



# Asymptomatic Carotid Stenoses: Interventional, Surgical or Medical Management

Robert M. Bersin, MD, MPH, FACC, FSCAI  
Medical Director, Endovascular Services  
Swedish Medical Center, Seattle, WA

# Disclosure Statement of Financial Interest

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

Robert M. Bersin, MD

Abbott Vascular C, P, SB

Ablative Solutions EI

Boston Scientific AB, C, EI, P, SB

Cook Medical, Inc. C, P

Med Alliance SA, AB, EI

Medtronic, Inc. C, P

Omeros Corp, EI

QT Vascular, EI

Transverse Medical AB, EI, SO

Vatrix Medical EI

W.L. Gore C, P

AB: Advisory Board

C: Consulting Relationship

EI: Equity Interest

GS: Grant Support

P: Proctor or Training Course Sponsorships

SB: Speakers Bureau

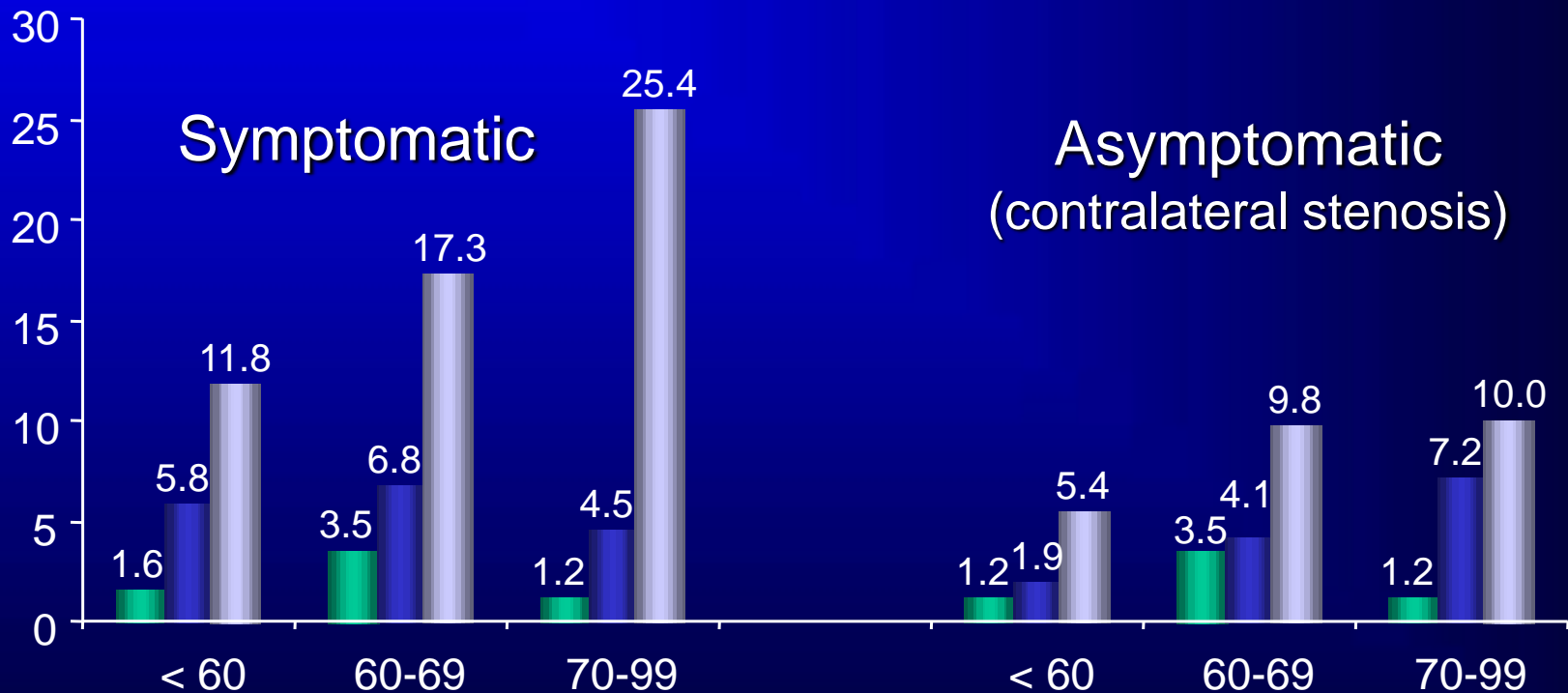
SE: Spouse Employee

SO: Stock Options or Positions

# Carotid Artery Disease: Causes of Stroke by Lesion Severity

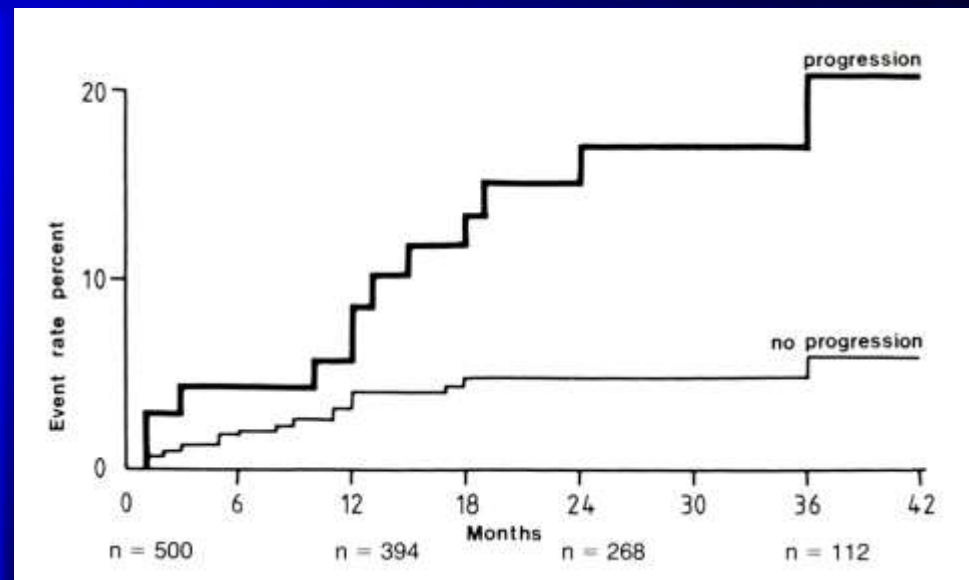
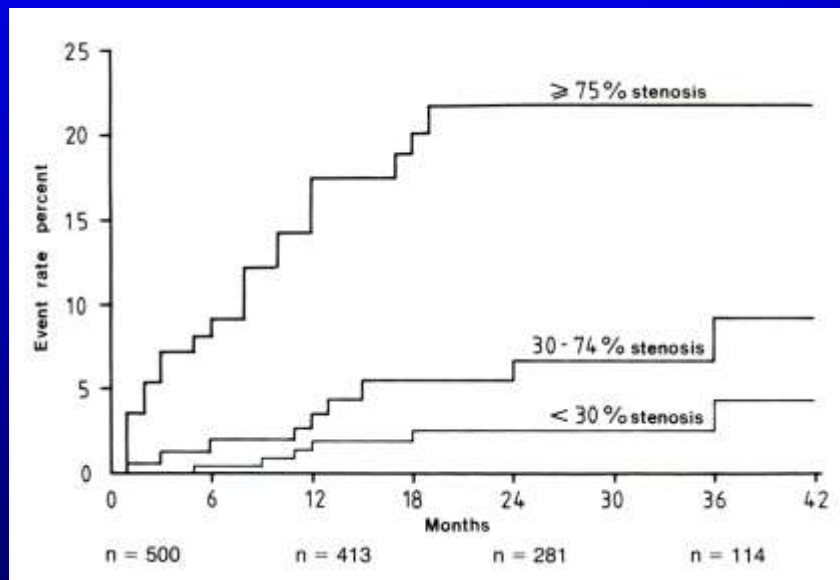
NASCET Trial – Medically Treated Patients, 5-year Risk

