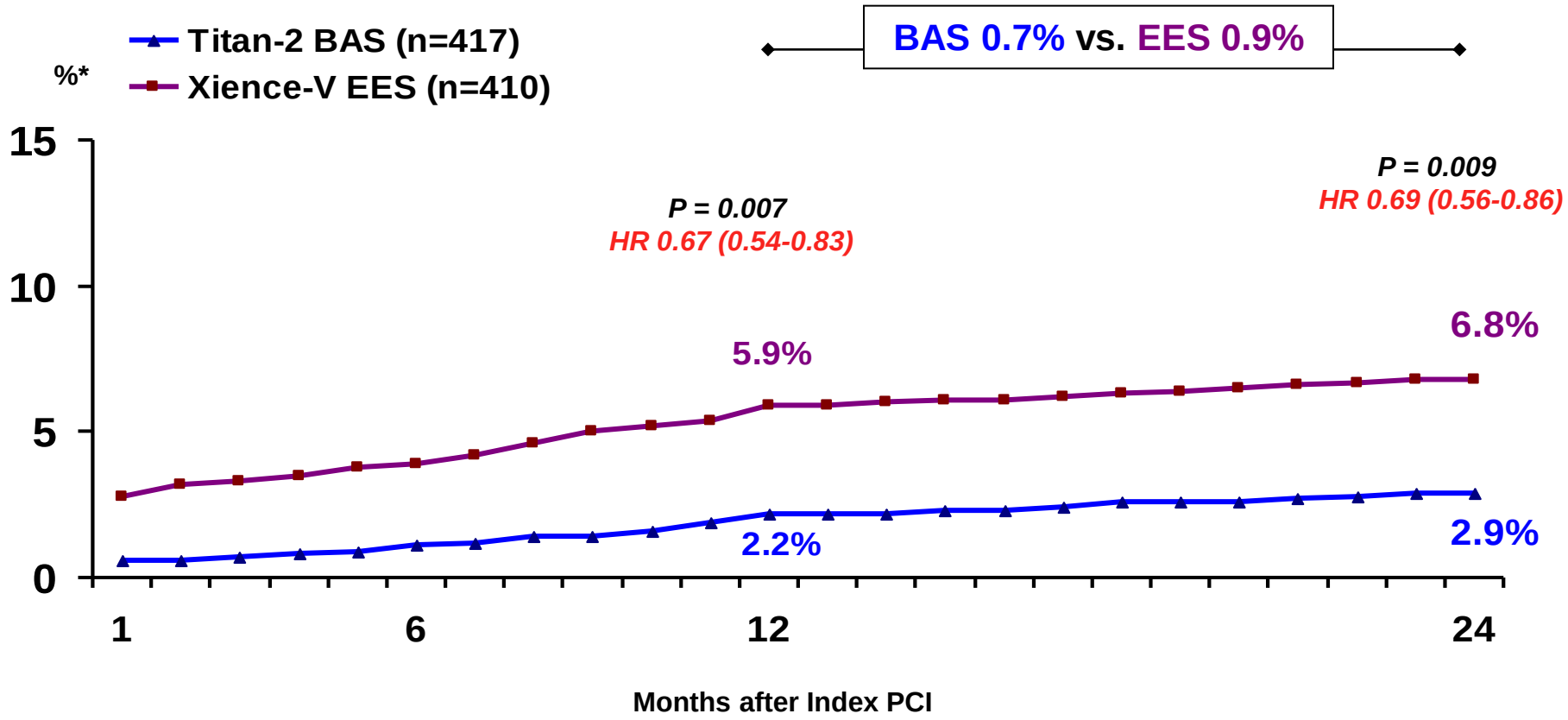
Myocardial Infarction at 12 Months



* Cumulative incidence of events (%)

