CardioPaTh
Cardiovascular Pathophysiology & Therapeutics

Novel therapeutic strategies to the treatment of ischemic heart disease

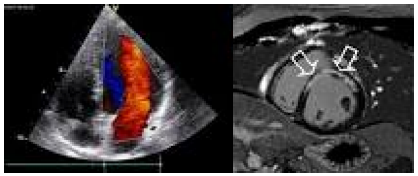
Stephan Windecker

Chairman and Professor
Department of Cardiology
Bern University Hospital Bern
Bern, Switzerland

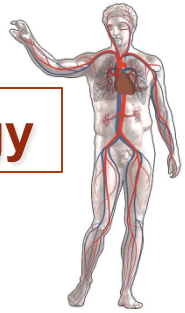
>800 Employees

Prevention
And Rehabilitation

Bildgebung

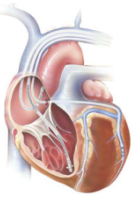


Angiology



Arterial Interventions

Venous Interventions



Electrophysiology

Swiss
Cardiovascular
Center Bern

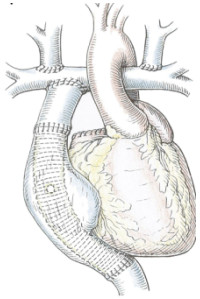
Cardiovascular
Surgery

Cardiology

Carotid
Surgery

Aorta

Pediatric Cardiology
GUCH



Invasive
Cardiology

Heart Failure

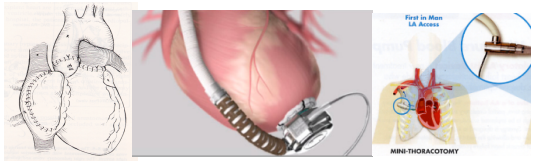
Heart Surgery

Psycho-
cardiology

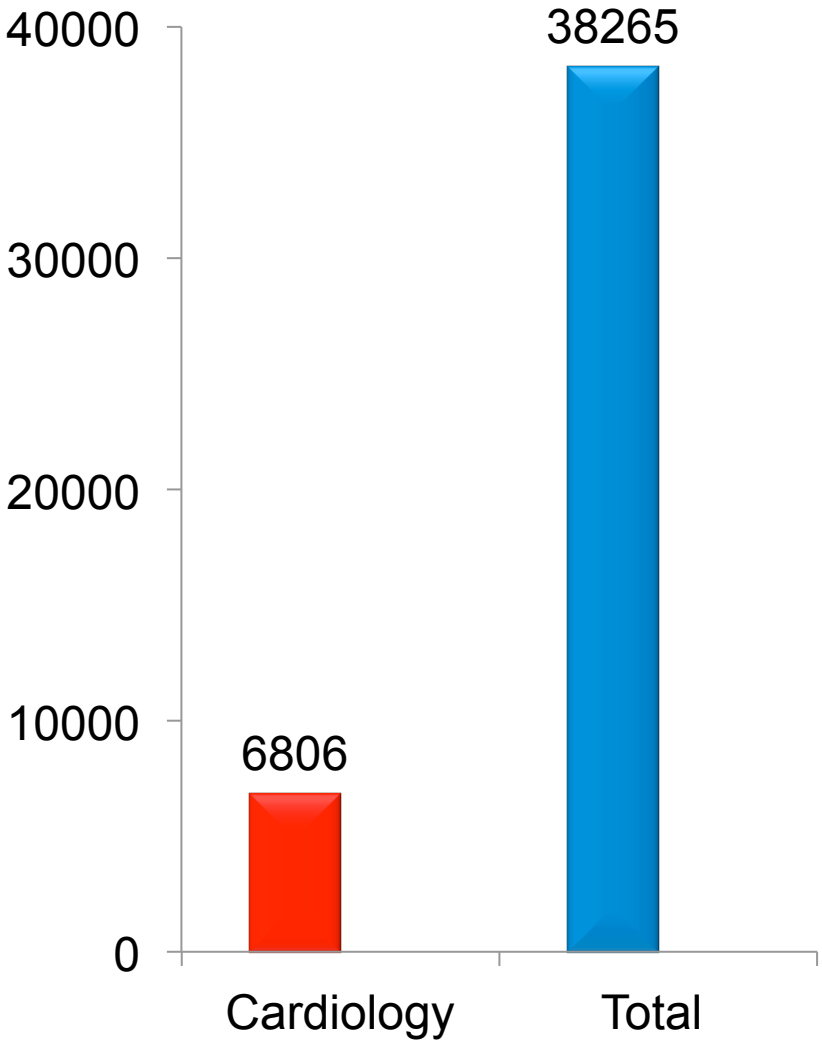
Medications

Trans-
plantation

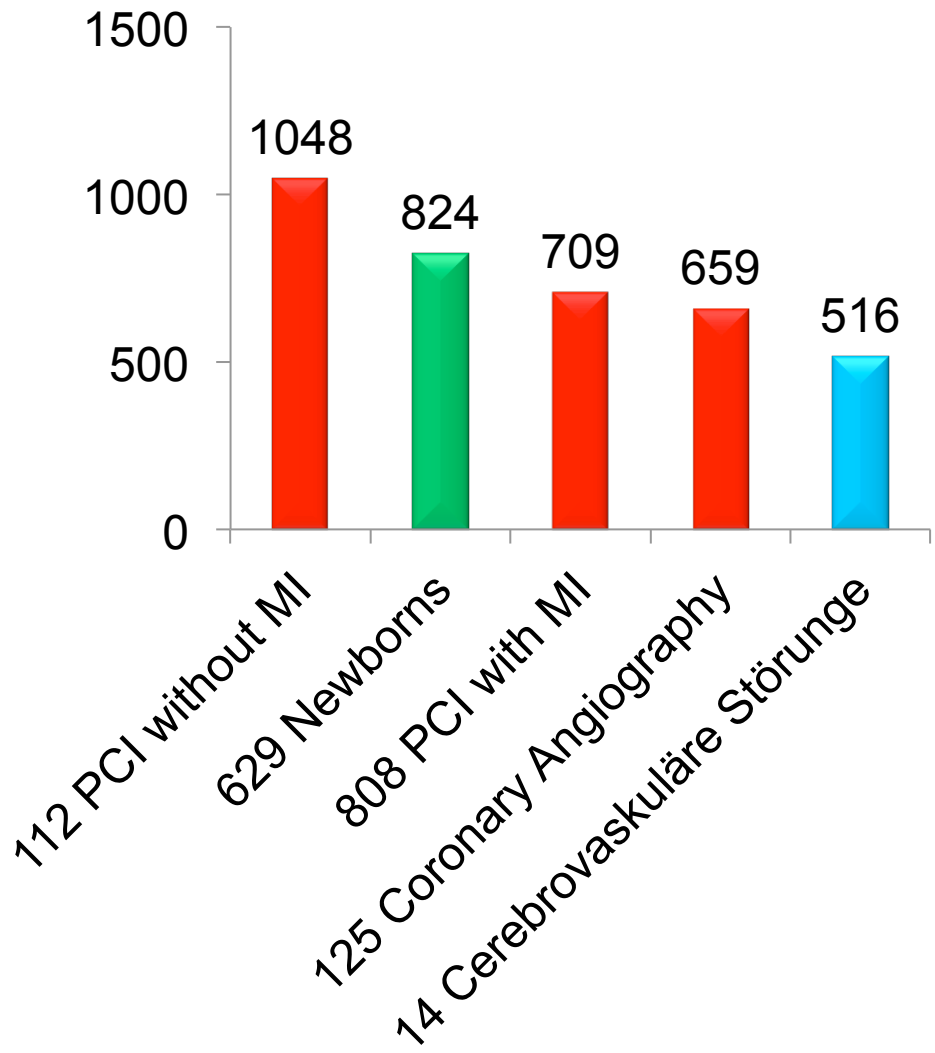
VAD

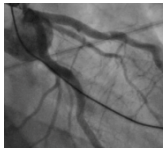


Bern University Hospital Case Load 2011



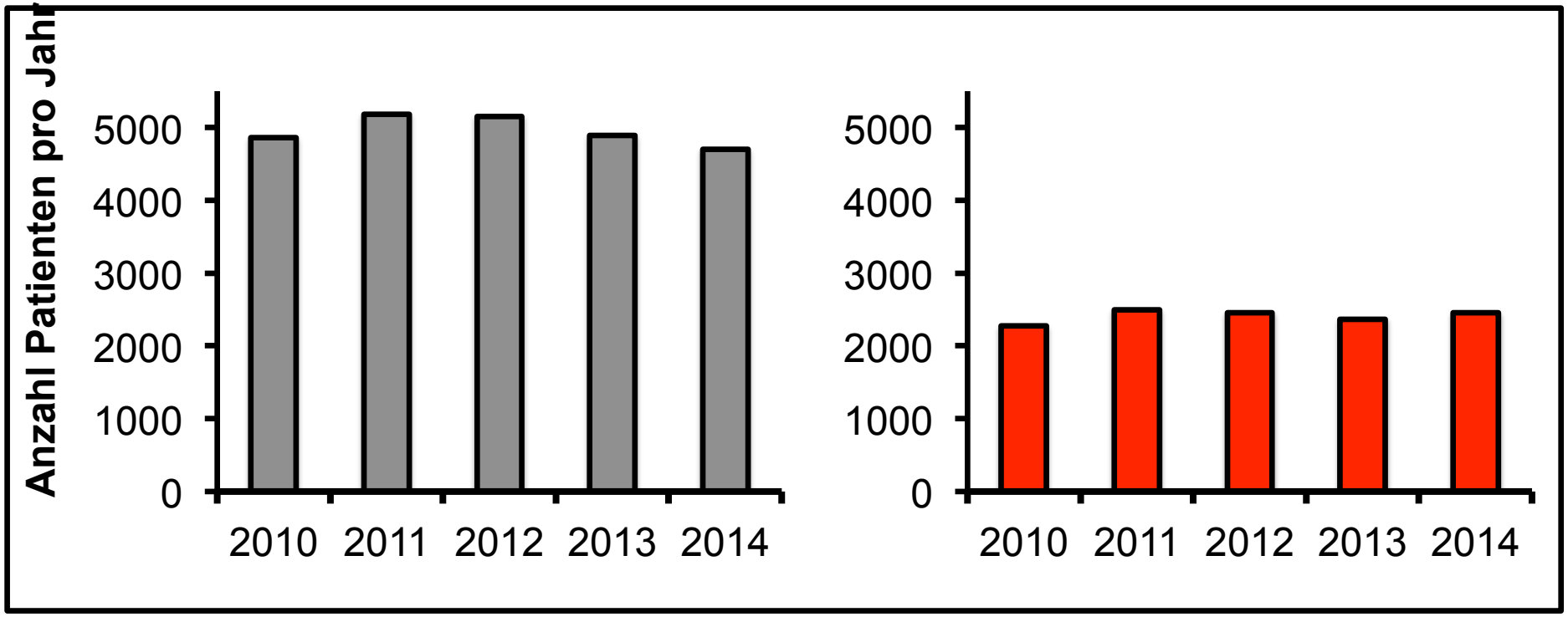
DRG Top 5 - 2011



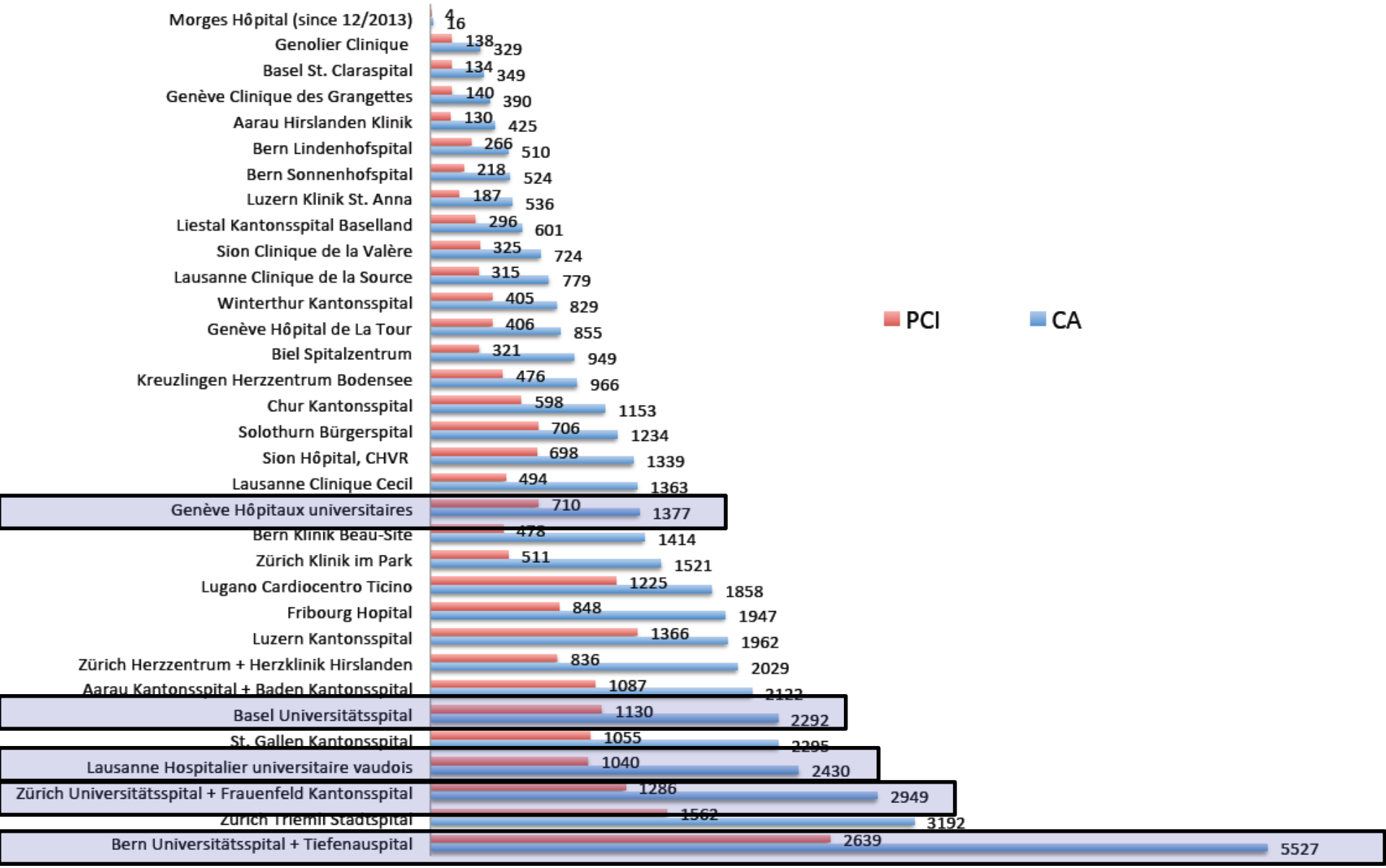


Coronary Angiography

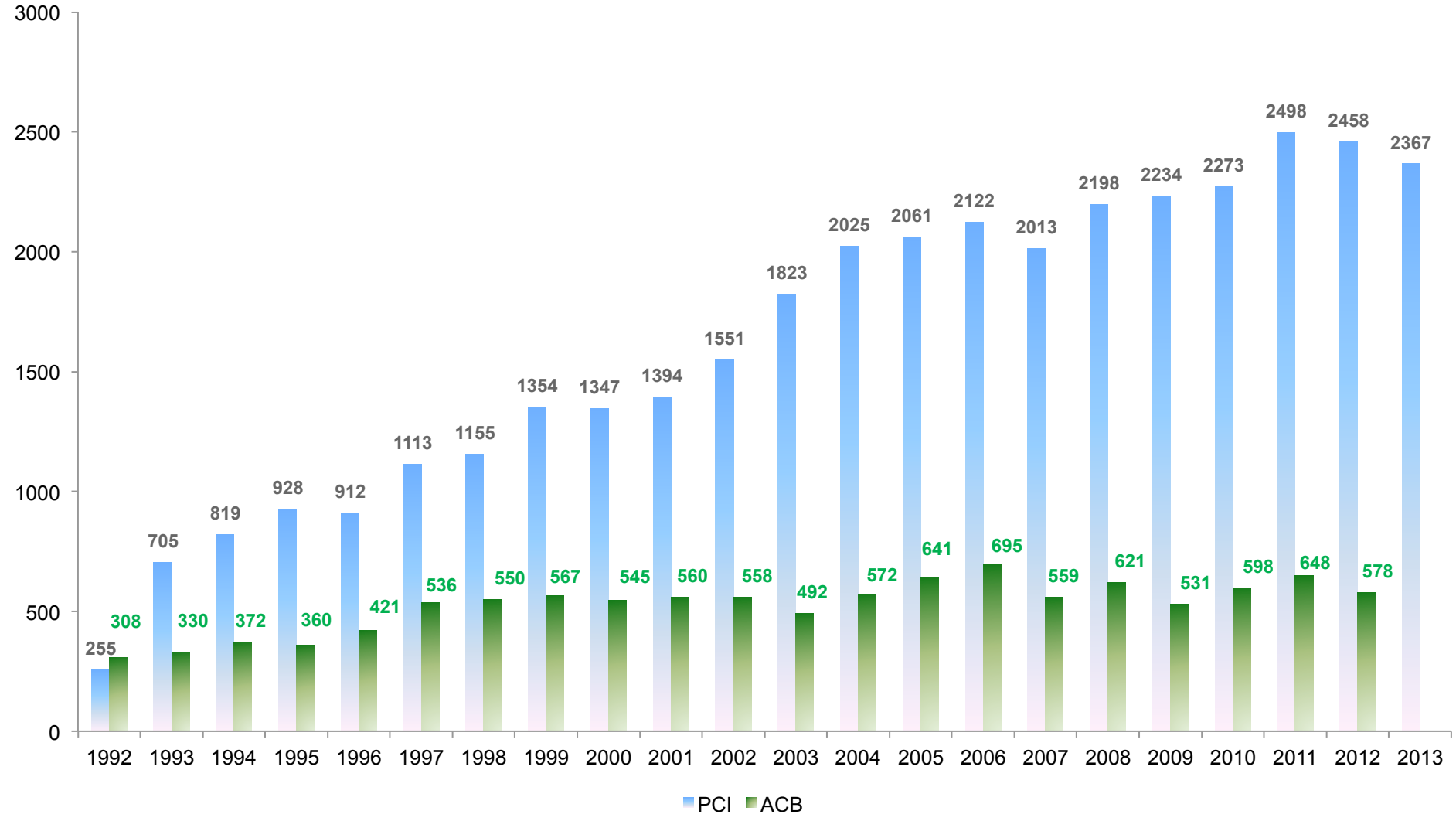
PCI



Coronary Angiographies (CA) and Percutaneous Coronary Interventions (PCI) in all centers during the year 2013 in Switzerland



PCI and CABG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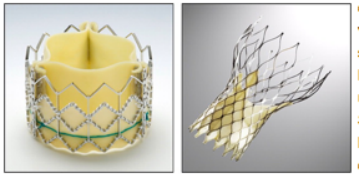
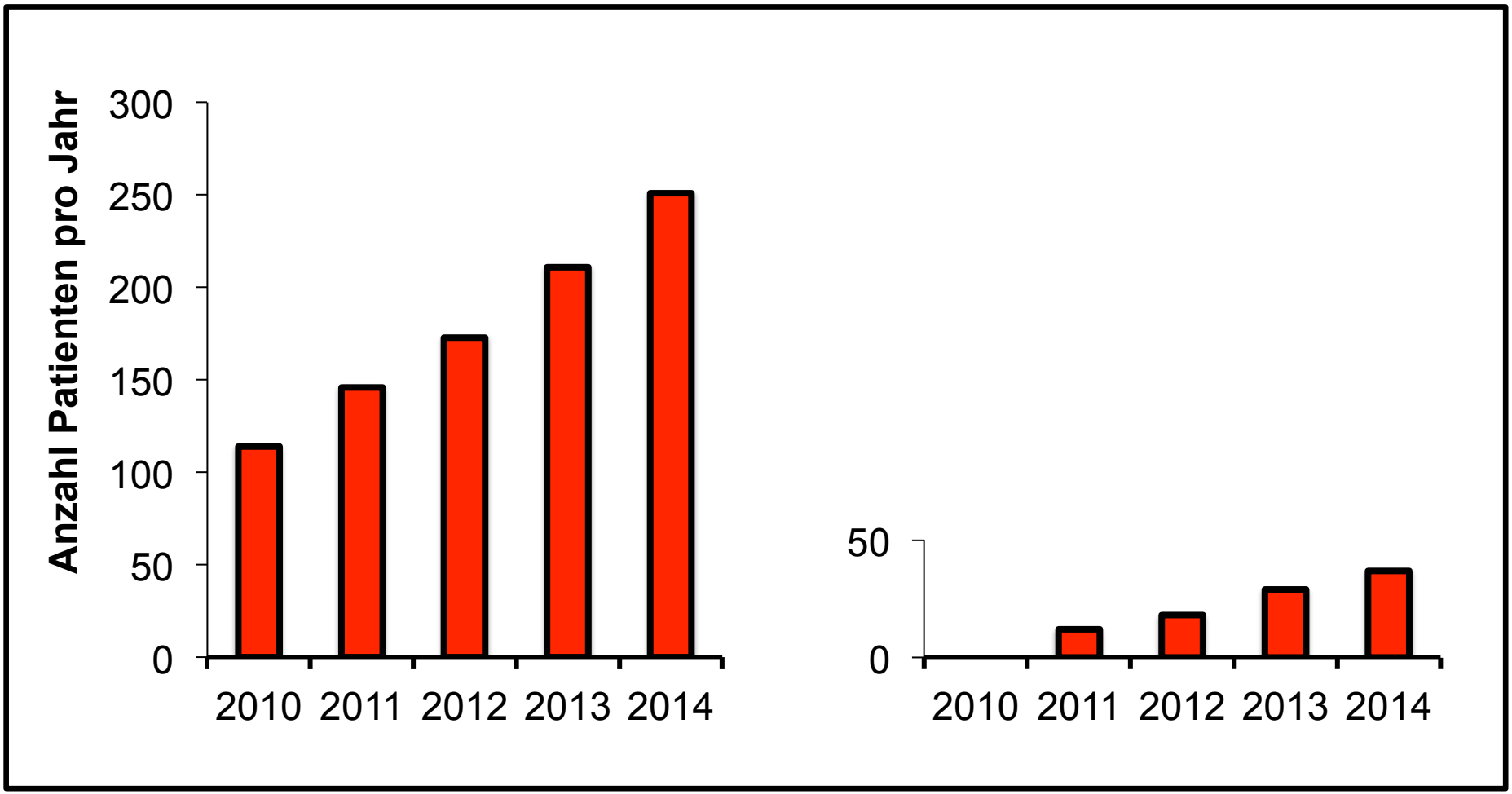
2500
2000
1500
1000
500
0
1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
255 705 819 928 912 1113 1155 1354 1347 1394 1551 1823 2025 2061 2122 2013 2198 2234 2273 2498 2458 2367
308 330 372 360 421 536 550 567 545 560 558 492 572 641 695 559 621 531 598 648 578
PCI
ACB



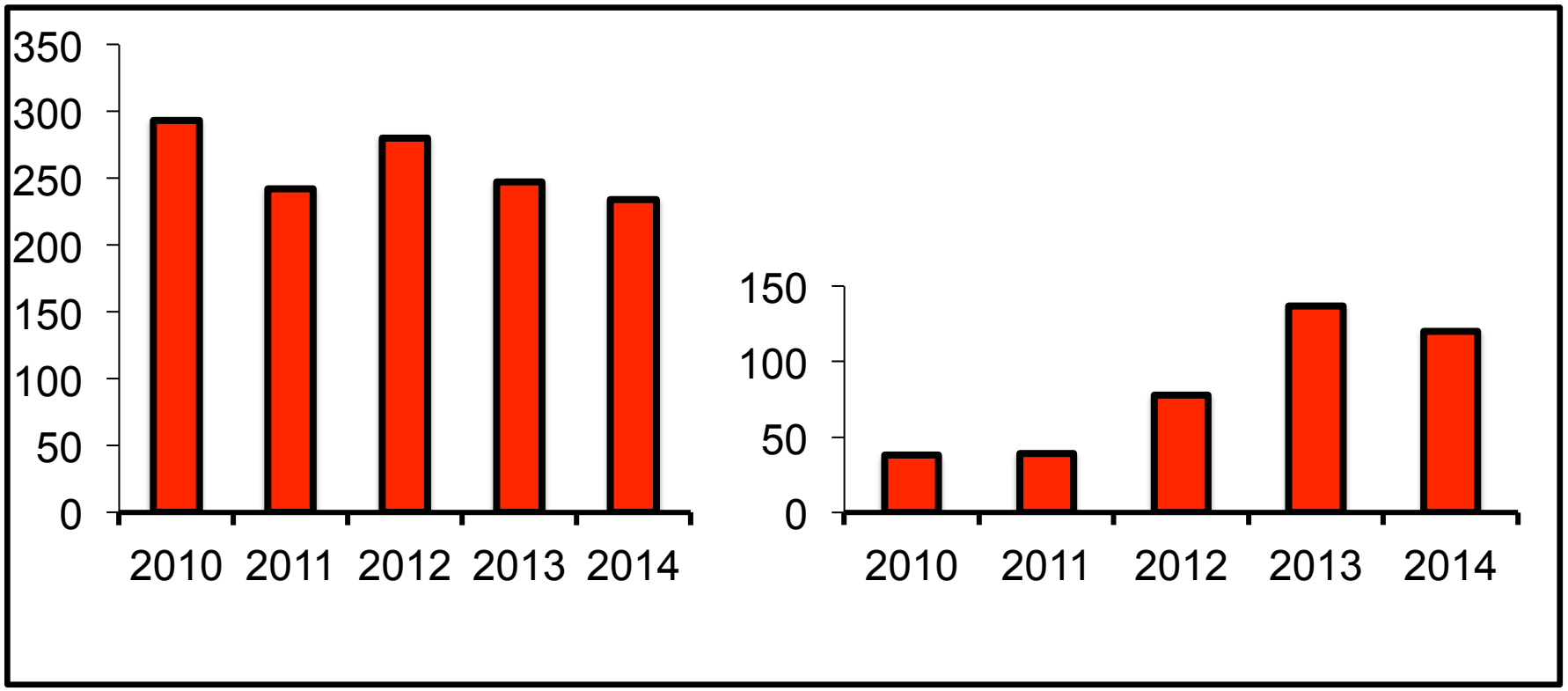
TAVI

Mitraclip



ASD/PFO

LAA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200
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2010
2011
2012
2013
2014
150
100
50
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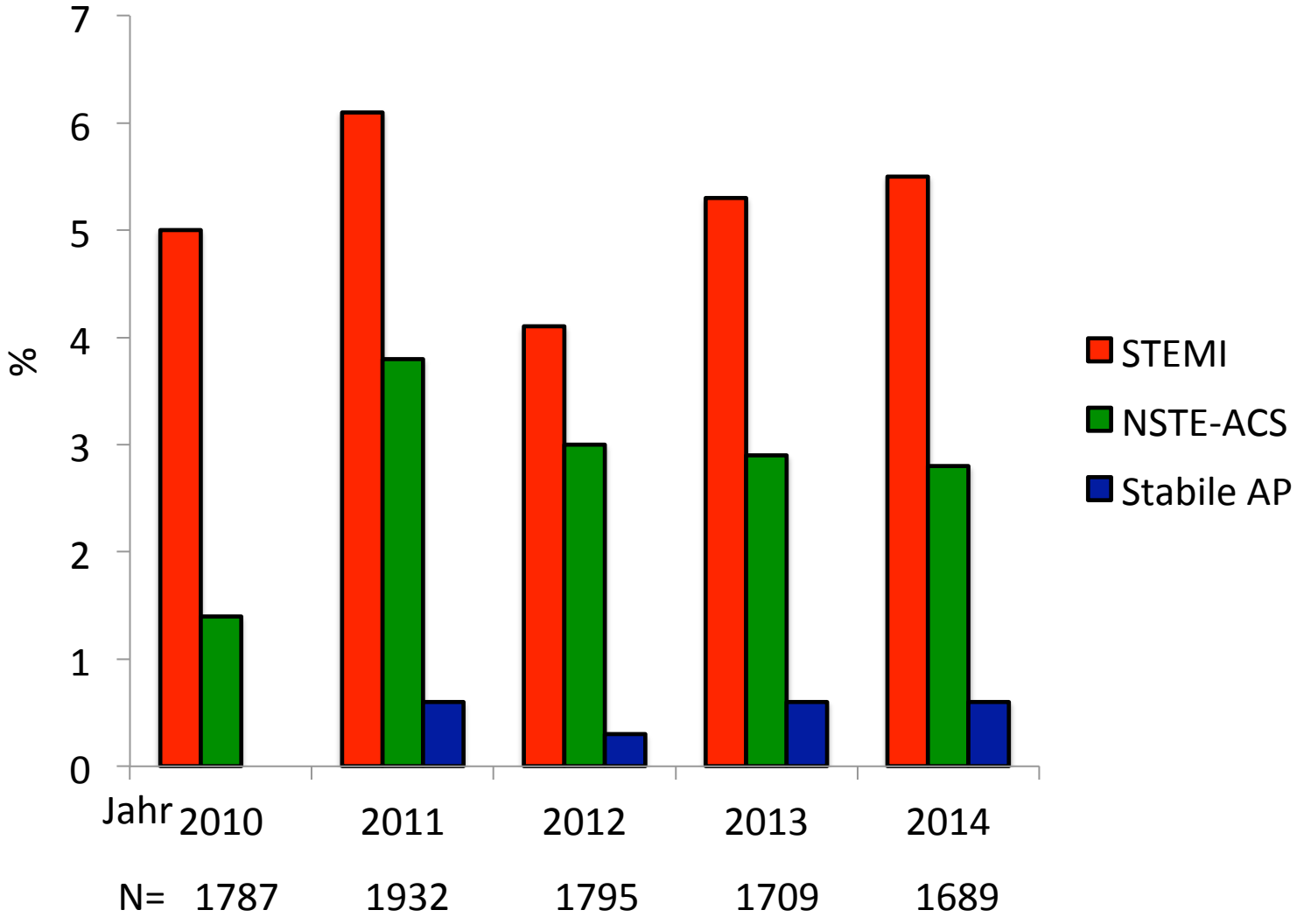
2010
2011
2012
2013
2014