■ Cardioembolic ■ Lacunar ■ Large Artery



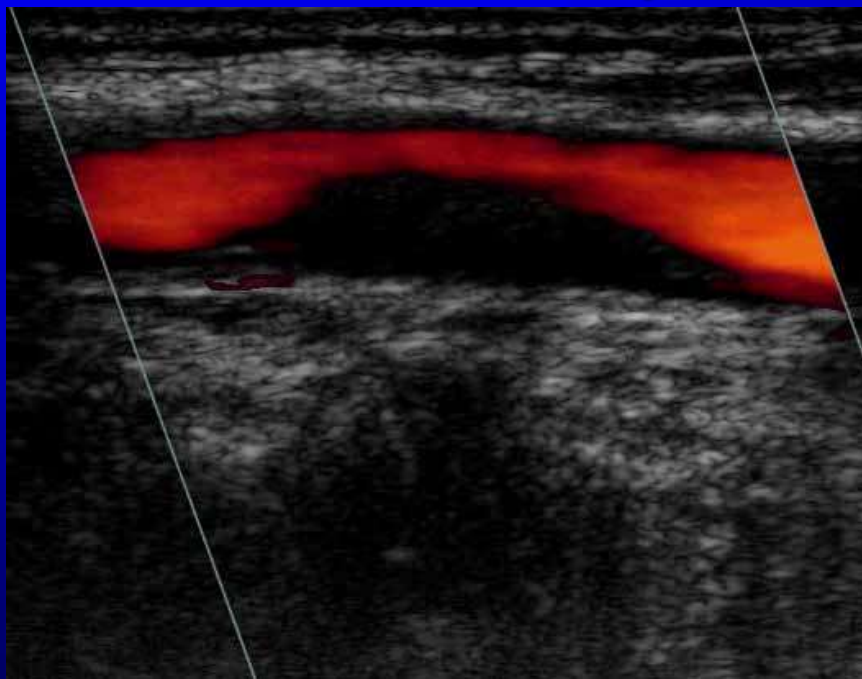
# Asymptomatic Carotid Stenosis Rate of Progression and Risk of Stroke

## Risk of Cerebral Events by Lesion Severity Duplex Ultrasonography

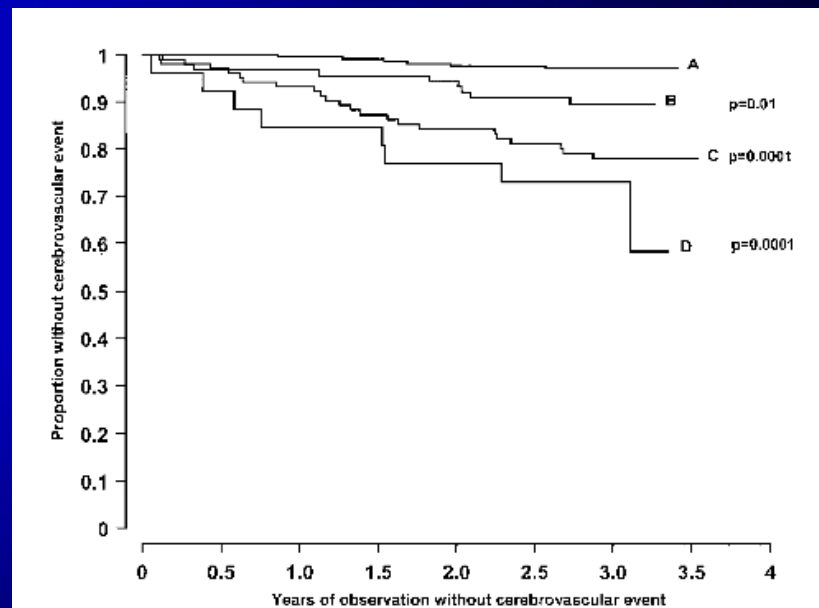


# Echolucent Carotid Plaques and Clinical Events

## Tromsø Study



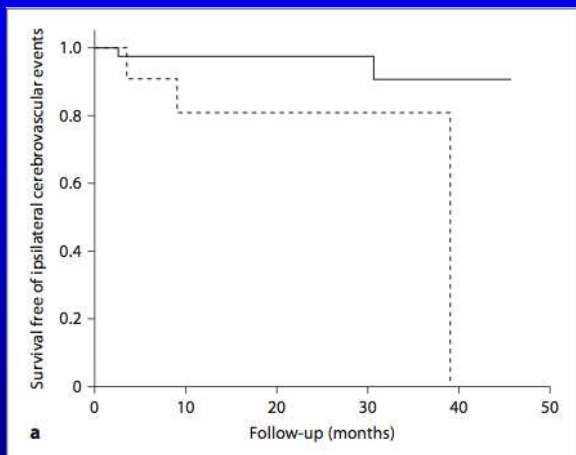
Echolucent Plaque



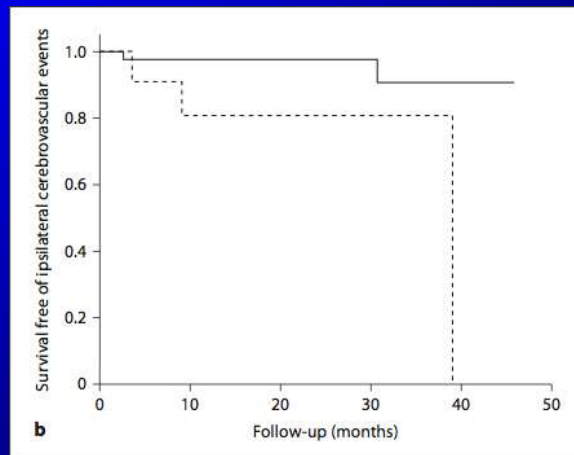
Graph of event-free survival for subjects without stenosis and subjects with stenosis according to plaque echogenicity. A, Subjects without stenosis; B, subjects with echogenic and predominantly echogenic plaques; C, subjects with predominantly echolucent plaques; and D, subjects with echolucent plaques. Probability values refer to comparison between group B, C, or D vs control subjects (A).

# Carotid Plaque Characteristics and Cerebrovascular Events

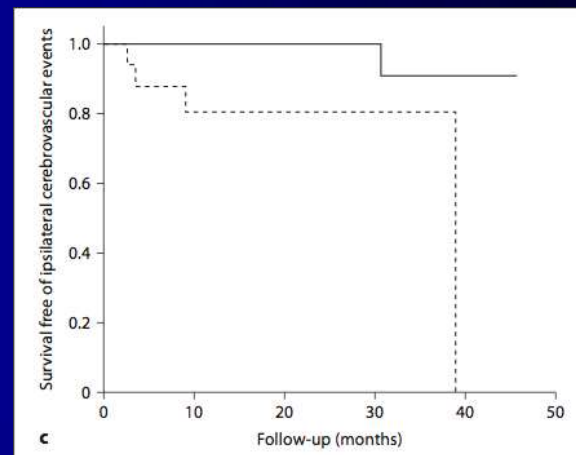
Carotid stenoses  $\geq 50\%$  (n=62)