BASE-ACS

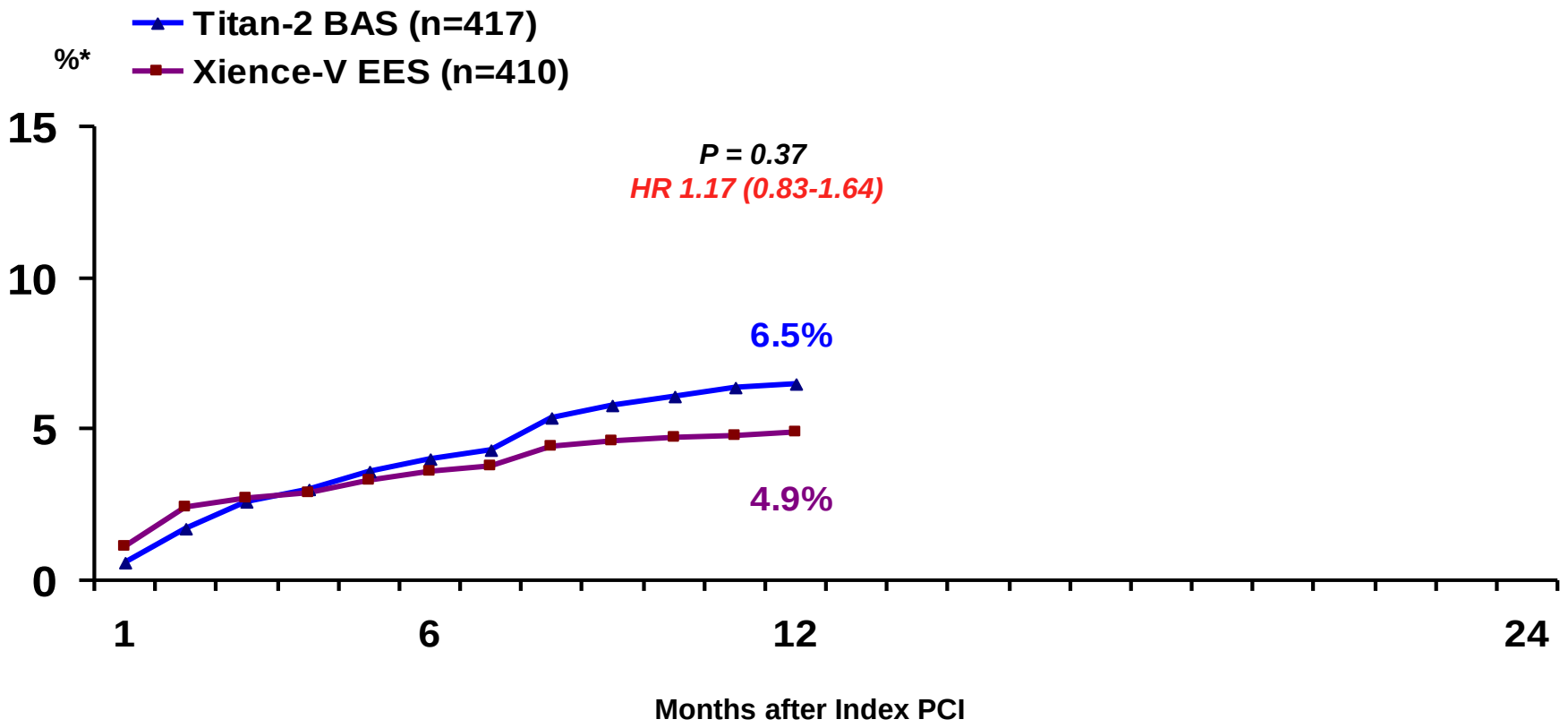
Myocardial Infarction at 24 Months



* Cumulative incidence of events (%)

BASE-ACS

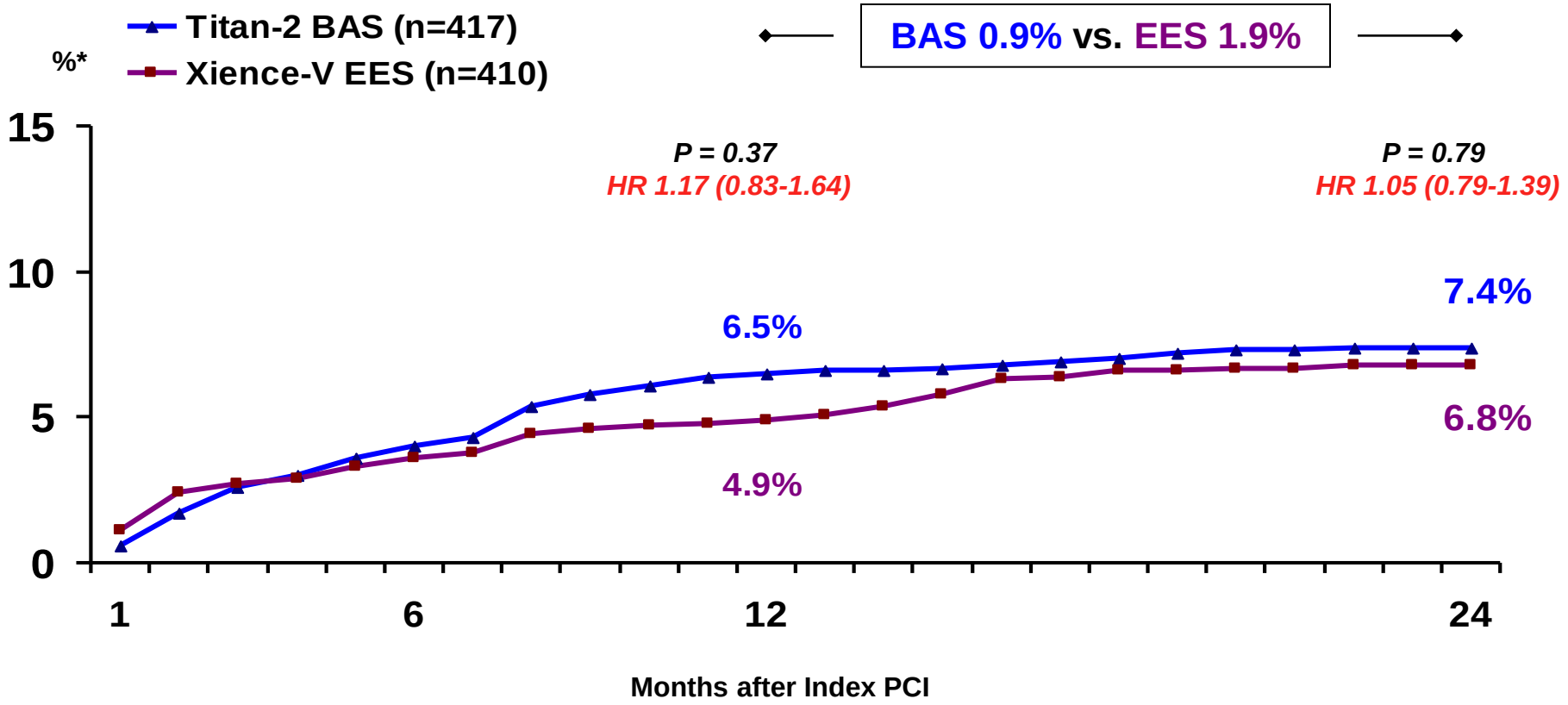
Ischemia Driven TLR at 12 Months



* Cumulative incidence of events (%)