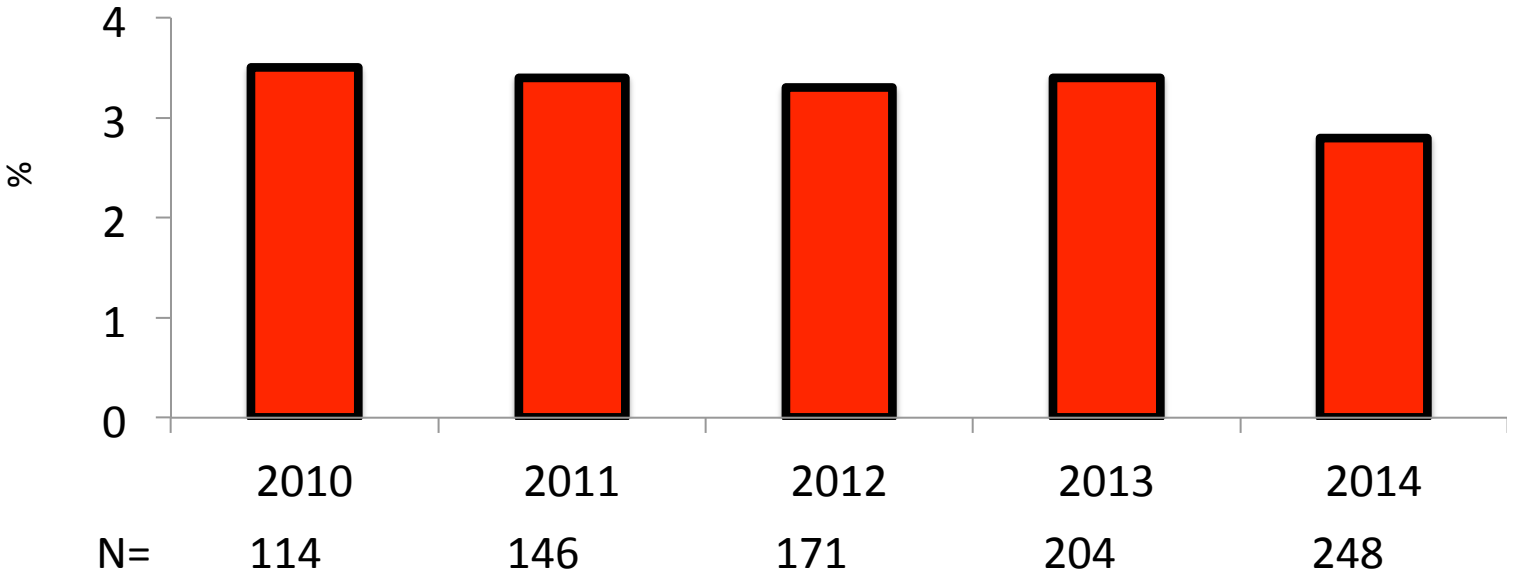
Quality Control Bern PCI Registry

In-Hospital All-Cause Mortality According to Clinical Presentation

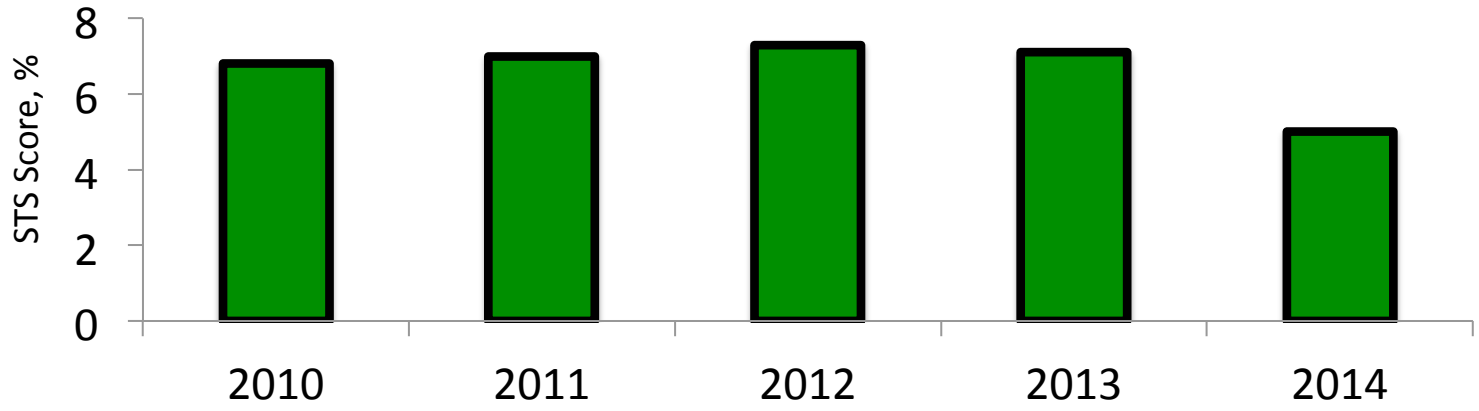


Quality Control – BERN TAVI Registry

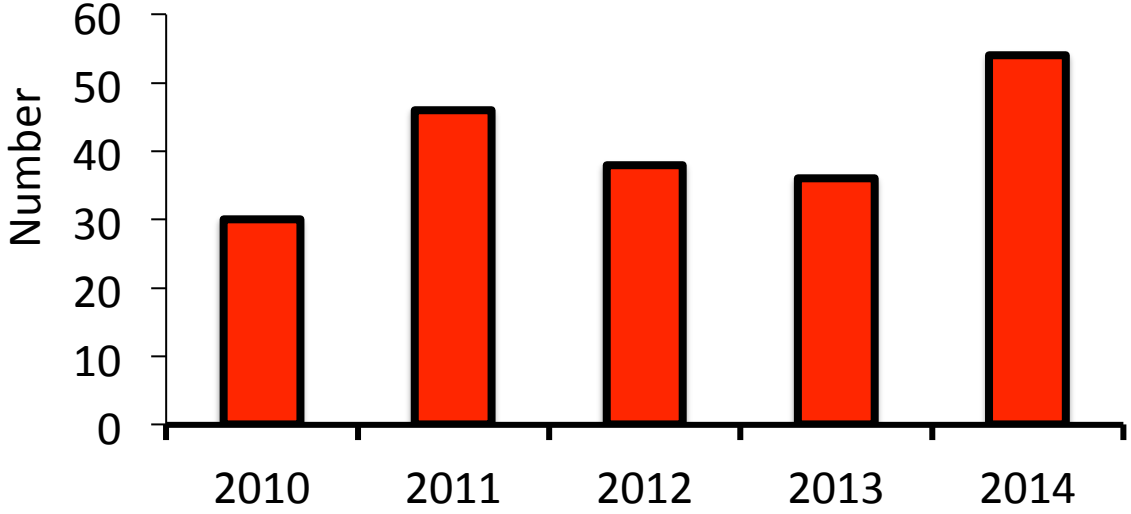
In-Hospital All-Cause Mortality



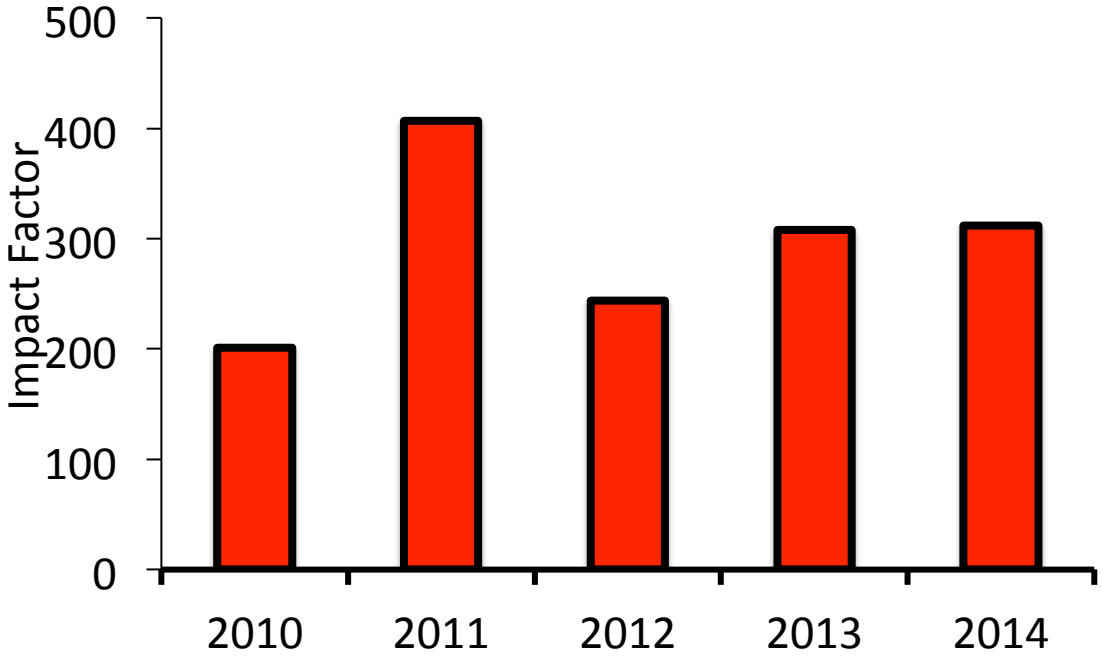
STS Score



Original Articles - Invasive Cardiology

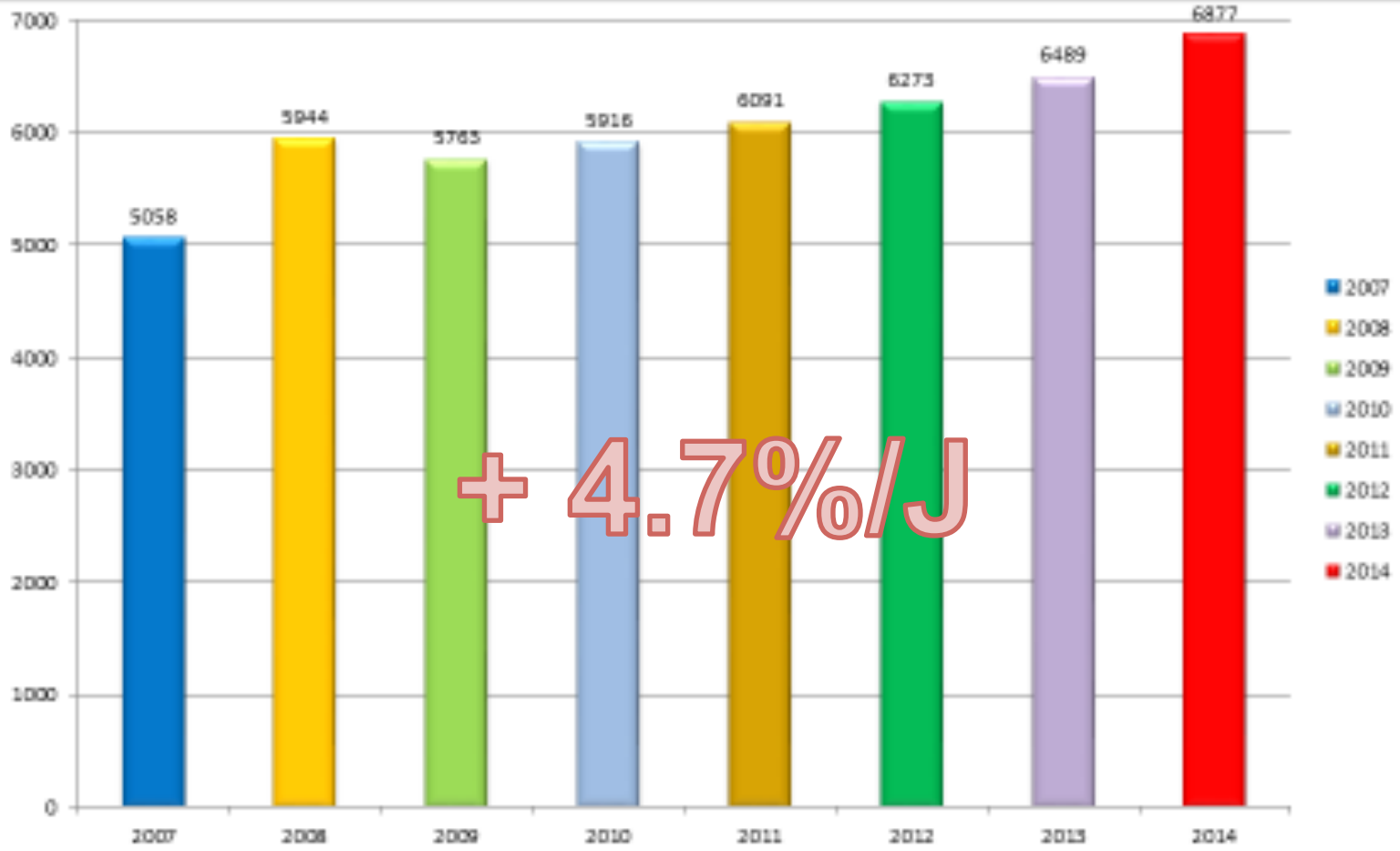


Cumulative Impact Factor

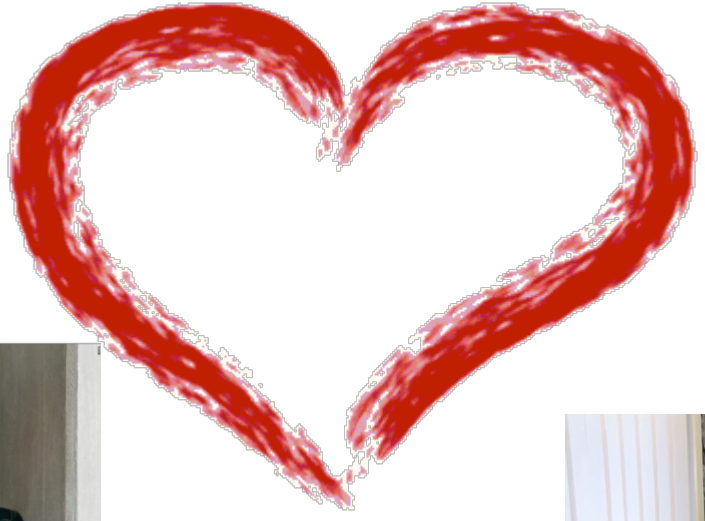


Web of Science
31.8.2015

Number of Admissions to Cardiology Department

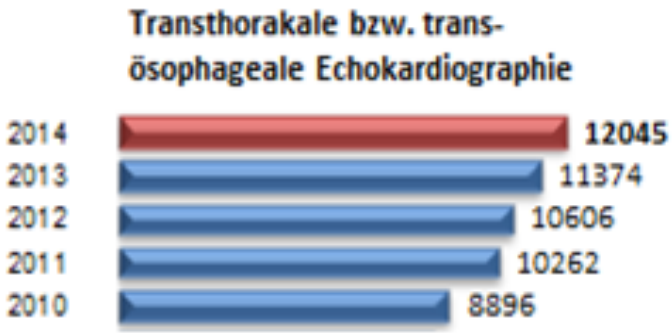


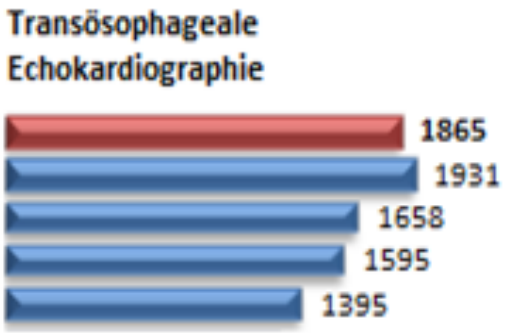
Heart Failure (CHF/ VAD / HTx)

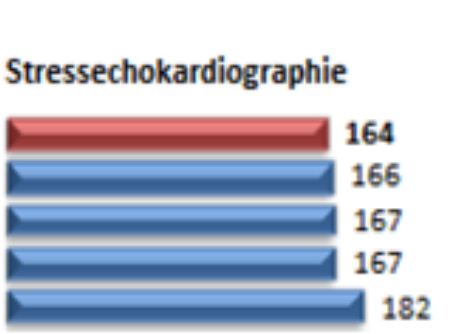


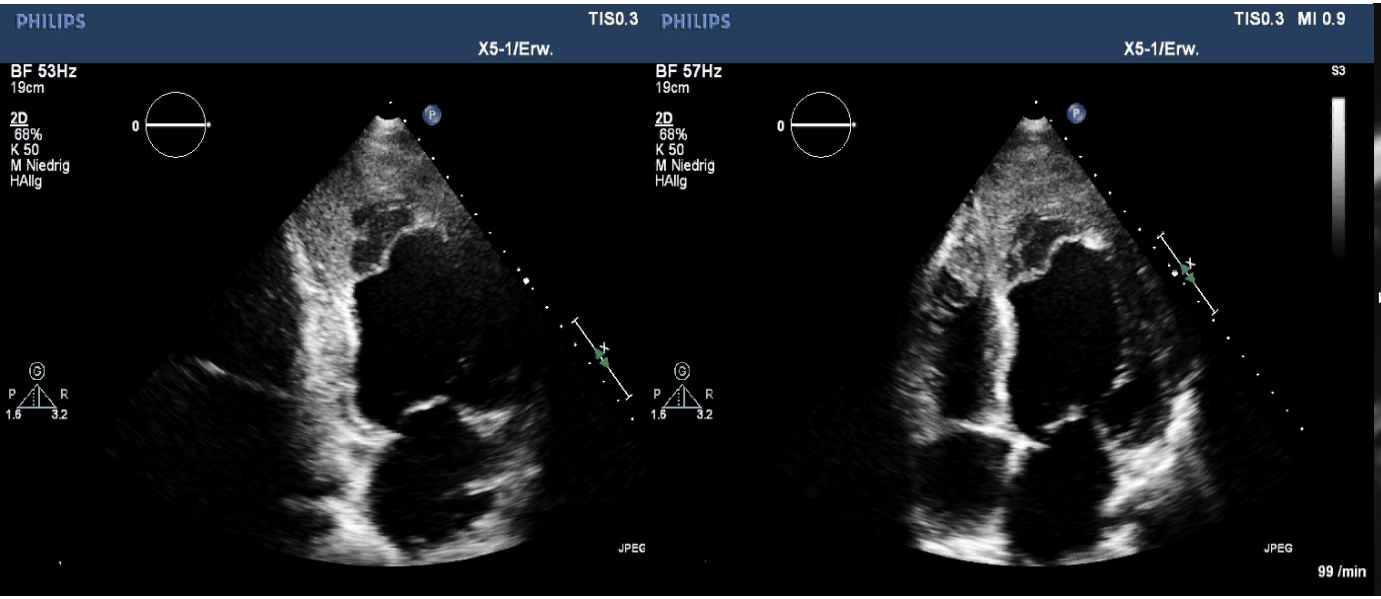
Jahr	HTx	VADs	EMBs	Psychokard. TPe
2010	10	5	230	Inov.projekt
2011	10	4	276	C. Kaelin
2012	10	15	216	Fr. Dr. St. Stauber
2013	12	19	143**	66‘800
2014	9	11	127**	
2015 (-Aug)	9	13*	66	64‘500* (per Ende Juli 2015)

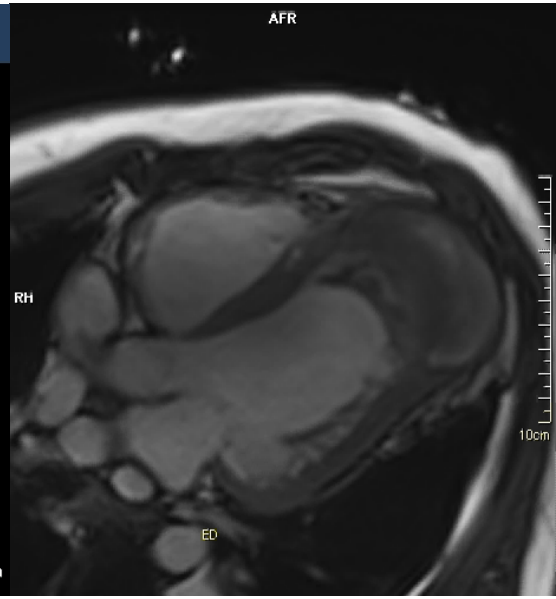
Cardiac Imaging
Echocardiography and Cardiac MR



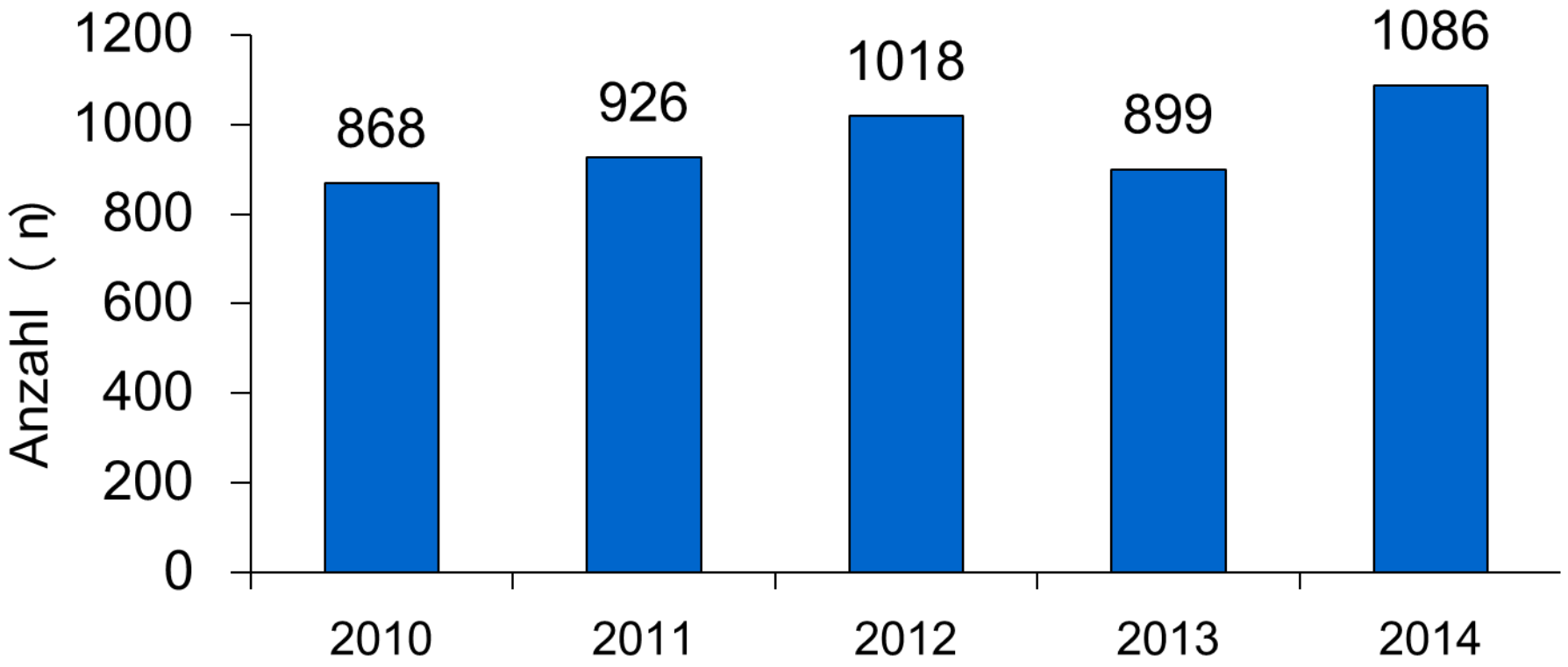








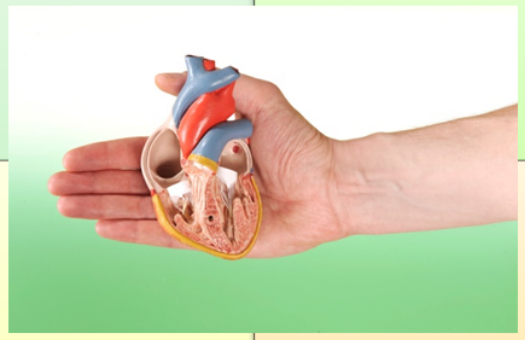
Interventional Electrophysiology 2010-2014



