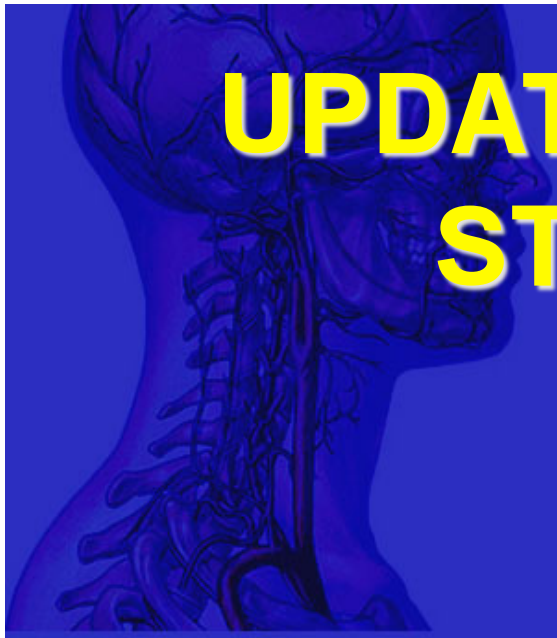
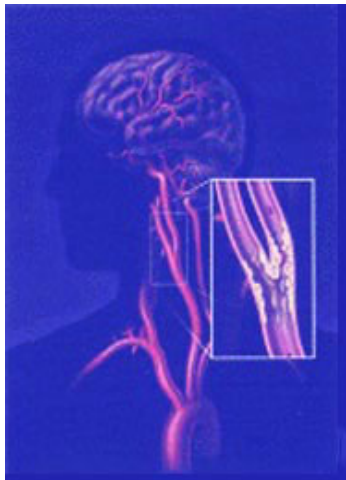


UPDATE IN CAROTID ARTERY STENTING & STROKE MANAGEMENT

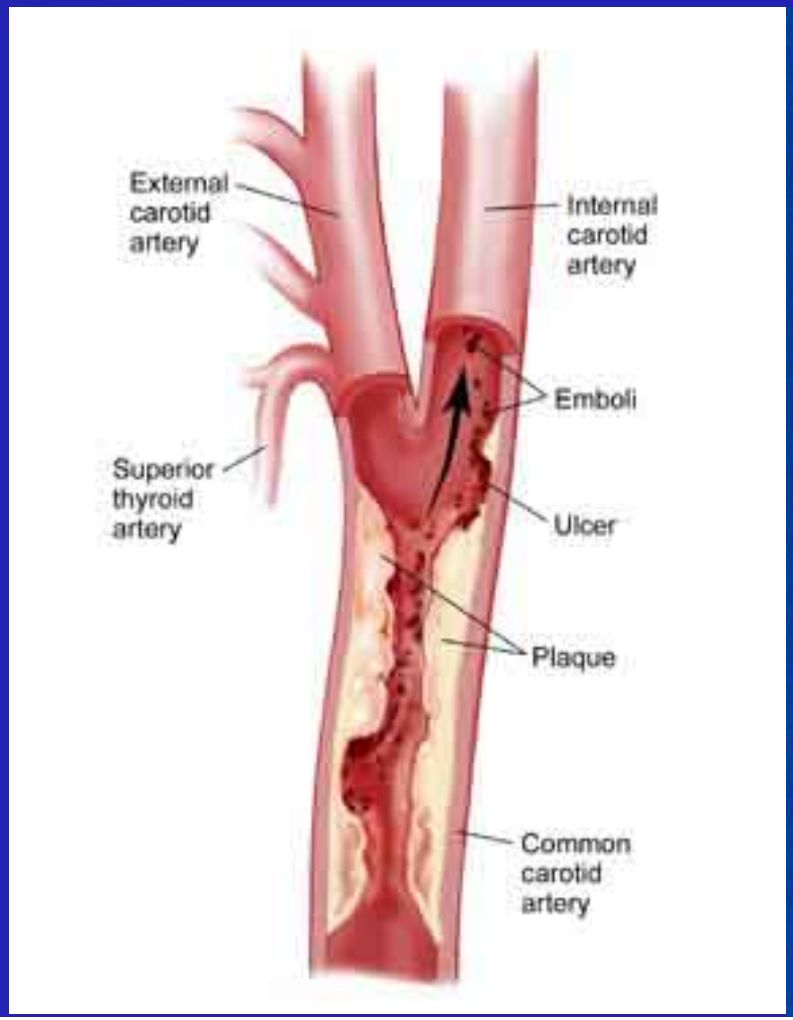
Dr. Nikolaos Melas, PhD
Vascular and Endovascular Surgeon

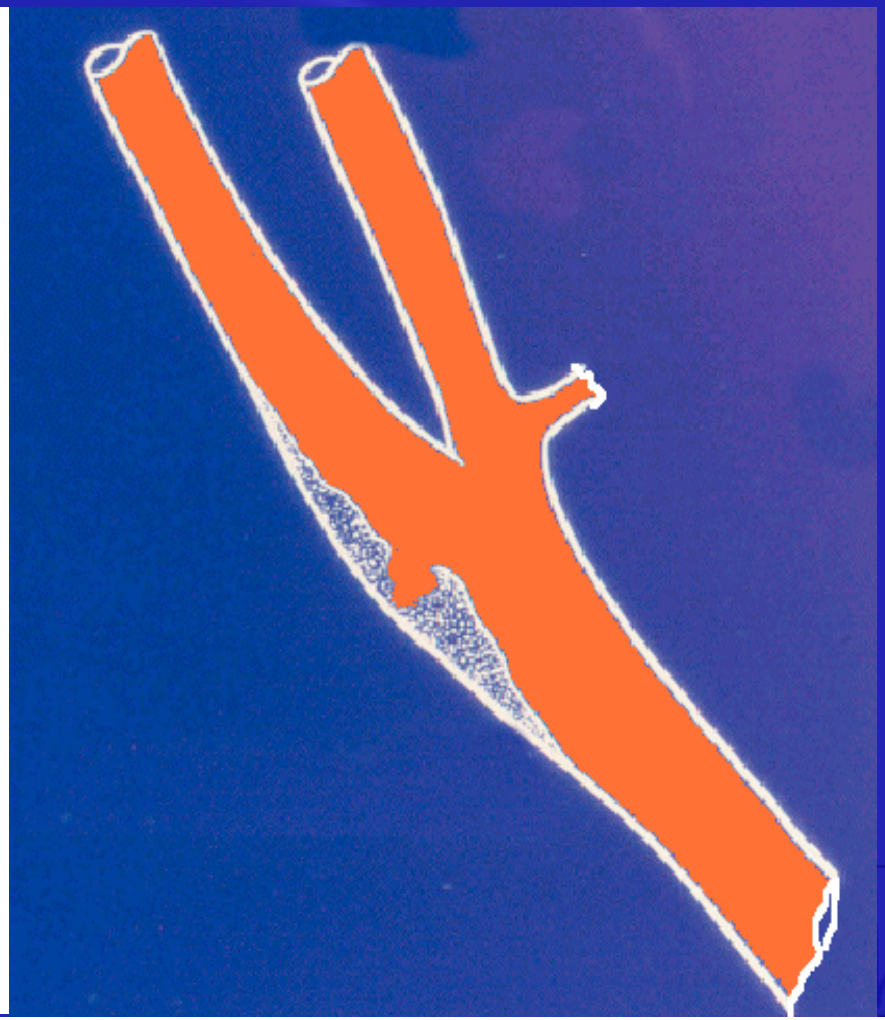
Military Doctor
Associate in 1st department of Surgery,
Aristotle University of Thessaloniki, Greece
Associate in Interbalcan Medical Center