BASE-ACS

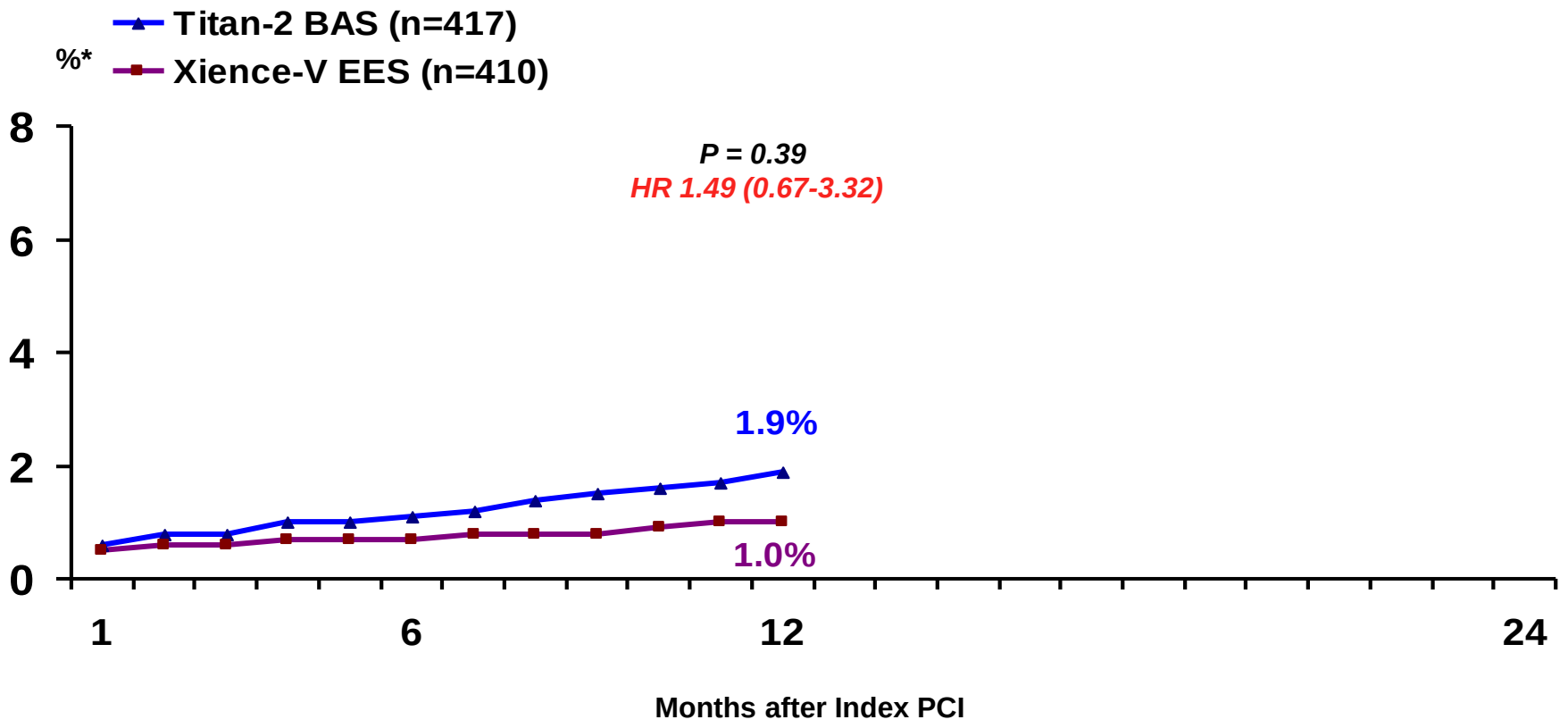
Ischemia Driven TLR at 24 Months



* Cumulative incidence of events (%)

BASE-ACS

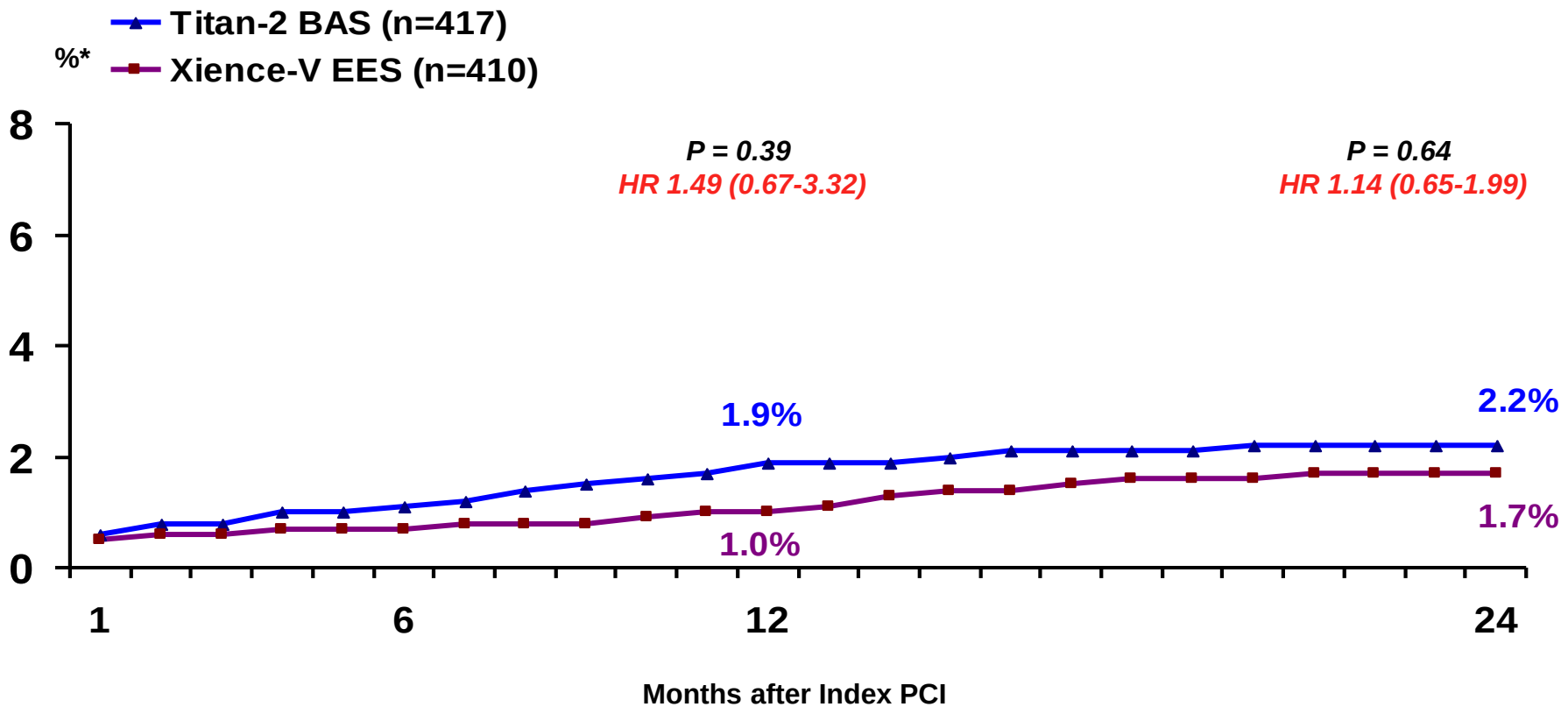
Cardiac Death at 12 Months



* Cumulative incidence of events (%)