Center for Congenital Heart Disease

Kinder-
kardiologie

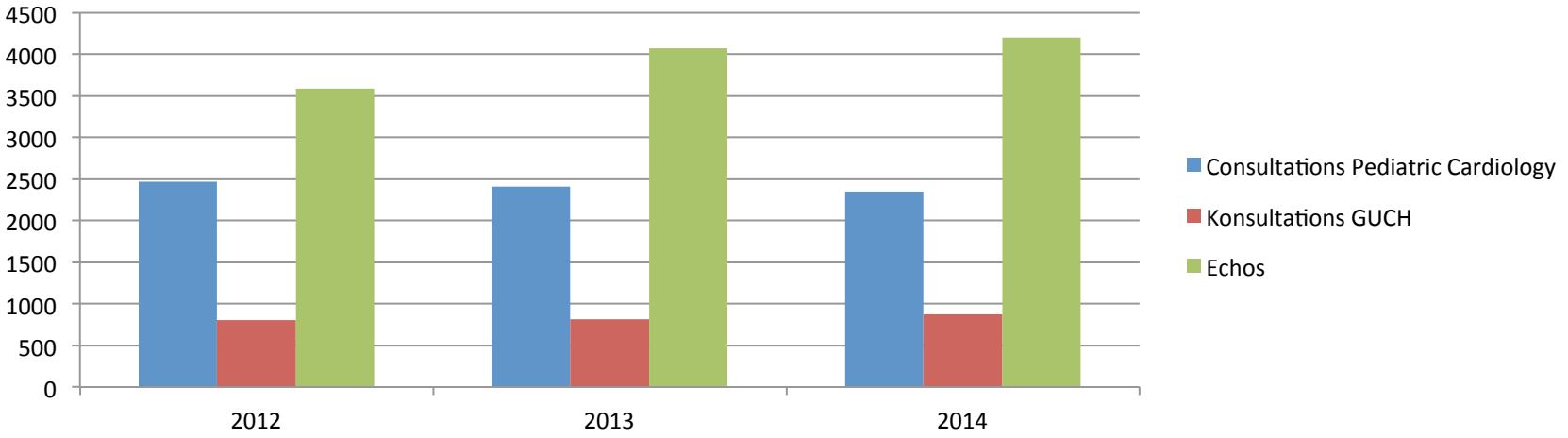
Transition

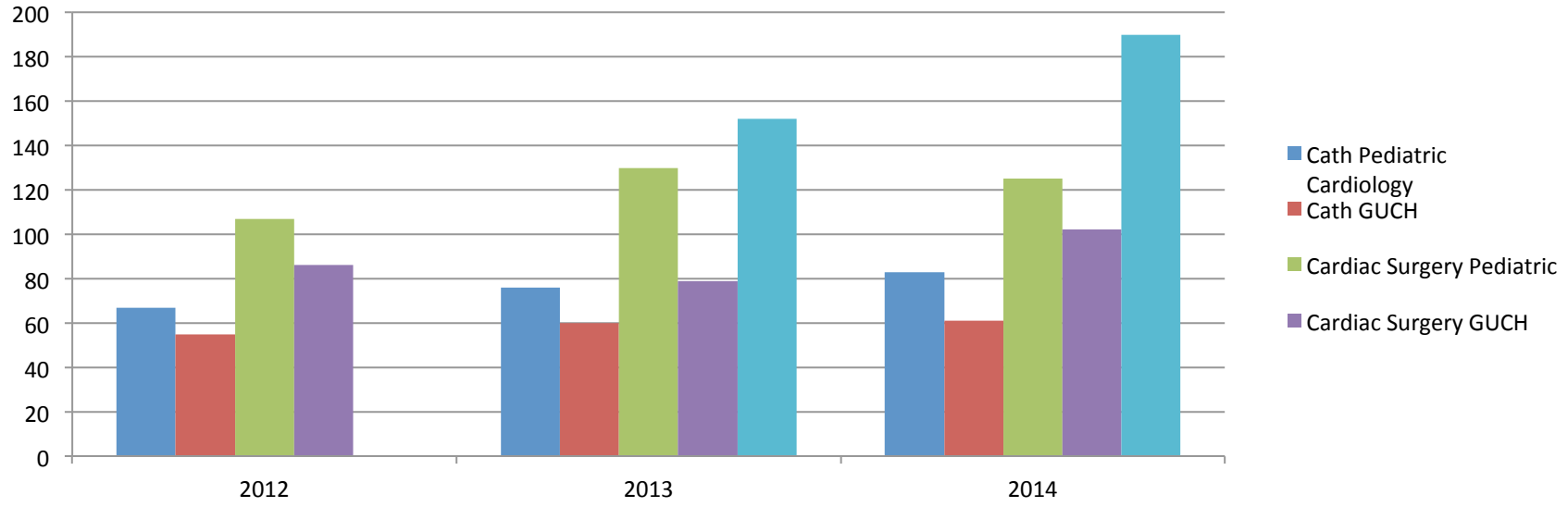


GUCH-
Kardiologie

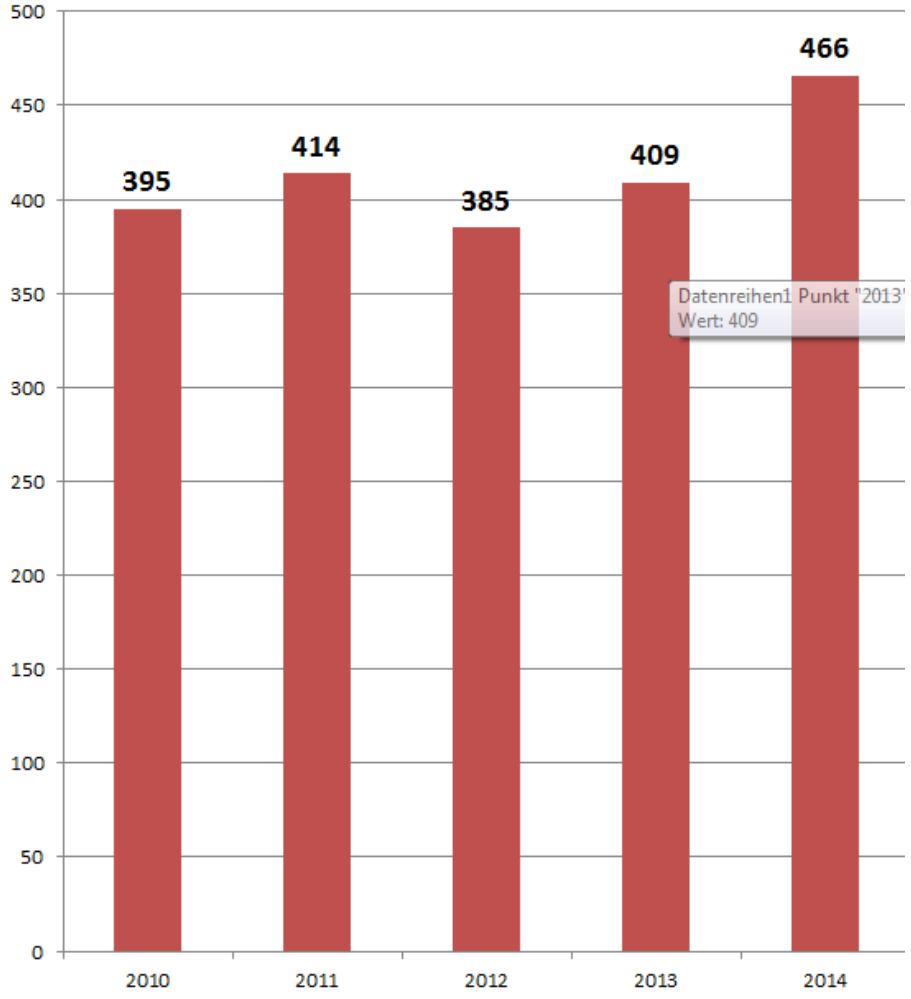
Kongenitale
Herzchirurgie

Center for Congenital Heart Disease

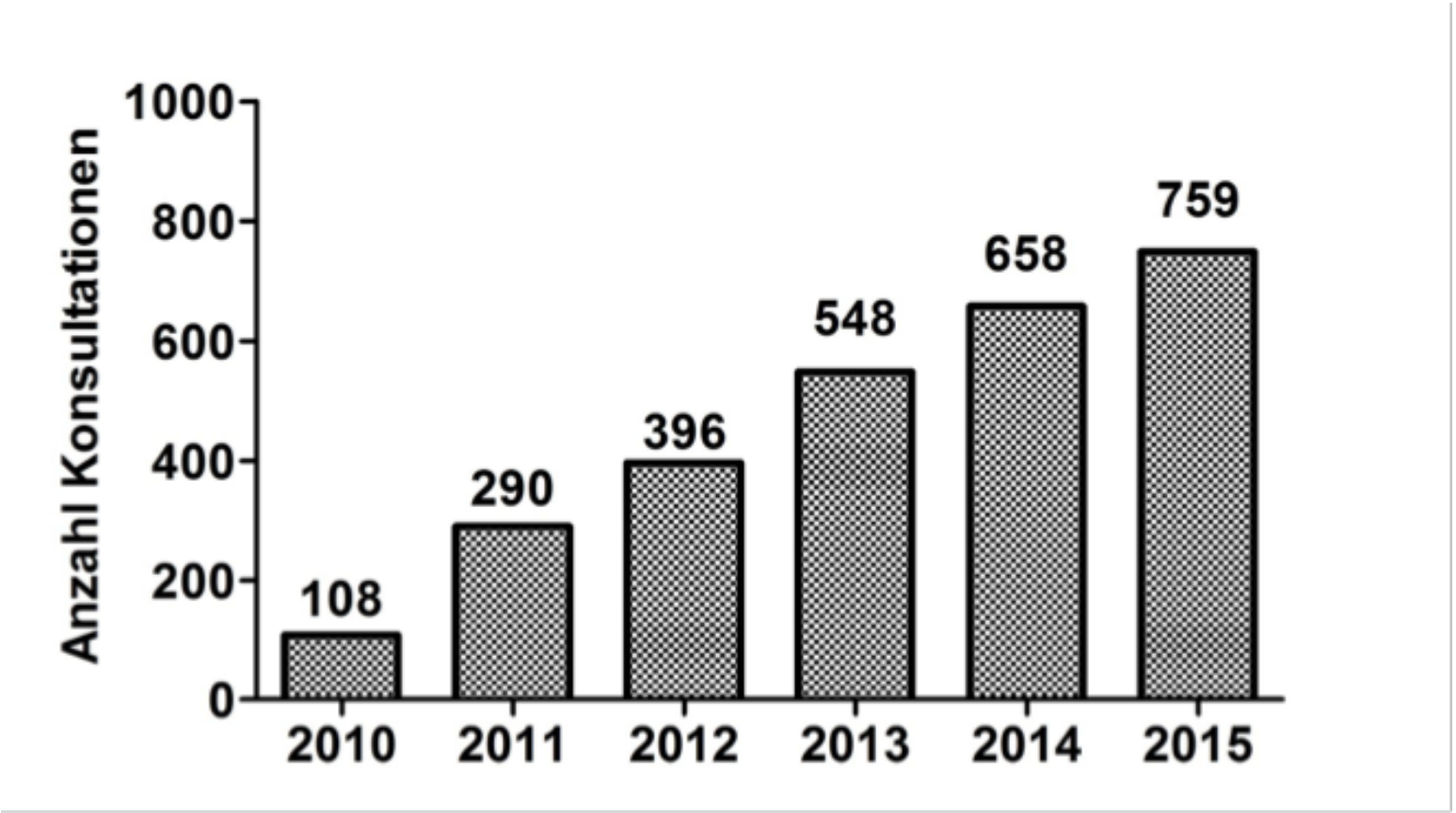




Prevention and Rehabilitatio

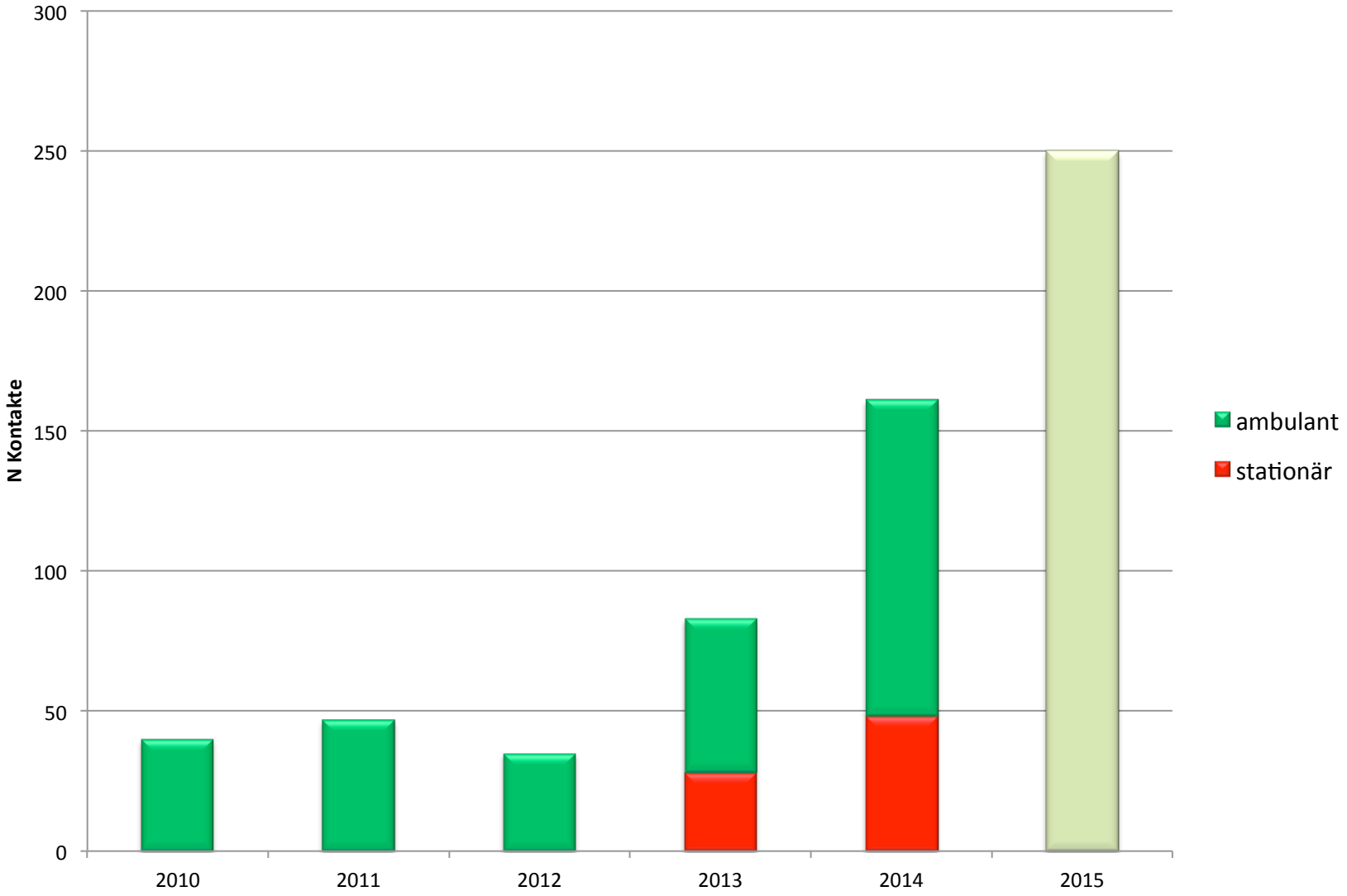


Arterial Hypertension and High Altitude Medicine 2010-2015



Daten: S. Rimoldi

Cardio-Oncology



EPIDEMIOLOGY OF CORONARY ARTERY DISEASE

Roth GA. *N Engl J Med* 2015;372:1333-41

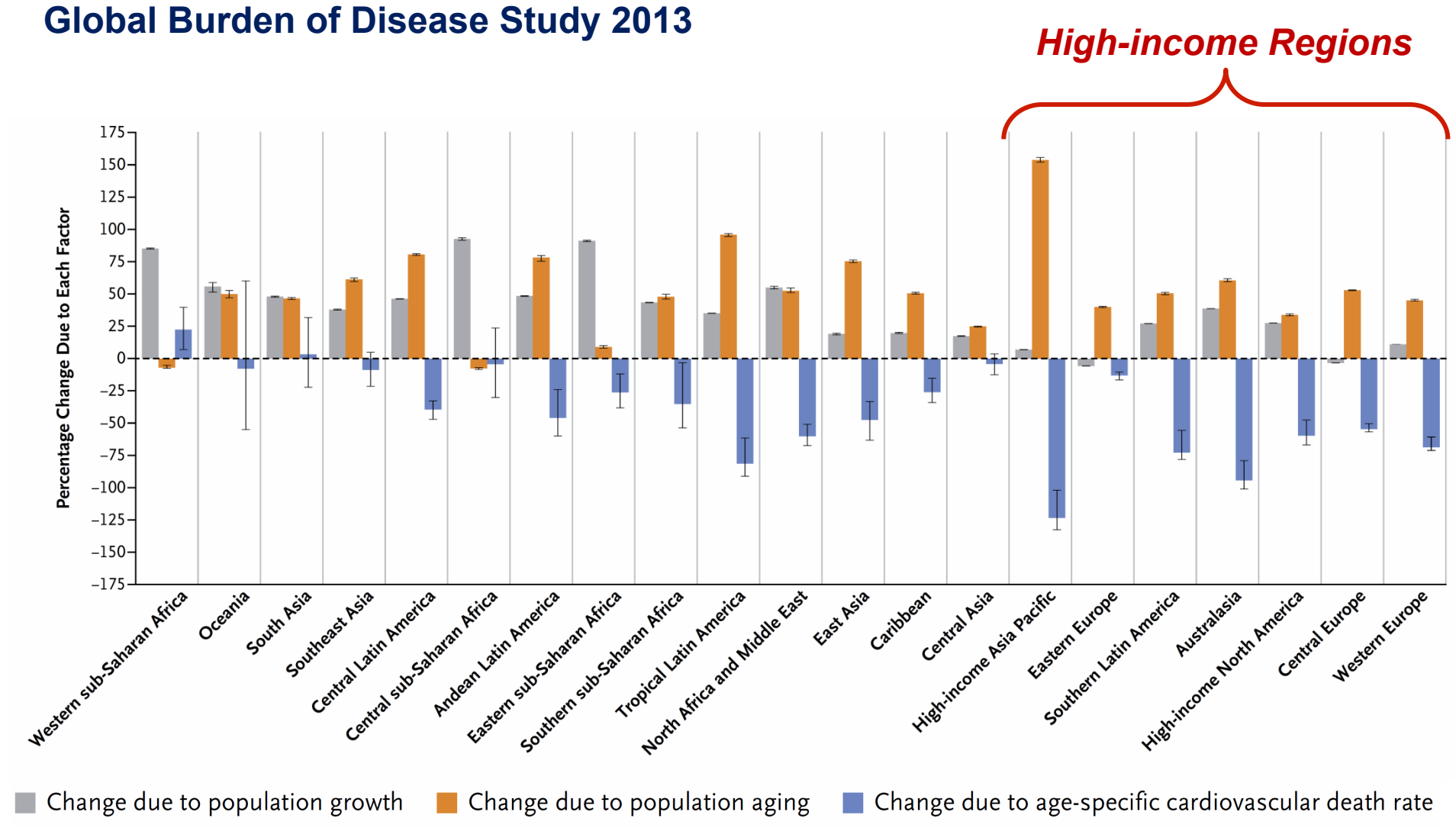
Global Burden of Disease Study 2013

Disease	Deaths in 1990	Deaths in 2013	Percentage Change, 1990–2013
Ischemic heart disease	5,737,483	8,139,852	41.7
Ischemic stroke	2,182,865	3,272,924	50.2
Hemorrhagic stroke	2,401,931	3,173,951	30.7
Hypertensive heart disease	622,148	1,068,585	74.1
Cardiomyopathy and myocarditis	293,896	443,297	51.4
Rheumatic heart disease	373,493	275,054	–26.5
Aortic aneurysm	99,644	151,493	52.1
Atrial fibrillation and flutter	28,916	112,209	288.1
Endocarditis	45,053	65,036	46.3
Peripheral vascular disease	15,875	40,492	155.3
Other cardiovascular and circulatory diseases	478,261	554,588	15.2
Total	12,279,565	17,297,480	40.8

This increase was driven by changes in population aging (55%) and population growth (25.1%), despite a decrease in age-specific death (-39.3%)

Demographic and Epidemiologic Drivers of Global Cardiovascular Mortality across Regions

Roth GA. *N Engl J Med* 2015;372:1333-41

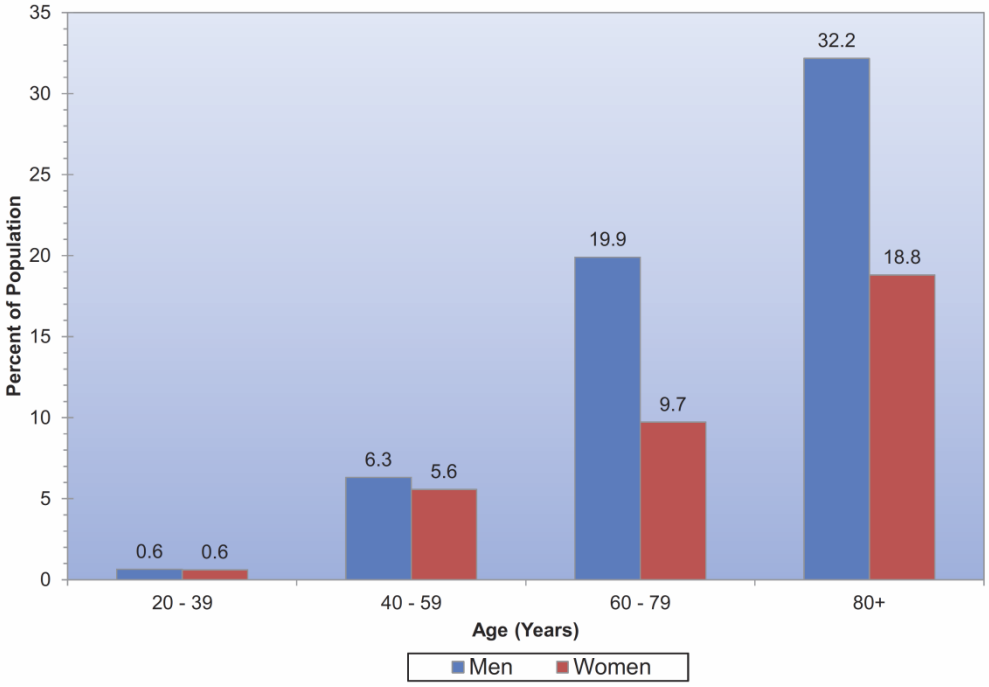


PREVALENCE OF CAD AND ANGINA

Mozaffarian D. *Circulation* 2015;131:e29-e322

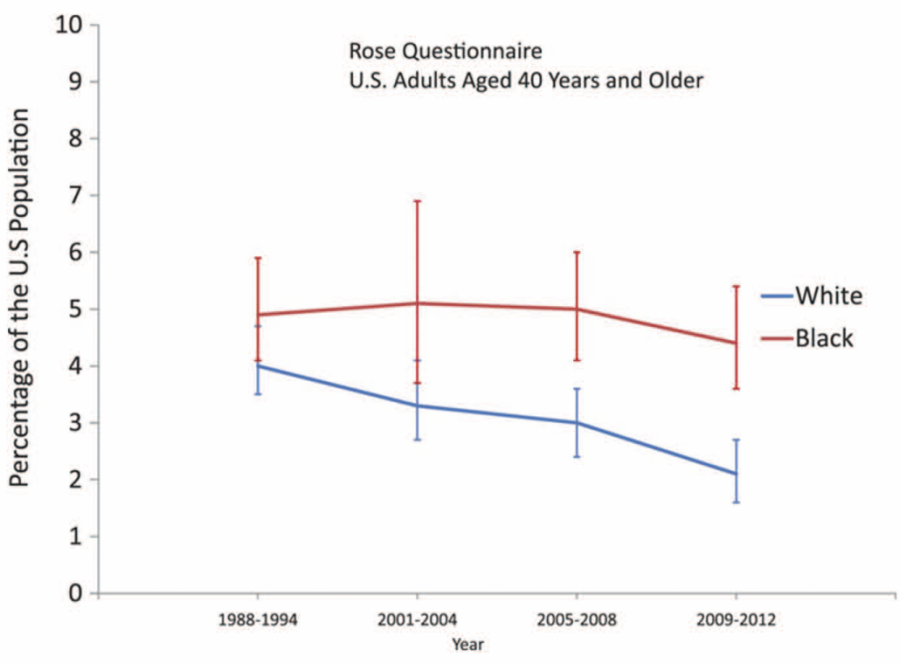
Heart Disease and Stroke Statistics – 2015

Prevalence of CAD by Age and Sex



Data from National Heart and Nutrition Examination Survey: 2009-2012

Age- and sex-adjusted prevalence rates of angina



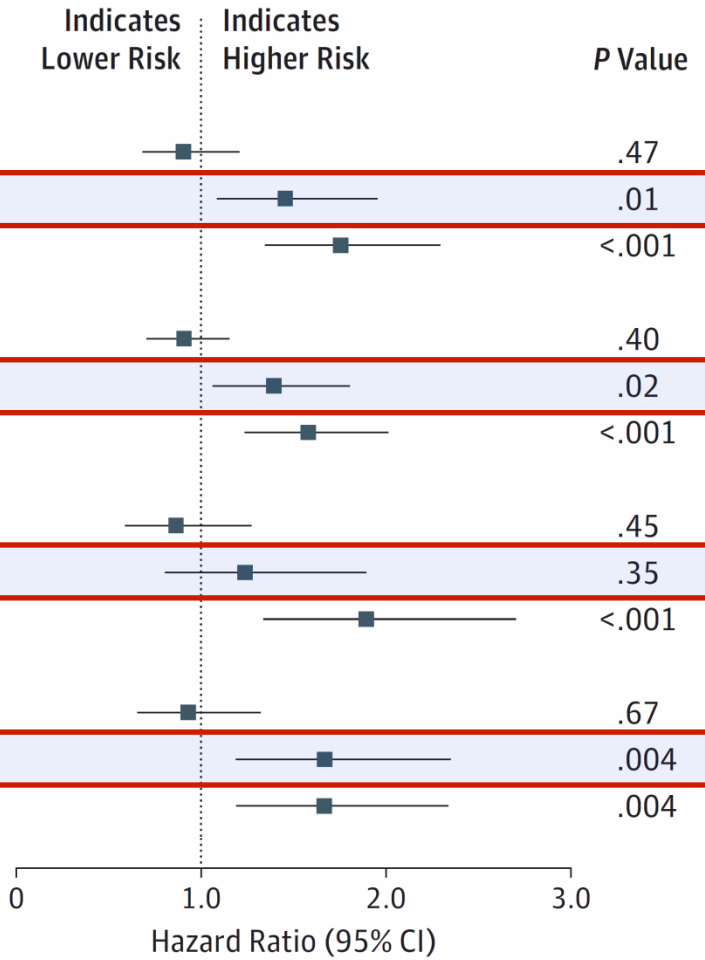
Secular trends for adults aged ≥40 yrs in the US by race. Angina defined using the Rose questionnaire.

PROGNOSIS OF PATIENTS WITH ANGINA

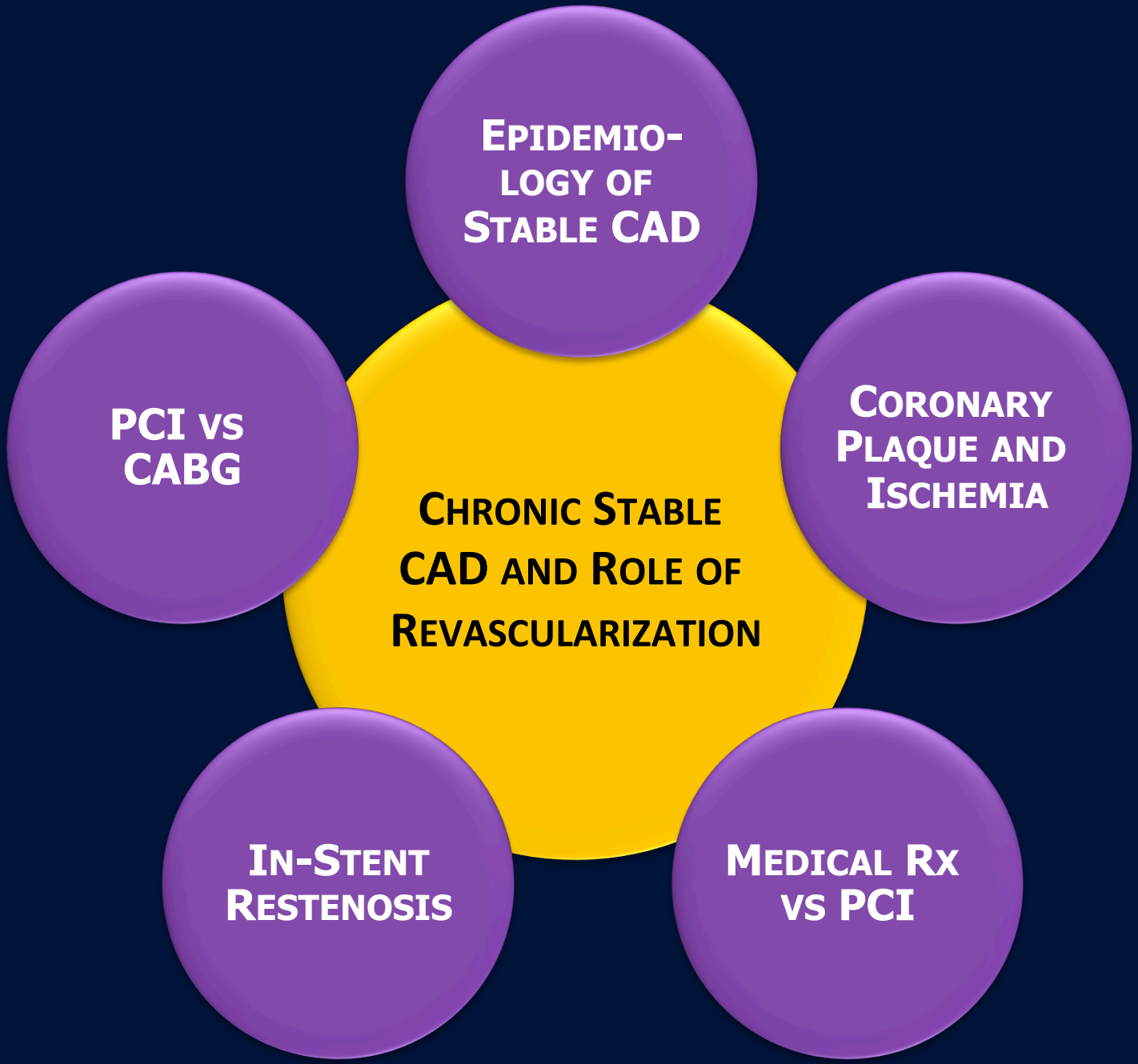
Steg PG. *JAMA Int Med* 2014;174:1651-59

CLARIFY Registry (n =32,105)

Outcome by Patient Group	HR (95% CI)	*P* Value
CV-related death, nonfatal MI		
Ischemia only	0.90 (0.68-1.20)	.47
Angina only	1.45 (1.08-1.95)	.01
Both	1.75 (1.34-2.29)	<.001
CV-related death, nonfatal MI, or stroke		
Ischemia only	0.90 (0.70-1.15)	.40
Angina only	1.38 (1.06-1.80)	.02
Both	1.57 (1.23-2.01)	<.001
CV-related death		
Ischemia only	0.86 (0.58-1.27)	.45
Angina only	1.23 (0.80-1.89)	.35
Both	1.89 (1.33-2.70)	<.001
MI[a]		
Ischemia only	0.93 (0.65-1.32)	.67
Angina only	1.67 (1.18-2.35)	.004
Both	1.66 (1.18-2.33)	.004

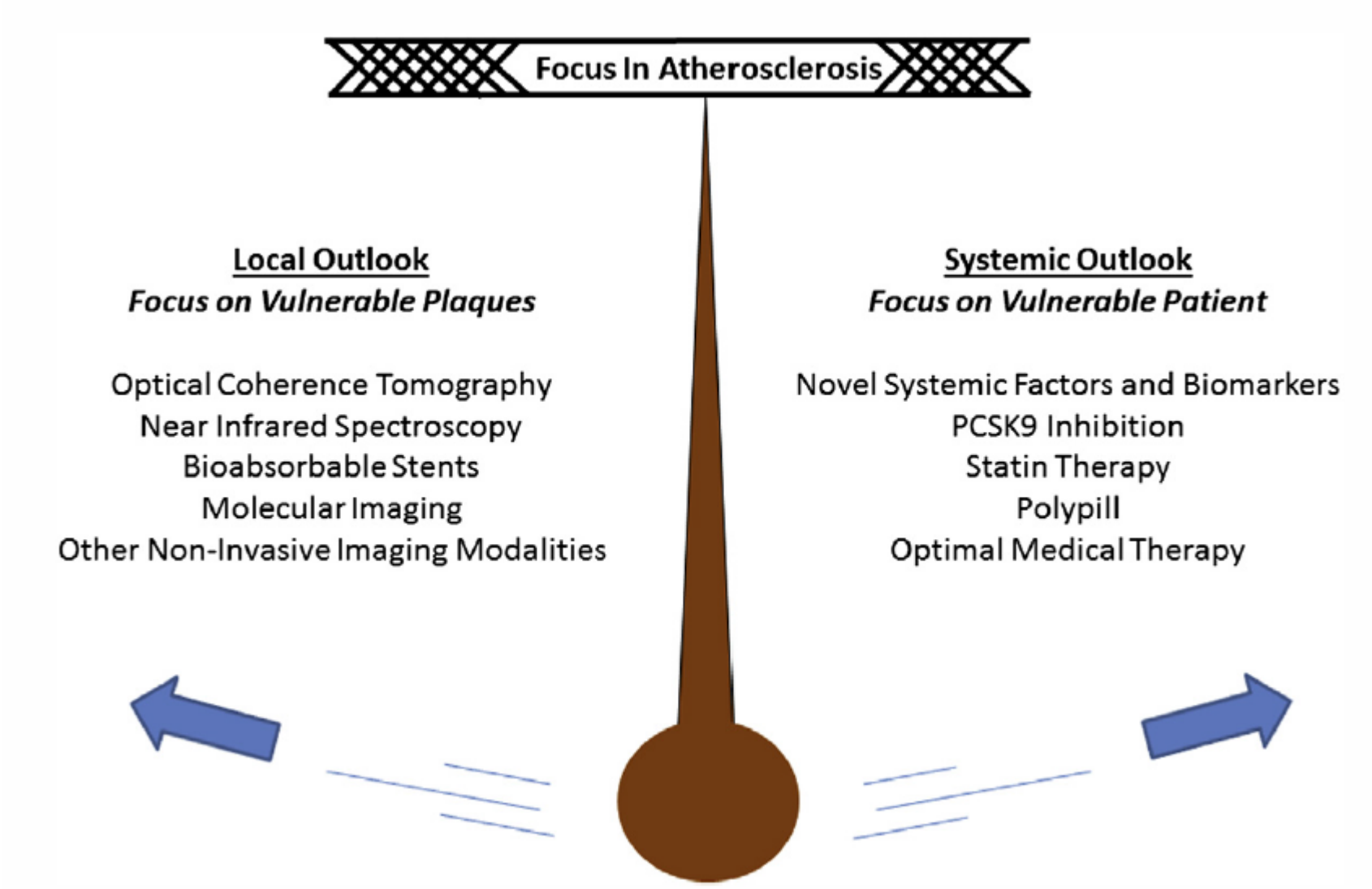


Inclusion criteria: 32,105 outpatients with prior myocardial infarction, chest pain and evidence of myocardial ischemia, evidence of CAD on angiography.


Epidemio-logy of Stable CAD
Coronary Plaque and Ischemia
Medical Rx vs PCI
In-Stent Restenosis
PCI vs CABG
Chronic Stable CAD and Role of Revascularization

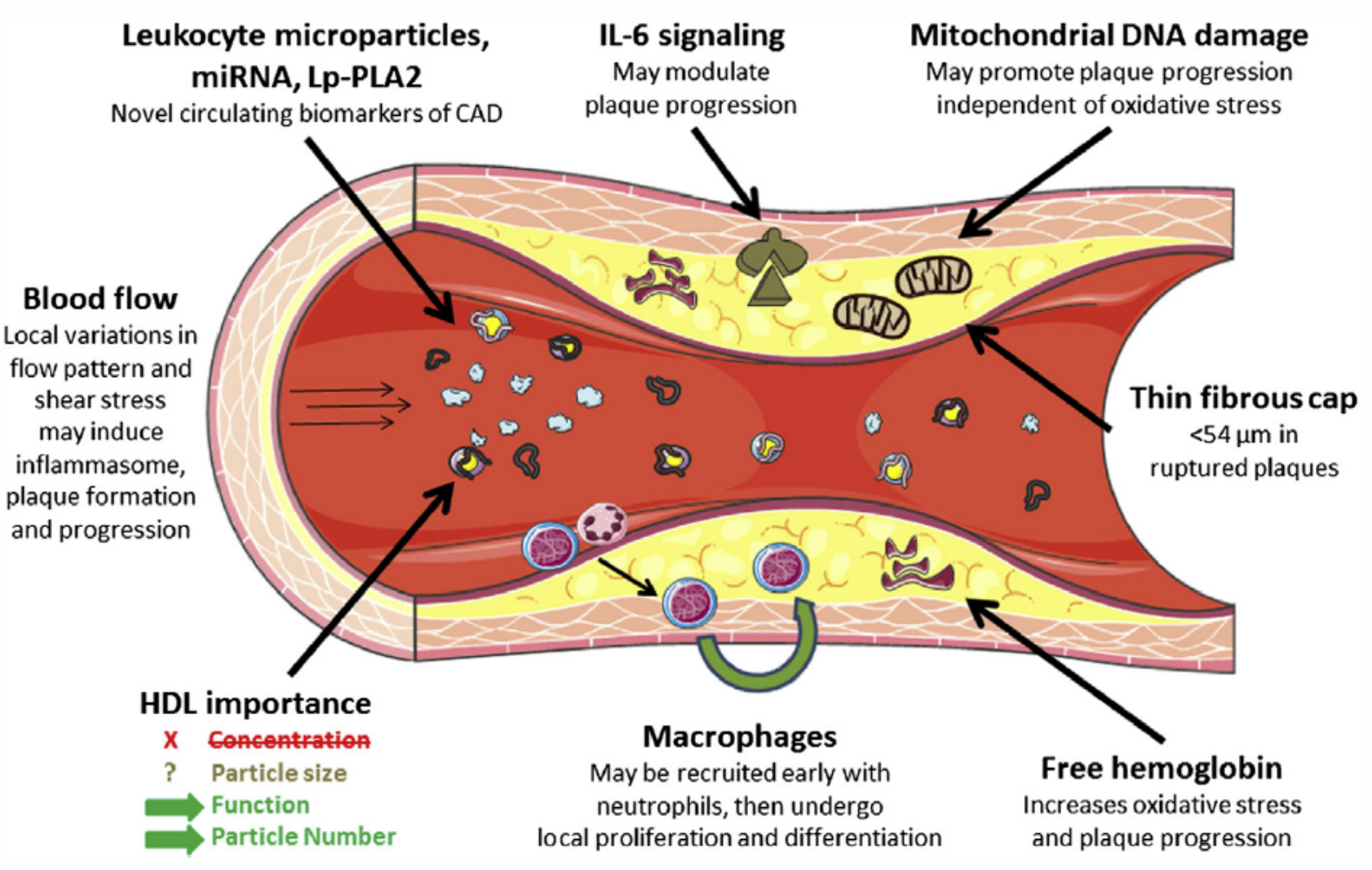
Focal vs Systemic Focus of Atherosclerosis

Tomey M. *J Am Coll Cardiol* 2014



Recent Advances in Local Atherosclerotic Plaque Progression

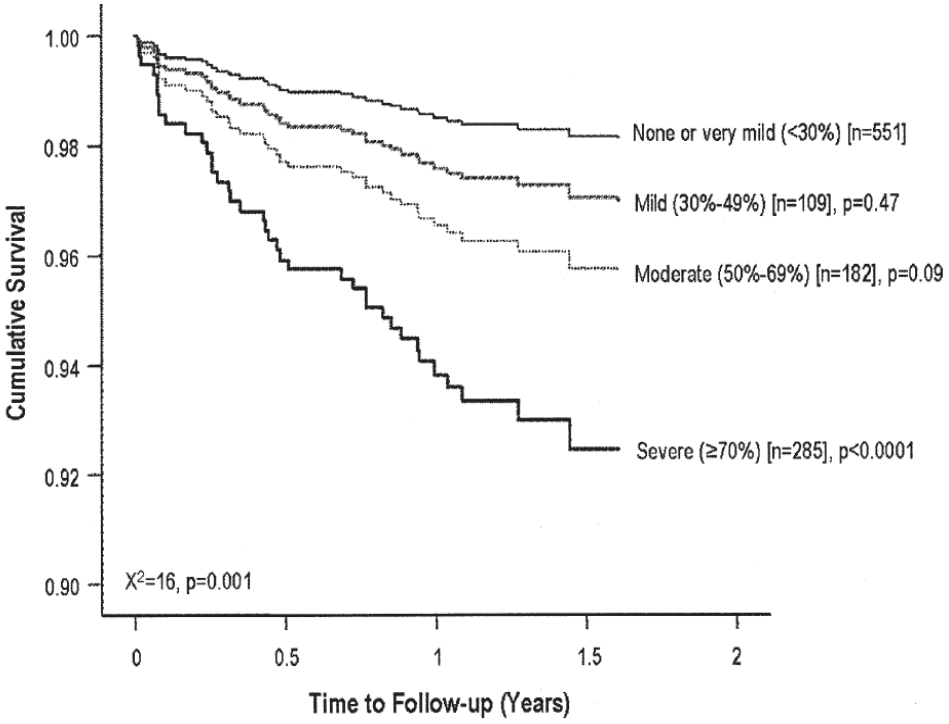
Tomey M. *J Am Coll Cardiol* 2014



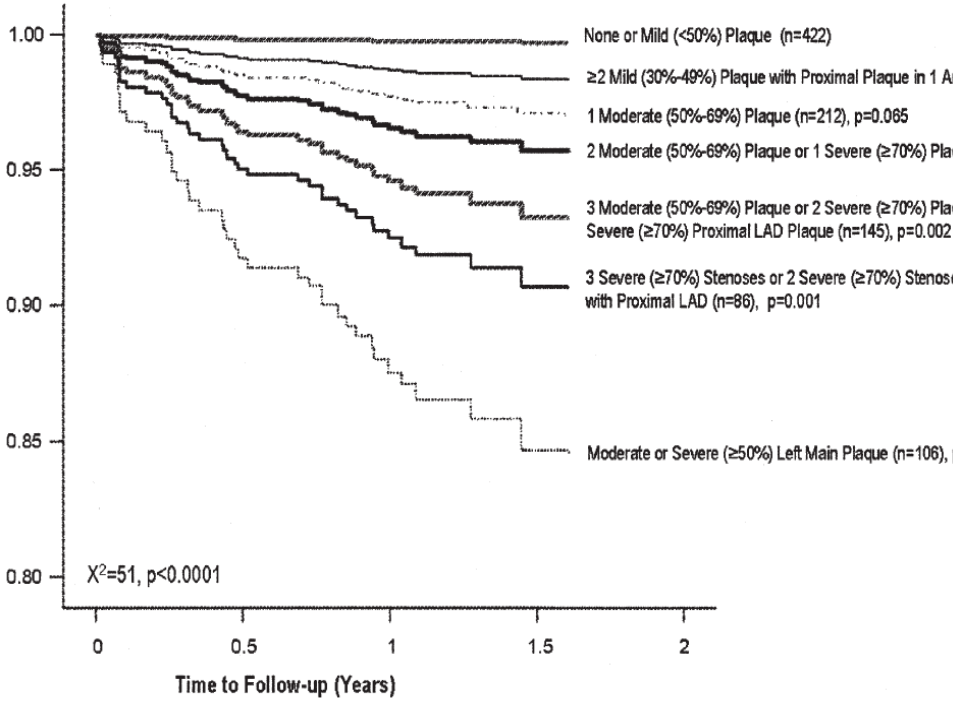
Severity of Coronary Stenoses and Mortality