Echolucent plaque



Plaque progression

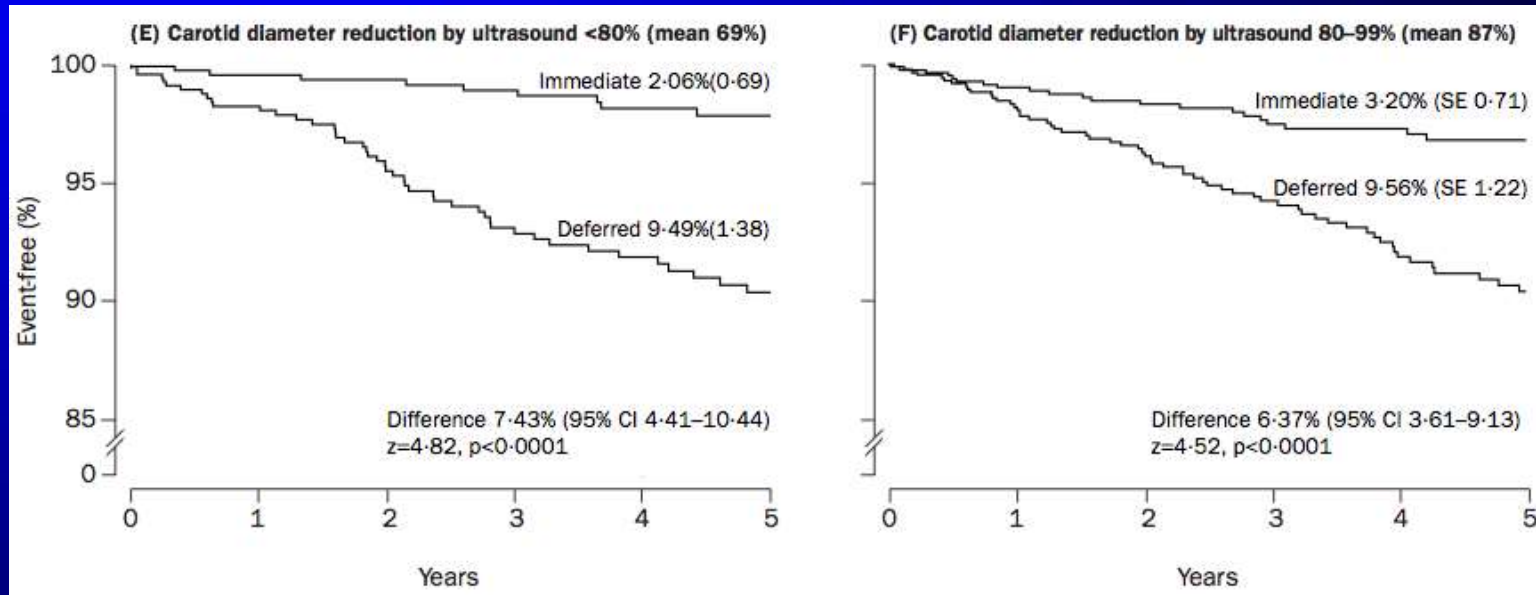


Symptomatic plaque

3-T MRI (TOF, special dark-blood weighted non-contrast and contrast-enhanced T1 and T2 images)

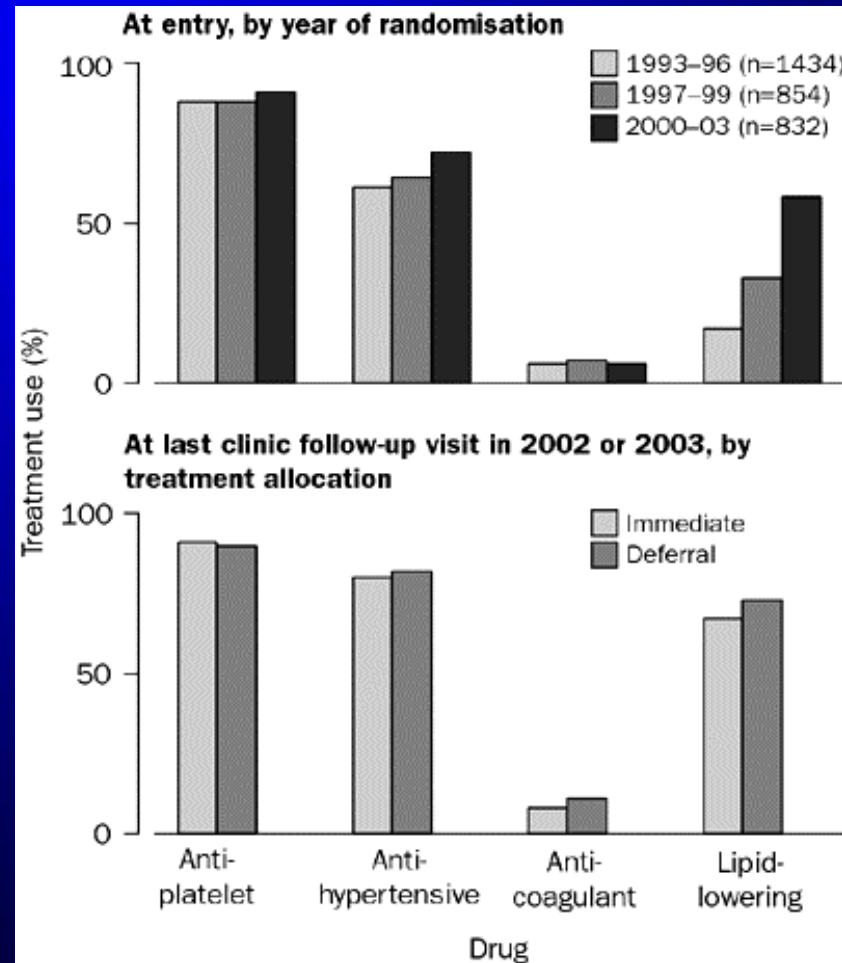
# Asymptomatic Carotid Artery Disease

## 5-Year Risk of Stroke - ACST Randomized Trial



5-year absolute stroke risk reduction:  
<80% stenosis (mean 69%) 7.43%  
80-99% stenosis (mean 87%) 6.36%

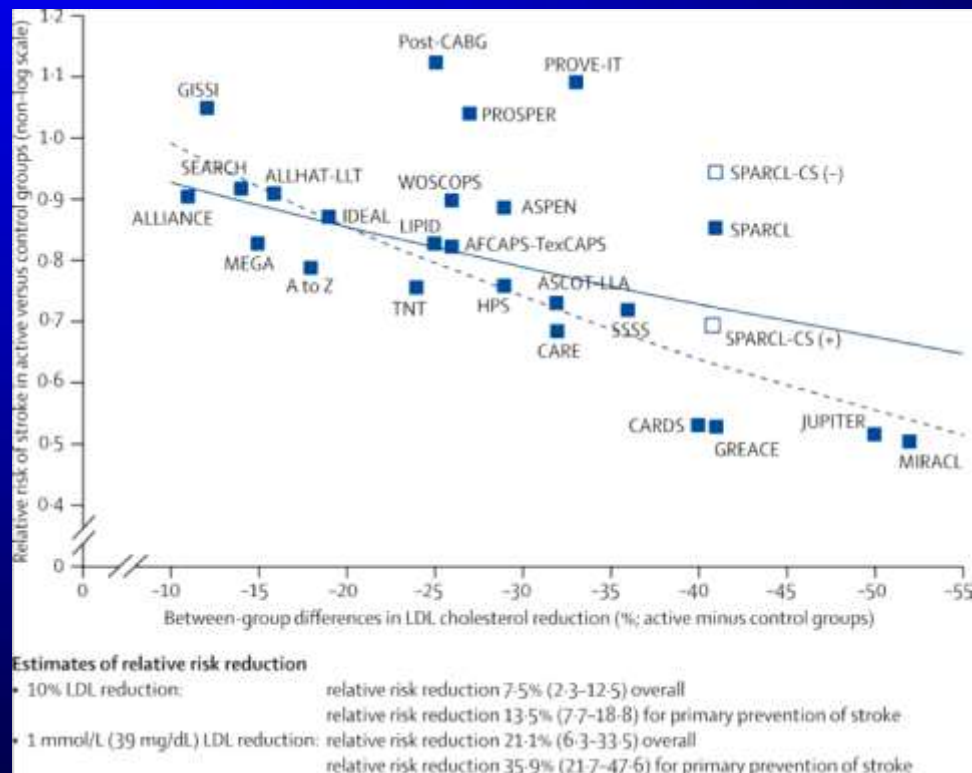
# Medical Management of Asymptomatic Carotid Artery Disease in ACST