BASE-ACS

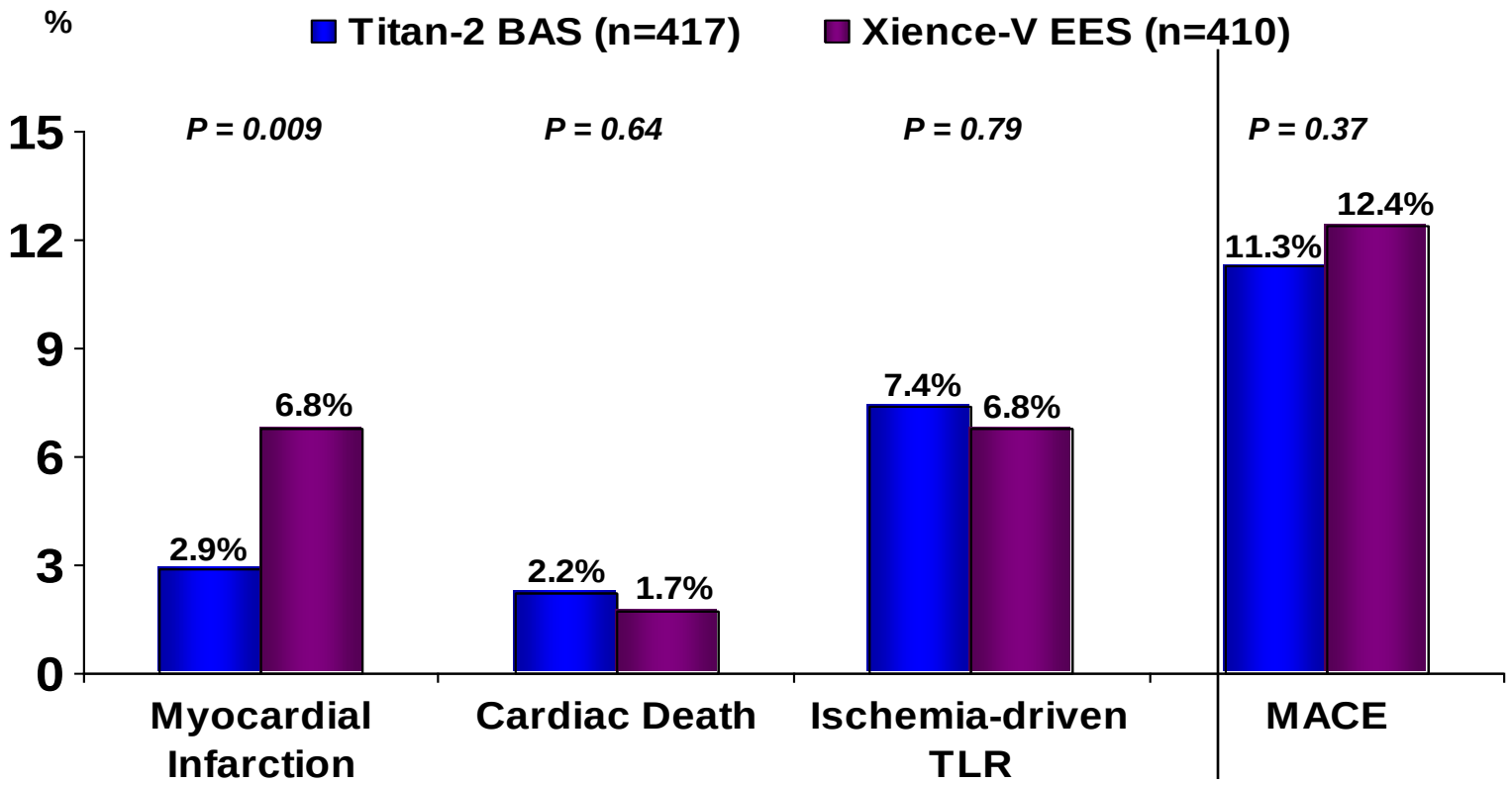
Cardiac Death at 24 Months



* Cumulative incidence of events (%)