Min JK et al. *J Am Coll Cardiol* 2007;50:1161-70

Left Anterior Descending Artery



Duke Prognostic CAD Index

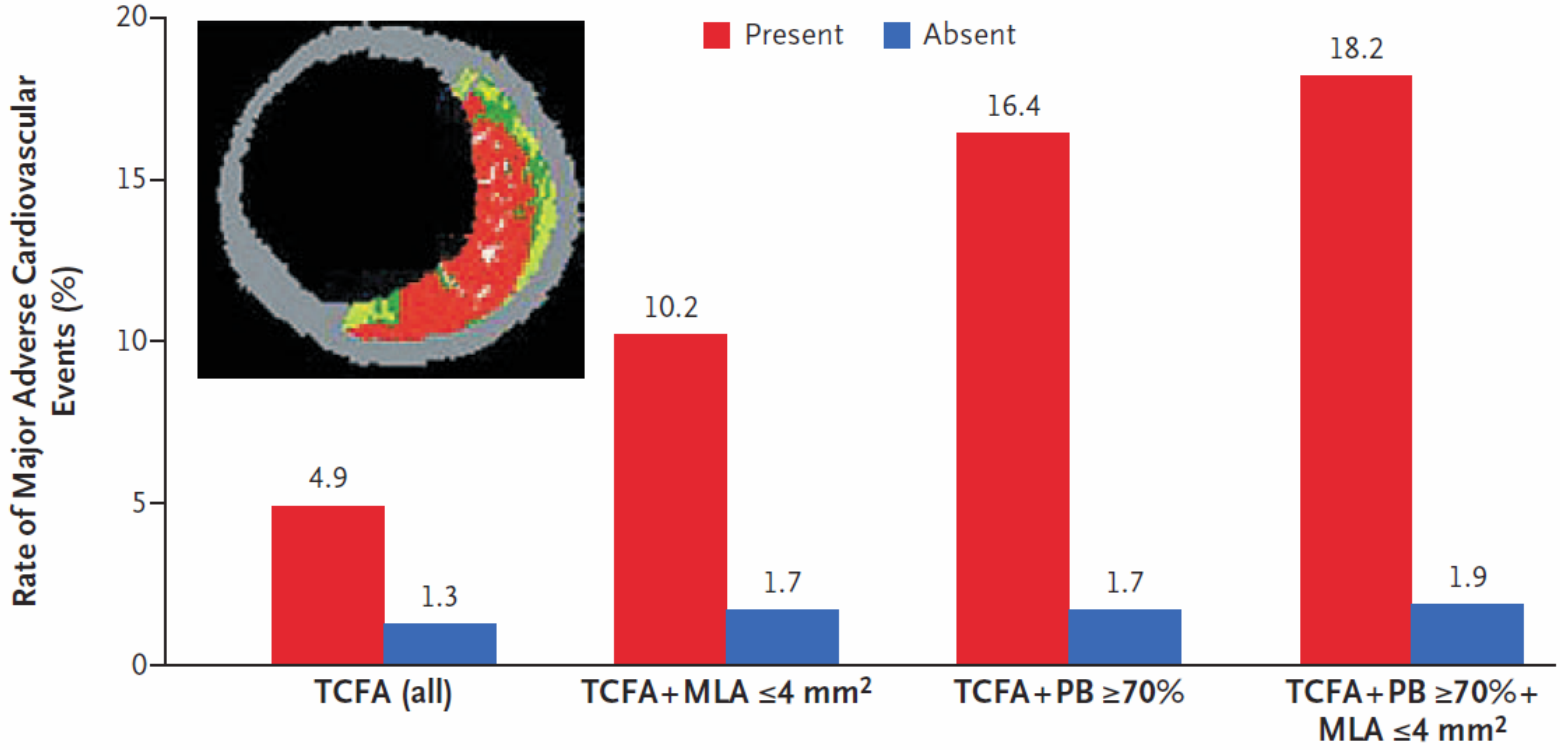


N=1,127 patients with symptoms

Natural History of Coronary Atherosclerosis: PROSPECT

Stone G et al. *N Engl J Med* 2011;364:226-35

607 ACS patients undergoing 3-vessel CAD and IVUS, IVUS-VH



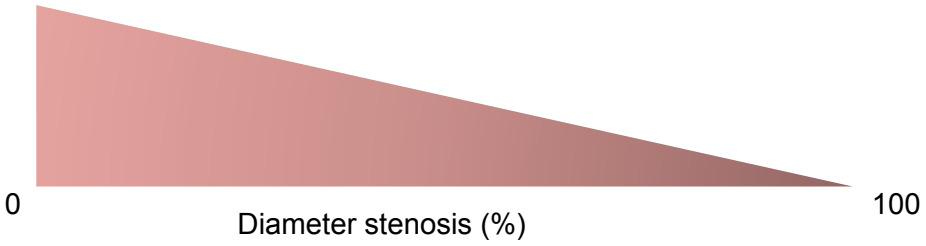
Lesion hazard ratio (95% CI)	3.90 (2.25–6.76)	6.55 (3.43–12.51)	10.83 (5.55–21.10)	11.05 (4.39–27.82)
P value	<0.001	<0.001	<0.001	<0.001
Prevalence (%)	46.7	15.9	10.1	4.2

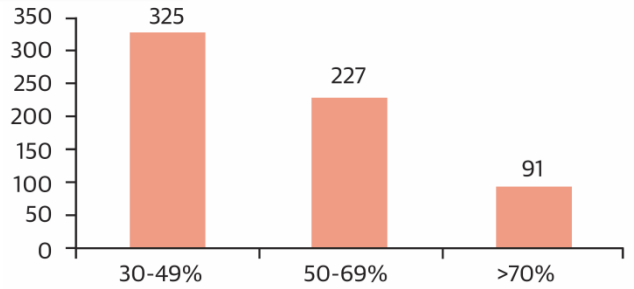
Thin-Cap Fibroatheroma (TCFA) and Degree of Coronary Artery Stenosis

Tian J et al. *J Am Coll Cardiol 2014*;64:672-680

Absolute Number of Plaques (n)

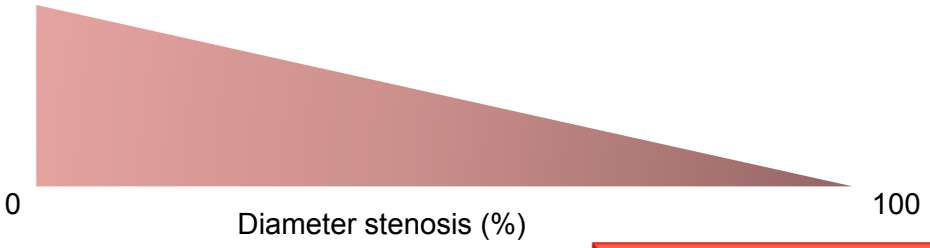
3-vessel OCT Examinations from MGH OCT Registry (patients =255)

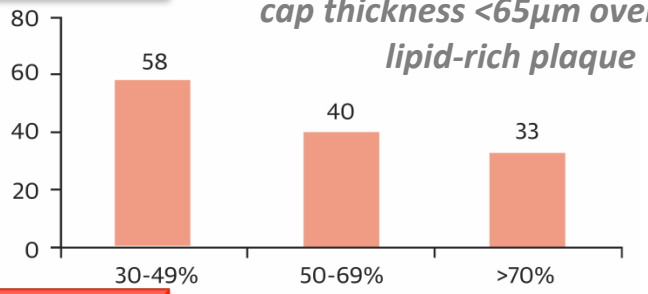




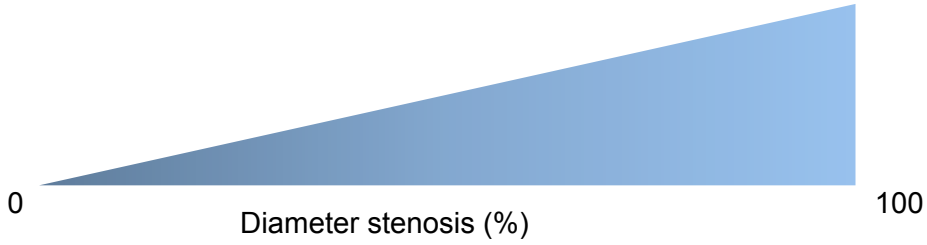
Absolute Number of TCFA (n)

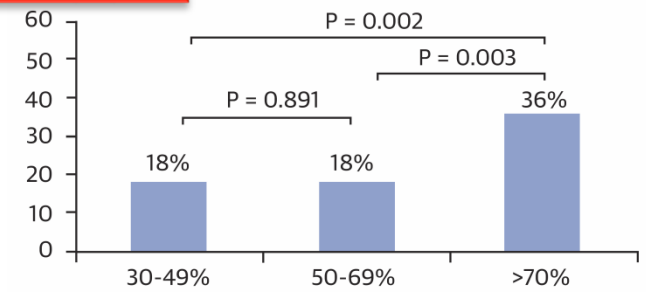
TCF defined as plaque with fibrous cap thickness <65µm overlying a lipid-rich plaque





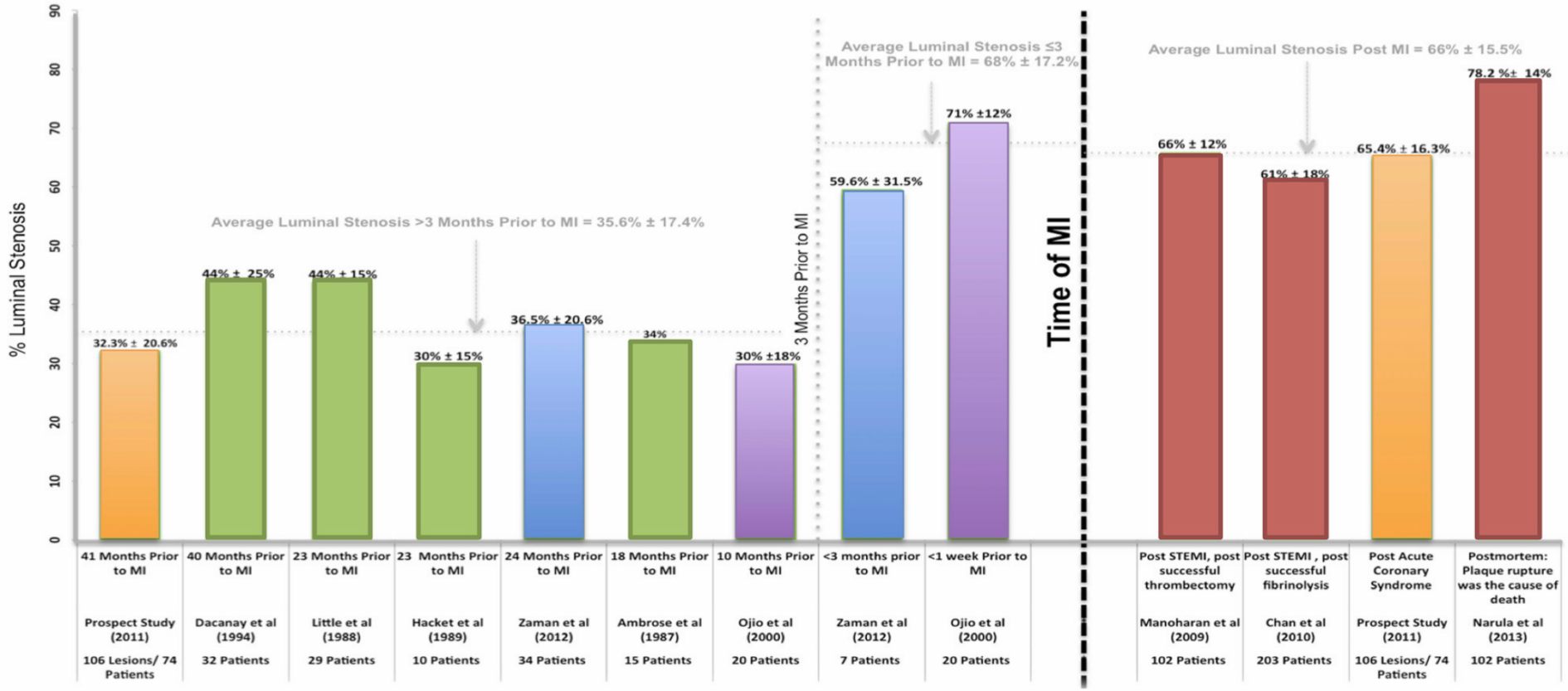
Relative Prevalence of TCFA (%)





DIAMETER STENOSIS AND MYOCARDIAL INFARCTION

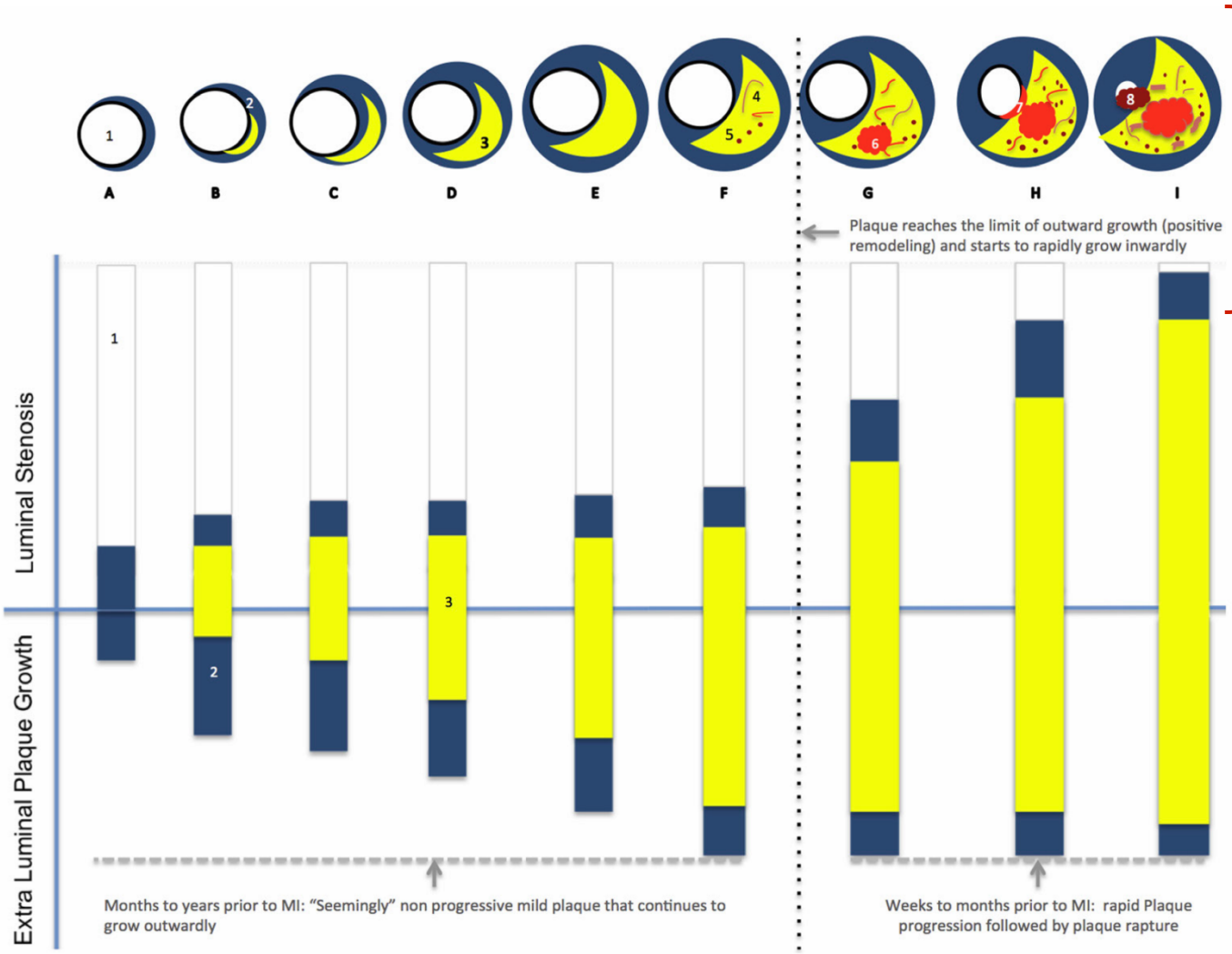
Ahmadi A. *Circ Res* 2015;117:99-104



Average luminal stenosis of culprit lesions in various studies organized relative to the time of MI

Mechanism of Rapid Plaque Progression Before Myocardial Infarction

Ahmadi A. *Circ Res* 2015;117:99-104



- *Intraplaque neovascularization*
- *Intraplaque hemorrhage*
- *Subclinical cycles of rupture and healing*

1: Coronary artery lumen
2: Fibrous part of plaque
3: Necrotic Core
4. Intra plaque neovascularization (incompetent vessels)
5: Red blood cell leakage from incompetent intra-plaque vessels
6: Intra-plaque hemorrhage
7: Subclinical Plaque Rupture
8: Thrombus formation

ISCHEMIA AND BENEFIT OF REVASCULARIZATION

Hachomovitch R et al. *Eur Heart J* 2011;32:1012-1024

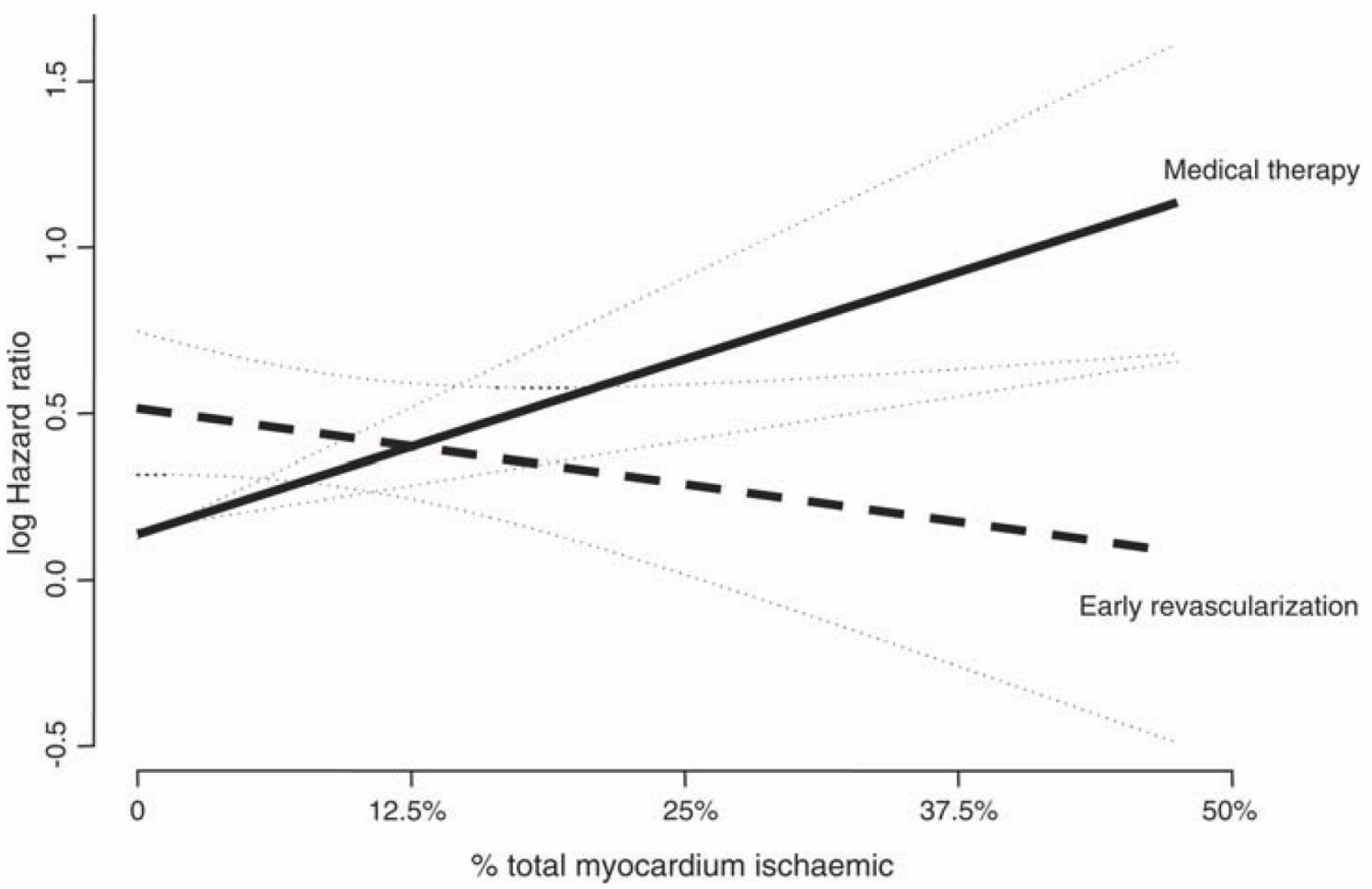
All-cause death among 13,555 pts undergoing MPS

Study period 1991-1997

Long-term follow-up (mean 8.7 yrs)

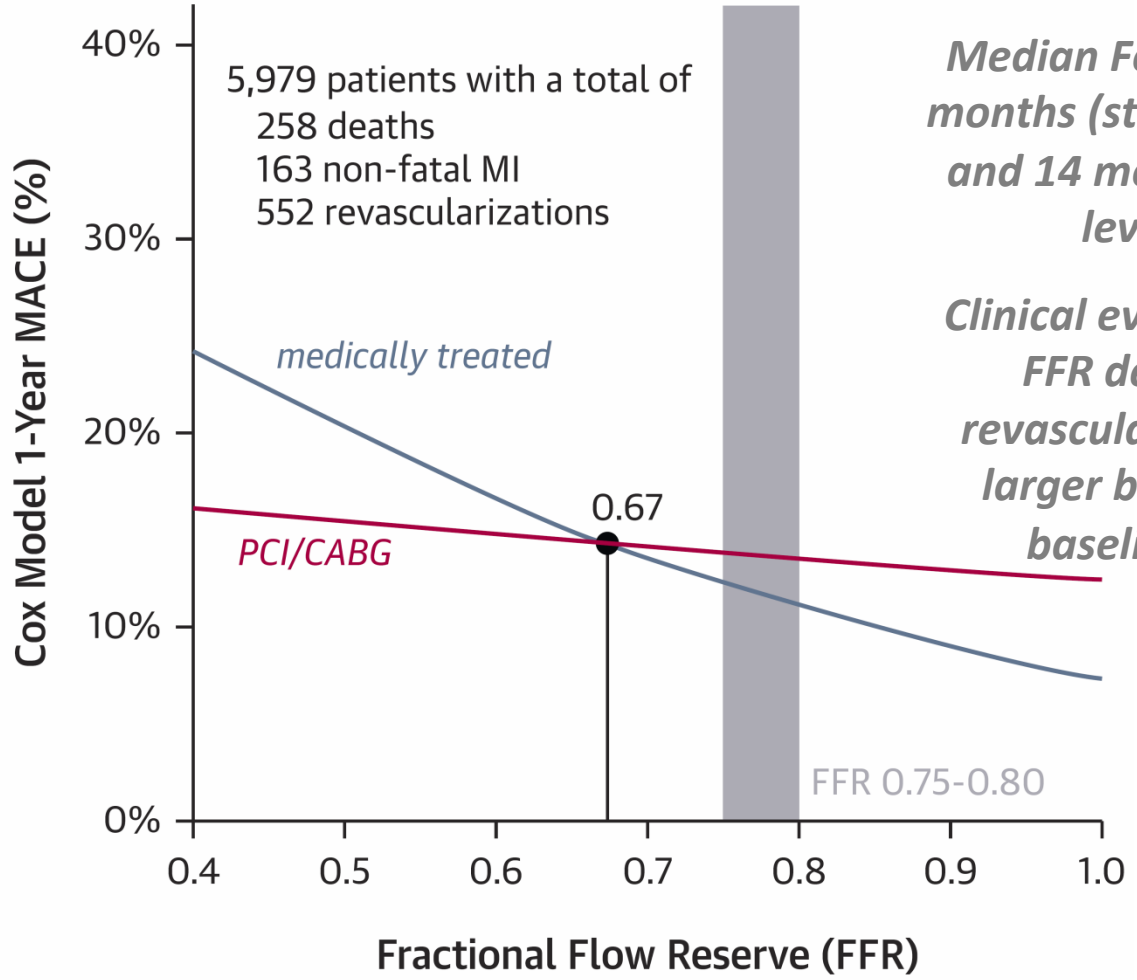
Early revascularization within first 90 d from MPS

41% CABG; 59% PCI



Extent Ischemia and Clinical Outcomes: Fractional Flow Reserve (FFR)

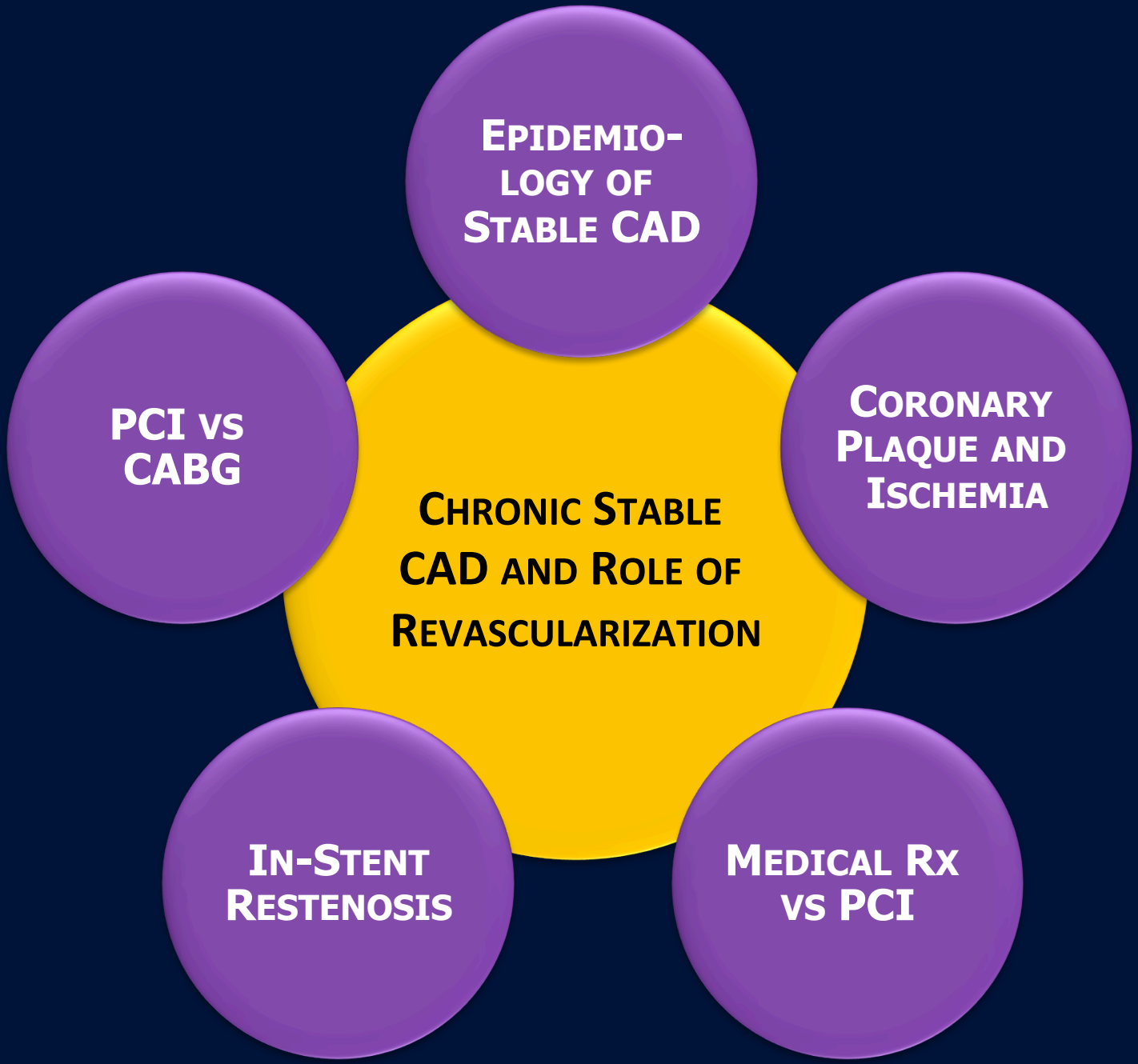
Johnson NP et al. *J Am Coll Cardiol* 2014;64:1641-54



Median Follow-up of 16 months (study-level data) and 14 months (patient-level data)

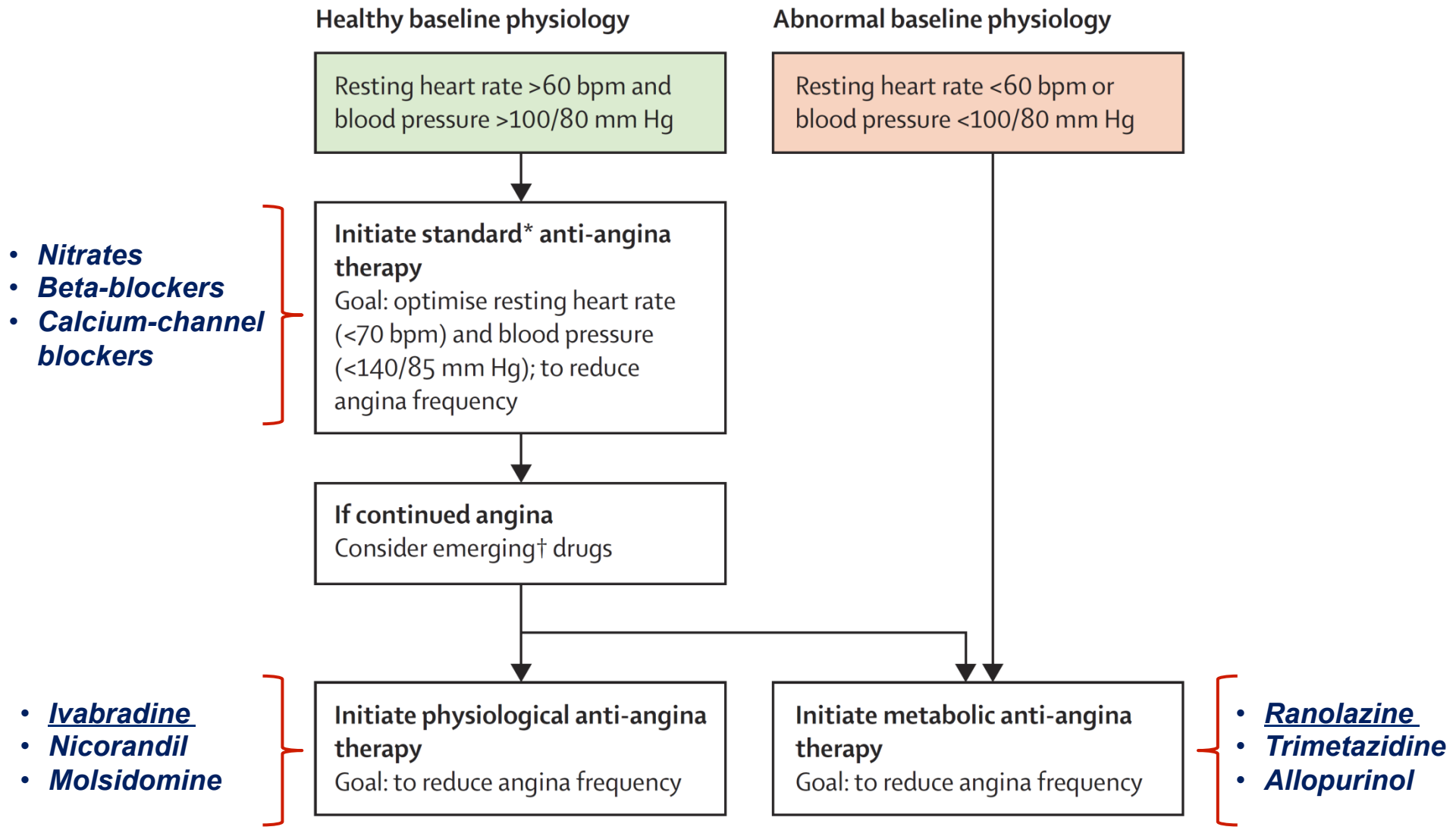
Clinical events increased as FFR decreased, and revascularization showed larger benefit for lower baseline FFR values

Meta-analysis of study-level (n=9,173) and patient-level (n=6,961) coronary lesions assesed with FFR.


Epidemio-logy of Stable CAD
Coronary Plaque and Ischemia
Medical Rx vs PCI
In-Stent Restenosis
PCI vs CABG
Chronic Stable CAD and Role of Revascularization

PHARMACOLOGICAL THERAPY FOR CHRONIC ANGINA

Husted SE et al. *Lancet* 2015;386:691-701



- ***Nitrates***
- ***Beta-blockers***
- ***Calcium-channel blockers***

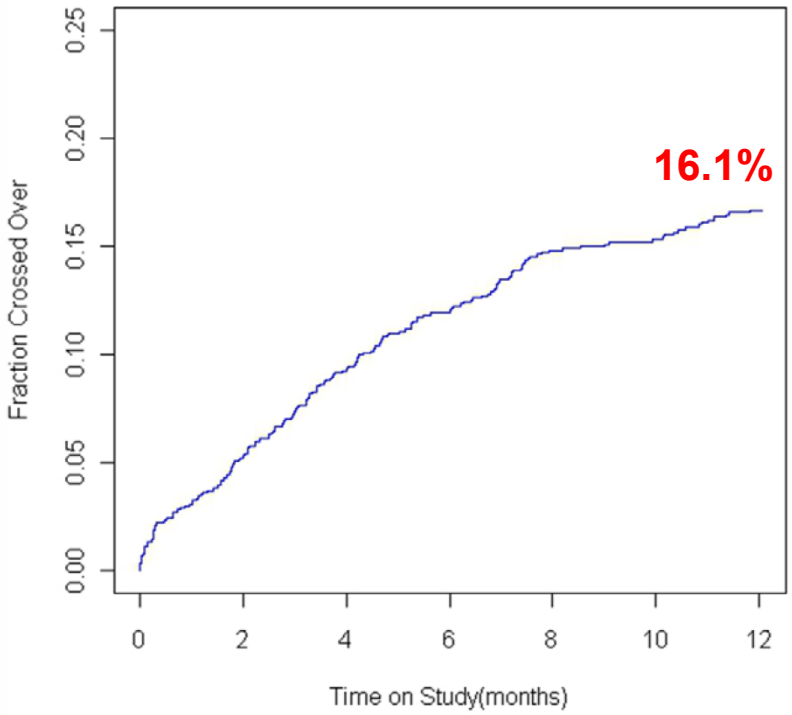
- ***Ivabradine***
- ***Nicorandil***
- ***Molsidomine***

- ***Ranolazine***
- ***Trimetazidine***
- ***Allopurinol***

Frequency And Predictors of Crossover to Revascularization at 12-month in the COURAGE

Spertus J et al *Circ Cardiovasc Qual Outcomes* 2013;06:409-418

Timing of early Rev in OMT Pts



Predictors of early Rev in OMT Pts

Characteristic	Cox Regression Hazard Ratio	Cox Regression 95% Confidence Interval
Baseline SAQ angina frequency (per –10 points)	1.11	1.03, 1.18
Baseline SAQ angina stability score (per –25 points)	1.37	1.18, 1.61
Baseline SAQ treatment satisfaction (per –12.5 points)	1.16	1.03, 1.30
Healthcare system: Canada vs VA	1.37	0.96, 1.98
Healthcare system: US non-VA vs VA	1.82	1.19, 2.78

OMT indicates optimal medical therapy; and SAQ, Seattle Angina Questionnaire.