Natural history of CAD

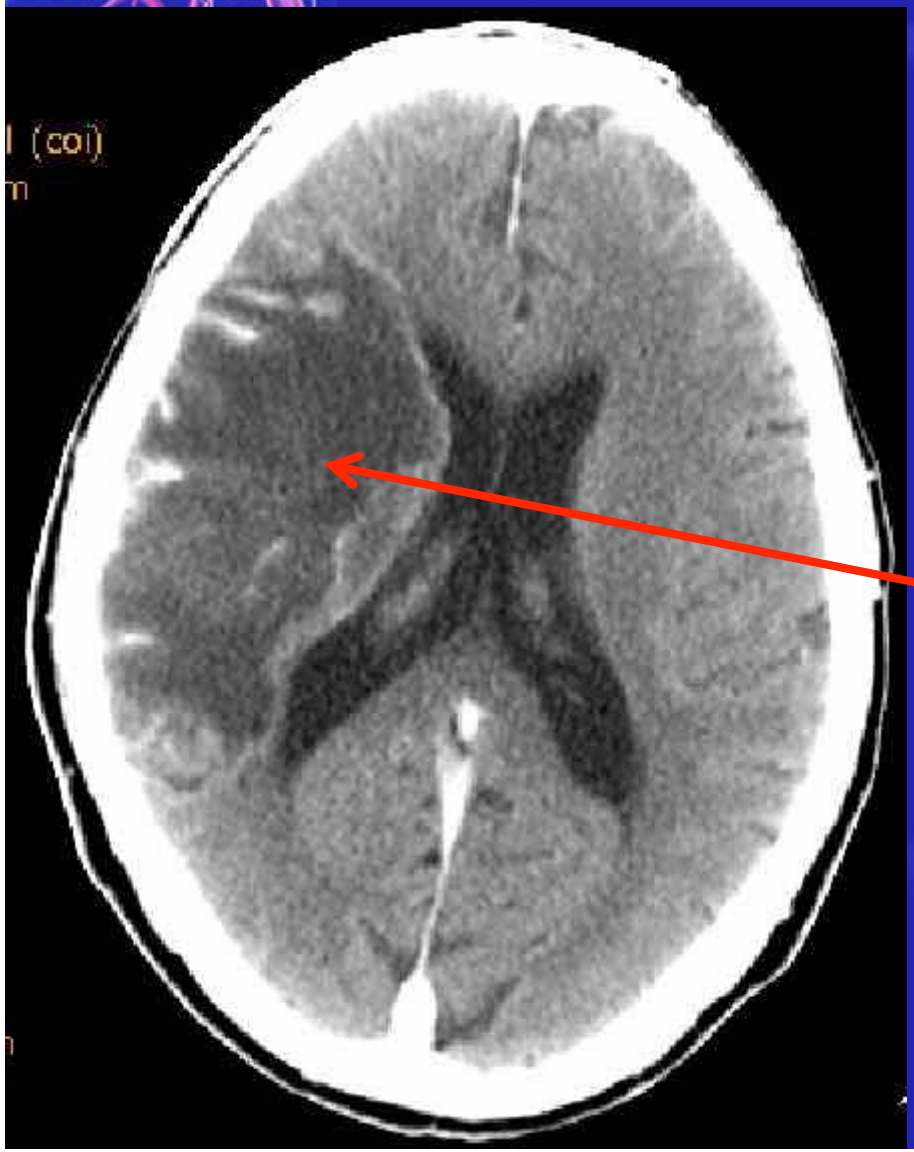
Atherothrombotic embolization from ICA plaque





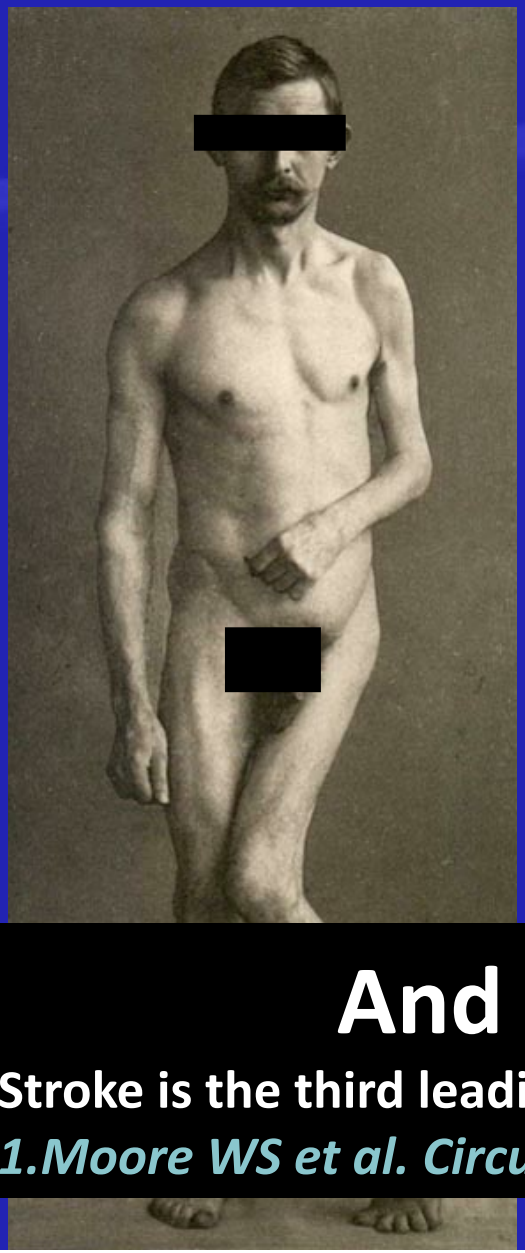
Natural history of CAD

Can produce TIA or Stroke



Natural history of CAD

Causing transient or permanent disability

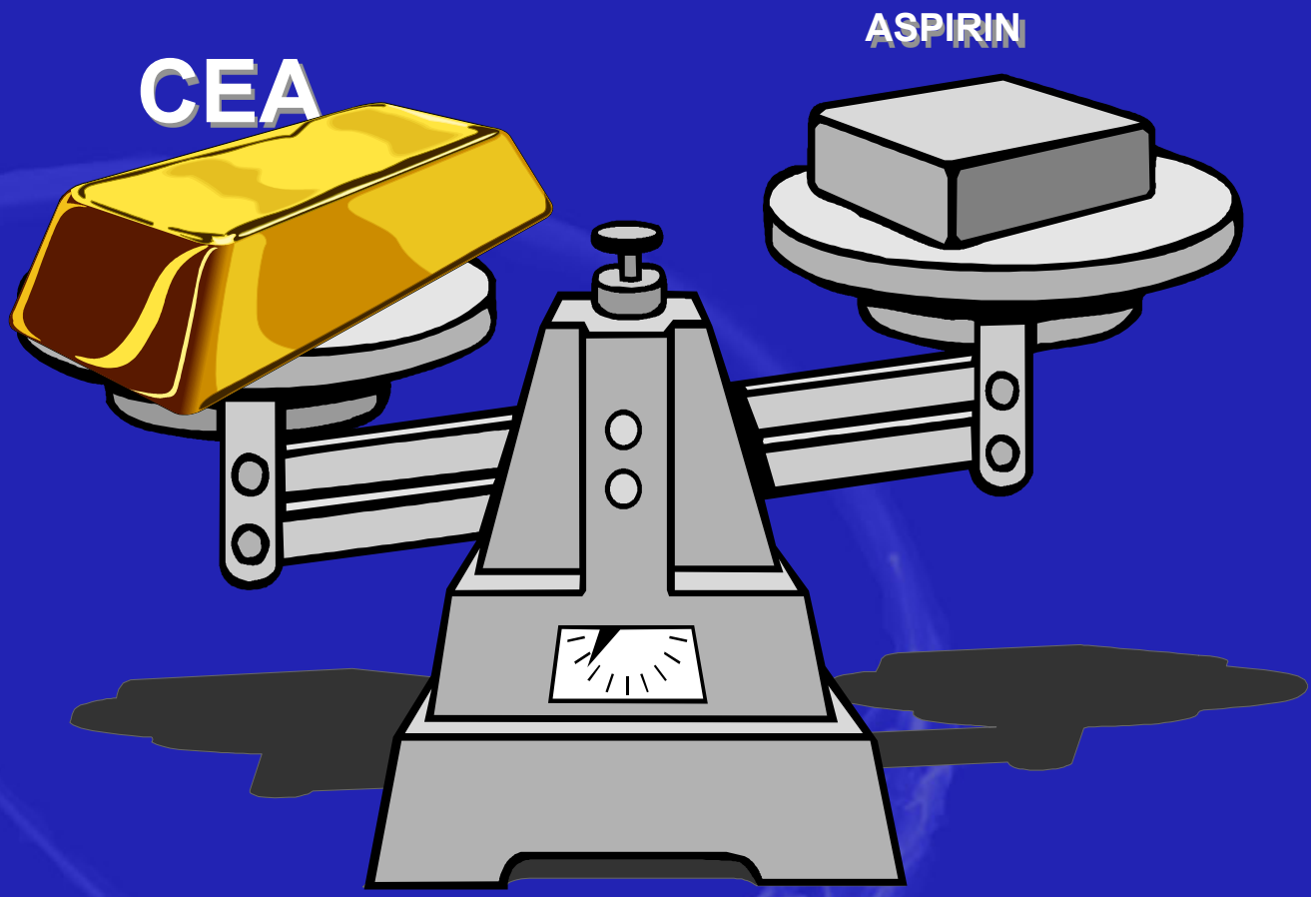


And even death

Stroke is the third leading cause of death worldwide[1]