MACE Components

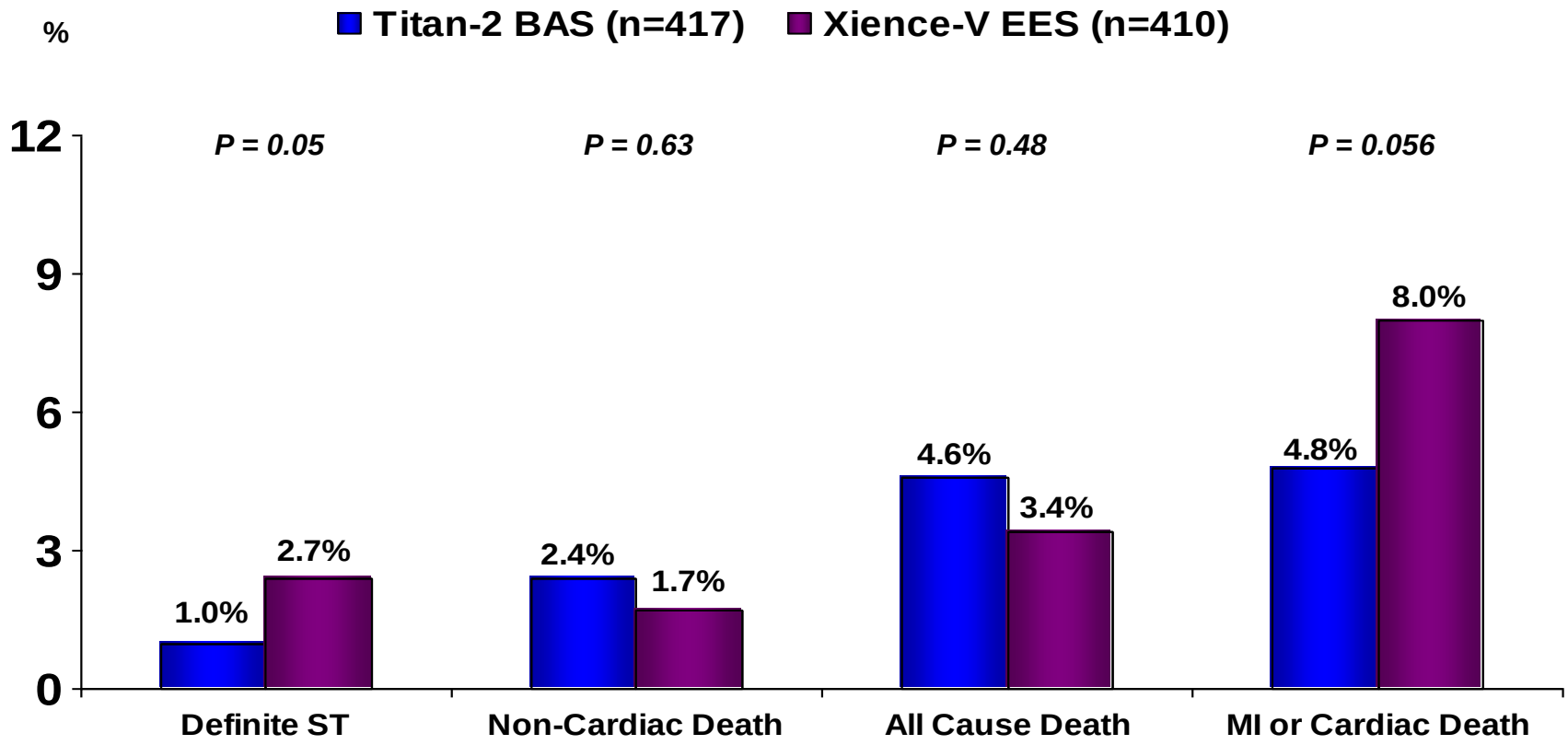
24 months Follow-up



TLR = Target Lesion Revascularization
ISR = In-Stent Restenosis

Secondary Endpoints

24 months Follow-up



ST = Stent Thrombosis
MI = Myocardial Infarction

BASE-ACS

ARC Stent Thrombosis

24 months

	Titan-2 BAS (n=417) n (%)	Xience-V EES (n=410) n (%)	*P Value*
Definite ST			
Acute/Subacute (<30 days)	3 (0.7)	7 (1.7)	0.19
Late (30-360 days)	0 (0)	2 (0.5)	0.15
Very Late (>360 days)	1 (0.2)	2 (0.5)	0.55
All ST	4 (1.0)	11 (2.7)	0.05
Definite or Probable ST			
Subacute (< 30 days)	5 (1.2)	8 (2.0)	0.39
Late (30-360 days)	0 (0)	3 (0.7)	0.08
Very Late (>360 days)	2 (0.4)	4 (1.0)	0.40
All ST	7 (1.6)	15 (3.7)	0.07

Subgroup Analysis

MACE at 24 months

	Titan-2 BAS	Xience-V EES	Odds Ratio (95% CI)	*P value*
Overall (n=827)	11.3%	12.4%	0.95 (0.77-1.16)	0.37
Diabetes				
Yes (n=140)	13.8%	17.3%	0.89 (0.30-1.31)	0.65
No (n=687)	10.8%	11.3%	0.97 (0.77-1.24)	0.90
Gender				
Male (n=629)	10.7%	10.9%	0.99 (0.77-1.28)	0.95
Female (n=198)	13.0%	17.3%	0.85 (0.60-1.21)	0.43
Age > 65 years (n=360)	12.8%	18.3%	0.82 (0.64-1.05)	0.19
STEMI (n=321)	11.1%	10.1%	1.06 (0.73-1.54)	0.86
NSTEMI (n=393)	10.6%	12.8%	0.90 (0.67-1.21)	0.53
Lesion length				
< 16 mm (n=475)	8.2%	14.9%	0.75 (0.60-0.92)	0.03
≥ 16 mm (n=352)	14.8%	9.0%	1.39 (0.91-2.11)	0.10
RVD				
< 3.0 (n=207)	13.6%	15.8%	0.92 (0.63-1.32)	0.70
≥ 3.0 (n=620)	10.3%	11.4%	0.95 (0.74-1.21)	0.70

BASE-ACS 24 months FU

Conclusions

- **TITAN-2 BAS and XIENCE-V EES were associated with a comparable frequency of adverse events in patients presenting with acute coronary syndrome (ACS)**

- **Low rate of definite ST in very complex lesion characteristics (e.g. thrombus >40%, B / C-type lesions >85%)**

- **The present study suggest that a stent coated with Titanium-Nitride-Oxide (TITAN-2 BAS) represents a safe and effective alternative to Xience-V EES in ACS patients**

Thank You

BASE-ACS

Investigators	Hospital
P Karjalainen, A Ylitalo, J Mikkelsson, Minna Ampio	Satakunta Central Hospital, Pori, Finland
M Niemelä, K Kervinen, H Romppanen, Eija Niemelä	Oulu University Hospital, Oulu, Finland
F Rivero, J Salamanca	Hospital Universitario de la Princesa, Madrid, Spain
J Airaksinen, M Pietilä, Tuija Vasankari	Turku University Hospital,Turku, Finland
J Sia	Kokkola Central Hospital, Kokkola, Finland
J Lalmand, A Aminian, D Dolatabadi, P Lefebvre, V Piamonte	C.H.U. de Charleroi, Charleroi, Belgium
O Hess, B Meier, C SchoenenbergerWeber	Bern University Hospital, Bern, Switzerland
B De Bruyne, W Wijns, An Roets	Cardiovascular Center Aalst, Aalst, Belgium
M Carlier, S Fasseaux, C Mortier, Y Dascotte, A. Jourdan	Grand Hôpital de Charleroi, Charleroi, Belgium
A deBelder, Nina Cooter	Royal Sussex County Hospital, Brighton, UK
J R López-Minguez, J M Nogales Asensio	Infanta Cristina University Hospital, Badajoz, Spain
M Laine	Helsinki University Hospital, Helsinki, Finland
P Tedjokusumo, A F Yahya,C Ahmad,J W Marta	Dr. Hasan Sadikin Hospital, Bandung, Indonesia
K Nyman	Jyväskylä Central Hospital, Jyväskylä, Finland