Angina frequency and intensity strongly predicted the need for Revasc in patients randomized to OMT

Progress with Metallic Drug-Eluting Stents

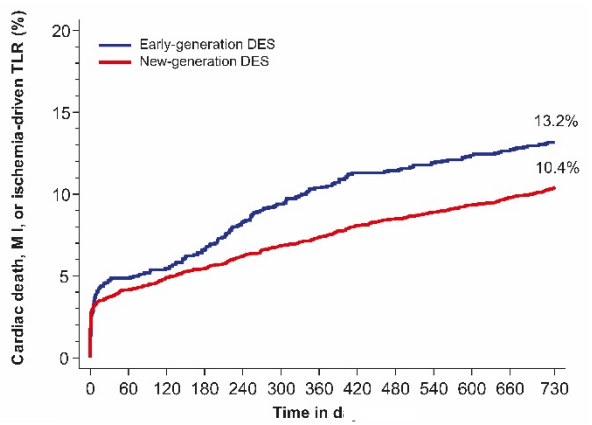
Piccolo R et al. *Lancet* 2015;386:702-713

Safety and Efficacy of New-generation vs. Early-generation DES

Piccolo R et al. *JACC CV Intv* 2015, in press

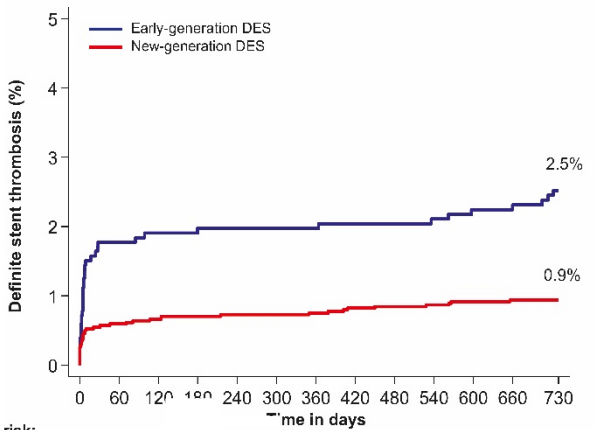
Cdeath, MI, TLR

HR 0.75 (0.63-0.89), P=0.001



Definite ST

HR 0.40 (0.25-0.65), P<0.001



Pooled Analysis of SIRTAX, LEADERS, RESOLUTE, BIOSCIENCE (n =6,081)
New-DES (n =4,554), Early-DES (n =1,527)

Follow-up available in 97.2% of patients at 2-year

Recommendations for DES Use

2013 Guidelines on the Mangement of Stable CAD

Montalescot G et al. *Eur Heart J 2013*;34:2949-3003

Stable CAD

DES is recommended in SCAD patients undergoing stenting if there is no contraindication to prolonged DAPT.	I	A

2014 Guidelines on Myocardial Revascularization

Windecker et al. *Eur Heart J 2014*;35(37):2541-619

NSTE-ACS

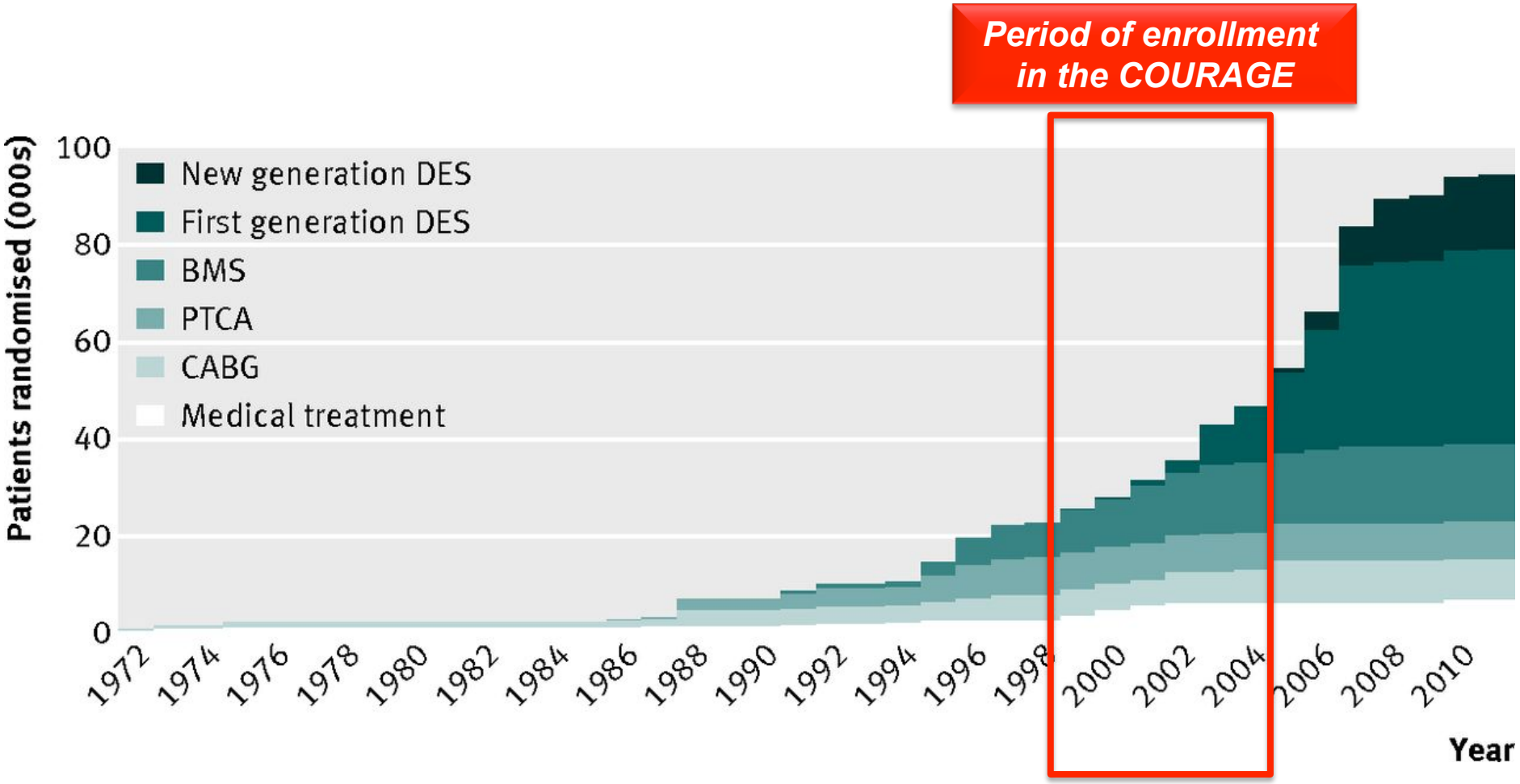
New-generation DES are indicated for percutanous treatment of significant coronary lesions in ACS patients.	I	A

STEMI

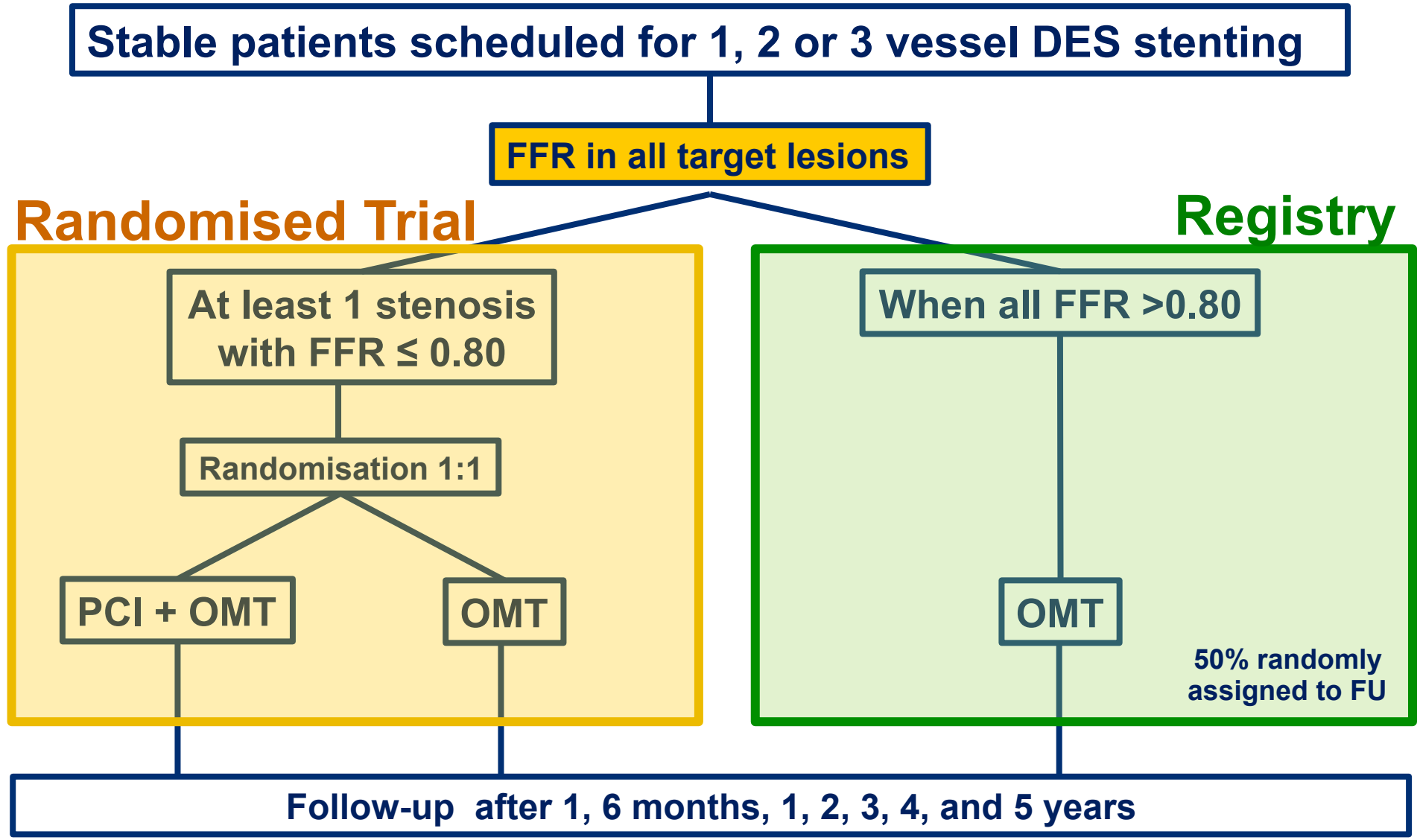
New-generation DES are recommended over BMS in primary PCI.	I	A

Accumulation of Data from RCTs using Different PCI Technologies over Time

Windecker et al. *BMJ. 2014 Jun 23;348:g3859*



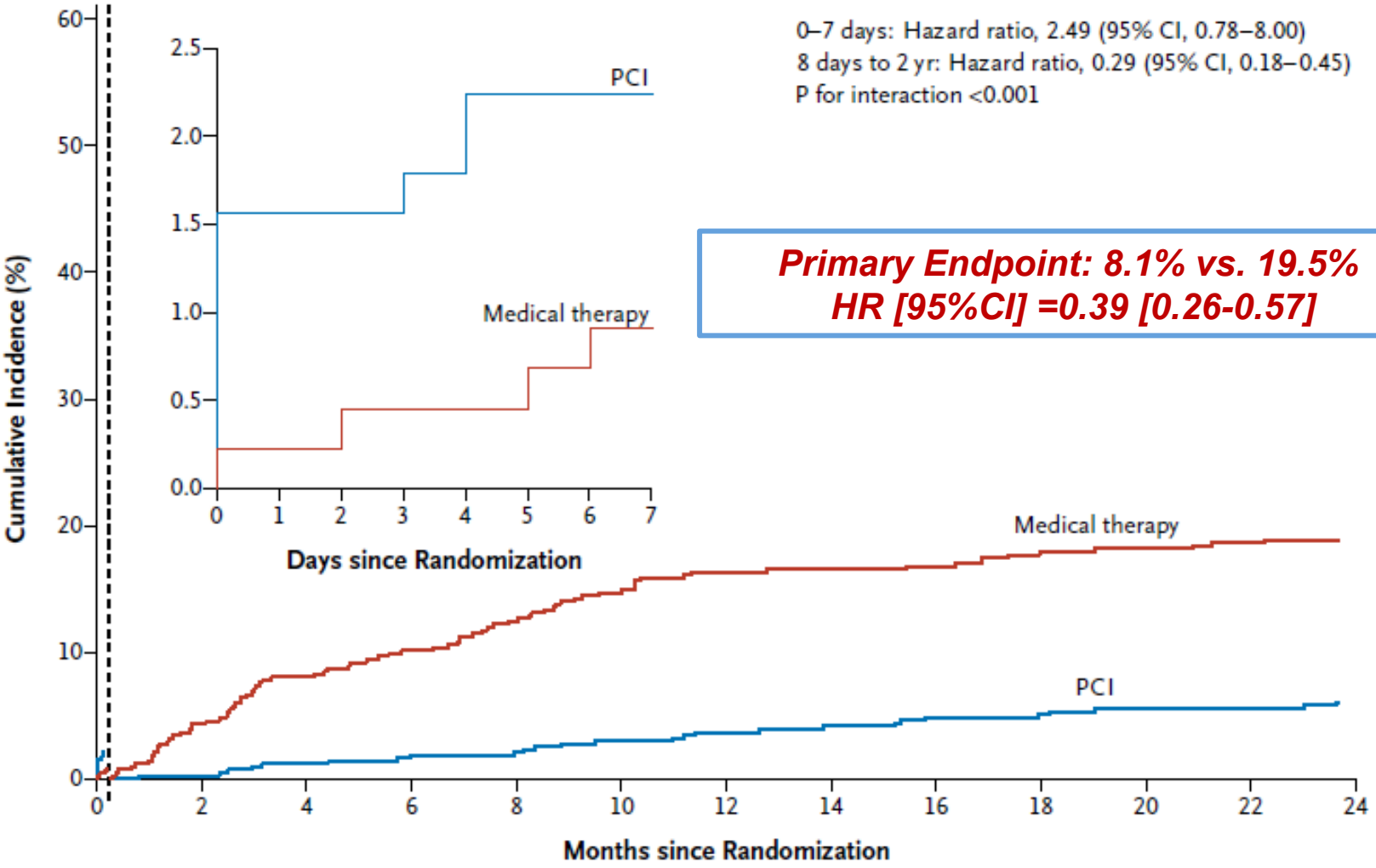
PCI versus Medical Therapy in Stable CAD With FFR Evidence of Ischemia: FAME 2



FAME 2: Two Years Results

De Bruyne et al. *NEJM* 2014;371(13):1208-17

PRIMARY ENDPOINT: ALL-CAUSE MORTALITY, MYOCARDIAL INFARCTION AND URGENT REVASCULARIZATION

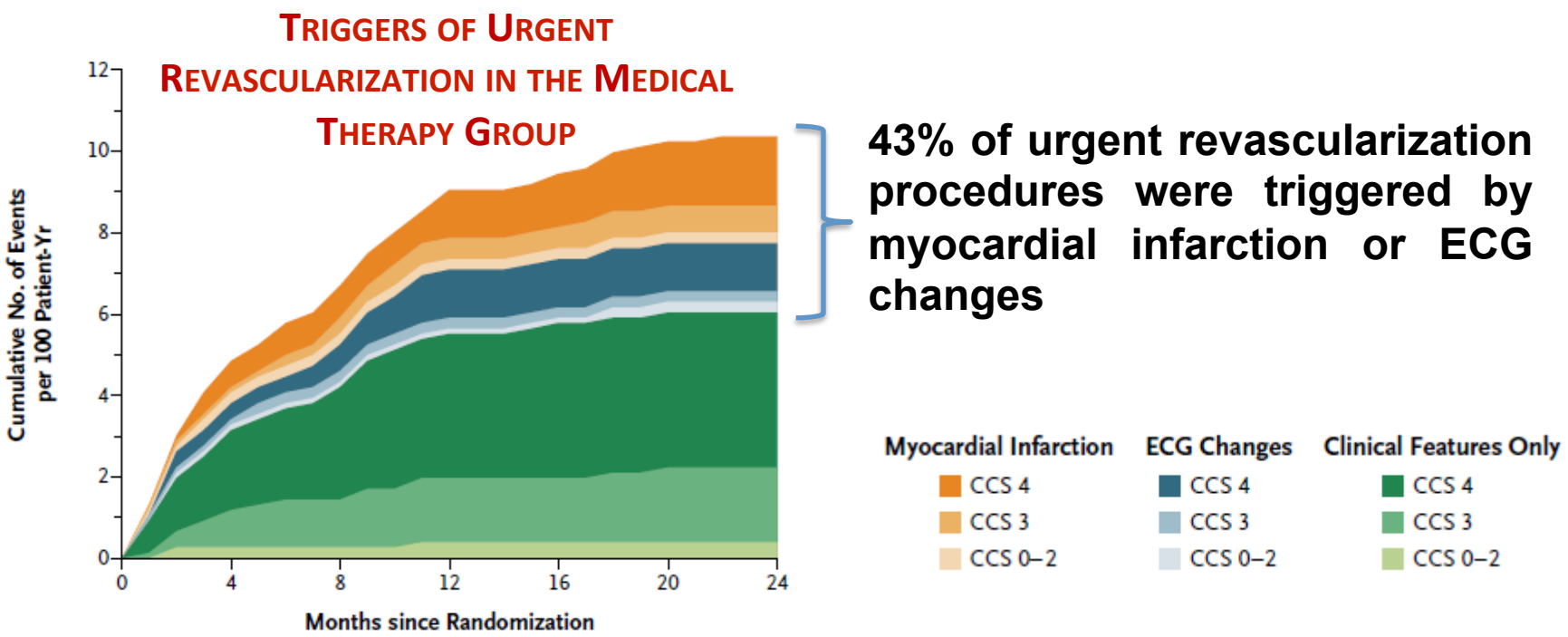


Primary Endpoint: 8.1% vs. 19.5%
HR [95%CI] =0.39 [0.26-0.57]

FAME 2: Two Years Results

De Bruyne et al. *NEJM* 2014;371(13):1208-17

Variable	PCI (N=447)	Medical Therapy (N=441)	Hazard Ratio (95% CI)†	P Value‡
	no. (%)			
Primary end point	36 (8.1)	86 (19.5)	0.39 (0.26–0.57)	<0.001
Death from any cause	6 (1.3)	8 (1.8)	0.74 (0.26–2.14)	0.58
Myocardial infarction	26 (5.8)	30 (6.8)	0.85 (0.50–1.45)	0.56
Urgent revascularization	18 (4.0)	72 (16.3)	0.23 (0.14–0.38)	<0.001

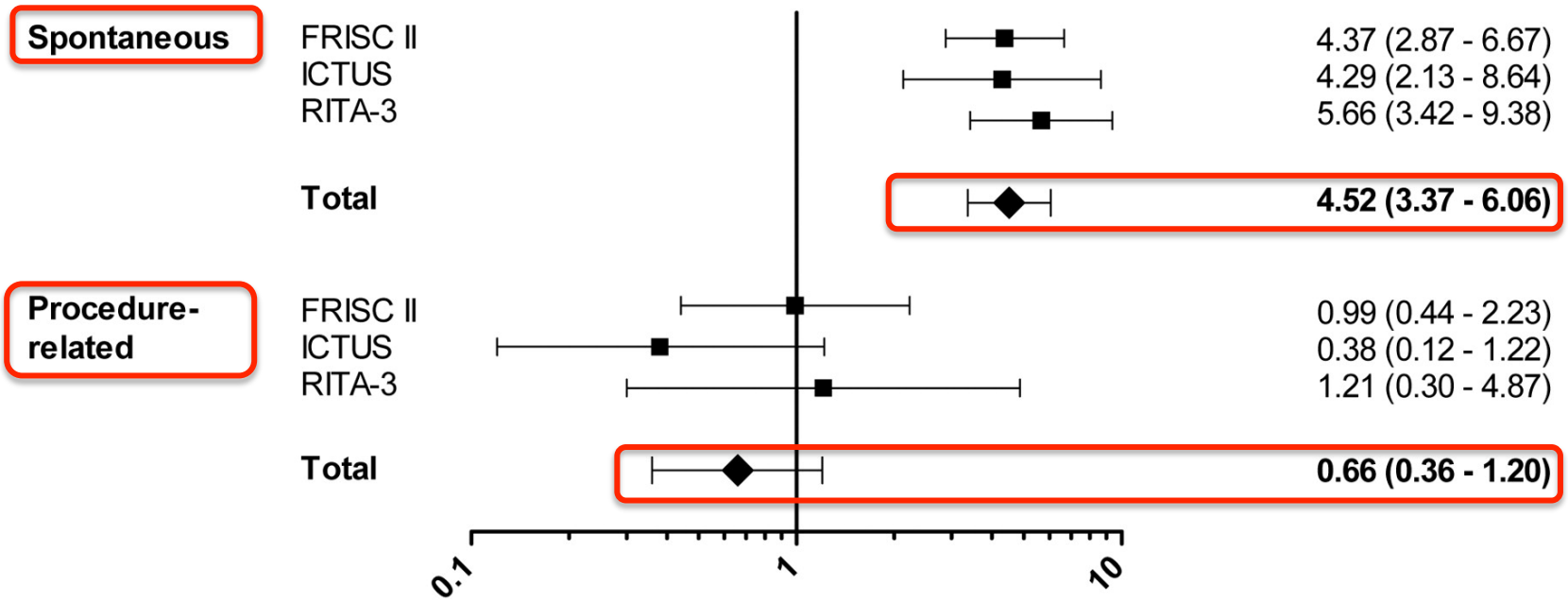


FAME 2: Two Year Results

De Bruyne et al. *NEJM* 2014;371(13):1208-17

Damman P et al. *Circulation* 2012

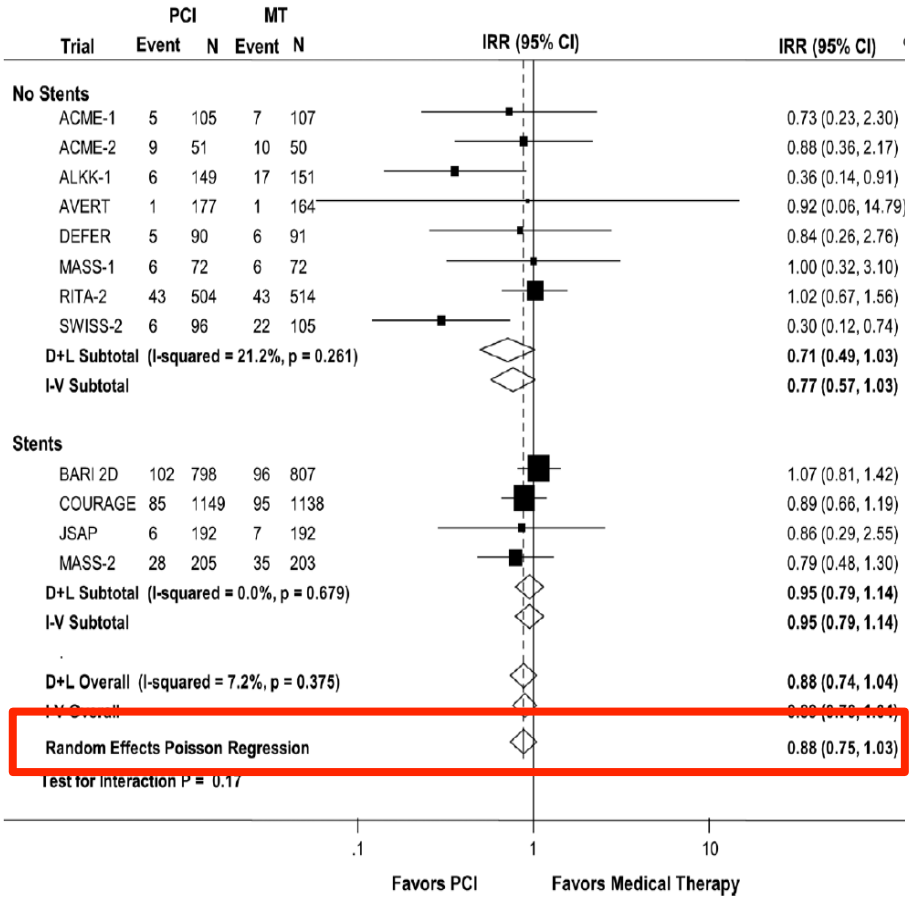
Long-term cardiovascular mortality after spontaneous or procedure-related MI



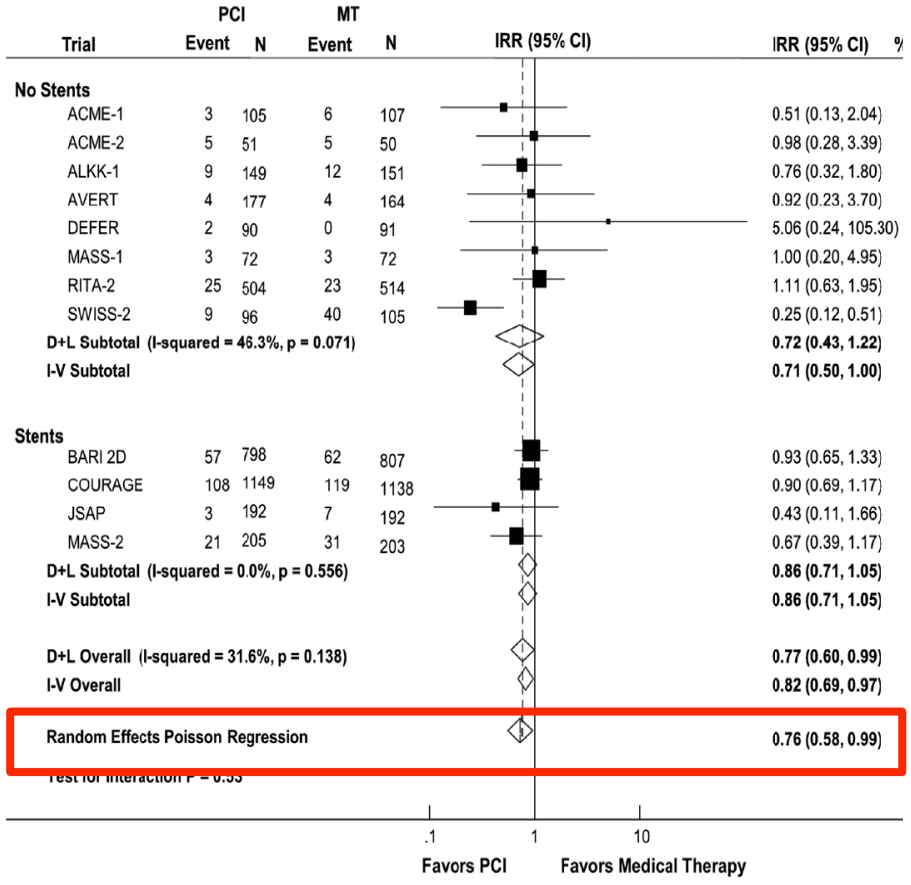
PCI versus Optimal Medical Therapy

Bangalore S et al. *Circulation* 2013;127:769-781

Mortality



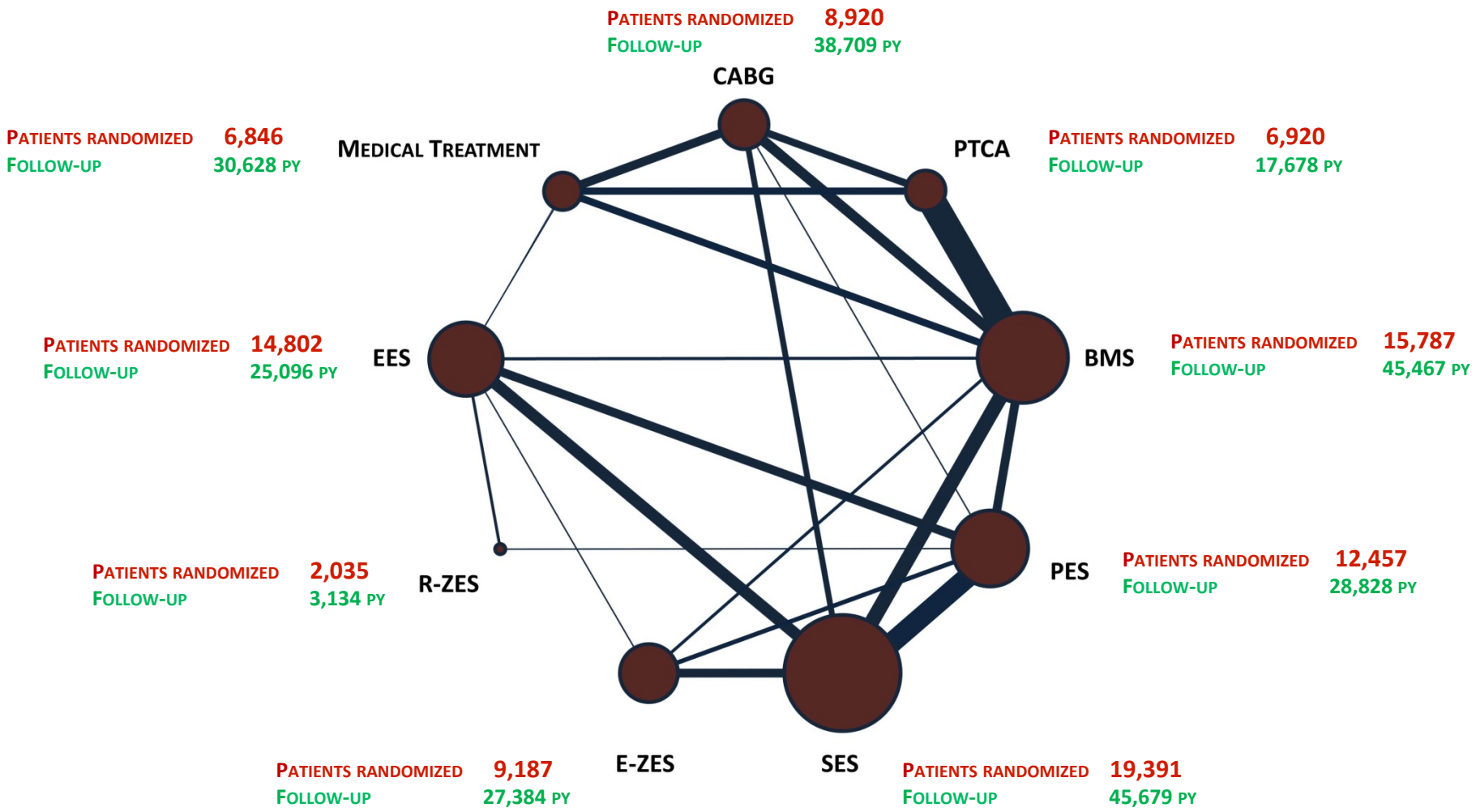
Spontaneous MI



Revascularization vs Medical Therapy: a Network Meta-analysis

Windecker S et al. *BMJ* 2014 23;348:g3859

100 RCTs - 93'553 PATIENTS RANDOMIZED
FOLLOW - UP OF 262'090 PATIENT-YEARS

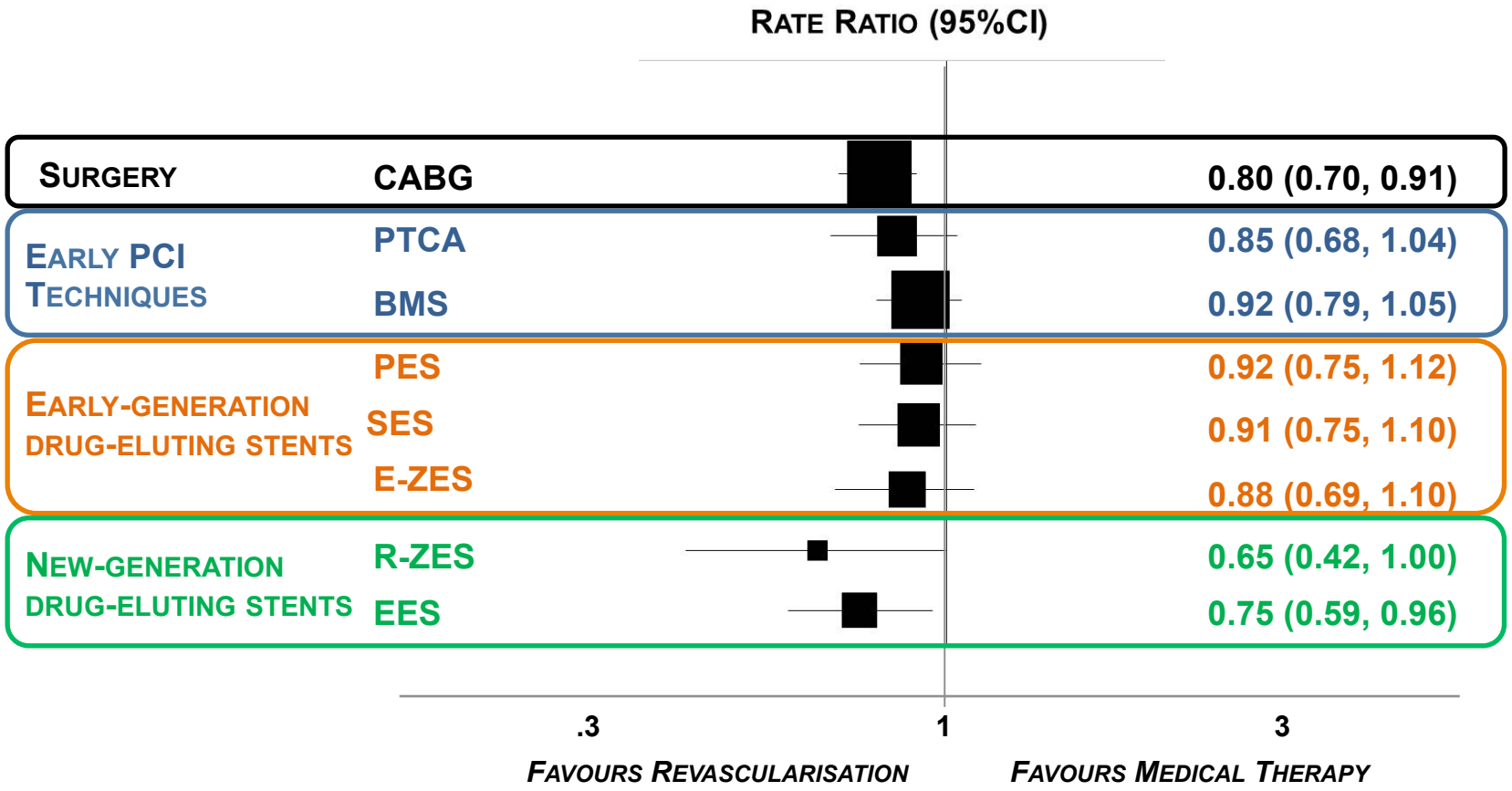


Revascularization vs Medical Therapy: a Network Meta-analysis

Windecker S et al. *BMJ* 2014 23;348:g3859

PRIMARY ENDPOINT: ALL-CAUSE MORTALITY

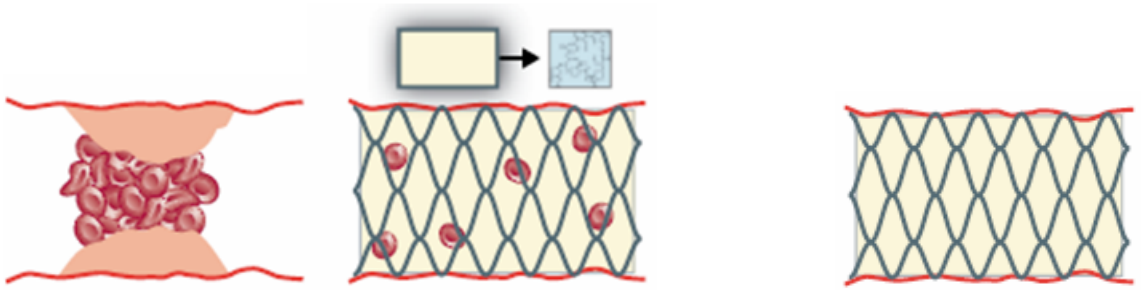
100 RCTS, 93'553 RANDOMIZED PATIENTS, 262'090 PATIENT-YEARS OF FOLLOW-UP, 5'346 EVENTS