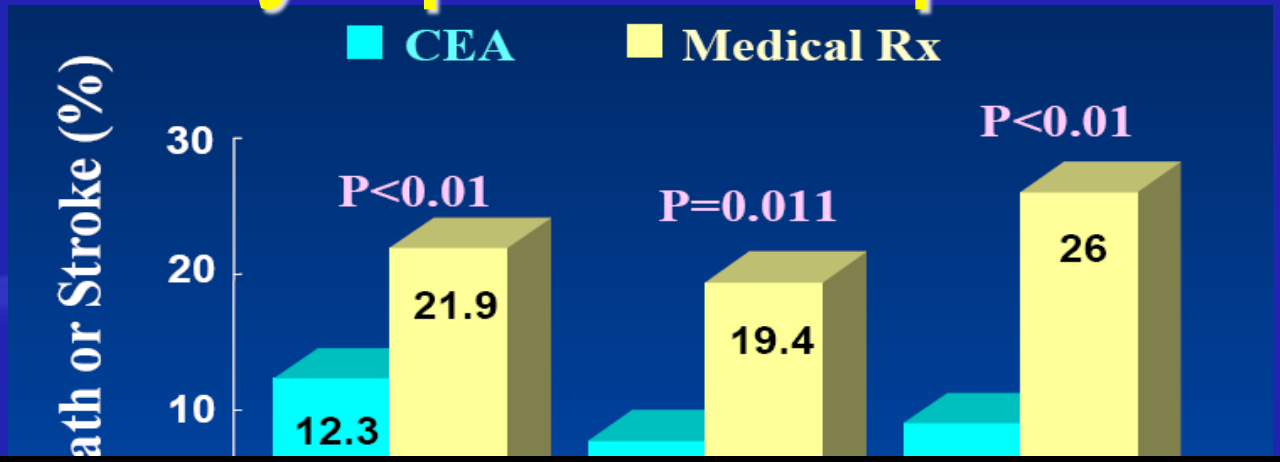
1.Moore WS et al. Circulation 1995; 91:566 –79

Carotid endarterectomy (CEA)



- A valuable therapeutic option for stroke management over simple medical treatment, since 1954 Eastcott first description

CEA for symptomatic patients



Offered Up to 17% relative risk reduction of major cardiovascular events

CEA for asymptomatic patients

Significant 5 year absolute risk reduction of apr. 5 %

Trial		Mean Follow-up	Rate of New Neurologic Events	
ACAS	Asymptomatic N= 1662	2.7 years	11%	5.1%
ACST	Asymptomatic	5 years	11.78%	6.4%

Carotid endarterectomy (CEA)

Remained the gold standard for carotid artery disease for many years as an evidence based procedure

Carotid Artery Stenting (CAS)

- Less invasive
- Less traumatic
- Less time consuming
- Painless
- Avoids neck incisions
- Avoids nerve damage
- Avoids systemic complications related to anesthesia

RESULTS ???

Evidence for CAS

Single center retrospective reports: Initial experience with CAS

Prospective multicenter registries for CAS

CAS vs CEA: Controlled trials

CAS vs CEA: meta- analysis (Cochrane review)

Controlled trials CAS vs CEA

meta- analysis (Cochrane review)

Safety and Efficacy of Endovascular Treatment of Carotid Artery Stenosis Compared With Carotid Endarterectomy

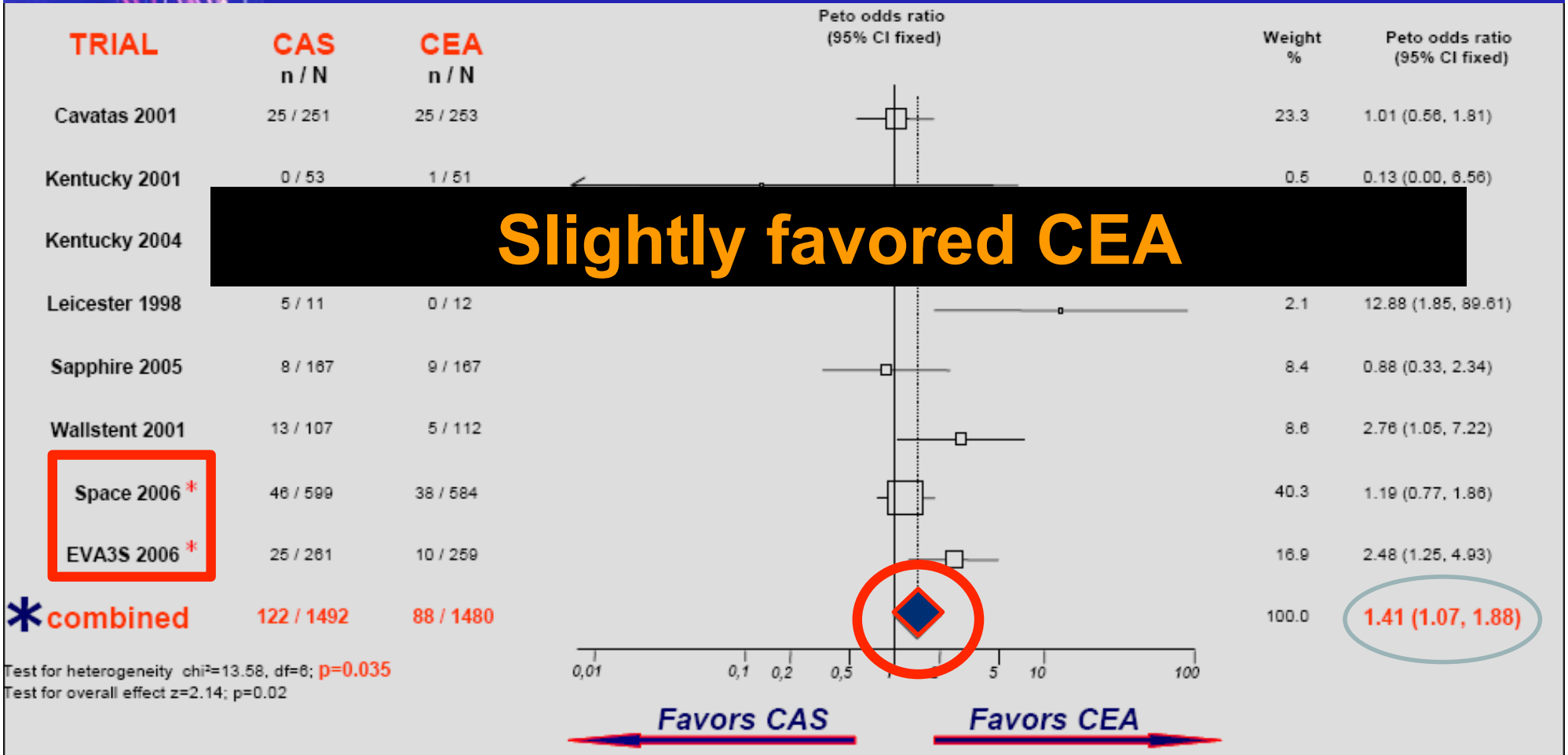
A Cochrane Systematic Review of the Randomized Evidence

Coward L, et al. Cochrane systematic review. Stroke. 2005; 36:905-11.

Ederle J, et al. Cochrane systematic review. Stroke. 2009;40(4):1373-80.

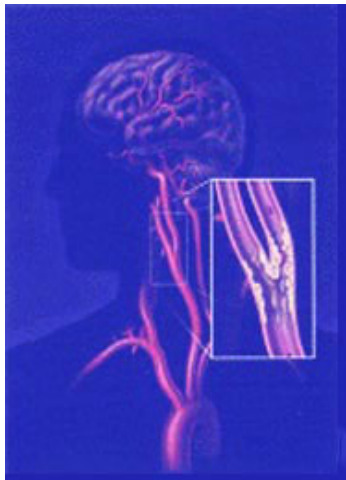
Death or stroke within 30 days of procedure

Controlled trials comparing CAS with CEA



Slightly favored CEA

Ederle J, et al. Cochrane systematic review. Stroke. 2009 Apr;40(4):1373-80.