Optical Coherence Tomography Study of Stent Strut Coverage With TITAN-2 (BAS) vs. XIENCE-V (EES)

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BASE-OCT studies

***68* Patients who participated the BASE-ACS trial**

Follow-up angiography

OCT at 9 or 18 months

OCT at 9 months of FU

TITAN-2® ***versus*** ***Xience-V***

(n = 13) **(n=15)**

OCT at 18 months of FU

TITAN-2® ***versus*** ***Xience-V***

(n = 20) **(n=20)**

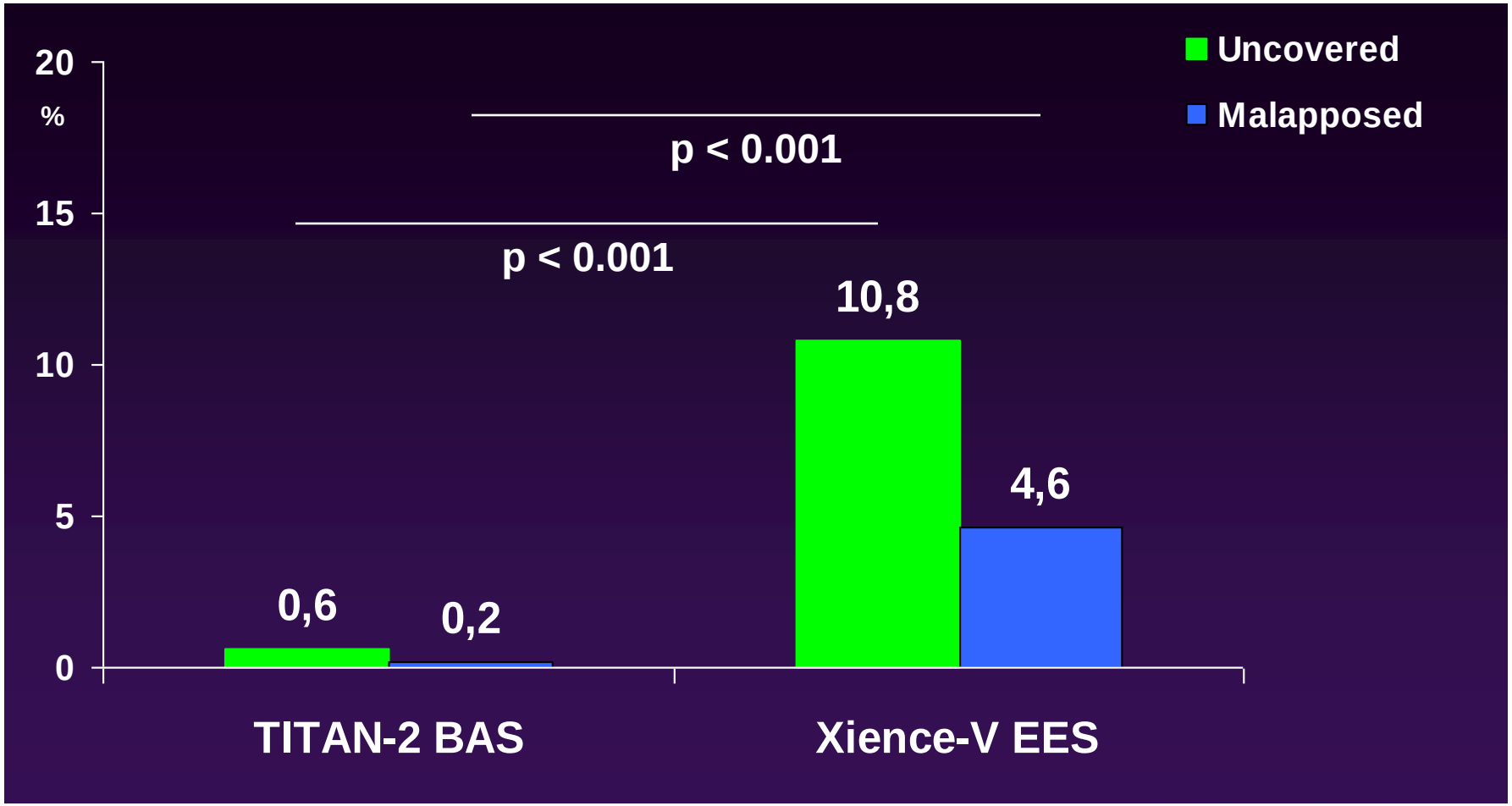
BASE-OCT