Devices for the Treatment of Acute Myocardial Infarction

Windecker S et al. *Lancet* 2013; 382:644-57

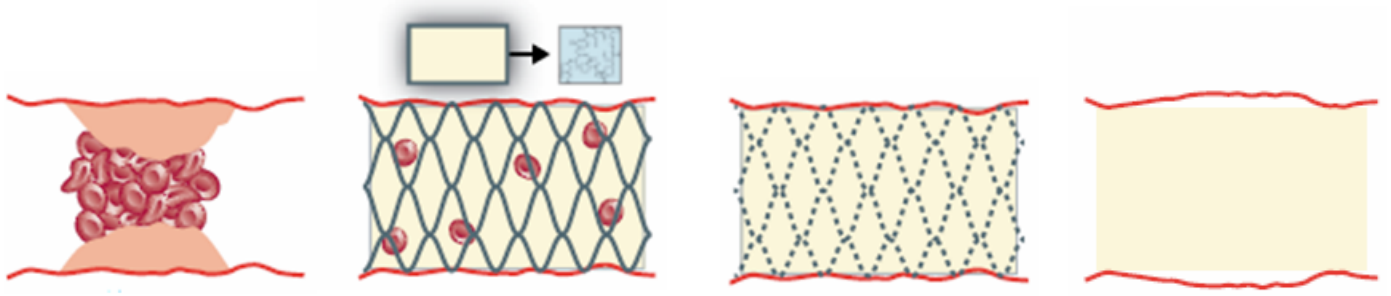
Stents



Scaffolding function and drug release

Caged Vessel

Scaffolds

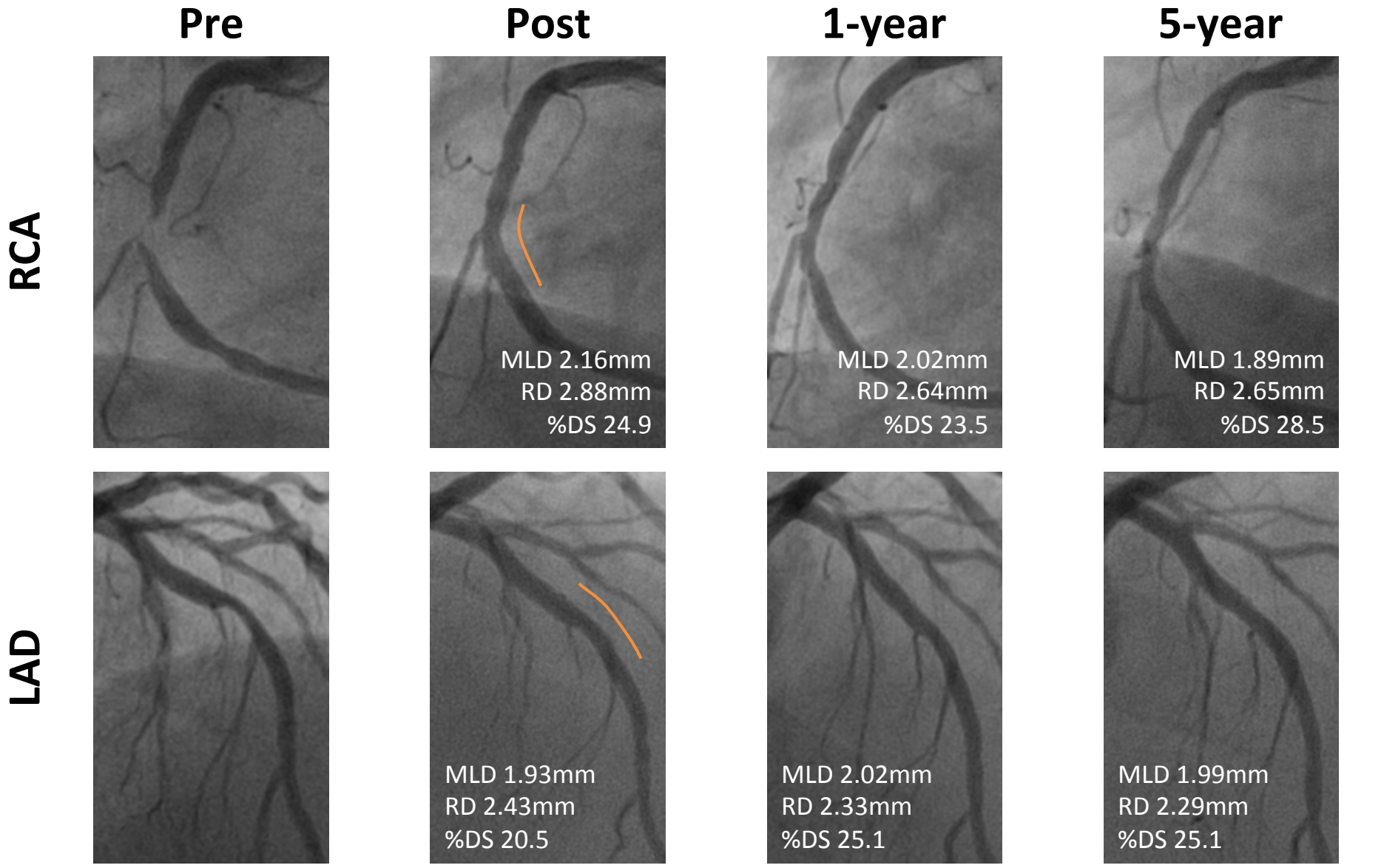


Scaffolding function and drug release

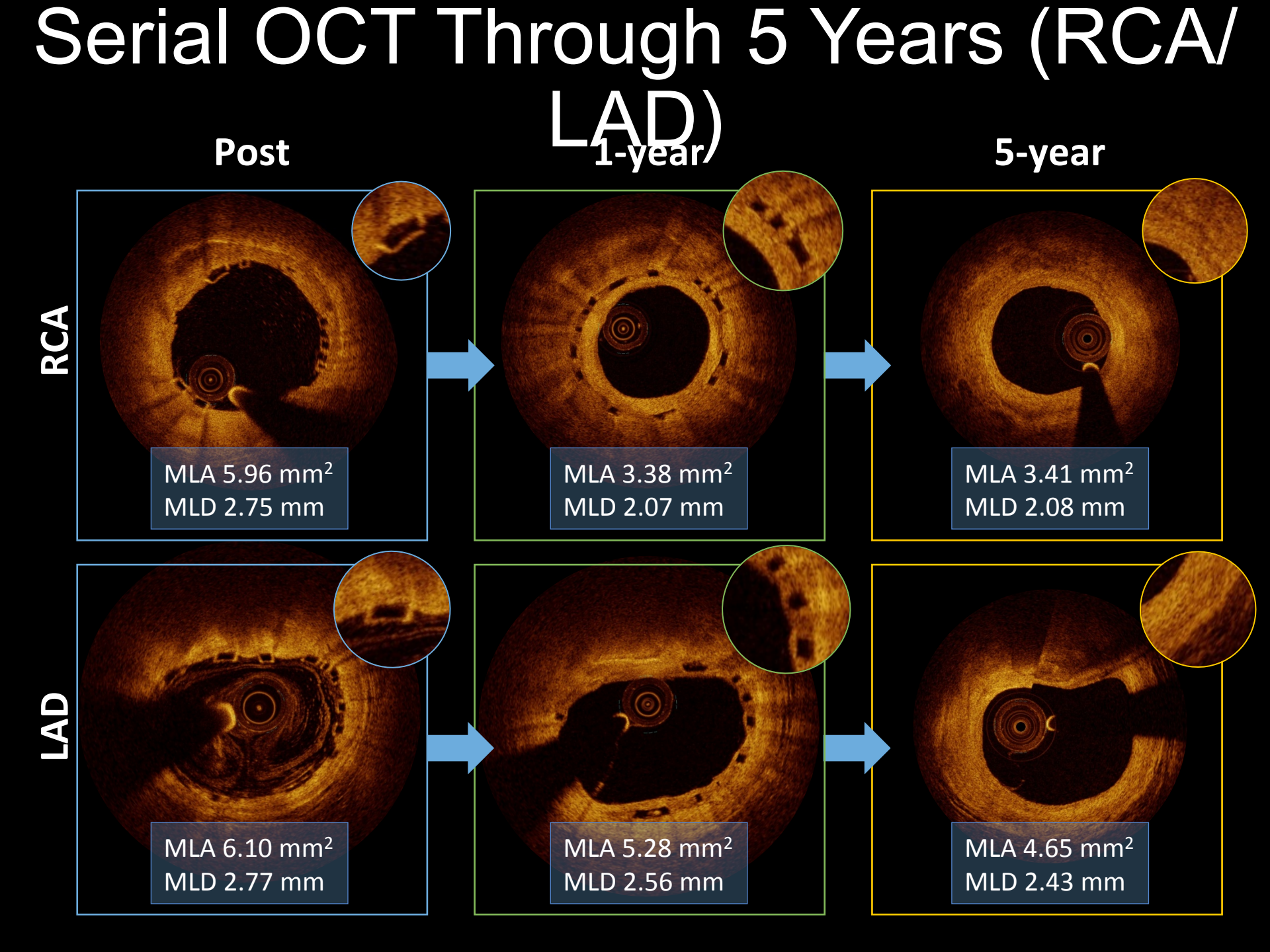
Bioresorption

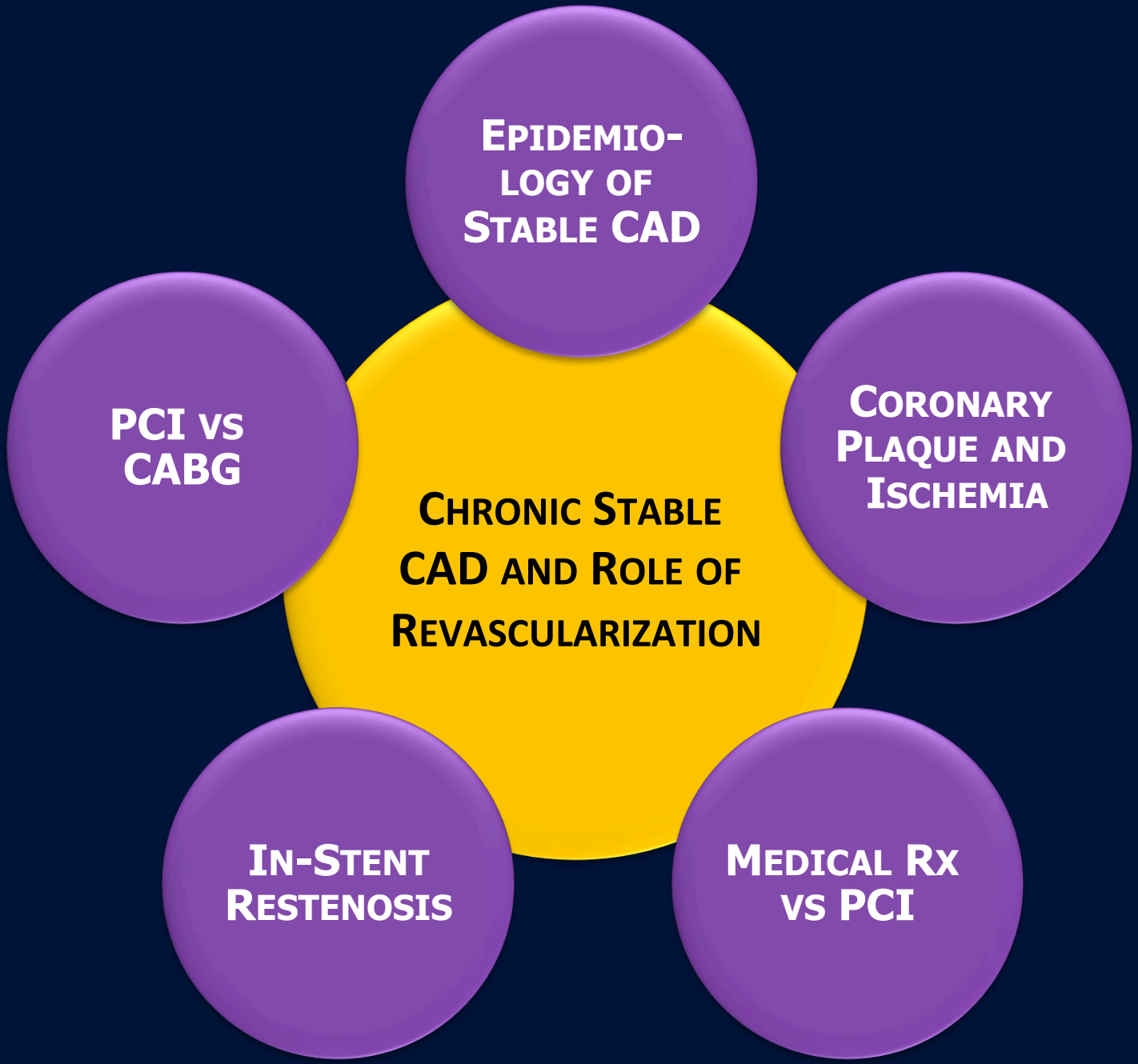
Restoration of vascular physiology and lumen enlargement

Serial Angiographic Assessment – Bern Case



Serial OCT Through 5 Years (RCA/LAD)




Epidemio-logy of Stable CAD
Coronary Plaque and Ischemia
Medical Rx vs PCI
In-Stent Restenosis
PCI vs CABG
Chronic Stable CAD and Role of Revascularization

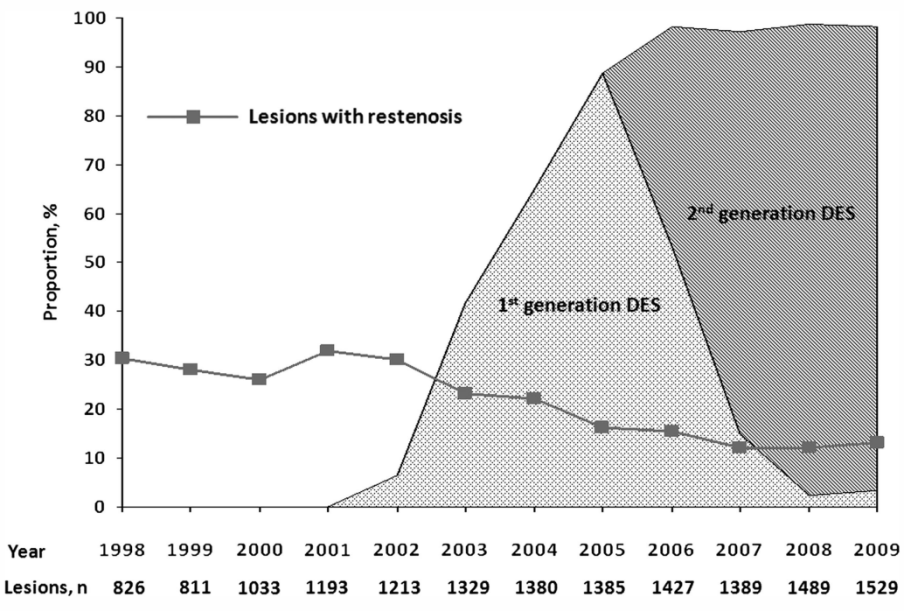
Prevalence and Impact of Restenosis After Coronary Stenting

10,004 PCI-Patients with routine control angiography at 6-8 months

Restenosis during 1998-2009

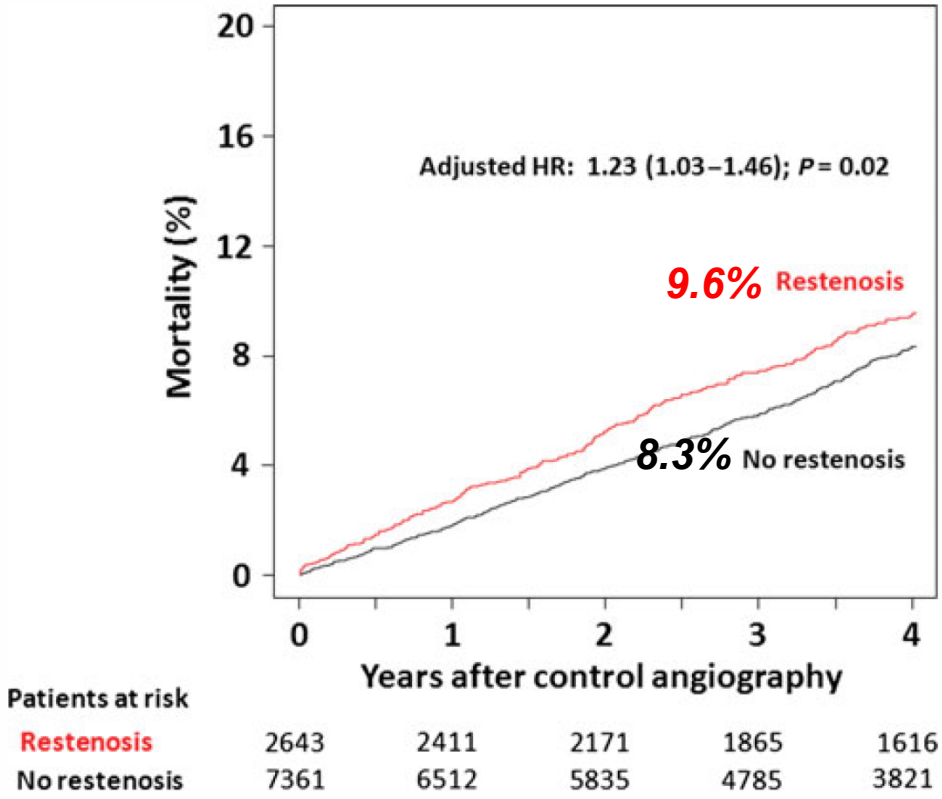
Cassese S et al. *Circulation* 2013;127:769-781

Restenosis with BMS (30.1%), Early DES (14.6%), New DES (12.2%)



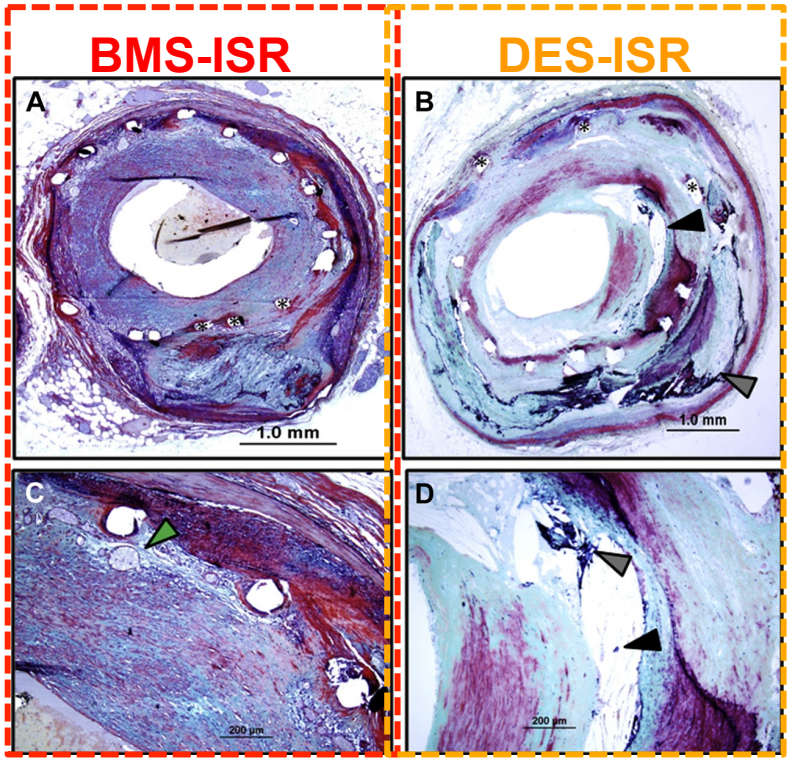
All-cause mortality @4 Yrs

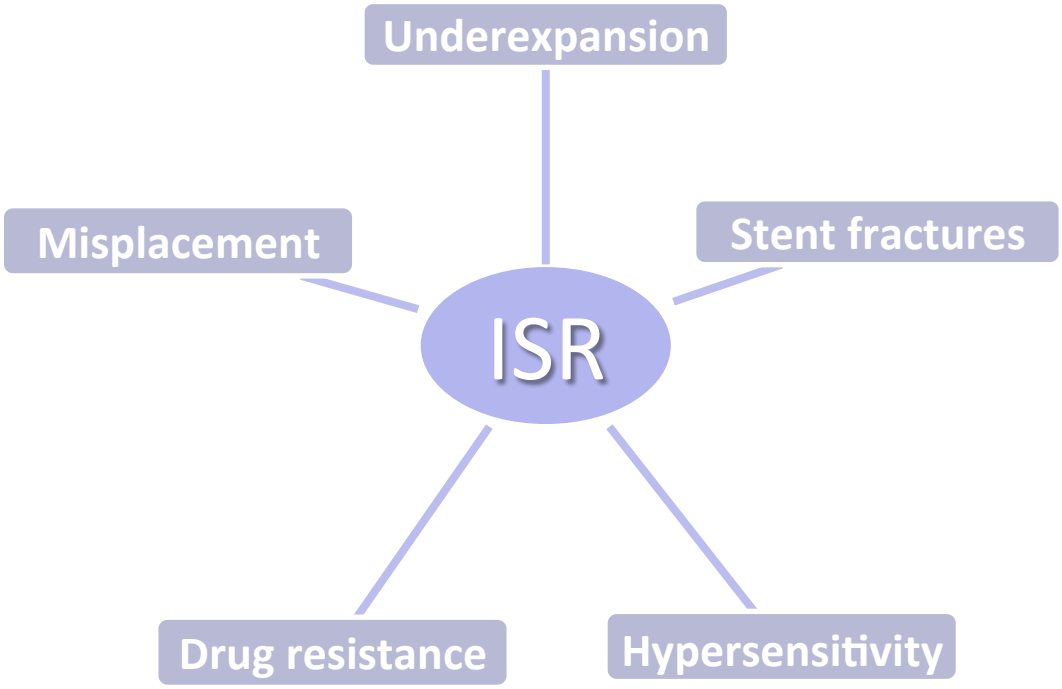
Cassese S et al. *Eur Heart J* 2015;36:94-99



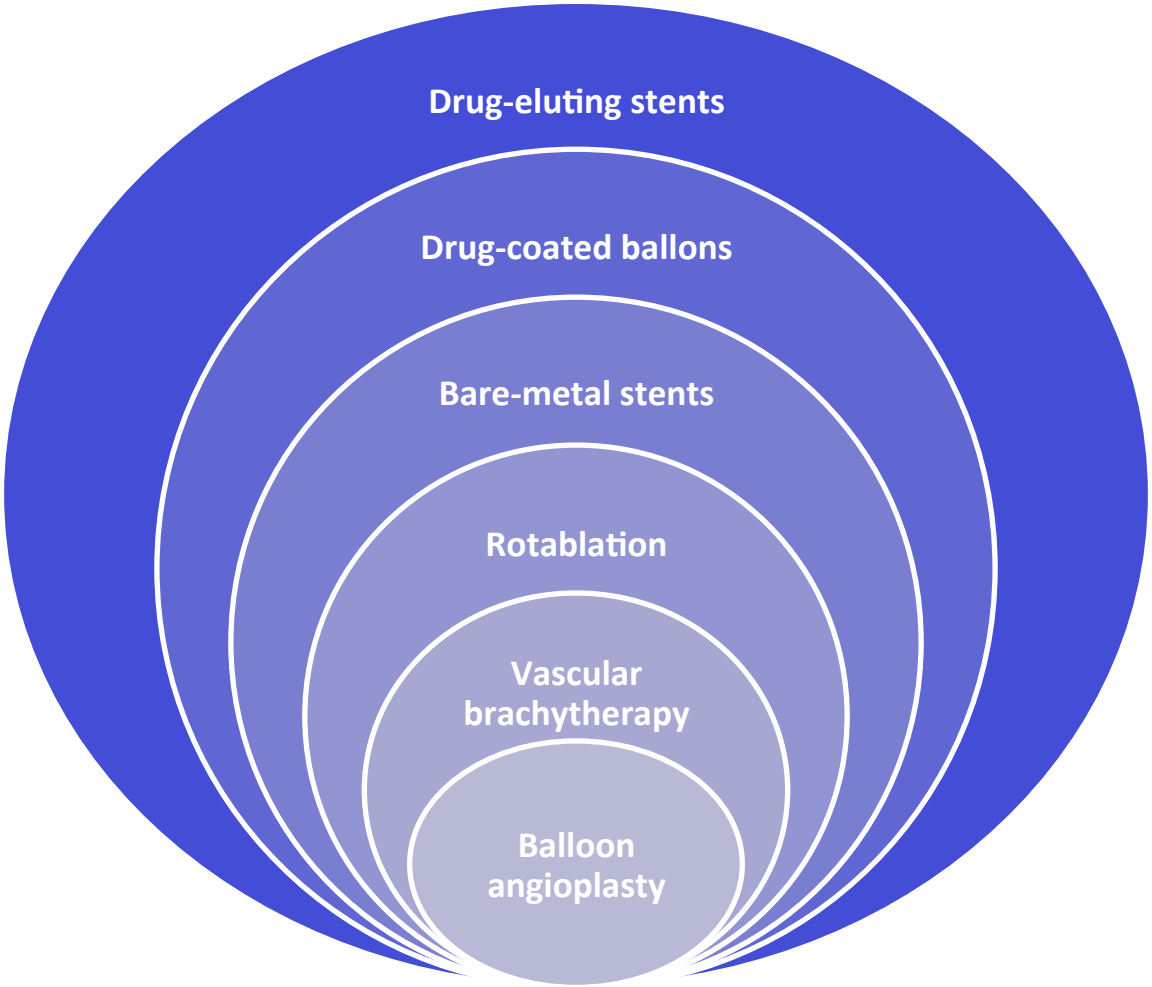
Substrates of ISR

Alfonso F. et al. *J Am Coll Cardiol* 2014

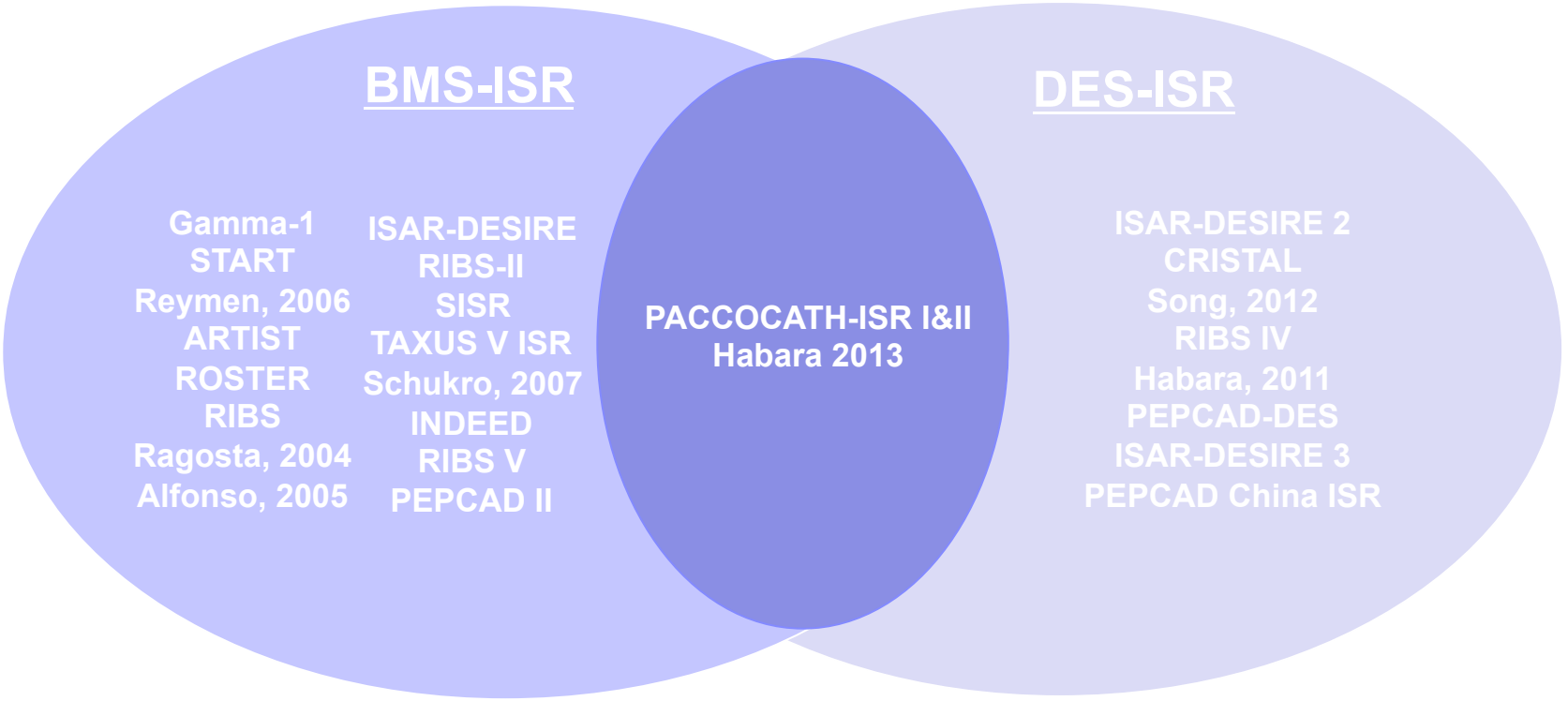




Percutaneous Treatment Options of ISR

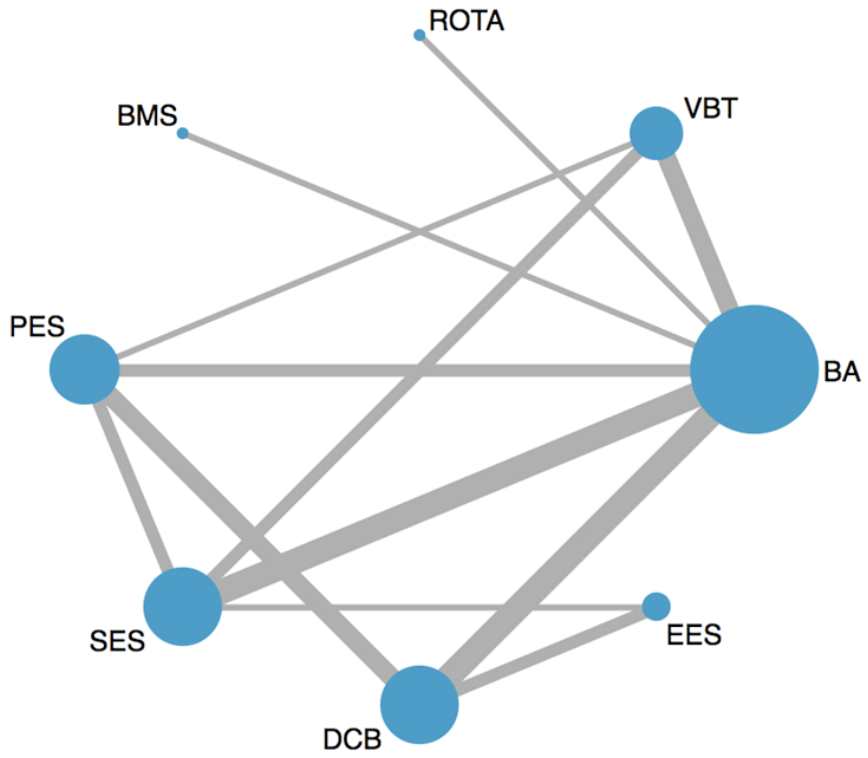


Evidence from RCTs



Evidence from Network Meta-analysis

Siontis GC et *al. Lancet* 2015;386:655-64



Trial	Year	Type of ISR	Interventions	Sample size
Vascular brachytherapy				
Gamma-1	2001	BMS	BA vs. VBT	252
START	2002	BMS	BA vs. VBT	476
Reynen K., et al	2006	BMS	BA vs. VBT	165
Rotablation				
ARTIST	2002	BMS	BA vs. ROTA	298
ROSTER	2004	BMS	BA vs. ROTA	200
Bare-metal stents				
RIBS	2003	BMS	BA vs. BMS	450
Ragosta M., et al	2004	BMS	BA vs. BMS	58
Ragosta M., et al	2004	BMS	ROTA vs. BMS	55
Alfonso F., et al	2005	BMS	BA vs. BMS	40
Drug-eluting stents				
ISAR-DESIRE	2005	BMS	BA vs. PES vs. SES	300
RIBS-II	2006	BMS	BA vs. SES	150
SISR	2006	BMS	VBT vs. SES	384
TAXUS V ISR	2006	BMS	VBT vs. PES	396
Schukro C., et al	2007	BMS	VBT vs. PES	37
INDEED	2008	BMS	VBT vs. SES	129
ISAR-DESIRE 2	2010	DES	PES vs. SES	450
CRISTAL	2012	DES	BA vs. SES	197
Song H., et al	2012	DES	BA vs. SES	96
Song H., et al	2012	DES	SES vs. EES	66
RIBS-V	2014	BMS	DCB vs. EES	189
RIBS-IV	2014	DES	DCB vs. EES	309
Drug-coated ballons				
PACCOCATH-ISR I&II	2006 (I), 2008 (II)	BMS & DES	BA vs. DCB	108
PEPCAD II	2009	BMS	PES vs. DCB	131
Habara S., et al	2011	DES	BA vs. DCB	50
PEPCAD-DES	2012	DES	BA vs. DCB	110
Habara S., et al	2013	BMS & DES	BA vs. DCB	210
ISAR-DESIRE 3	2013	DES	BA vs. PES vs. DCB	402
PEPCAD China ISR	2014	DES	PES vs. DCB	215