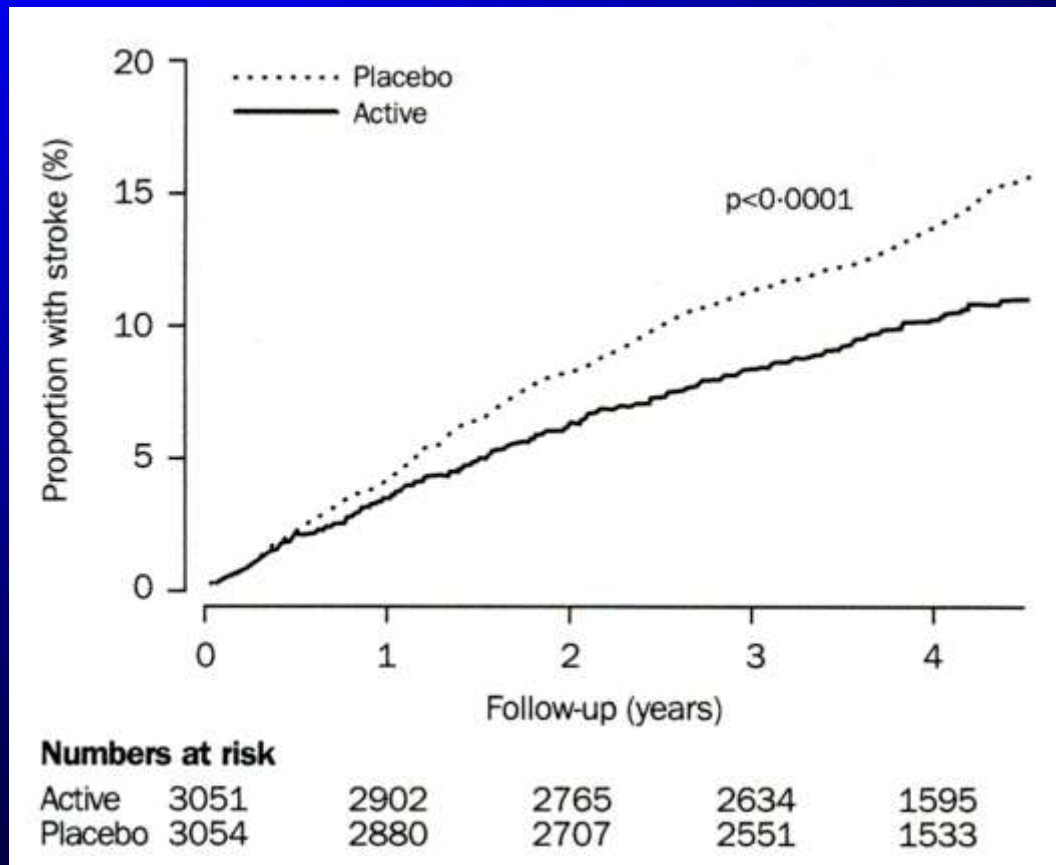
# Carotid Artery Disease: Cholesterol Therapy and Stroke Risk

## Meta-Analysis of Statin Trials for CV Event Risk Reduction



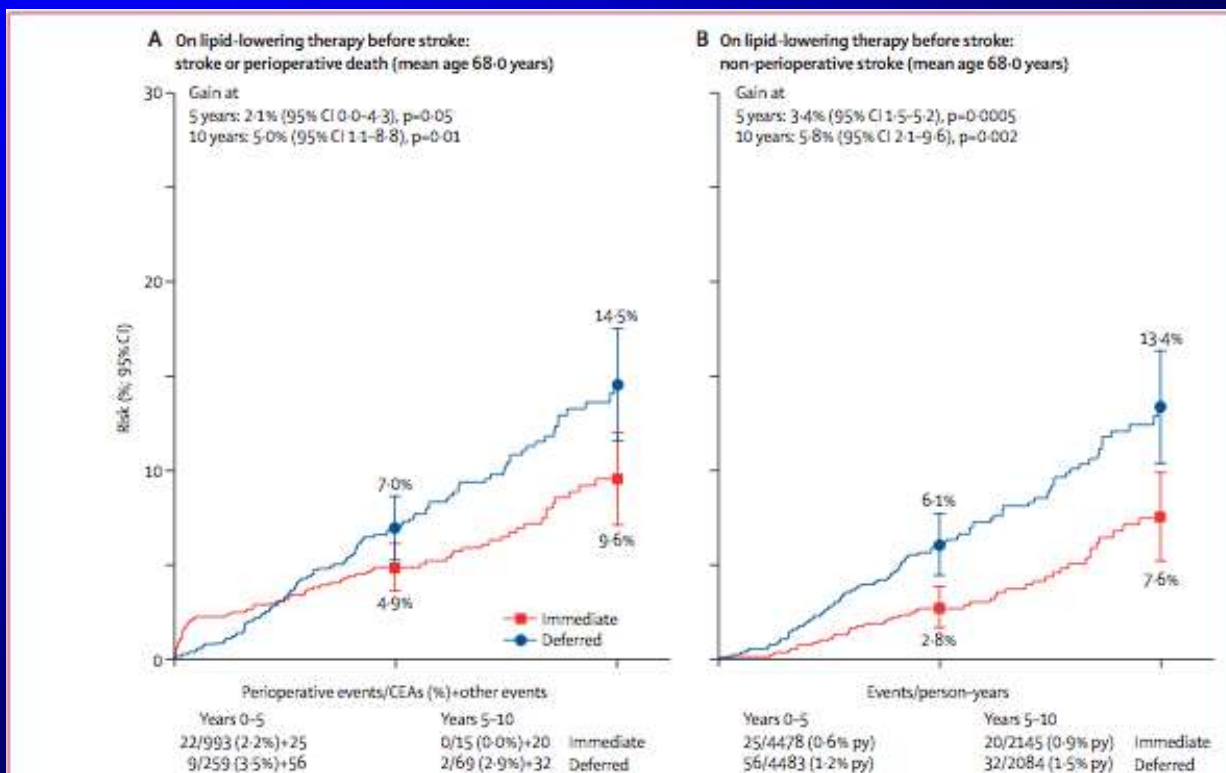
# Carotid Artery Disease: ACE-I Therapy and Stroke Risk

Perindopril in Symptomatic Patients With Prior TIA/Stroke



# Asymptomatic Carotid Artery Disease

## 10-Year Risk of Stroke - ACST Randomized Trial



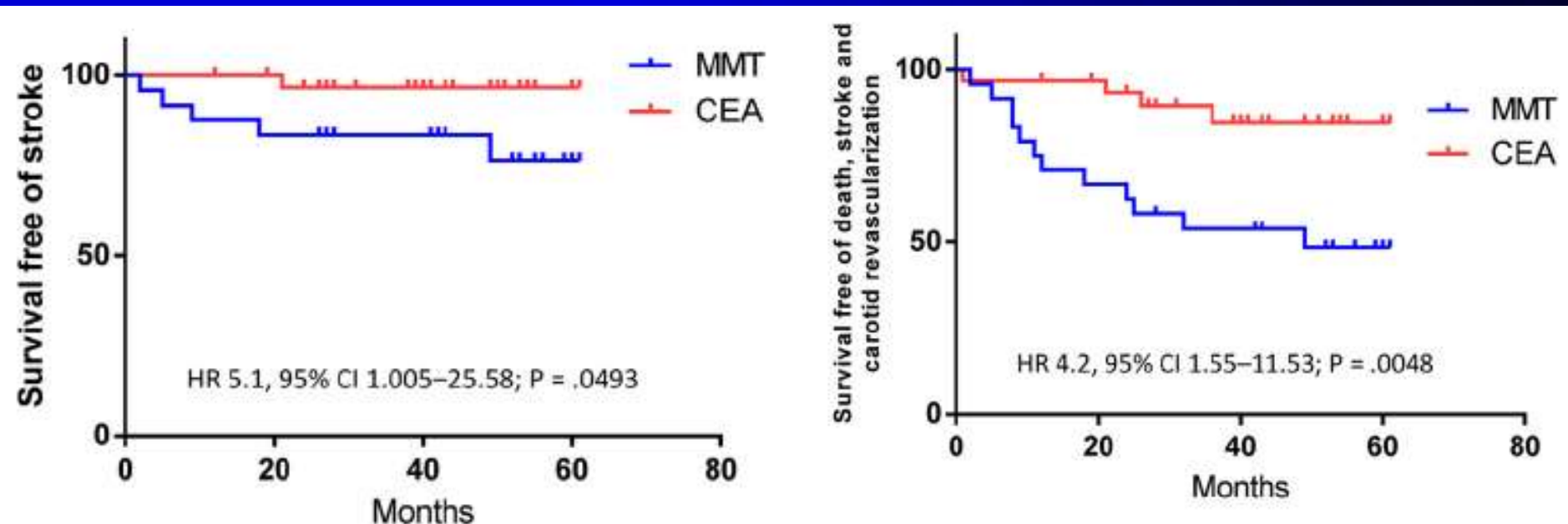
Absolute benefit of revascularization on stroke risk reduction in patients on lipid lowering therapy:

5-years 3.4% p=0.0005

10-years 5.8% p=0.002

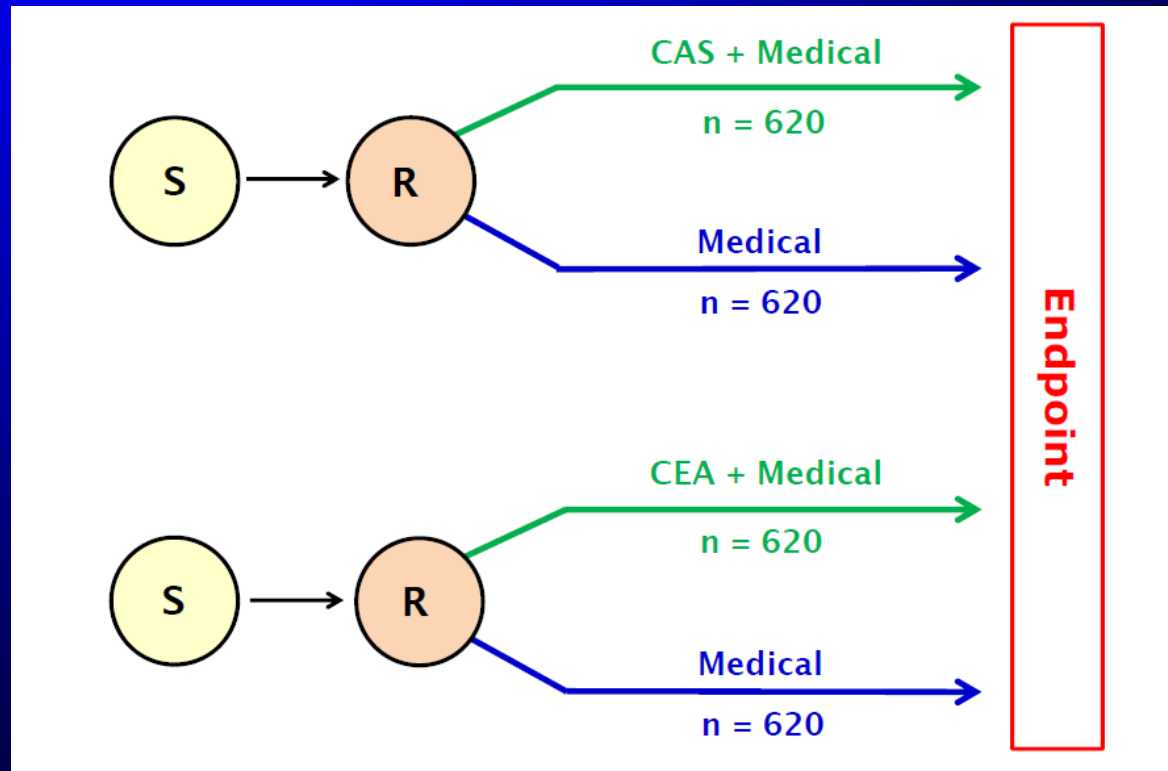
# Modern Medical Treatment with or w/o CEA for Asymptomatic Carotid Stenoses