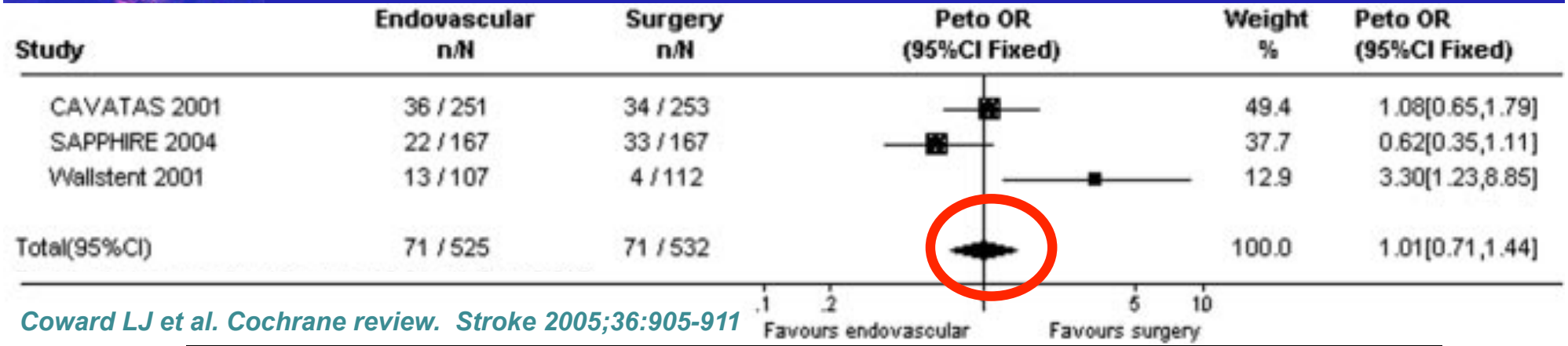


Criticism on EVA-3S and SPACE trials- weak points

- inadequate sample size (type II statistical error)
- different stent systems
- different protocols in pre- and post- administration of antiplatelet drugs
- not uniform use of EPDs
- not similar patient groups (e.g. four times as many people with contralateral ICA occlusion in the CAS group in EVA-3S)
- surprisingly better results of French surgeons (EVA-3S) in performing CEA, comparing to NASCET and ECST (3.9% vs 6.5% and 7.1%)

The results do not support a change in clinical practice away from recommending carotid endarterectomy as the treatment of choice for suitable carotid artery stenosis but support continued recruitment in the large ongoing trials.

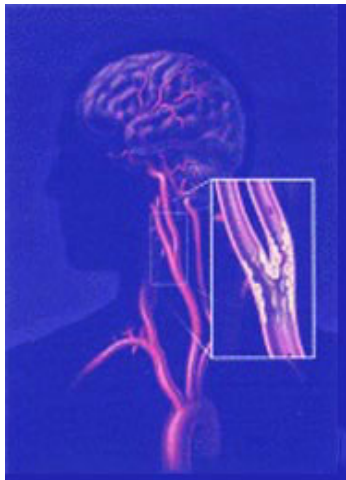
Mid and Long term results (6m-5 years)



Coward LJ et al. Cochrane review. Stroke 2005;36:905-911

Equal results between CEA and CAS

Trial	Year	FU	CAS ips. stroke	CEA ips. stroke	P	Article
SPACE	2008	2 years	9,5%	8,85%	NS	*Lancet Neurol 2008; 7: 893-902*
EVA-3s	2008	4 years	After the periprocedural period, the risk of ipsilateral stroke was low and similar in both treatment groups		NS	*Lancet Neurol 2008; 7: 885-892*
SAPPHIRE	2008	3 years	6%	8,7%	NS	*N Engl j Med 2008; 358: 1572-79*
CAVATAS	2009	5 years	11·3%	8·6%	NS	*Lancet Neurol. 2009;8(10):898-907*
CREST	2011					



Cranial neuropathy

Stronly favored CAS

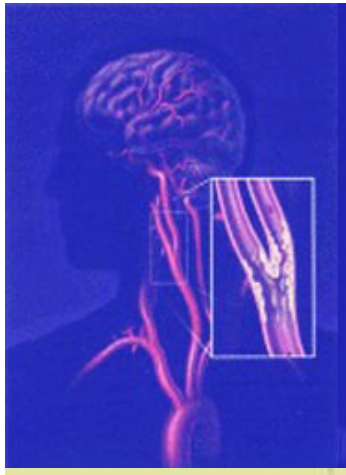
Study	Endovascular n/N	Surgery n/N	Peto OR (95%CI Fixed)	Weight %	Peto OR (95%CI Fixed)
CAVATAS 2001	0 / 251	22 / 253		64.3	0.13[0.05,0.29]
Kentucky 2001	0 / 53	4 / 51		11.8	0.12[0.02,0.90]
Kentucky 2004	0 / 43	0 / 42		0.0	Not Estimable
Leicester 1998	0 / 11	0 / 12		0.0	Not Estimable
SAPPHIRE 2004	0 / 167	8 / 167		23.9	0.13[0.03,0.53]
Total(95%CI)	0 / 525	34 / 525		100.0	0.13[0.06,0.25]