27 trials eligible, 5923 patients - angiographic follow-up for 4975 (84%)

Evidence from Network Meta-analysis

Siontis GC et *al. Lancet* 2015;386:655-64

→ Assessed outcomes:

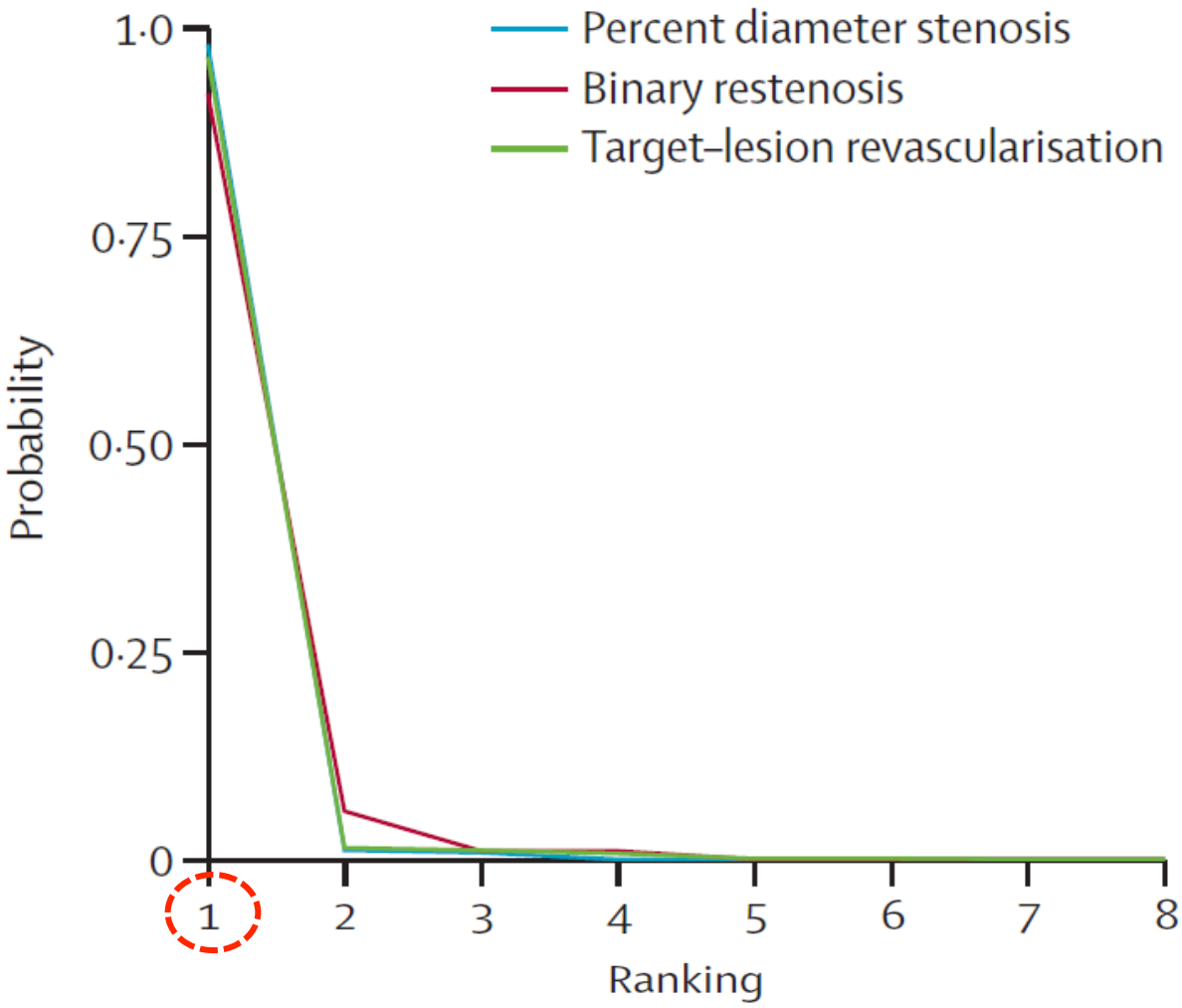
- **Primary outcome:**
  - ✓ Percent diameter stenosis

- **Secondary outcomes:**
  - ✓ Binary restenosis
  - ✓ Target lesion revascularization
  - ✓ Myocardial infarction
  - ✓ All-cause mortality

Evidence from Network Meta-analysis

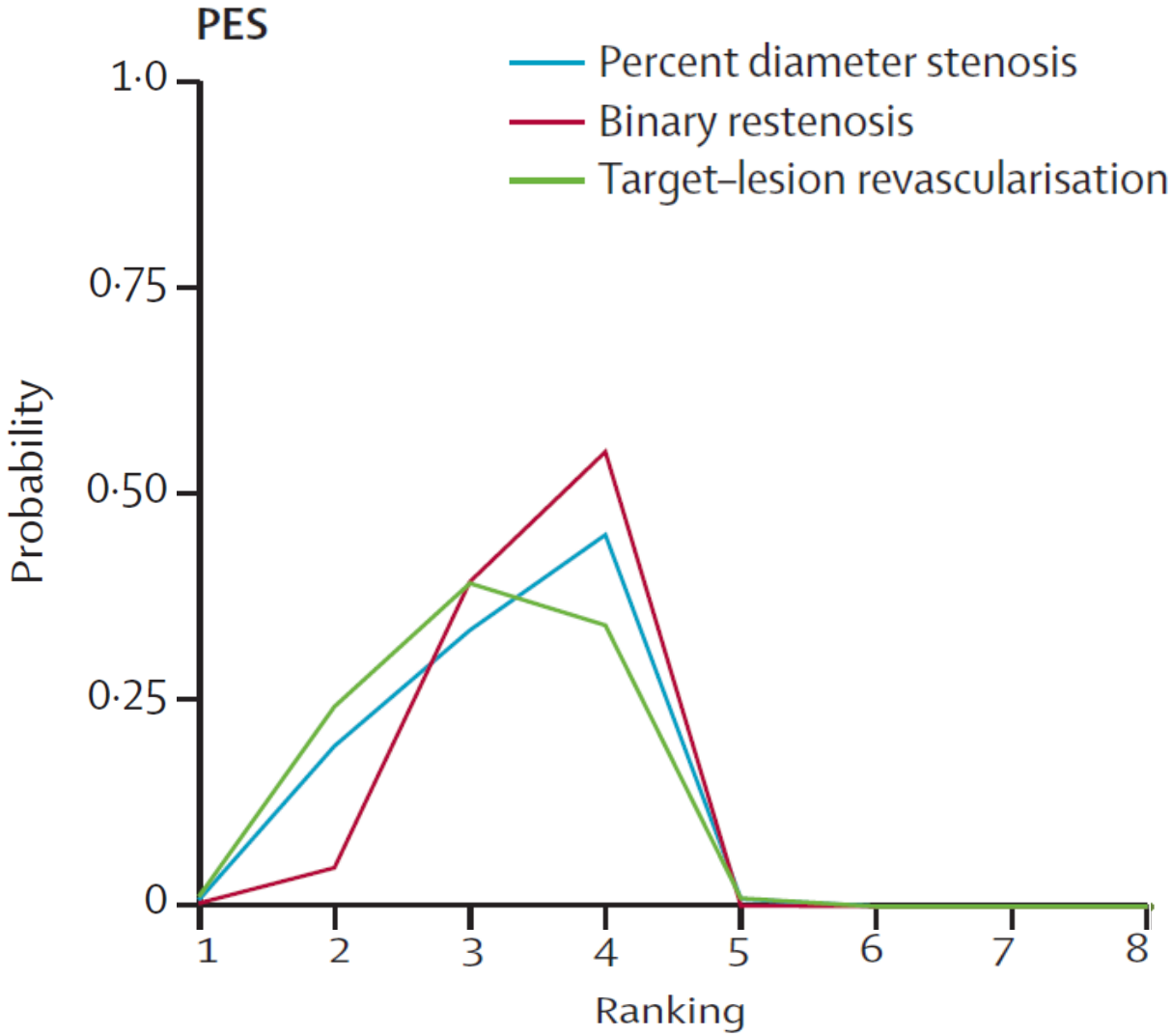
Siontis GC et *al. Lancet* 2015;386:655-64

Everolimus-eluting stents



Evidence from Network Meta-analysis

Siontis GC et *al. Lancet* 2015;386:655-64



Evidence from Network Meta-analysis

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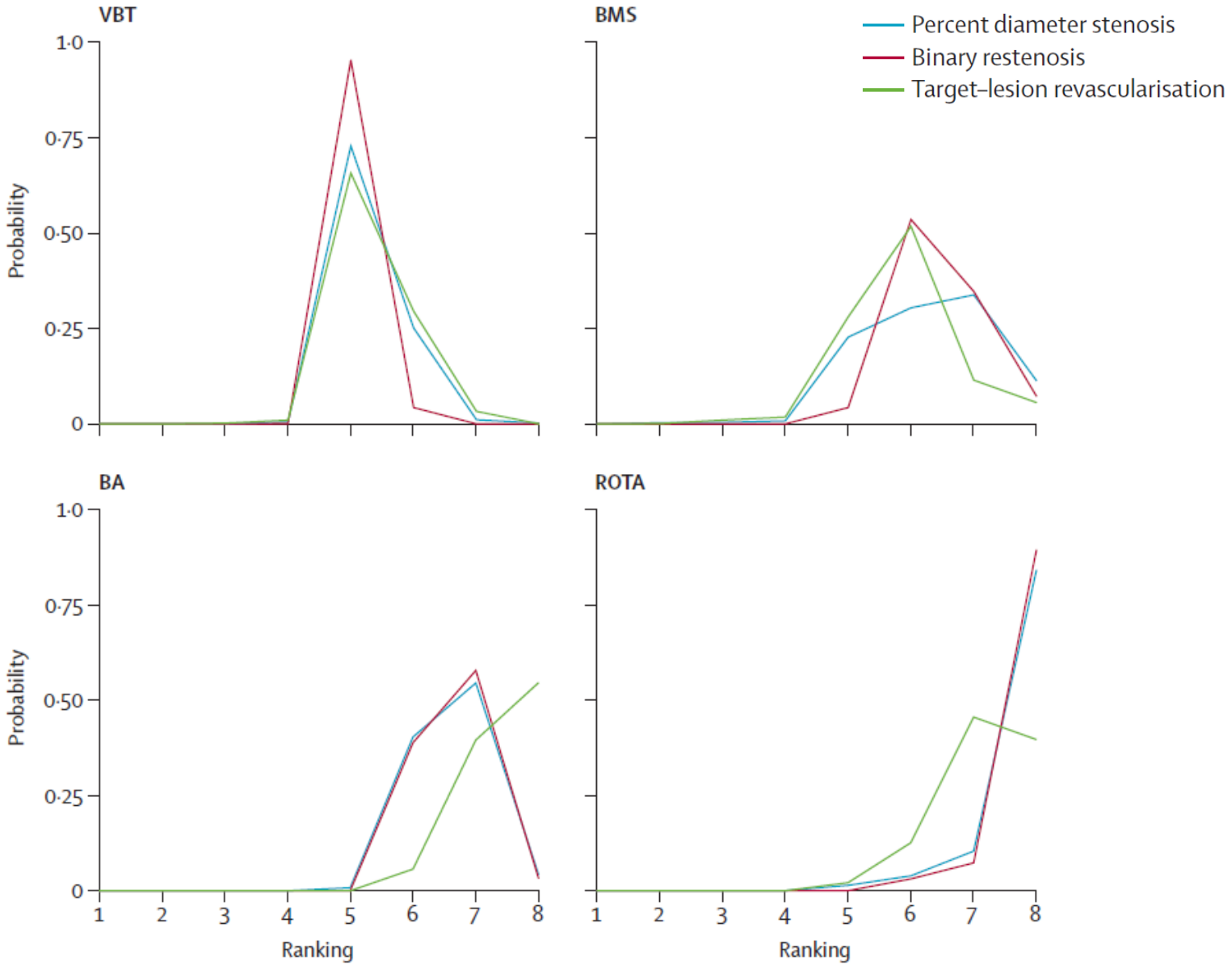


Evidence from Network Meta-analysis

Siontis GC et *al. Lancet* 2015;386:655-64

	EES	DCB	SES	PES	VBT	BMS	BA	ROTA
EES	**99·6 (0·98)**	–9·0% (–15·8,–2·2)	–9·4% (–17·4,–1·4)	–10·2% (–18·4,–2·0)	–19·2% (–28·2,–10·4)	–23·4% (–36·2,–10·8)	–24·2% (–32·2,–16·4)	–31·8% (–44·8,–18·6)
DCB		**73·7 (0·00)**	–0·2% (–6·2,5.6)	–1·2% (–6·4,4·2)	–10·2% (–17·0,–3·4)	–14·4% (–25·6,–3·2)	–15·2% (–20·4,–10·2)	–22·8% (–34·4,–11·0)
SES			**72·8 (0·01)**	–0·8% (–6·4,4·6)	–10·0% (–15·4,–4·4)	–14·2% (–25·2,–3·2)	–15·0% (–19·4,–10·4)	–22·4% (–33·8,–11·0)
PES				**67·7 (0·01)**	–9·0% (–15·6,–2·4)	–13·2% (–24·6,–2·0)	–14·2% (–19·4,–8·8)	–21·6% (–33·2,–9·8)
VBT					**38·9 (0·00)**	–4·2% (–15·4,7.0)	–5·0% (–10·2,–0·00)	–12·6% (–24·2,–0·8)
BMS						**24·3 (0·00)**	–0·8% (–10·8,9·2)	–8·2% (–22·8,6·2)
BA							**19·7 (0·00)**	–7·4% (–18·0,3·0)
ROTA								**3·2 (0·00)**

Primary outcome: % Diameter stenosis

Evidence from Network Meta-analysis

Siontis GC et *al. Lancet* 2015;386:655-64

	EES	DCB	PES	SES	VBT	BMS	ROTA	BA
EES	**99·1 (0·97)**	0·36 (0·14,0·94)	0·34 (0·12,1·00)	0·34 (0·12,0·97)	0·17 (0·06,0·51)	0·14 (0·04,0·47)	0·09 (0·03,0·31)	0·09 (0·03,0·25)
DCB		**73·7 (0·01)**	0·93 (0·51,1·71)	0·93 (0·55,1·58)	0·47 (0·26,0·86)	0·38 (0·17,0·84)	0·26 (0·12,0·55)	0·24 (0·15,0·40)
PES			**70·7 (0·02)**	1·00 (0·59,1·68)	0·50 (0·30,0·84)	0·41 (0·19,0·90)	0·28 (0·13,0·59)	0·26 (0·16,0·42)
SES				**70·0 (0·01)**	0·50 (0·30,0·85)	0·41 (0·19,0·90)	0·28 (0·13,0·58)	0·26 (0·16,0·41)
VBT					**38·0 (0·00)**	0·82 (0·38,1·76)	0·55 (0·27,1·14)	0·52 (0·34,0·80)
BMS						**30·3 (0·00)**	0·68 (0·32,1·46)	0·64 (0·34,1·21)
ROTA							**11·0 (0·00)**	0·94 (0·53,1·67)
BA								**7·3 (0·00)**

Secondary outcome: Target-lesion revascularisation

REVASCULARIZATION IN MULTIVESSEL CAD
PCI VERSUS CABG

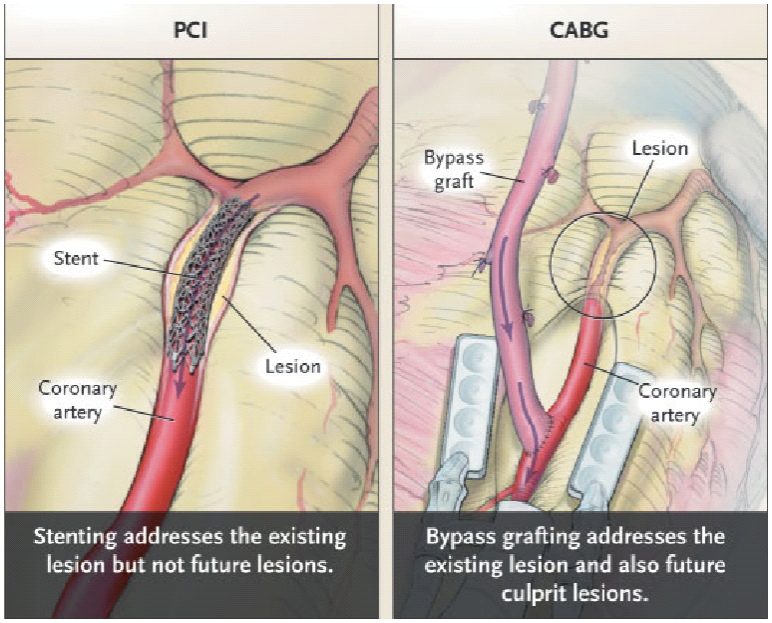
PCI

-less invasive

-shorter hospitalisation

-lower risk of CVA

-quality of life



Gersh et al. *NEJM* 2005

CABG

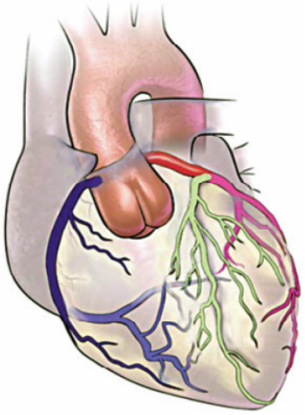
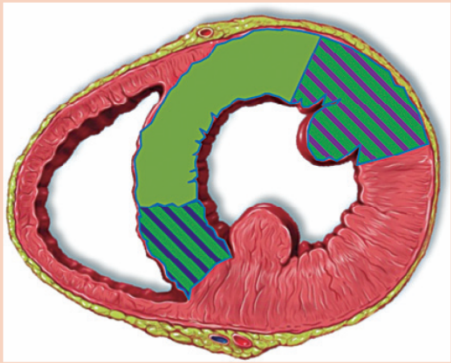
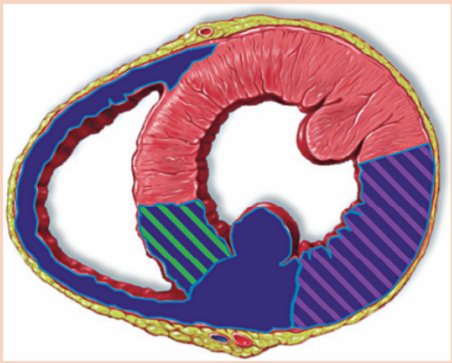
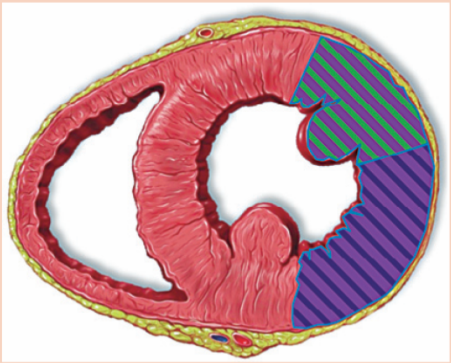
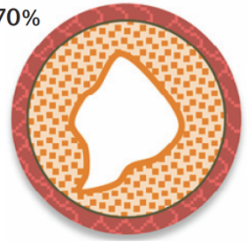
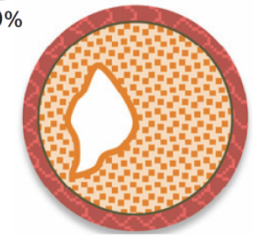
-more complete revascularization

-fewer repeat revascularizations

-protection against future events

Choice of Conduits in Patients undergoing CABG

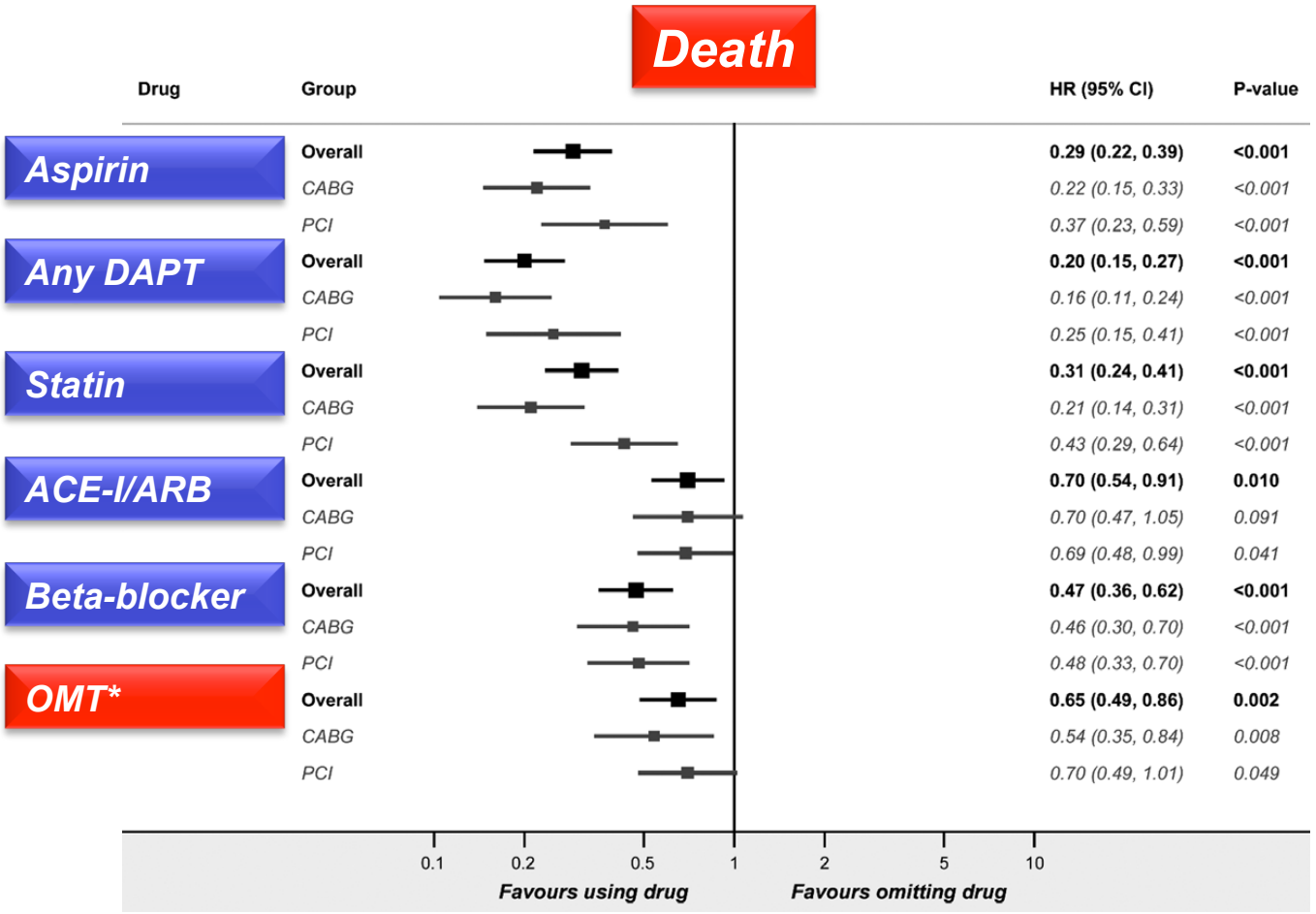
Piccolo R et al. *Lancet* 2015;386:702-713

Coronary distribution	LAD	RCA	LCx
			
Target-vessel stenosis 50–70% 	Internal mammary artery (left)	Saphenous vein	Second internal mammary artery (BIMA) Saphenous vein, if internal mammary artery is not indicated*
Target-vessel stenosis >70% 	Internal mammary artery (left)	Saphenous vein for 70–90% diameter stenosis Radial artery for ≥90% diameter stenosis	Second internal mammary artery (BIMA) Radial artery, if internal mammary artery is not indicated*

LAD RCA LCx LAD or RCA LAD or LCx RCA or LCx

Optimal Medical Therapy in Patients Undergoing PCI or CABG

Iqbal J et al. *Circulation* 2015;131:1269-77



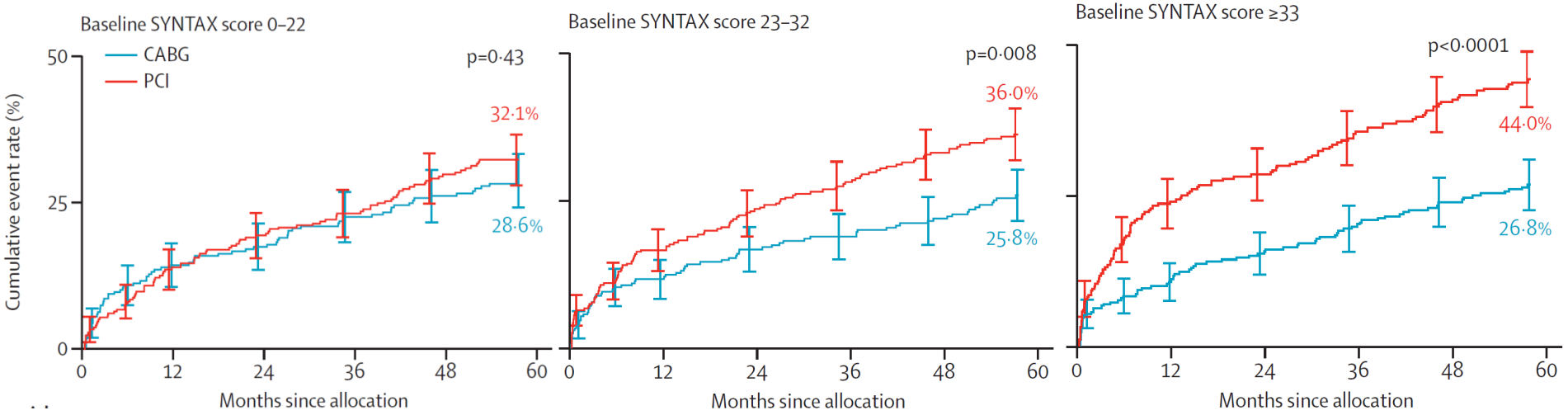
N=1,800 patients included in the SYNTAX. FU: 5 years

**OMT defined as the combination of at least 1 antiplatelet drug, statin, β-blocker, and angiotensin-converting enzyme inhibitor/angiotensin receptor blocker.*

MACCE TO 5 YEARS BY SYNTAX SCORE

Mohr FW et al. *Lancet* 2013;381:629-38

Low Scores (0-22) | **Intermediate Scores (23-32)** | **High Score ≥33**



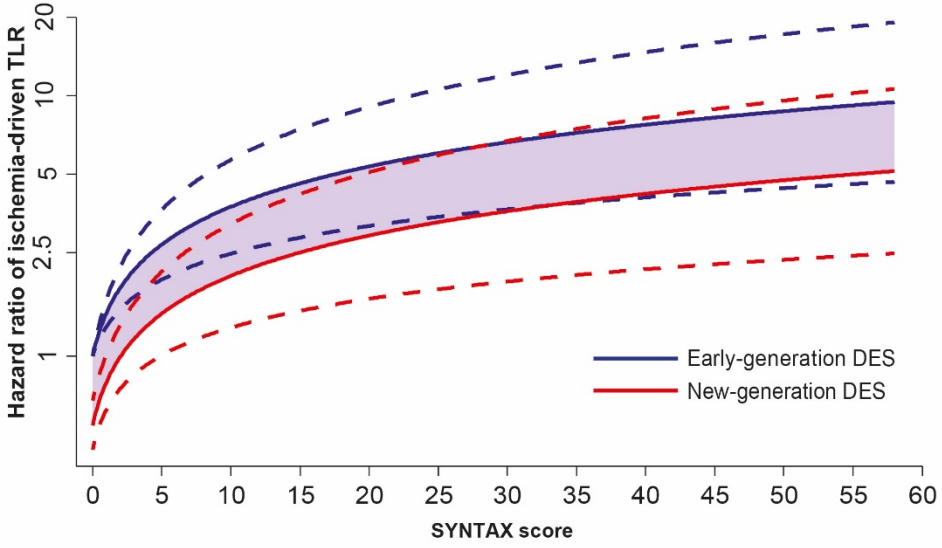
	Death	MI	Death	MI	Death	MI
PCI	8.9	7.8	13.8	11.2	19.2	10.1
CABG	10.1	4.2	12.7	3.6	11.4	3.9
	P=0.64	*P=0.11*	*P=0.68*	*P=0.0009*	*P=0.005*	*P=0.004*

SAFETY AND EFFICACY OF NEW-GENERATION VS. EARLY-GENERATION DES ACCORDING TO SYNTAX SCORE

Piccolo R et al. *JACC CV Intv* 2015, in press

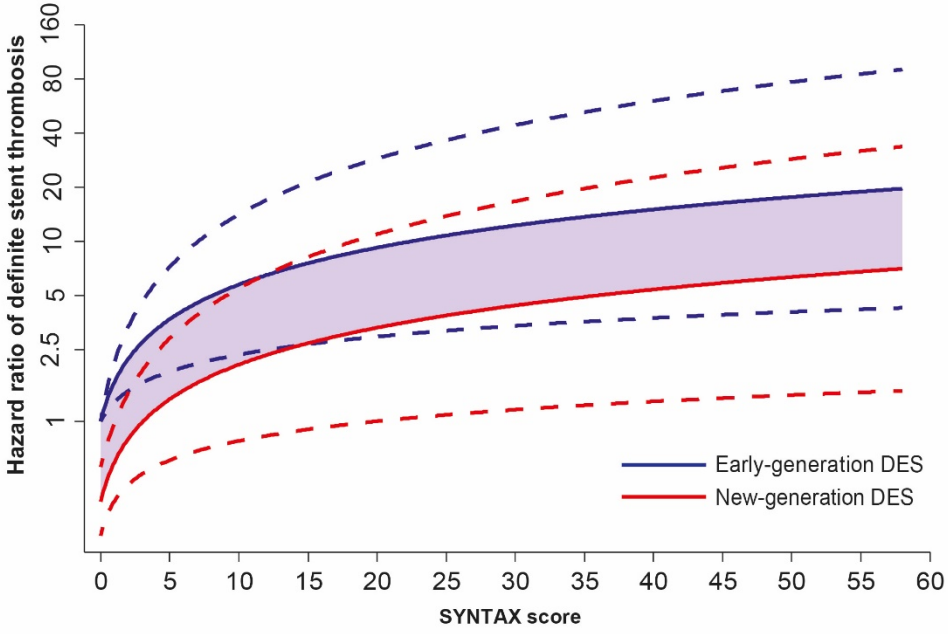
Target-lesion revascularization

P_{int} for SYNTAX score and type of DES =0.25



Definite Stent Thrombosis

P_{int} for SYNTAX score and type of DES =0.11



Preserved benefit of New-generation DES across the overall spectrum of CAD
Pooled Analysis of SIRTAX, LEADERS, RESOLUTE, BIOSCIENCE (n =6,081)

