Stenóza karotické tepny:

krok po kroku

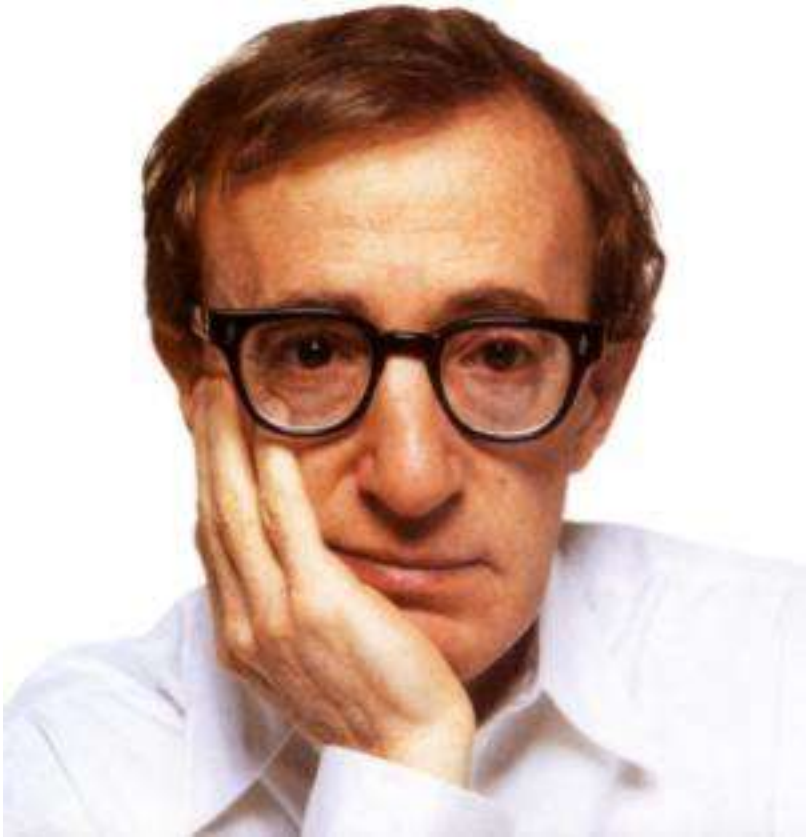
Josef Veselka

Kardiologická klinika 2. LFUK a FN Motol

Motto:

„Neničte můj mozek, je to můj druhý nejoblíbenější orgán.“

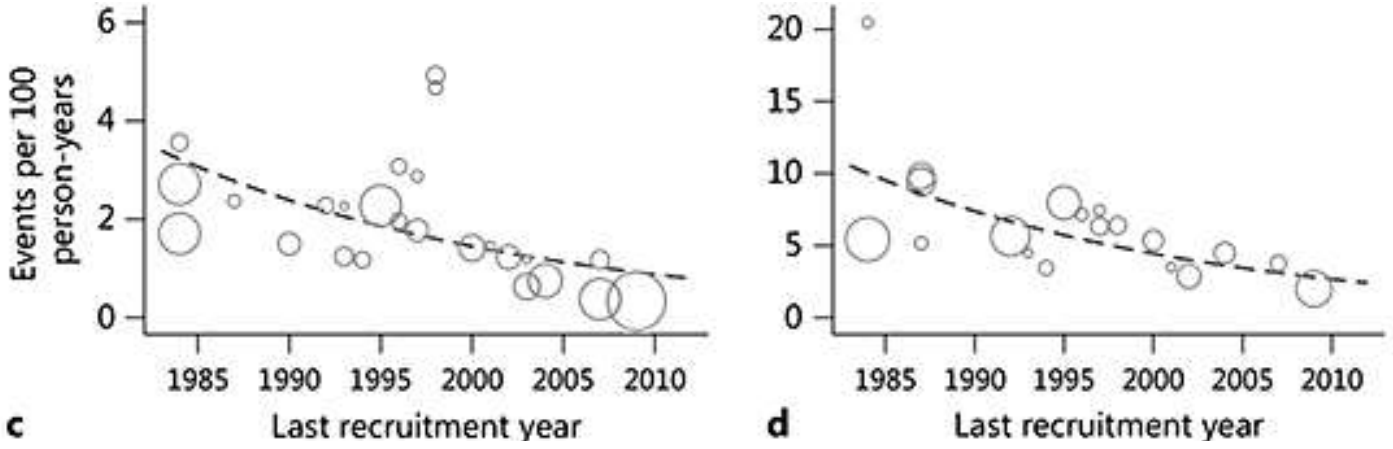
Woody Allen



Prevalence

- Karotická aterosklerosa je příčinou pětiny CMP.
- Prevalence je odhadována u subjektů nad 65 years 5% and 10%, méně než 1% má stenosu nad 80%.