Test for heterogeneity chi-square=0.00 df=2 p=1

Test for overall effect z=-5.94 p<0.00001

.01 .1 1 10 100

Favours endovascular Favours surgery

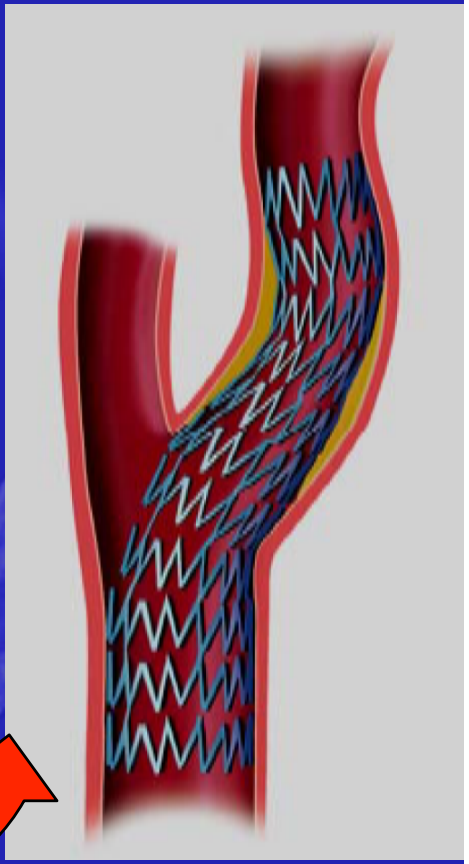


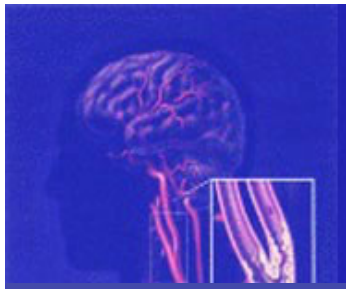
Conclusions

No significant difference in the major risks of treatment

Minor complication favor endovascular treatment

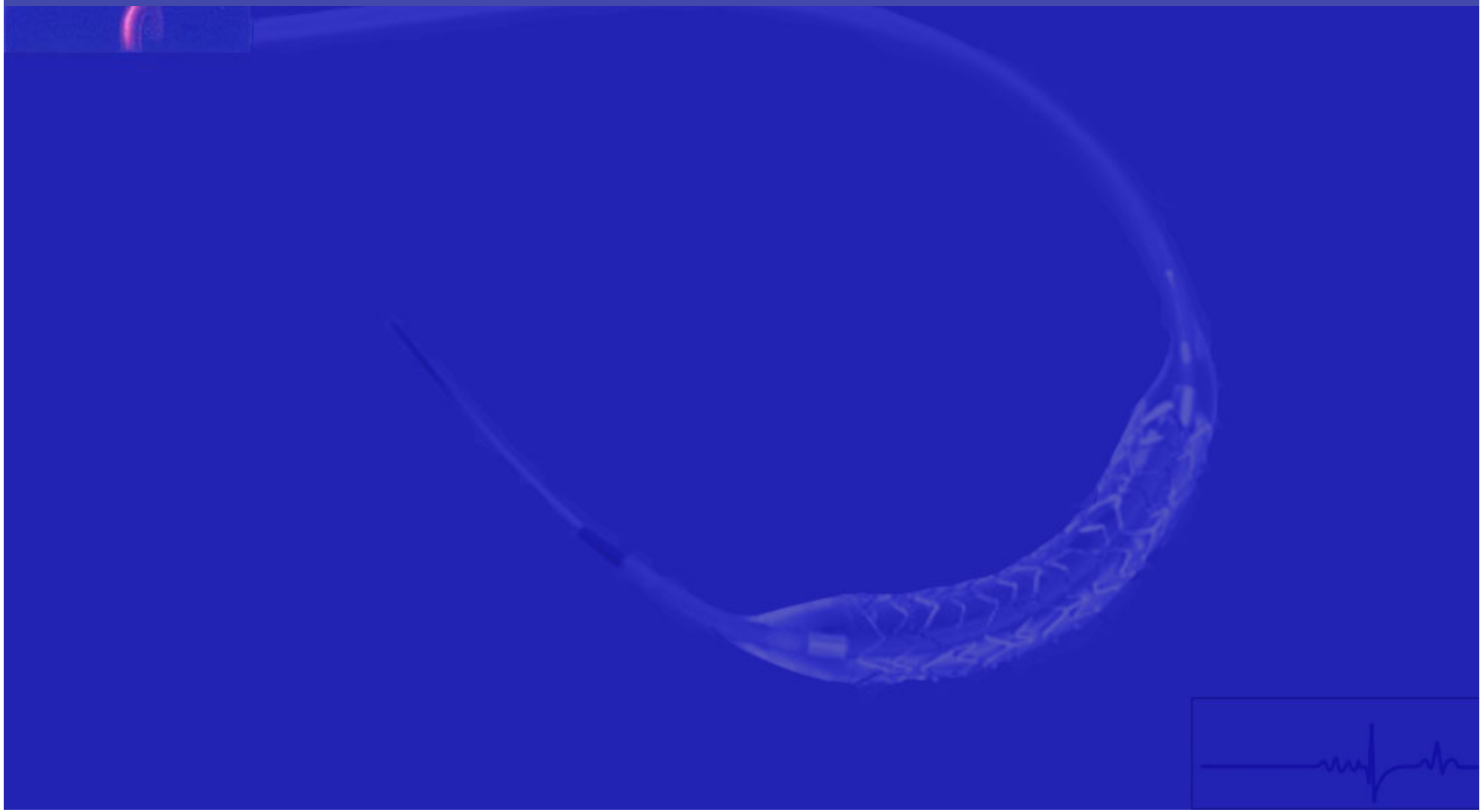
Insufficient evidence to support a widespread change in clinical practice





So, which is the VERDICT???

Current trials didn’t prove CAS inferiority!



The initial question about gold standard is wrong

X

Both CAS *and* CEA

Play a role in stroke prevention in different patient groups

Defining patient groups that either CEA or CAS is beneficial

Vessel anatomy ⟷ *Plaque characteristics*

Vessel anatomy → *The high risk patient*

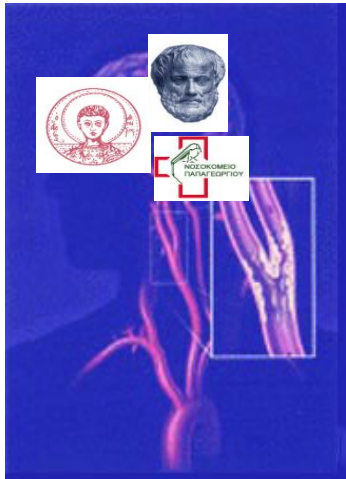
Plaque characteristics → *The high risk patient*

Defining patient groups that either CEA or CAS is beneficial

Vessel anatomy

Plaque characteristics

The high risk patient



Vessel anatomy

The influence of anatomy on treatment selection for carotid disease

1. **Congenital anatomical variation** (bovine arch, aortic arch types I-III, high or low carotid bifurcation, aberrant vessels)

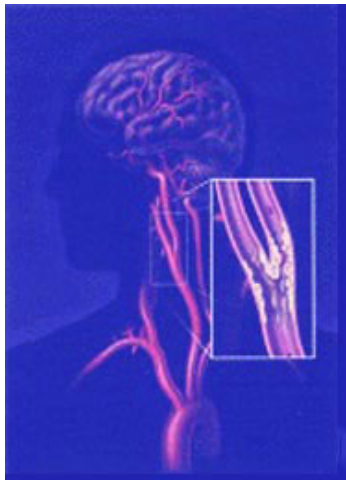
2. **Alterations that occur with aging and hypertension** (inflow and outflow tortuousity, calcification, thrombi)

5. **Extension of disease** (e.g diffuse, multisegmental disease involving the proximal CCA or distal ICA)

Vessel anatomy

Which Anatomy Complicates CEA?	Which Anatomy Complicates CAS?
Low lesions	Bifurcation
High lesions (above C2)	Long lesions
Prior CEA	Extensive calcification
Other major neck operation (radical neck, laryngectomy, tracheostomy, etc)	ICA or CCA tortuosity
	Occlusion or stenosis of the external carotid artery
	Fresh thrombus at ICA lesion
Cervical fusion or immobility	Access related
	Aorto-iliac occlusive disease
Prior neck radiation	Type III aortic arch
	Stenosis or calcification of innominate or left CCA origin
	Bovine arch