Randomized trial of 55 pts with 70-79% carotid stenosis



# Carotid Revascularization for Primary Prevention of Stroke Trial (CREST-2)

>70% Asymptomatic Carotid Stenoses with Parallel Randomizations



# Carotid Artery Stenting: Prospective Randomized Trials

## Carotid Artery Disease Patients

65%

Normal Risk

35%

High Risk

50%

Asymptomatic

15%

Symptomatic

25%

Asymptomatic

10%

Symptomatic

2520 patients

CREST

1658 patients

ACT I

3640 patients

SPACE-2

2480 patients

CREST-2

1200 patients

SPACE

527 patients

EVA-3S

1713 patients

ICSS

307 patients

SAPPHIRE

Ongoing RCTs

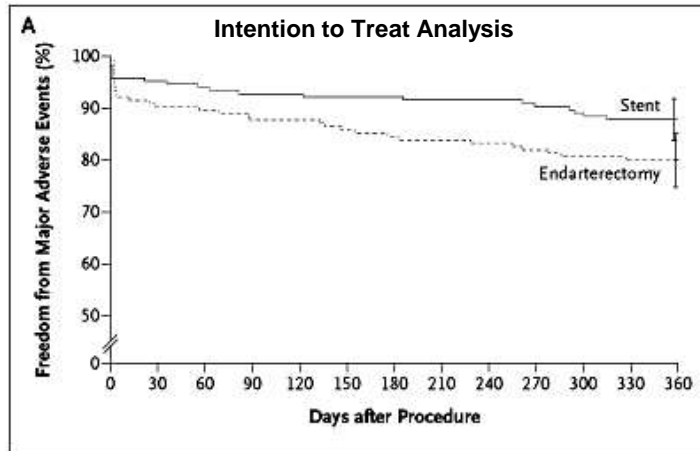
Negative RCTs

Positive RCT

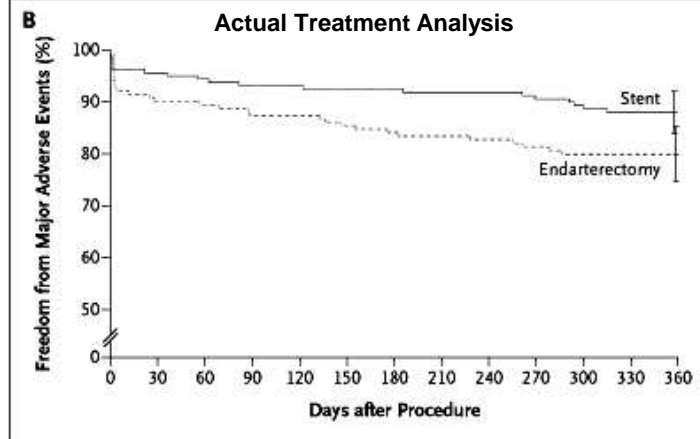


# Sapphire Trial

## Randomized Patients 1-Year Events

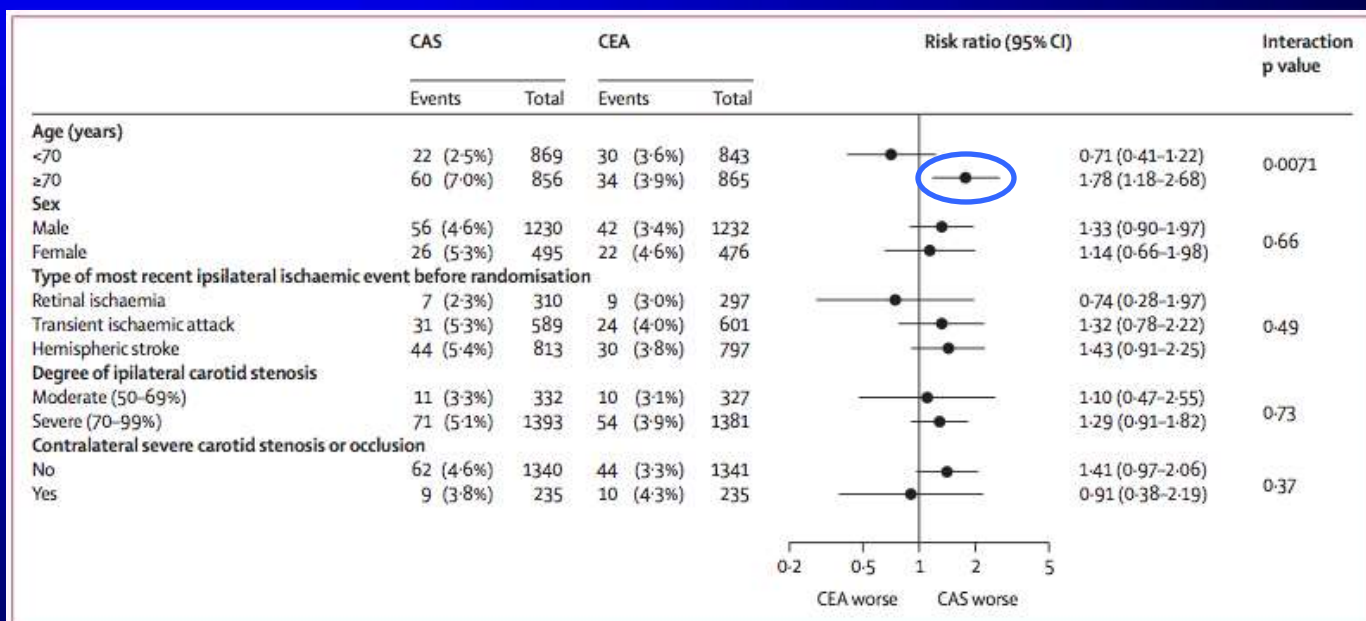


**P=0.053**



**P=0.048**

# Meta-Analysis of 30-Day Outcomes from SPACE, EVA-3S and ICSS



**Figure 5: Treatment risk ratios of disabling stroke or death within 120 days of randomisation in selected patient subgroups**

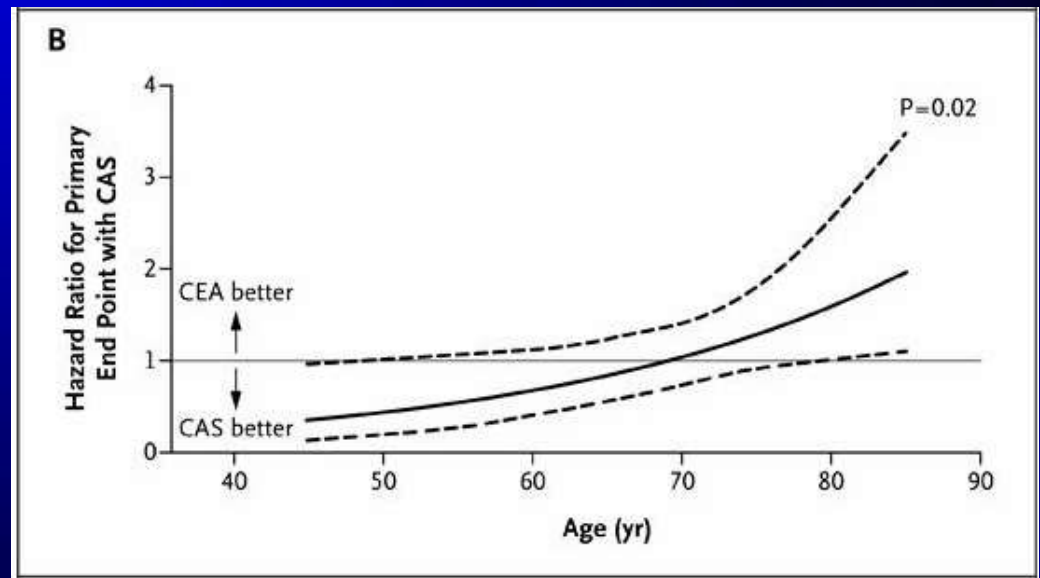
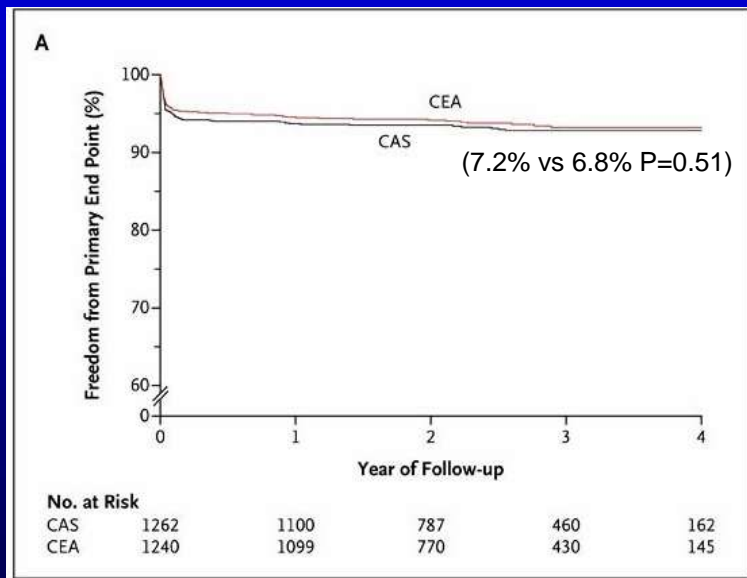
Data are number or number (%), unless otherwise indicated. Percentages are number of events divided by number of patients. Analysis was by intention to treat. Dots and horizontal bars represent treatment risk ratios and 95% CIs, respectively, within subgroups, with carotid endarterectomy (CEA) as the reference group, on a log scale. Risk ratios and interaction p values (categorical interaction) were adjusted for source trial. Patients with missing subgroup data were excluded from subgroup analysis (for details of missing data see webappendix pp 2-4). CAS=carotid stenting.



# CREST Trial

## Primary endpoint:

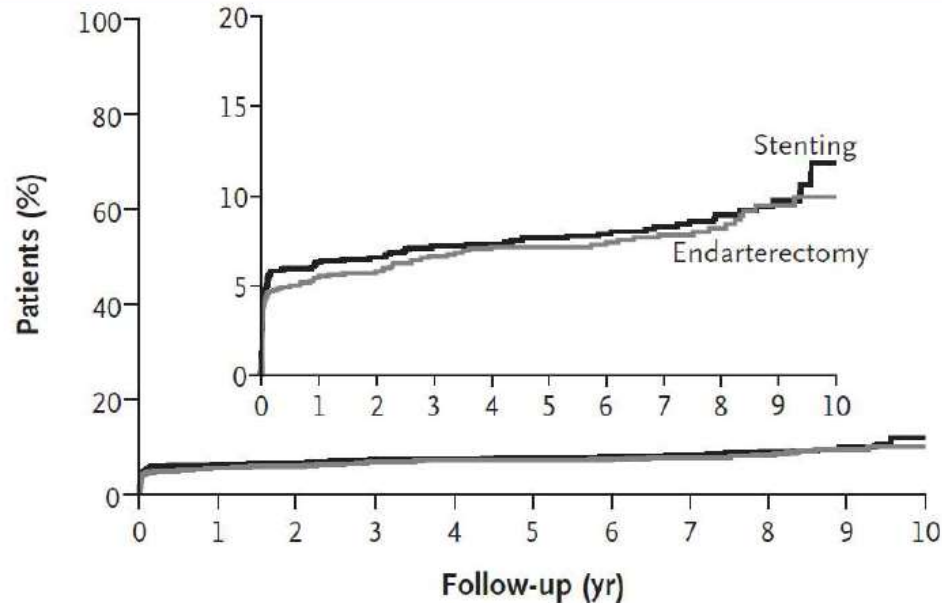
Periprocedural (30-day) stroke, myocardial infarction, or death plus ipsilateral stroke within the ensuing 4 years (P=NS)