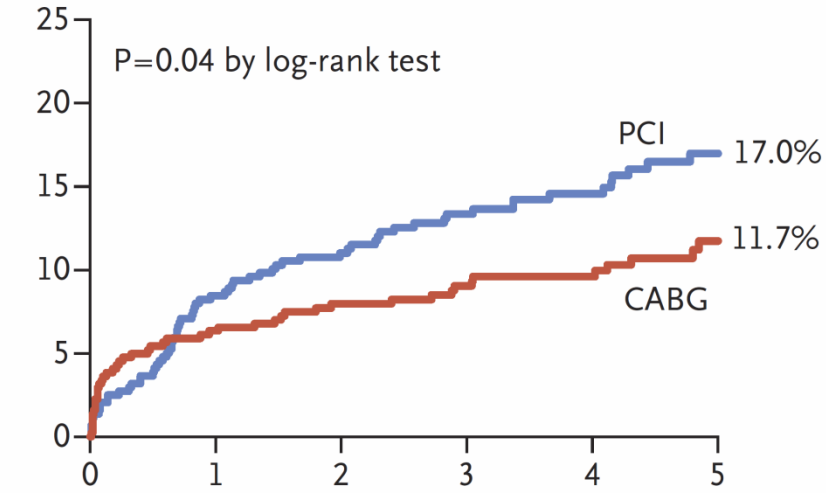
EVEROLIMUS-ELUTING STENT VS CABG IN MVD: BEST

Park S et al. *NEJM* 2015;372:1204-12

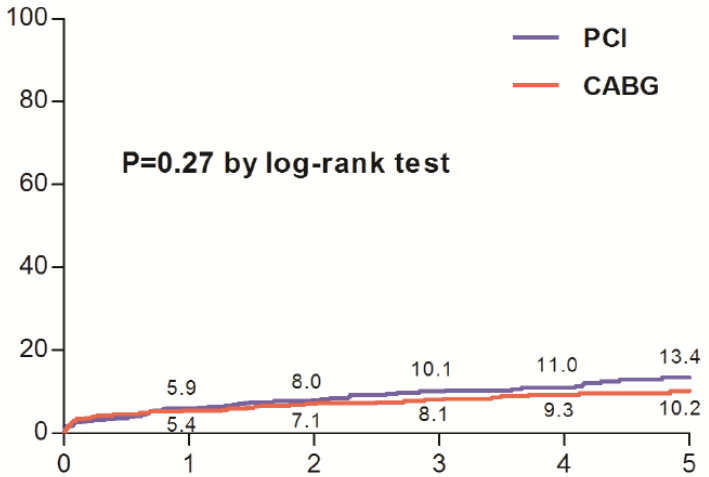
EES vs. CABG (n =880) – 49.5% of the planned sample (n =1,776)

Randomized non inferiority trial
27 centers in East Asia (South Korea, China, Malaysia, and Thailand)

Death, MI or TVR*



Death, MI, or Stroke



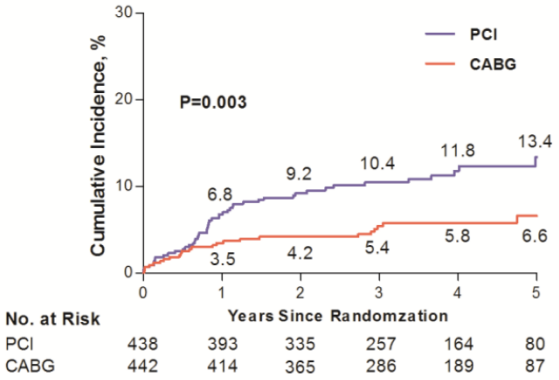
Death, MI, or Stroke: 13.4% in EES vs. 10.2% in CABG (p=0.27)

****primary endpoint***
55% of patients (n=487) enrolled at one site.

BEST: Analysis of Repeat Revascularization

Park S et al. *NEJM* 2015;372:1204-12

Any Repeat Revascularization

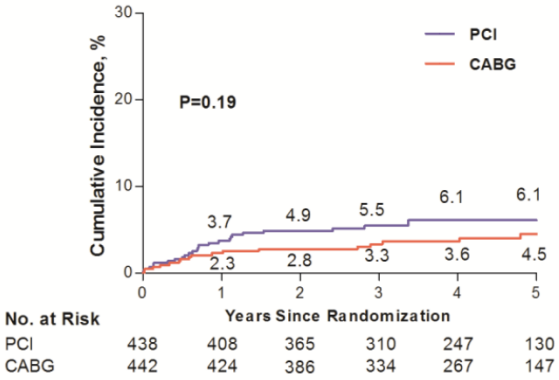


EES: 13.4%

CABG: 6.6%

P-value: 0.003

Target-lesion Revascularization

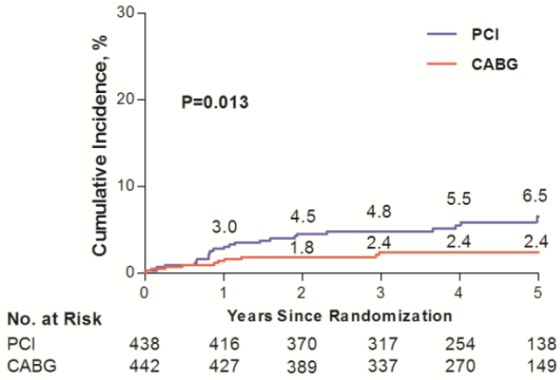


EES: 6.1%

CABG: 4.5%

P-value: 0.19

New Lesion Revascularization



EES: 6.5%

CABG: 2.4%

P-value: 0.013

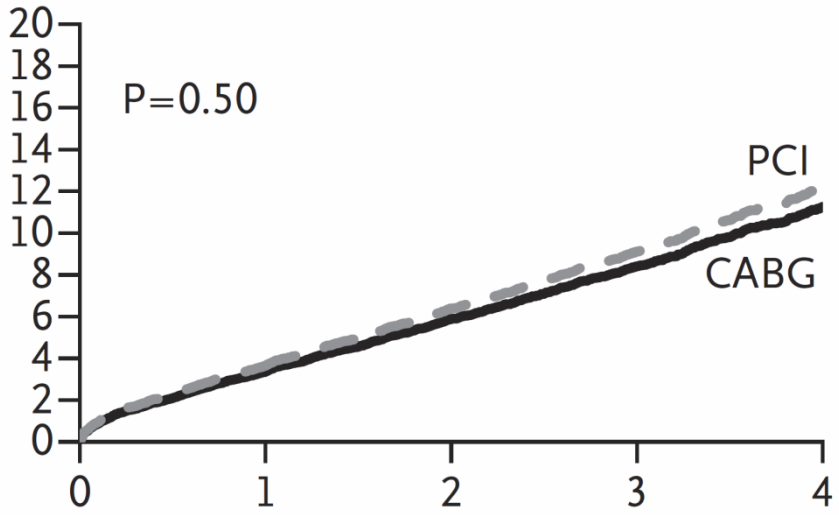
Complete revascularization (no residual stenosis >50% in all diseased segments with RVD≥2.00 mm) was higher in the CABG than in the PCI group (71.5% vs. 50.9%, p <0.001)

EES vs CABG in MVD: New York State Cardiac Registry

Bangalore S et al. *NEJM* 2015;372:1213-22

18,446 patients included in propensity-score matched analysis

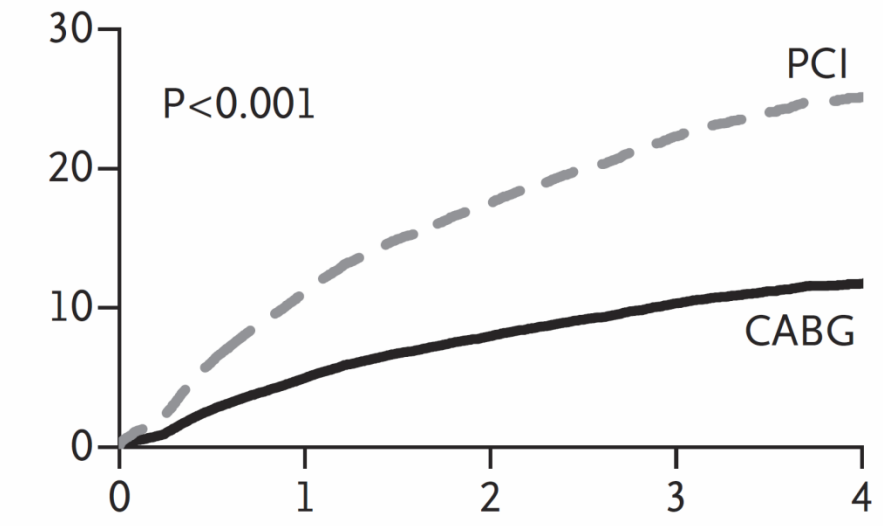
Death*



EES: 3.1% per year

CABG: 2.9% per year

Repeat revascularization



EES: 7.25% per year

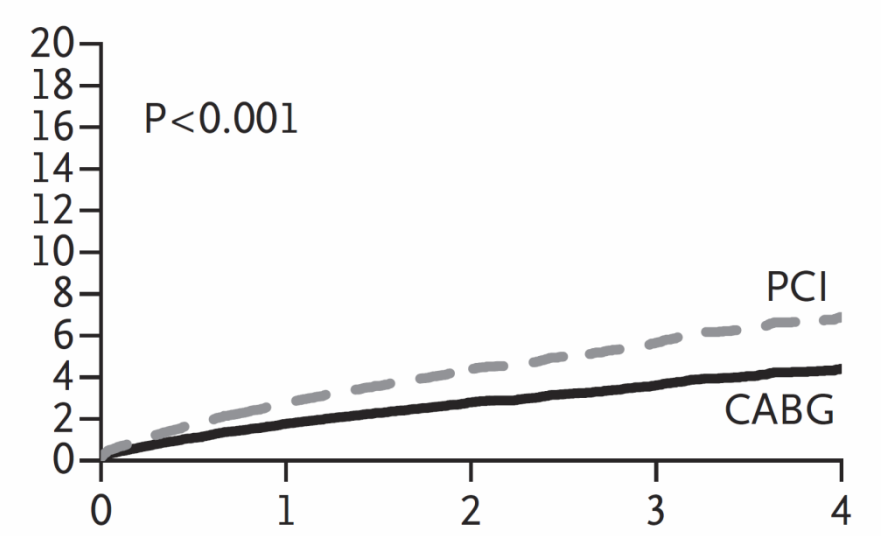
CABG: 3.1% per year

****primary outcome***

EES vs CABG in MVD: New York State Cardiac Registry

Bangalore S et al. *NEJM* 2015;372:1213-22

Myocardial infarction



EES: 1.9% per year

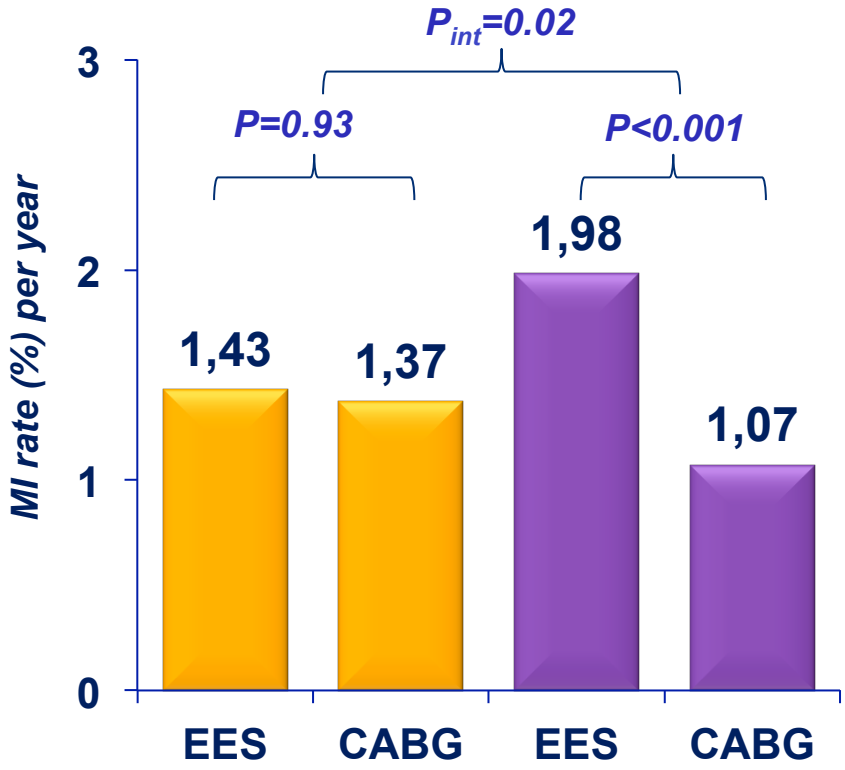
CABG: 1.1% per year

***Complete revasc: 3,822 (20.7%)**
***Incomplete revasc: 14,624 (79.3%)**

Effect of Completeness Rev on MI*

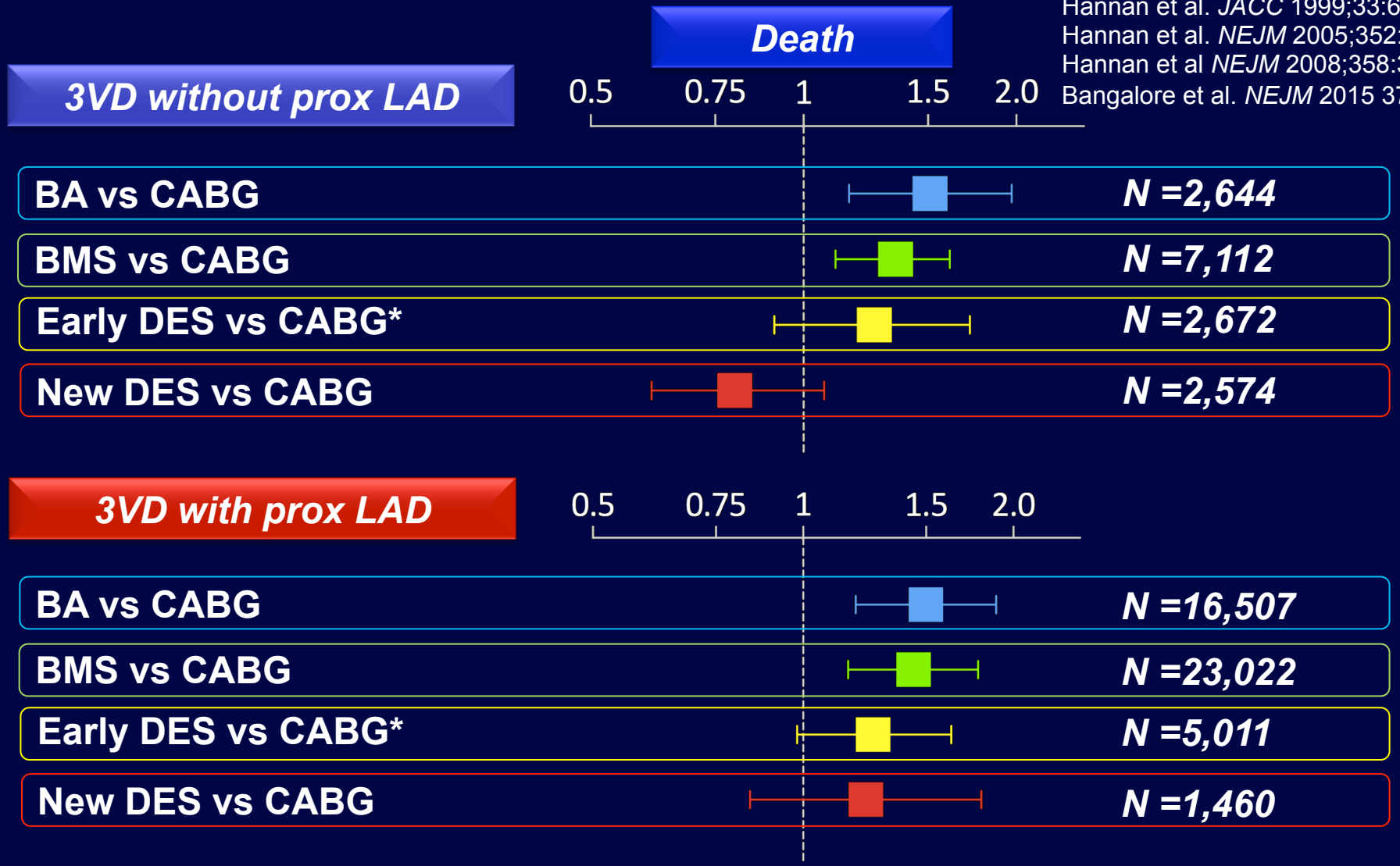
Complete Revasc

Incomplete Revasc



PCI Iterations vs. CABG in the New York State Cardiac Registry: Effect on Mortality

Hannan et al. *JACC* 1999;33:63
Hannan et al. *NEJM* 2005;352:2174
Hannan et al *NEJM* 2008;358:331
Bangalore et al. *NEJM* 2015 372:1213



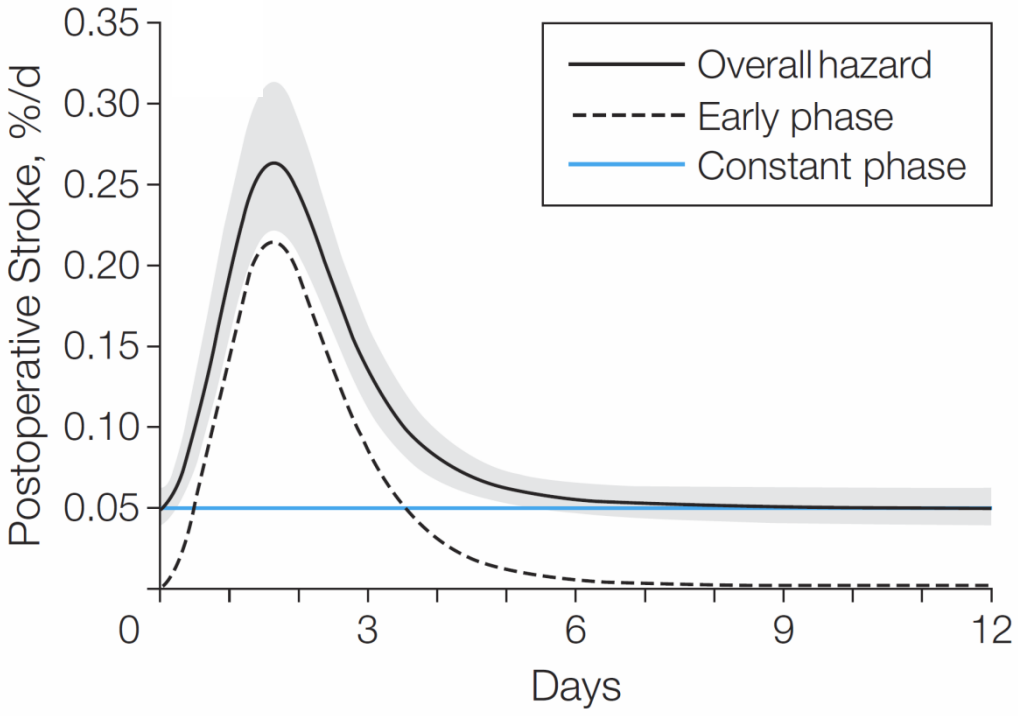
*CABG imrpoved survival in the overall 3VD

PERIOPERATIVE STROKE WITH CABG

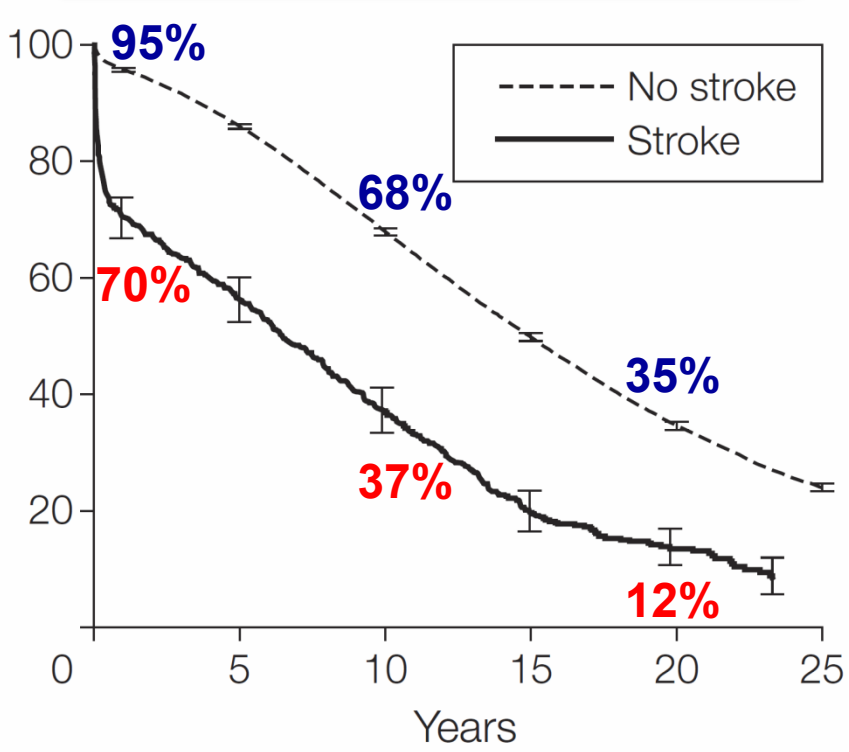
Tarakji K et al. *JAMA* 2011;305:381-390

Prospective study conducted from 1982 to 2009 at single US centre (N =45,432)

Instantaneous risk of stroke



Survival rate (%) after stroke

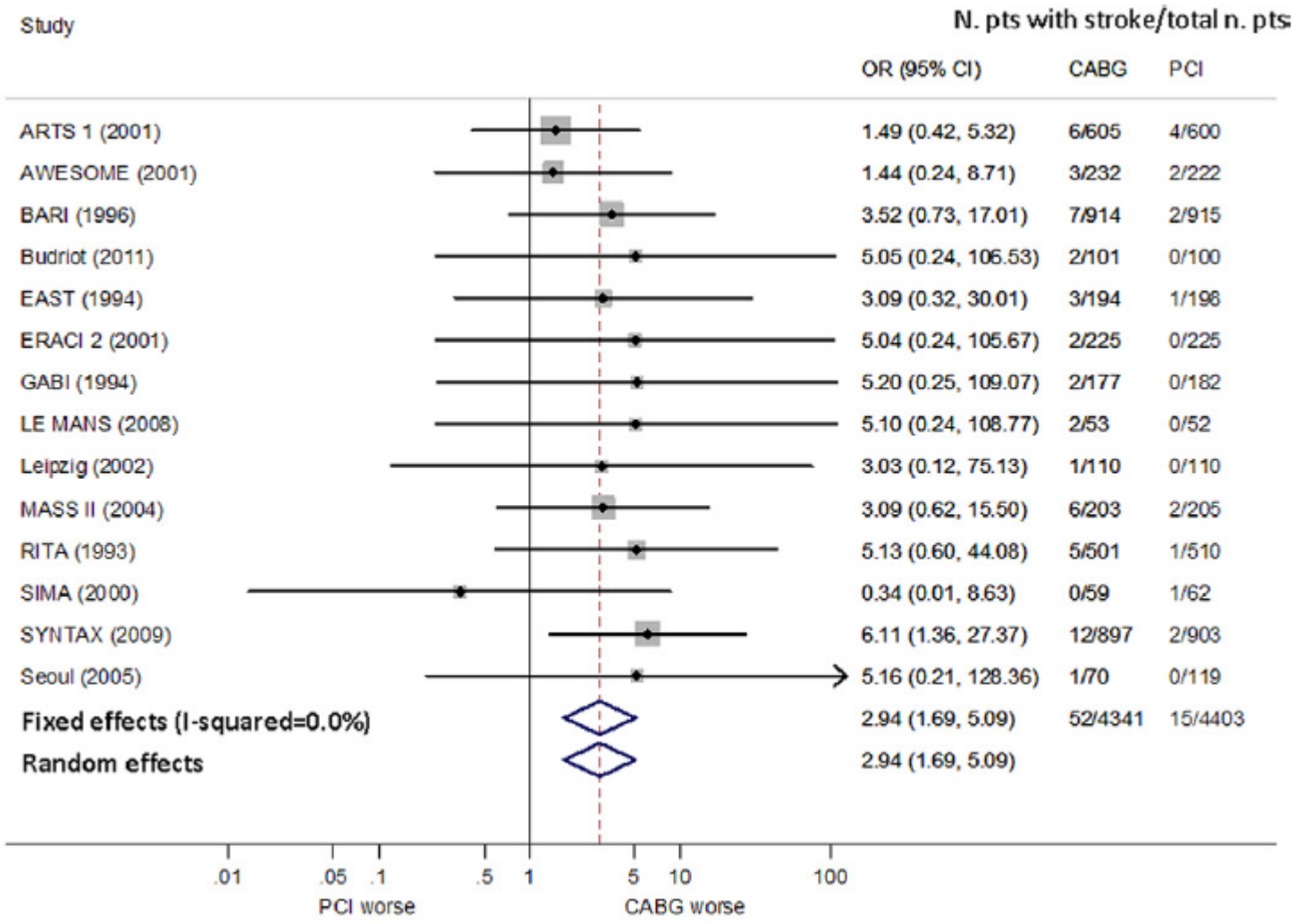


Stroke occurred in 1.6% patients – Intraoperative stroke in 40% of cases

Risk factors: older age, small BSA, previous stroke, perioperative AF

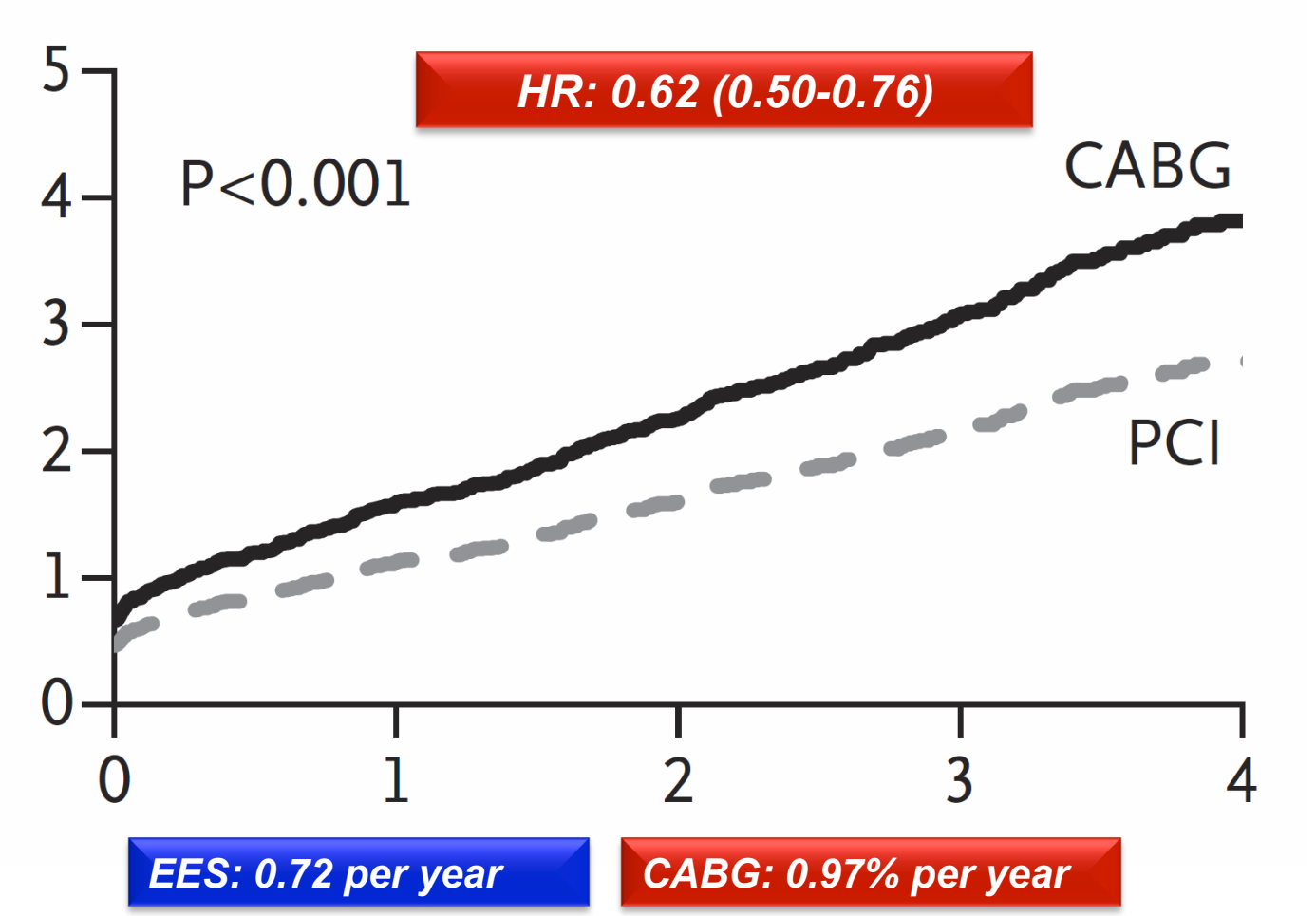
CABG vs PCI – Risk of Stroke

Palmerini T et al. *J Am Coll Cardiol* 2012;60(9):798-805



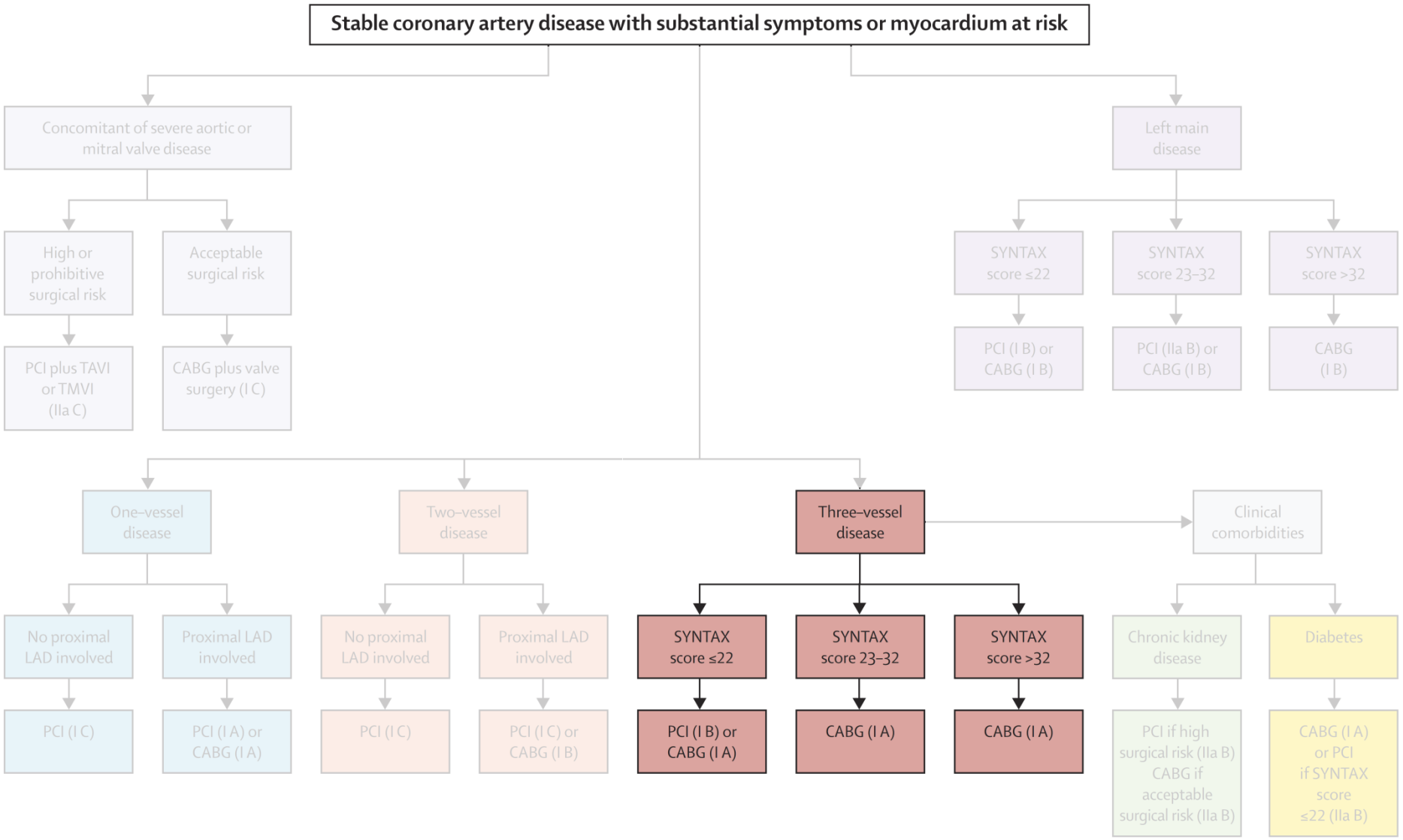
RISK OF STROKE: THE NEW YORK STATE CARDIAC REGISTRY

Bangalore S et al. *NEJM* 2015;372:1213-22



Revascularization Across Different Anatomical and Clinical Subsets

Piccolo R et al. *Lancet* 2015;386:702-713



Coronary Artery Disease

Remains most common cause of death and MI

– Avoids procedural risk

– ↑ Quality of life
– ↑ Exercise time
– ↓ Angina
– ↓ Antianginal drugs
– ↓ Revascularization
– ↓ Death or MI