Schneider PA et al. Semin Vasc Surg 20:216-225. 2007

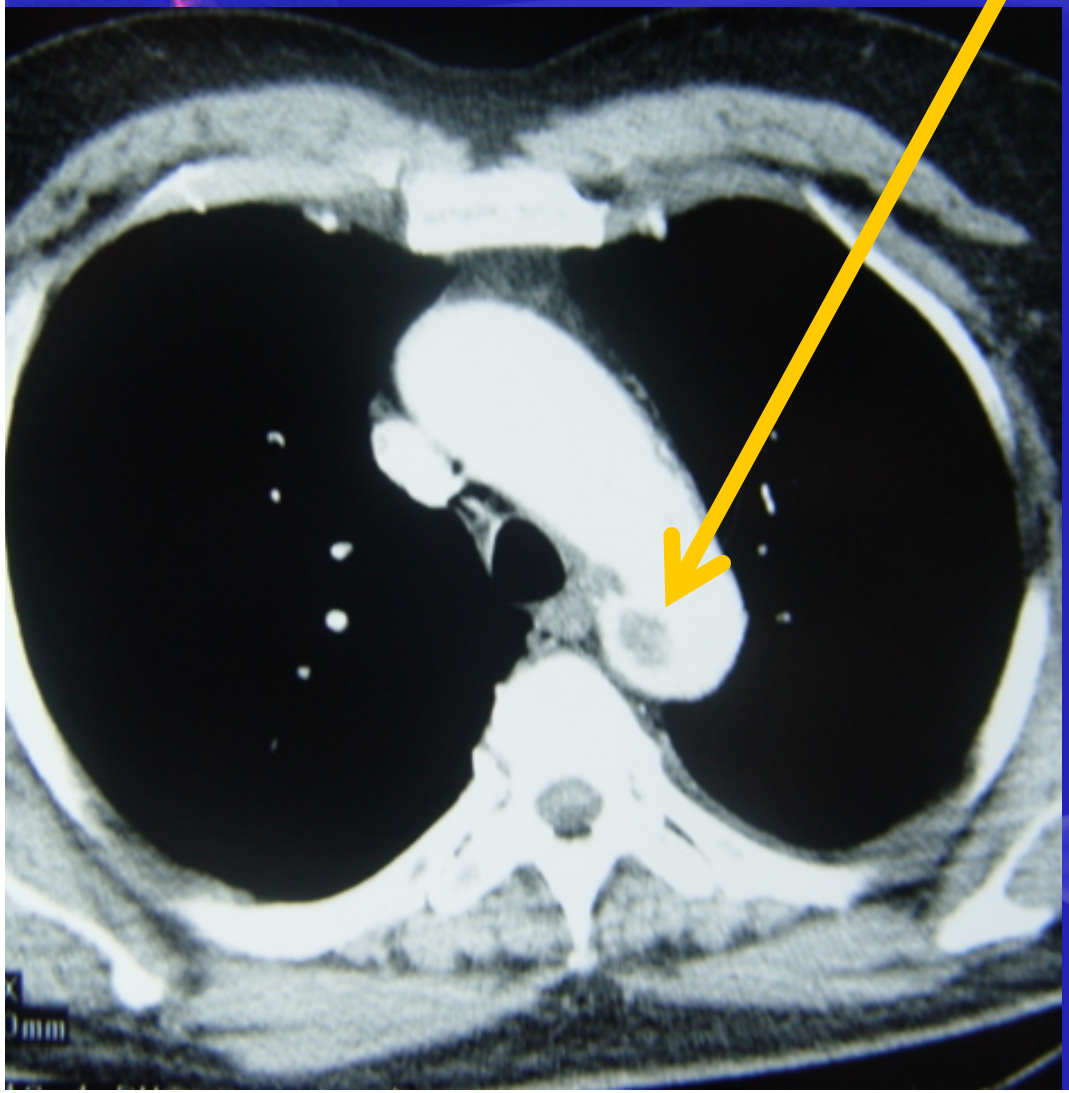


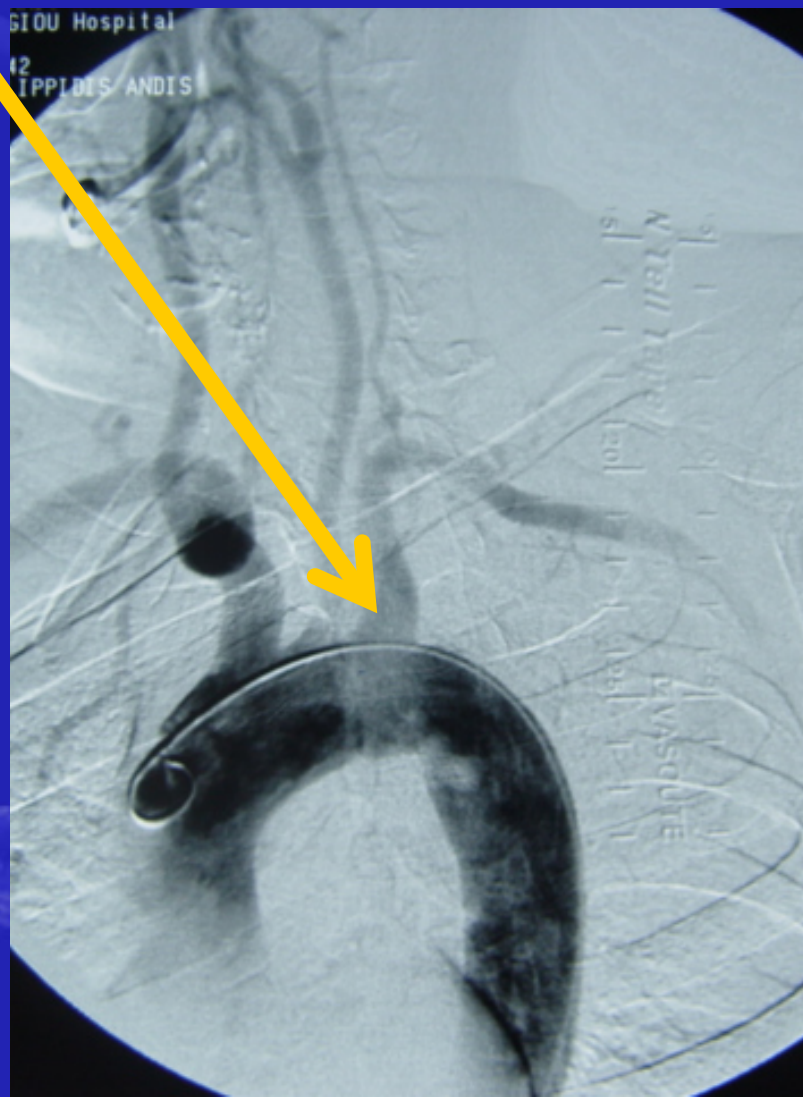
Vessel anatomy

Aortic arch type and orificial calcification

Vessel anatomy

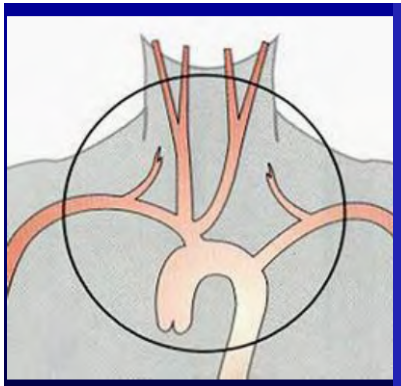
Mobile thrombi



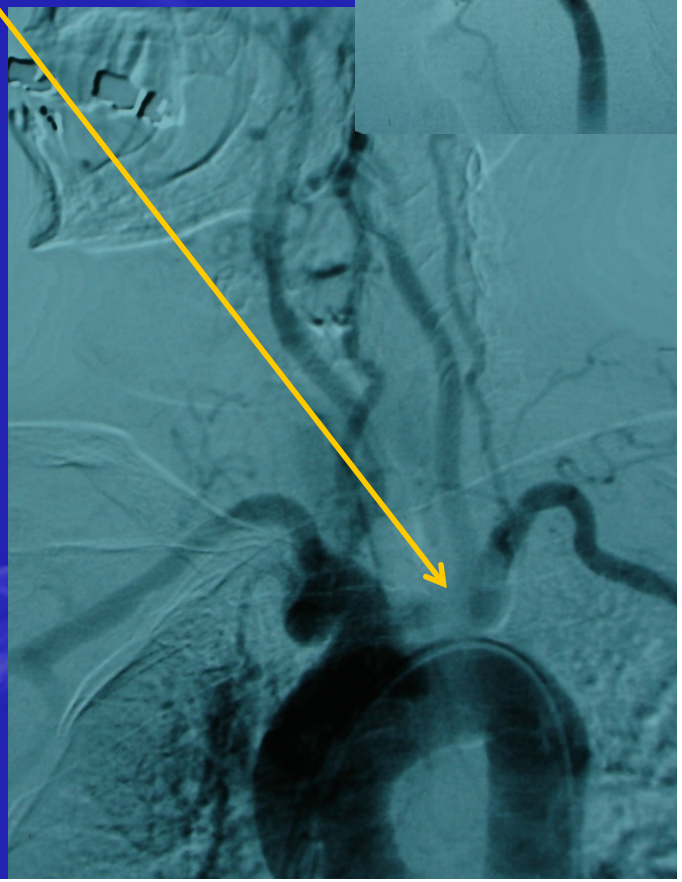


Vessel anatomy

Bovine carotid configuration

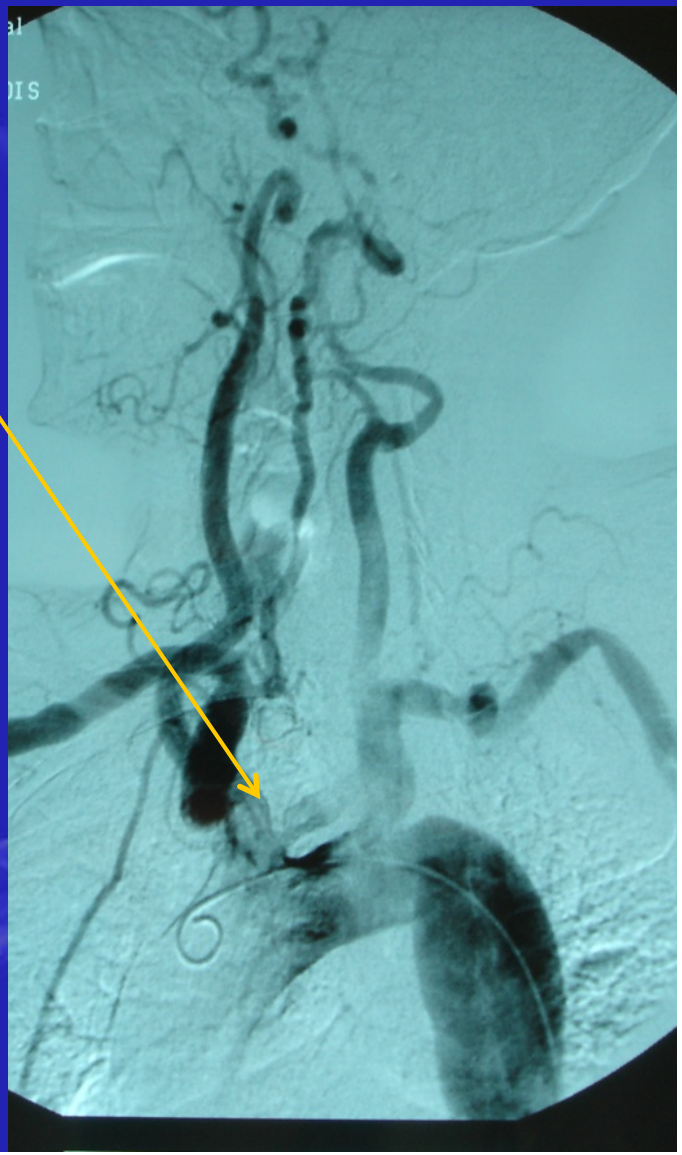


Vitek
Headhunter H3
Simmons / Sidewinder

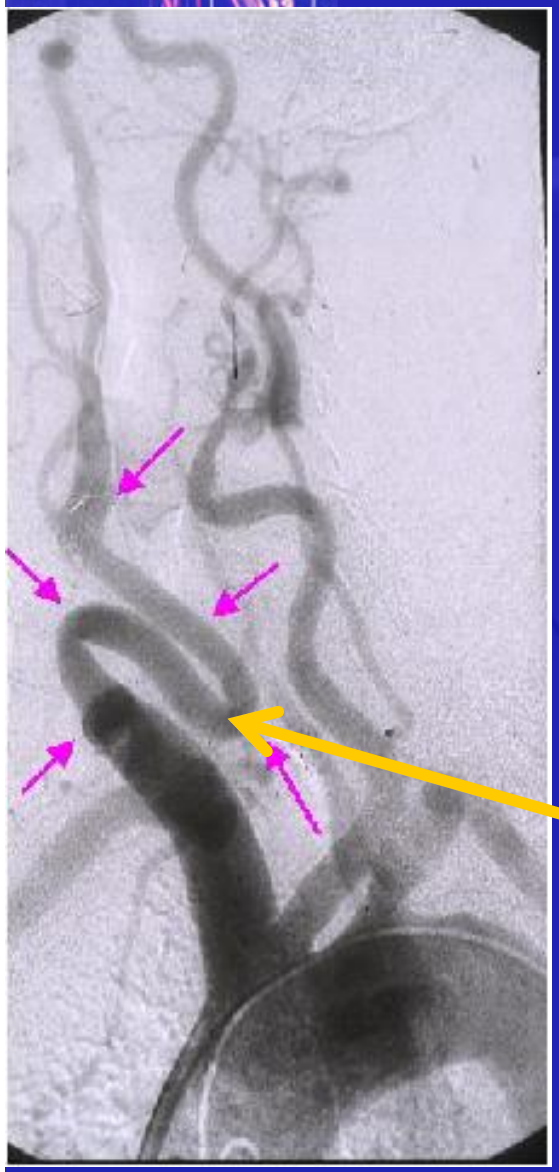


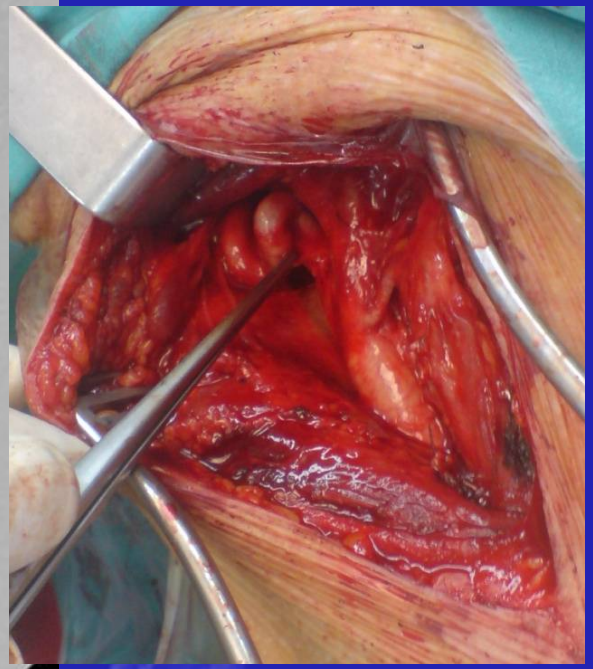
Vessel anatomy

Proximal common carotid lesions



Vessel anatomy





Tortuous CCA

or ICA coil

Vessel anatomy

“String sign” carotid morphology