Follow-Up Measurements at 9 months

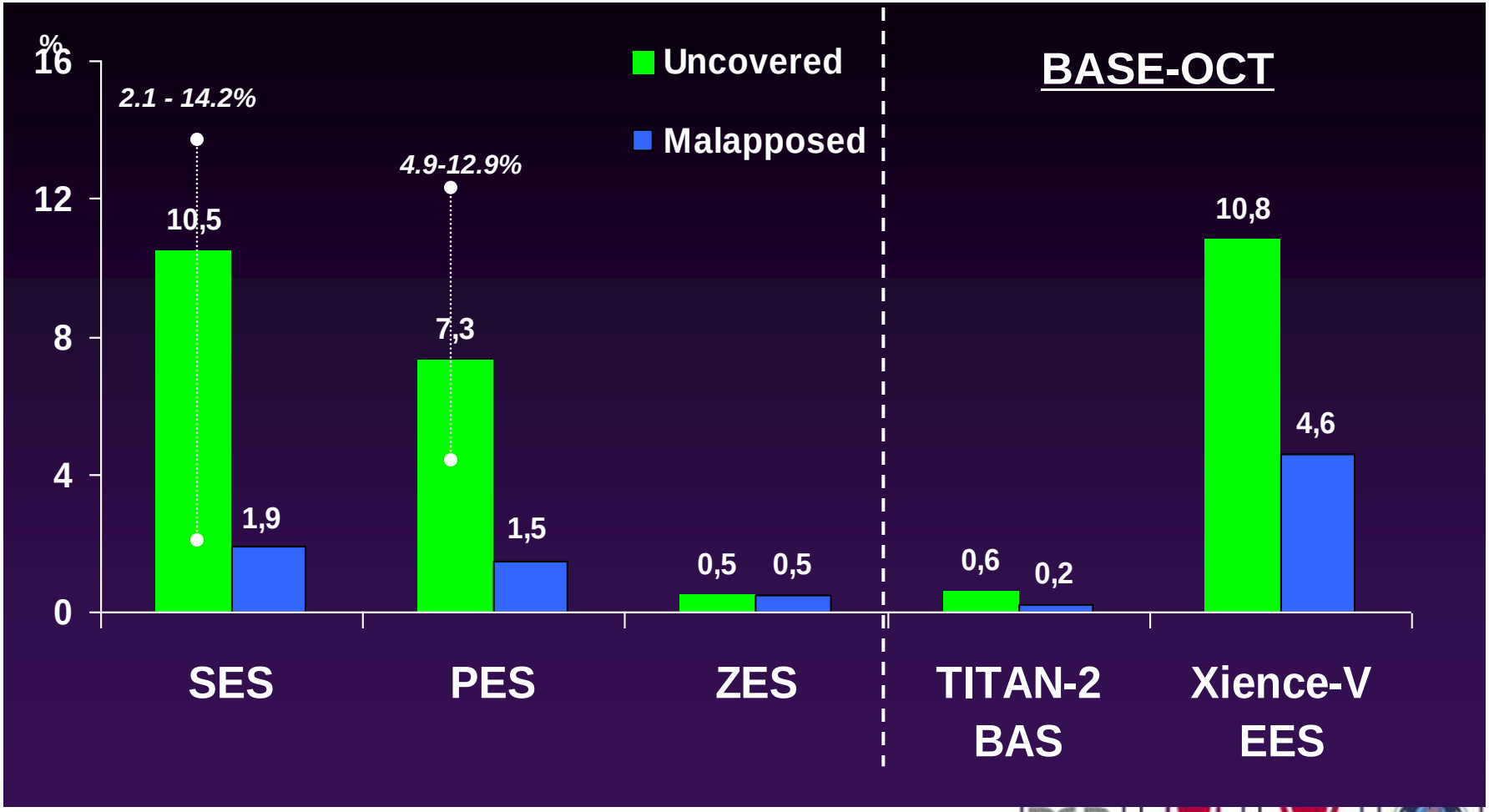
	TITAN-2 BAS 13 pts	Xience-V EES 15 pts	*P*
No. of Cross Sections	214	284	---
No. of Struts	2033	2898	---
Struts per cross section	9.5 ± 2.8	10.2 ± 3.1	ns
Mean NIH Thickness (µm)	274.2 ± 168.3	100.1 ± 101.0	< 0.001
Mean NIH area (mm^2)	2.0 ± 1.1	0.6 ± 0.8	< 0.001
Mean NIH area (%)	29.7 ± 12.3	10.8 ± 16.2	< 0.001
Binary Strut Coverage (%)	99.4%	89.2%	< 0.001
Presence of Thrombi n (%)	0 (0)	1 (6.7%)	---