# CREST Trial 10-Year Results



## Primary Composite End Point

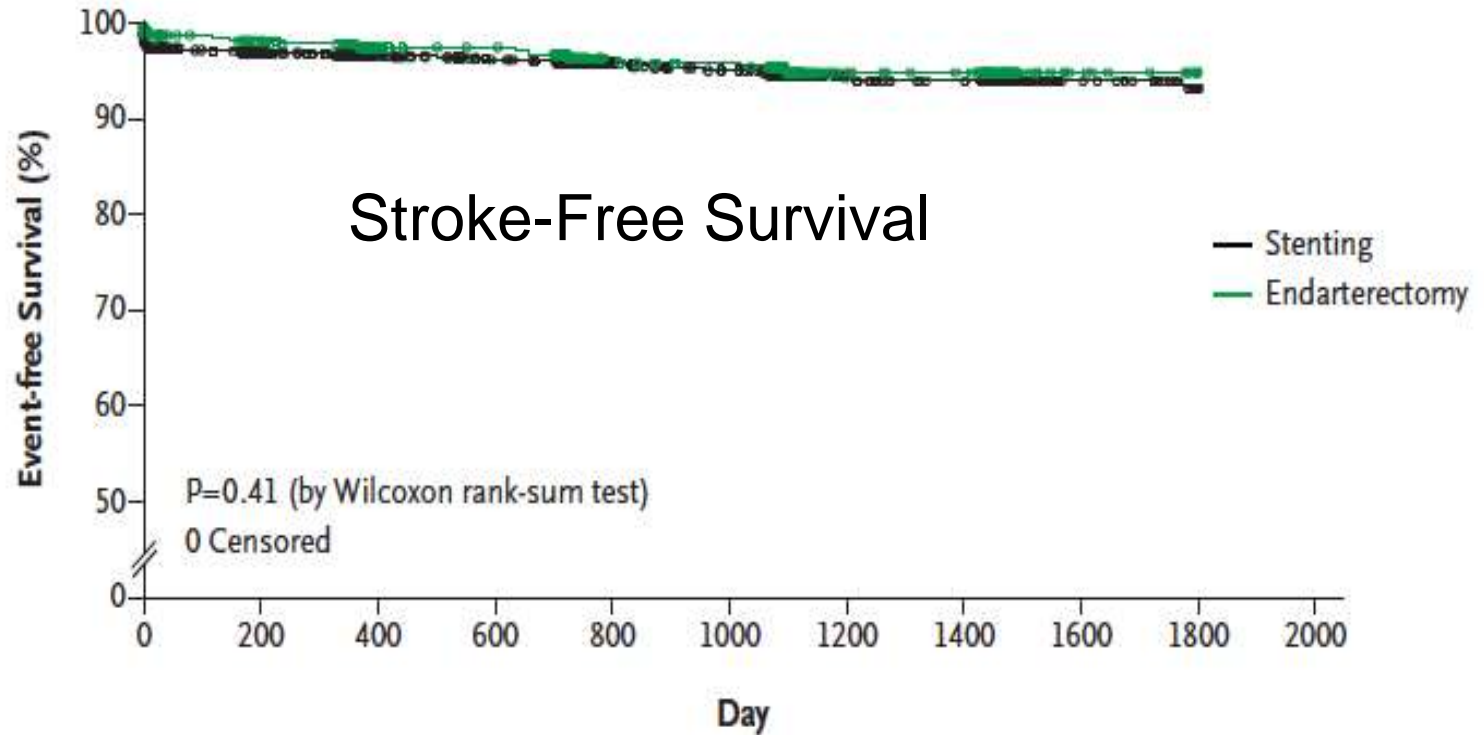


### No. at Risk

Endarterectomy	1240	1104	1036	949	833	736	695	620	438	243	66
Stenting	1262	1103	1041	972	884	774	738	676	477	264	68

# ACT-1 Randomized Trial 5-year Results

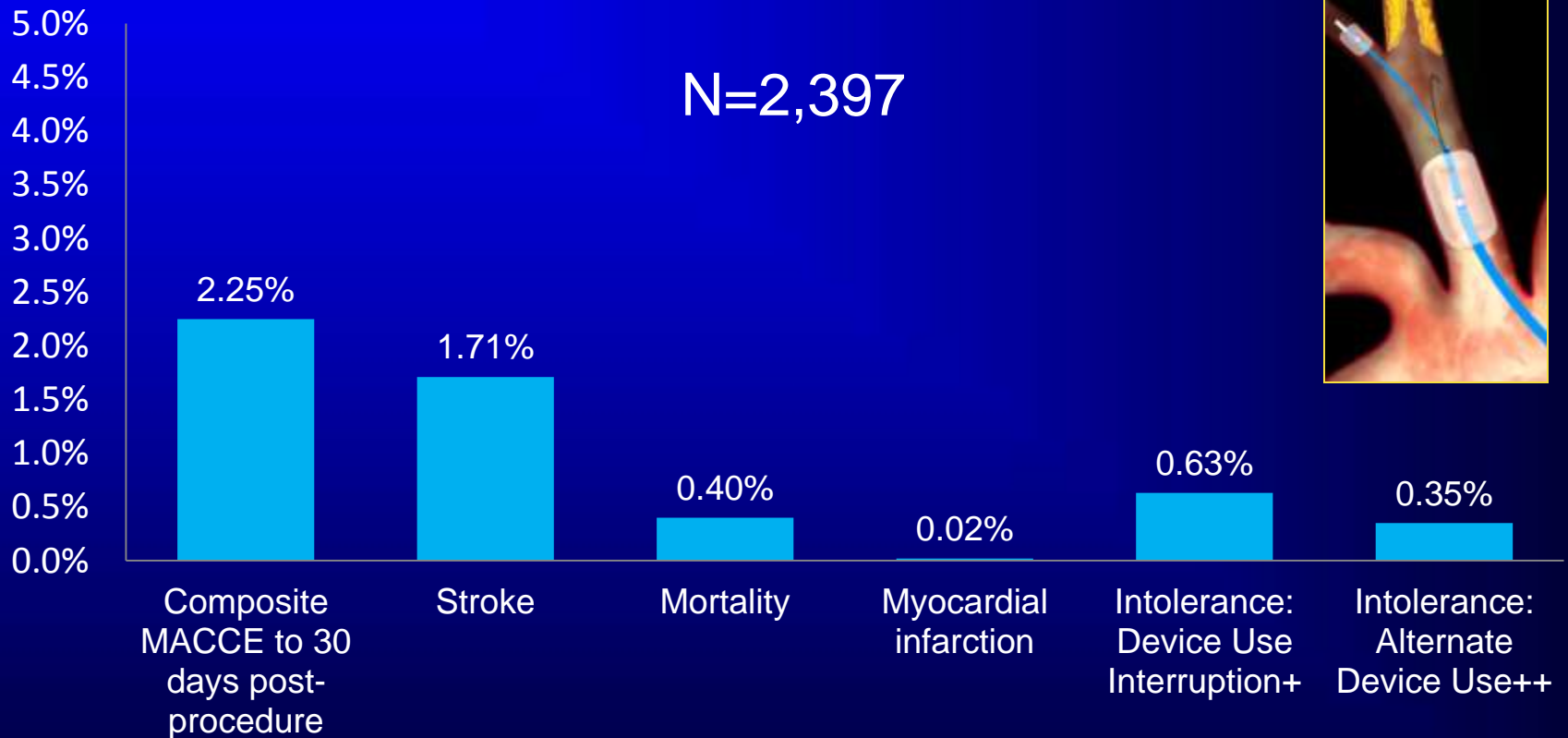
## Asymptomatic Carotid Stenoses



Days	0	0-365	365-730	730-1095	1095-1460	1460-1825
Stenting (no. at risk)	1089	1068	865	730	541	363
Endarterectomy (no. at risk)	364	355	287	244	180	112