Would you advance an EPD into such a vessel?

Defining patient groups that either CEA or CAS is beneficial

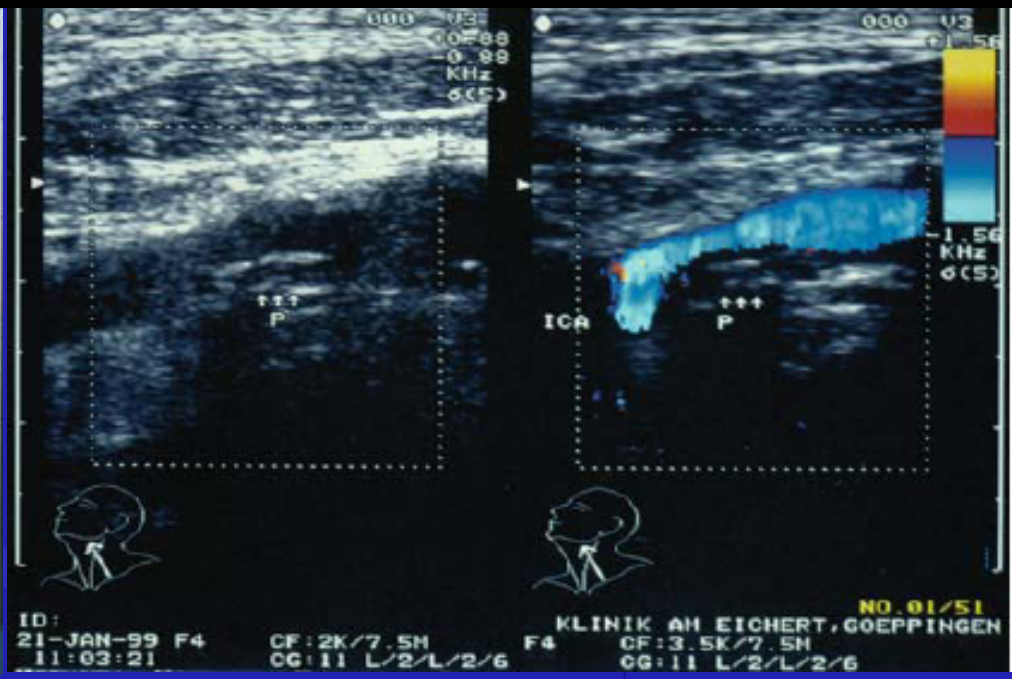
Plaque characteristics

Vessel anatomy

The high risk patient

Plaque characteristics

- **GSM<25 is related with a higher risk of neurologic complications after CAS**
- **low GSM is not a contraindication to CAS but rather a predictor of increased stroke risk**
- **Low GSM values are further related to future coronary events and higher rate of restenosis**

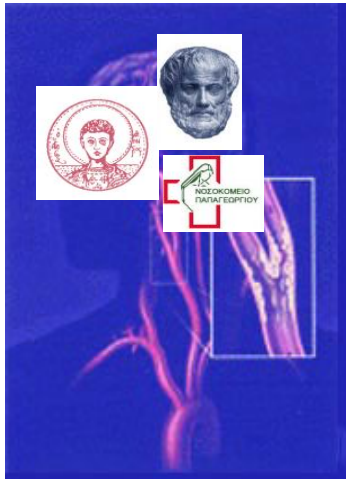


Biasi et al. ICAROS study. Circulation 2004;110:756-62
Fisher M et al. Stroke 2005;36:253–7.
Rothwell PM et al. Stroke 2000;31:615–21.