Risk of neurological events in medically treated patients with carotid stenosis according to the year of enrollment to the study.



Ipsilateral stroke

Stroke + TIA

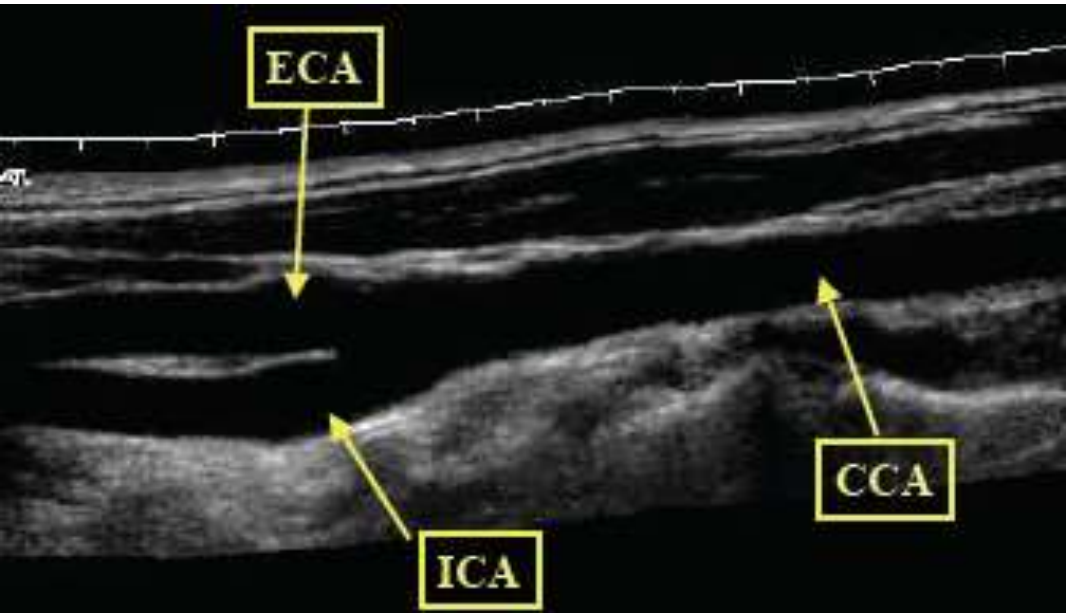
Diagnostika

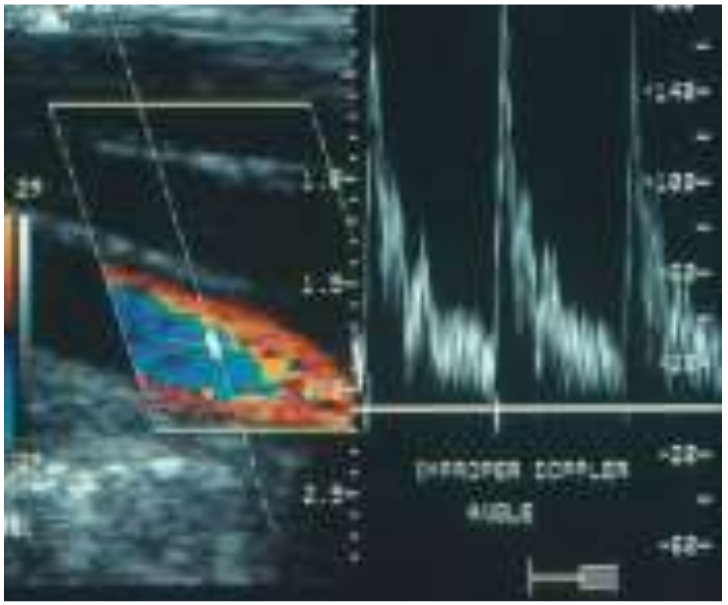
Indikace
(pro neinvazivní vyšetření)

- **CMP nebo TIA**
- **Amaurosis fugax**
- Šelest
- Sledování asymptomatické stenózy nad 20%
- Kumulace rizikových faktorů
  - Hypertenze
  - DM
  - Nikotin
  - Hypercholesterolemie
  - ICHS a/nebo ICHDK – symptomatická ateroskleróza
  - Věk


S.K.L.A
THE TIMES-PICAYUNE
©2003
DOUBLE CHEESEBURGER, LARGE FRIES, AND A JUMBO SHAKE
YOU WANT ANGIOPLASTY WITH THAT?