# POD Meta-analysis

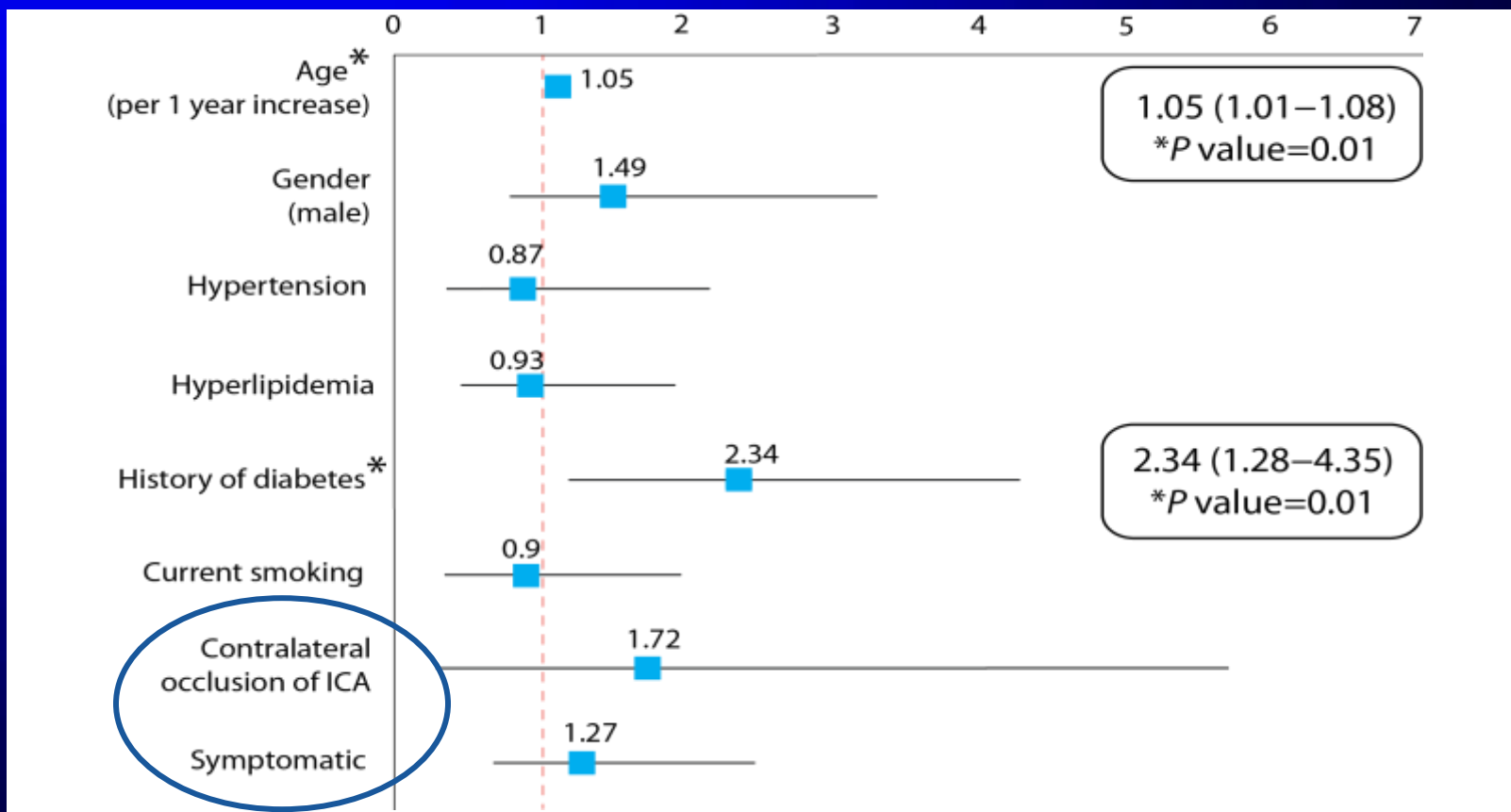
## Overall 30-day Event Rates



# POD Meta-analysis Independent Risk Predictors



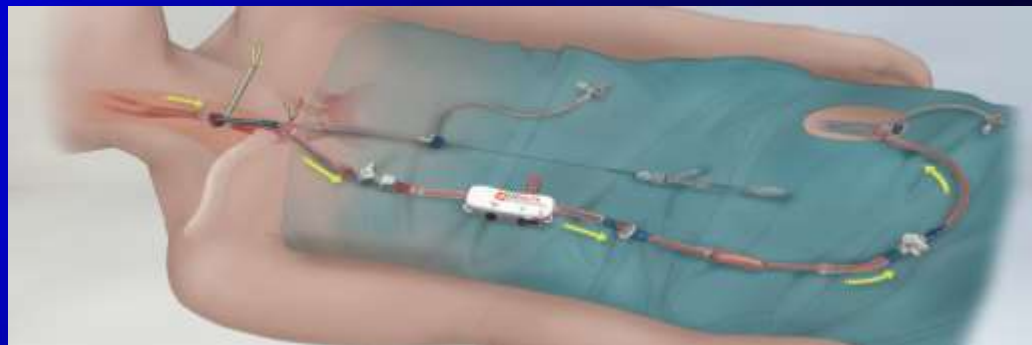
Odds of Baseline Characteristics to Predict Composite MACCE



A contralateral occlusion also does not predict device intolerance

# ROADSTER-Transcarotid Stenting with Dynamic Flow Reversal

<i>Inclusion criteria</i>	<i>No. (%)</i> <i>(N = 141)</i>
<b>Anatomic</b>	
Contralateral carotid occlusion	11 (7.8)
Tandem stenosis >70%	1 (0.7)
High cervical carotid artery stenosis	42 (29.8)
Restenosis after CEA	29 (20.6)
Hostile neck	22 (15.6)
Bilateral carotid artery stenosis requiring treatment	6 (4.3)
<b>Physiologic</b>	
Age >75 years	66 (46.8)
>2 vessel CAD and history of angina	15 (10.6)
History of angina	2 (1.4)
CCF NYHA functional class III/IV	1 (0.7)
LVEF <30%	2 (1.4)
MI >72 hours and <6 weeks before the procedure	1 (0.7)
Severe COPD	6 (4.3)
Permanent contralateral CNI	0
Chronic renal insufficiency	1 (0.7)



## Events ≤30 days of the index procedure

Patients who died, No. (%)	2 (1.4)
Patients who had a stroke, No (%)	2 (1.4)
Patients who had an MI, No. (%)	1 (0.7)

# Conclusions

---

- Optimal medical management of carotid artery disease includes antiplatelet monotherapy, statins and ACE-1 inhibitors.
- Symptomatic lesions have a higher incidence of neurologic events over the ensuing 5 years than asymptomatic lesions.
- Asymptomatic plaques with echolucent cores and/or rapid progression behave like symptomatic lesions and should be treated aggressively.
- CAS is superior to endarterectomy in high surgical risk patients (SAPPHIRE) and equivalent to endarterectomy in standard risk patients (CREST, ACT-1).

# Conclusions

---

- There is an interaction suggested for age when filter EPDs are used such that the elderly trend to fare better with endarterectomy, and the younger fare better with CAS (SPACE, EVA-3S, ICSS and CREST).
- Symptomatic status is not a risk predictor of MACE with CAS when proximal protection devices are used.
- Carotid stenting with the Roadster device may provide an attractive alternative for patients who are not ideal candidates for either CEA or CAS with filter EPDs.
- Whether revascularization is superior to best medical management in asymptomatic patients is being addressed in the CREST-2 trial.