Defining patient groups that either CEA or CAS is beneficial

Vessel anatomy ⟷ *Plaque characteristics*

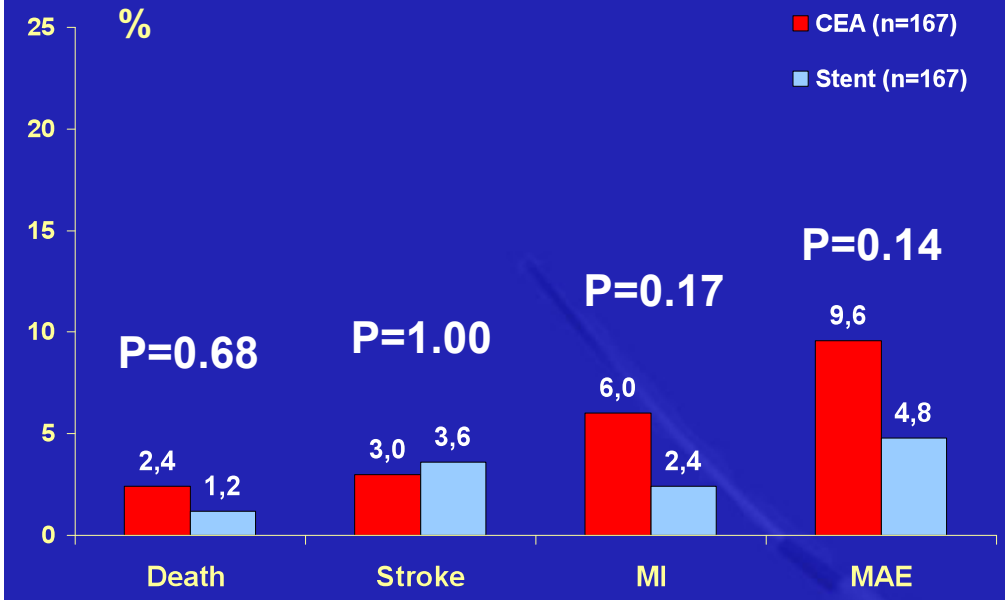
The high risk patient



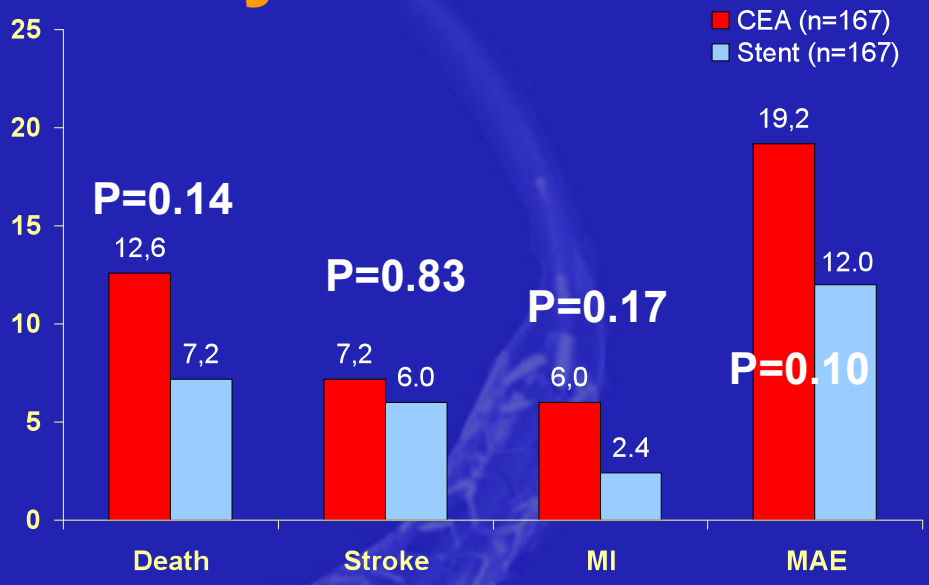
The“high risk” patient

SAPPHIRE: CAS vs CEA

30 Days endpoint



1 year results



CEA can be performed in high-risk patients with acceptable standard complication rates

Mozes G et al. Semin Vasc Surg 2005;18:61– 8.

octogenarians

Is CAS safe in this subgroup?

The CREST trial: lead-in phase,

30-day stroke and death rate

Age>80y	Age 70-79y	Age 60-69
12.1%	5.3%	1.3%

Retrospective study

- We conducted a retrospective review of CAS from 2003 to 2008
- RX Acculink - RX Accunet carotid system (Guidant →Abott)

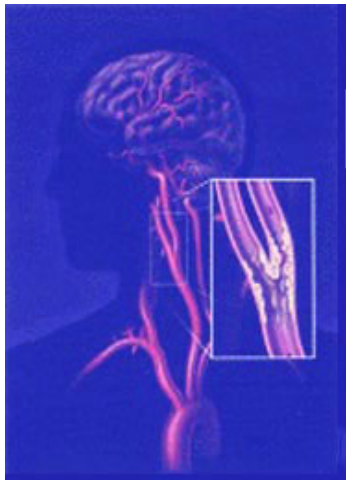
Material - Methods

- **67 months**
- **520 patients**
- **mean age : 76, range: 56-85**
- **364 male (70%), 156 female (30%)**
- **mean follow-up was 32 months (range: 1 – 54 months).**

Material - Methods

- Symptomatic (stroke (13,5%), TIA, Fugax): 51,5%

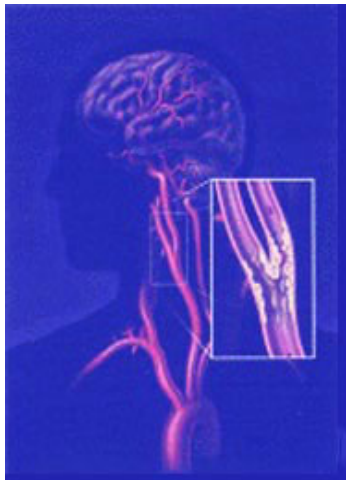
- Asymptomatic: 48,5%



Results within early follow-up (<30 days)

- Mortality: (0,9%)
  Stroke: (1,1%)
  TIA: (1,3%)
  Non fatal MI: (1,3%)

MAE : 4,6 %



Results within early follow-up (<30 days)

Predictors of adverse outcomes included:

- Age >80
- symptomatic patients
- Female gender
- predilation prior to CPD
- placement of multiple stents
- Contralateral occlusion
- Unfavorable anatomy

Late Follow-Up (>30 days)

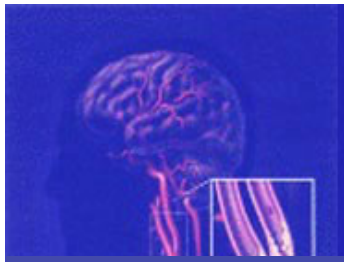
Mean follow-up was 32 months (range: 1 – 60 months)
46 (8,8%) patients lost of FU

- Mortality: (1,73 %).
  Stroke: (0,7%)
  Restenosis >70% : (2,3%).

Conclusion

- CAS within experienced hands can be highly efficient and durable

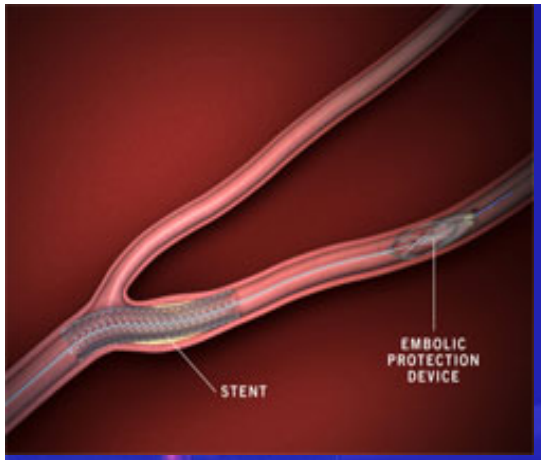
Acculink / Accunet system is safe and effective for CAS



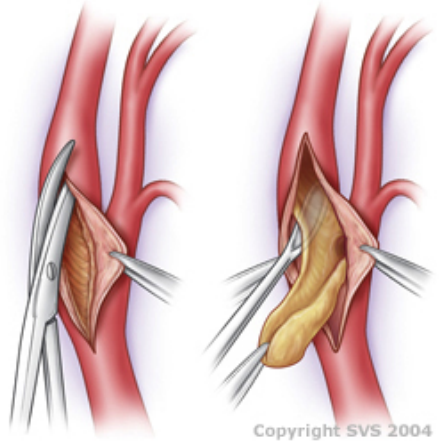
Conclusions

CEA is the goal standard when:

- specific carotid anatomy
- Extensive arch and carotid bif. calcification
- Access related problems
- Fresh thrombus at ICA lesion
- “String sign” morphology
- Very low GSM



Conclusions



CAS and CEA are not competitive procedures, but powerful treatment options tailored on different groups of patients

The gold standard is the experienced vascular team, able to twist between endovascular and open surgical options in order to achieve the best treatment for the patient


Thank you for your attention!