DUS



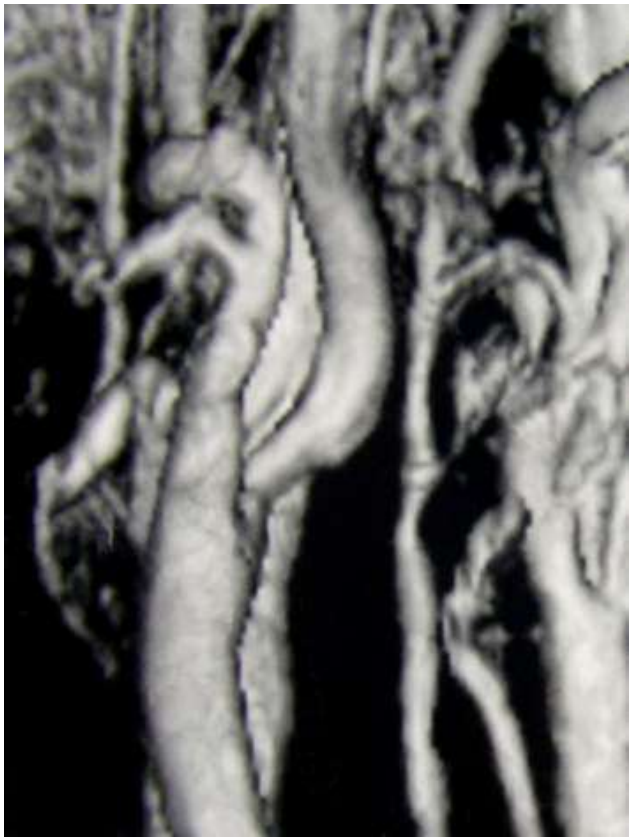


Hodnocení stenosy ICA dle DUS

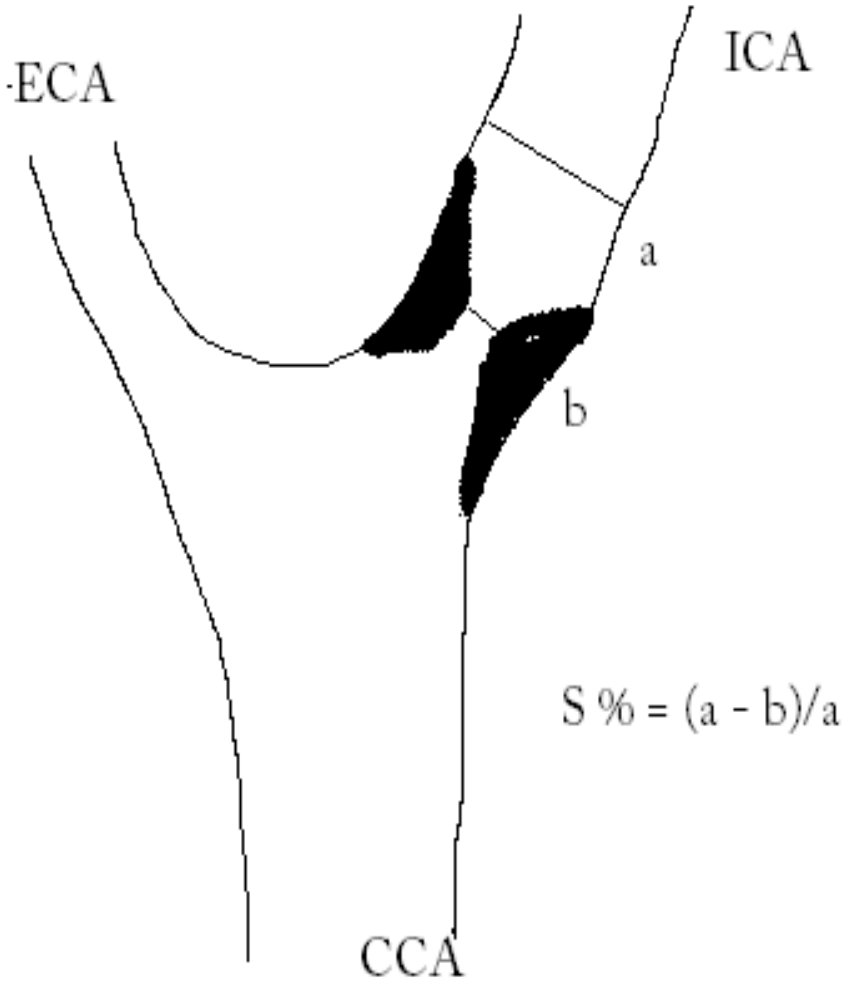
Stenosis (%)	PSV (cm/s)	EDV (cm/s)	PSV_{ICA}/PSV_{CCA}
0–29	PSV≤100	EDV<40	
30–49	110<PSV <130	EDV<40	
50–59	PSV >130	EDV<40	PSV ratio <3,2
60–69	PSV >130	40< EDV < 110	3,2 ≤PSV ratio <4
70-79	**PSV >210**	**110< EDV <140**	**PSV ratio ≥4**
80-95	**PSV >210**	**EDV >140**	**PSV ratio ≥4**
96–99	String flow		
100	Absence of flow		