BASE-OCT

Uncovered and Malapposed Struts at 9 months



Uncovered and Malapposed Struts with DES

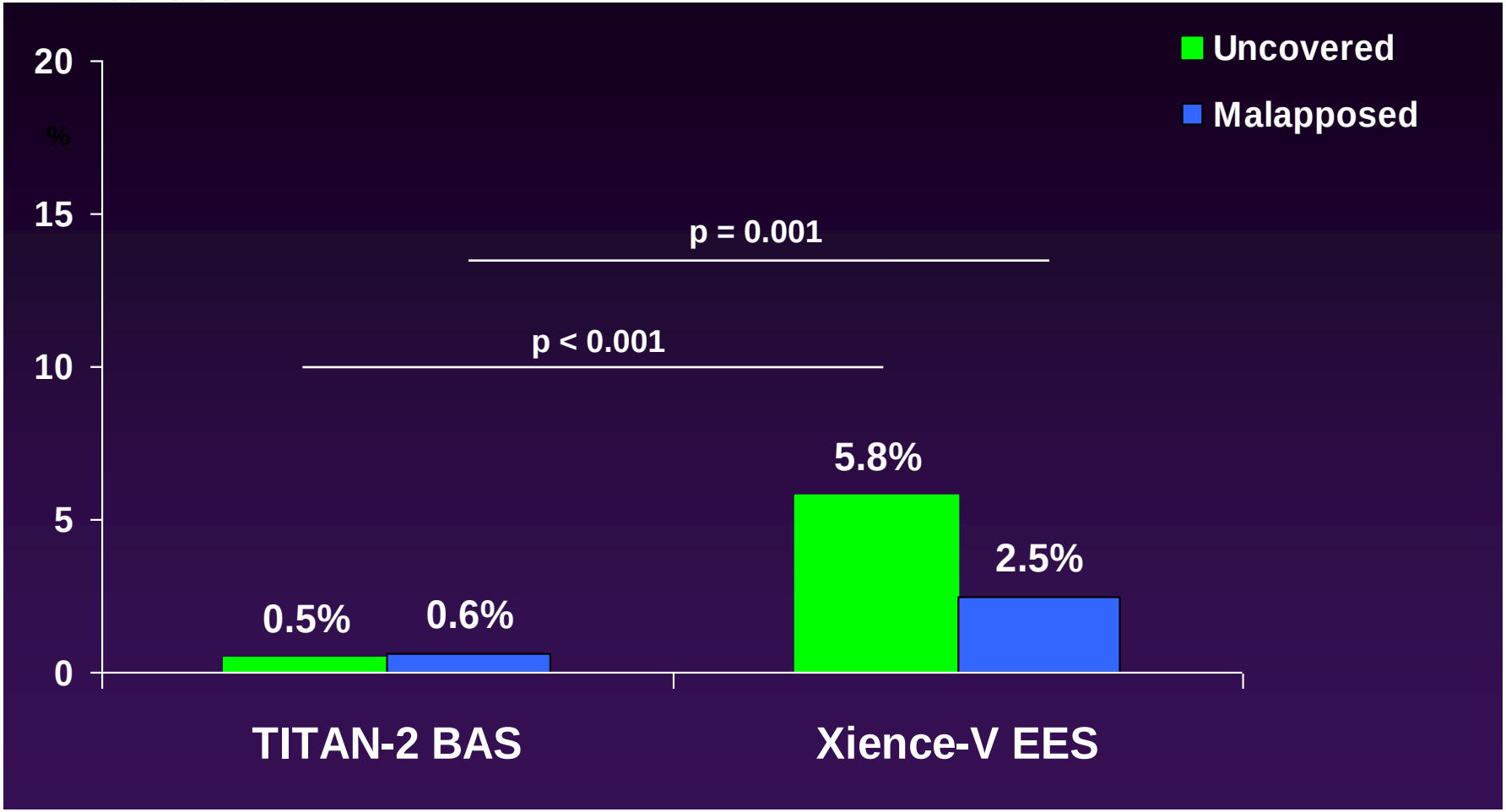


BASE-OCT at 18 months

Follow-Up Measurement

	TITAN-2 BAS 20 pts	Xience-V EES 20 pts	P
No. of Cross Sections	310	316	---
No. of Struts	3307	3327	---
Struts per cross section	10.7 ± 3.9	10.5 ± 3.7	0.64
NIH per stent group (µm)	248.8 ± 178.5	96.9 ± 101.2	< 0.001
NIH per patient (µm)	241.6 ± 101.8	108.1 ± 62.1	< 0.001
Binary Strut Coverage (%)	99.5%	94.2%	< 0.001
Presence of Thrombi n (%)	0 (0)	3 (18%)	< 0.001

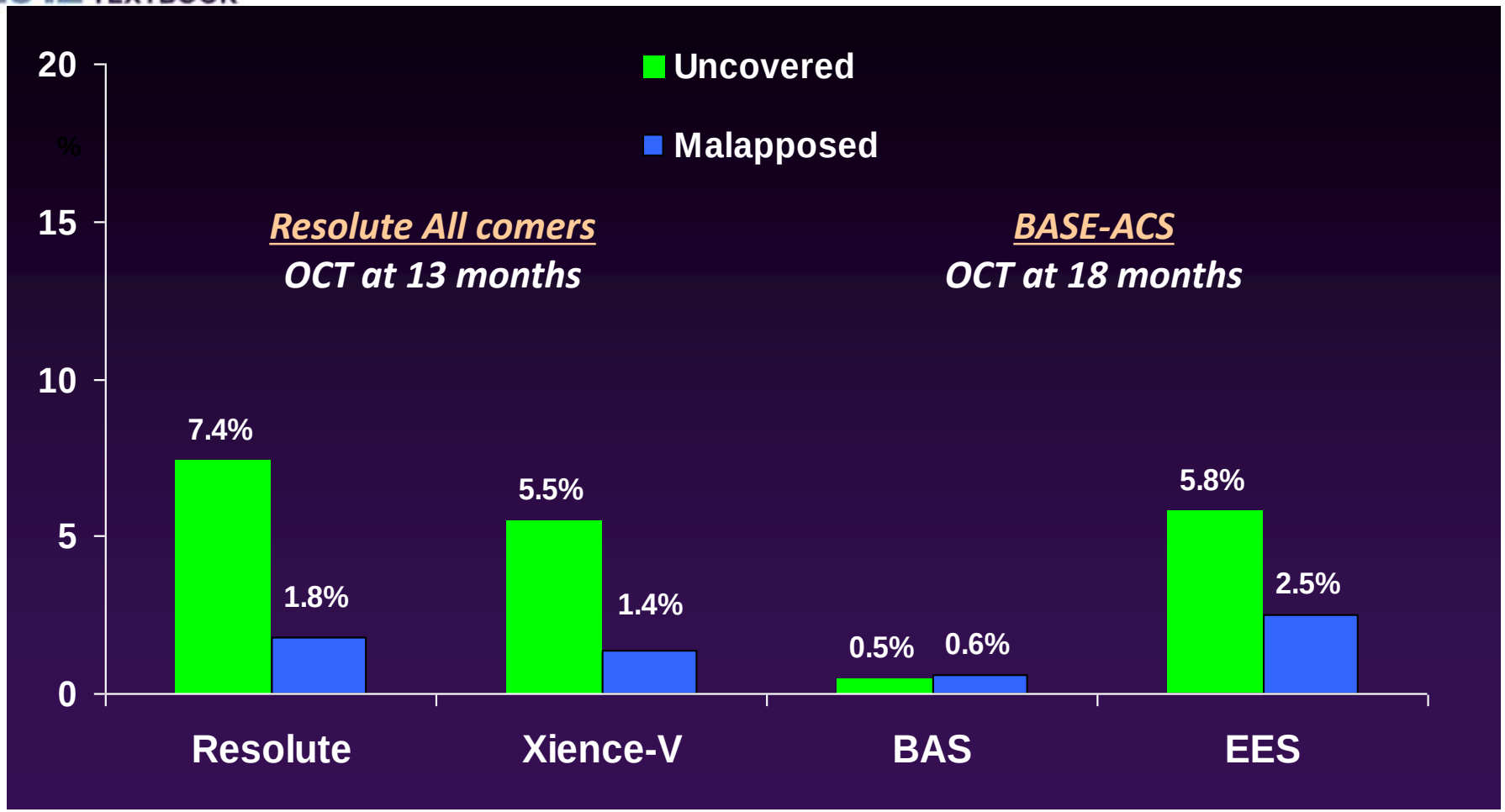
BASE-OCT at 18 months



626 cross-sections / 6067 struts

TCT2011

Strut Apposition



TCT2011

Thank You! --- Kiitos!

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