CT angio

MR angiografie



Měření významnosti stenosy dle NASCET



Indikace k léčbě

Indikace

Asymptomatic patients

It is reasonable to perform CEA or CAS in asymptomatic patients who have more than 70% stenosis of the internal carotid artery if the risk of perioperative stroke, MI, and death is low.

Class II

Asymptomatické versus symptomatické stenózy

- **Asymptomatické stenózy:**
  - **indikační kriteria byla v minulosti značně nejasná a nejednotná**
  - **Teprve výsledky *ACAS – (Asymptomatic Carotid Surgery Trial)* prokázaly, že chirurgicky léčení pacienti mají nižší riziko vzniku CMP (RRR 54% u stenosy nad 60%).**
  - **Asymptomatické stenosy mají dobrou prognosu (2% riziko CMP/rok)**

- **Symptomatické stenózy:**
  - ***CMP, TIA, amaurosis fugax***
  - **Prospektivní studie prokázaly, že pacienti s významnou stenózou, kteří již prodělali TIA, mají 5-leté riziko CMP *30%-40%***
  - **Efektivnost CEA prokazují dvě studie: (NASCET - North American Symptomatic Surgery Trials, ECST - European Carotid Surgery Trials)**
  - **Vyplývá z nich, že operovaní pacienti se stenózou 70%-99% mají výrazně lepší prognózu ve srovnání s konzervativní léčbou**

CREST

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Stenting versus Endarterectomy for Treatment of Carotid-Artery Stenosis

Thomas G. Brott, M.D., Robert W. Hobson, II, M.D.,* George Howard, Dr.P.H., Gary S. Roubin, M.D., Ph.D., Wayne M. Clark, M.D., William Brooks, M.D., Ariane Mackey, M.D., Michael D. Hill, M.D., Pierre P. Leimgruber, M.D., Alice J. Sheffet, Ph.D., Virginia J. Howard, Ph.D., Wesley S. Moore, M.D., Jenifer H. Voeks, Ph.D., L. Nelson Hopkins, M.D., Donald E. Cutlip, M.D., David J. Cohen, M.D., Jeffrey J. Popma, M.D., Robert D. Ferguson, M.D., Stanley N. Cohen, M.D., Joseph L. Blackshear, M.D., Frank L. Silver, M.D., J.P. Mohr, M.D., Brajesh K. Lal, M.D., and James F. Meschia, M.D., for the CREST Investigators†

NEJM 2010

CREST is the largest RCT comparing CAS vs CEA

- Largest, most rigorous, prospective randomized trial and shows the two therapies are safe and effective
- 108 US and 7 Canadian sites, 2502 pts.
- PE: stroke, MI, death; ipsilateral stroke up to 4 years

Clinical Trial	# of Patients	# of Sites
CREST	**2,502**	**117**
ICSS	1,710	53
SPACE*	1,183	35
EVA-3S*	520	30
SAPPHIRE*	334	29

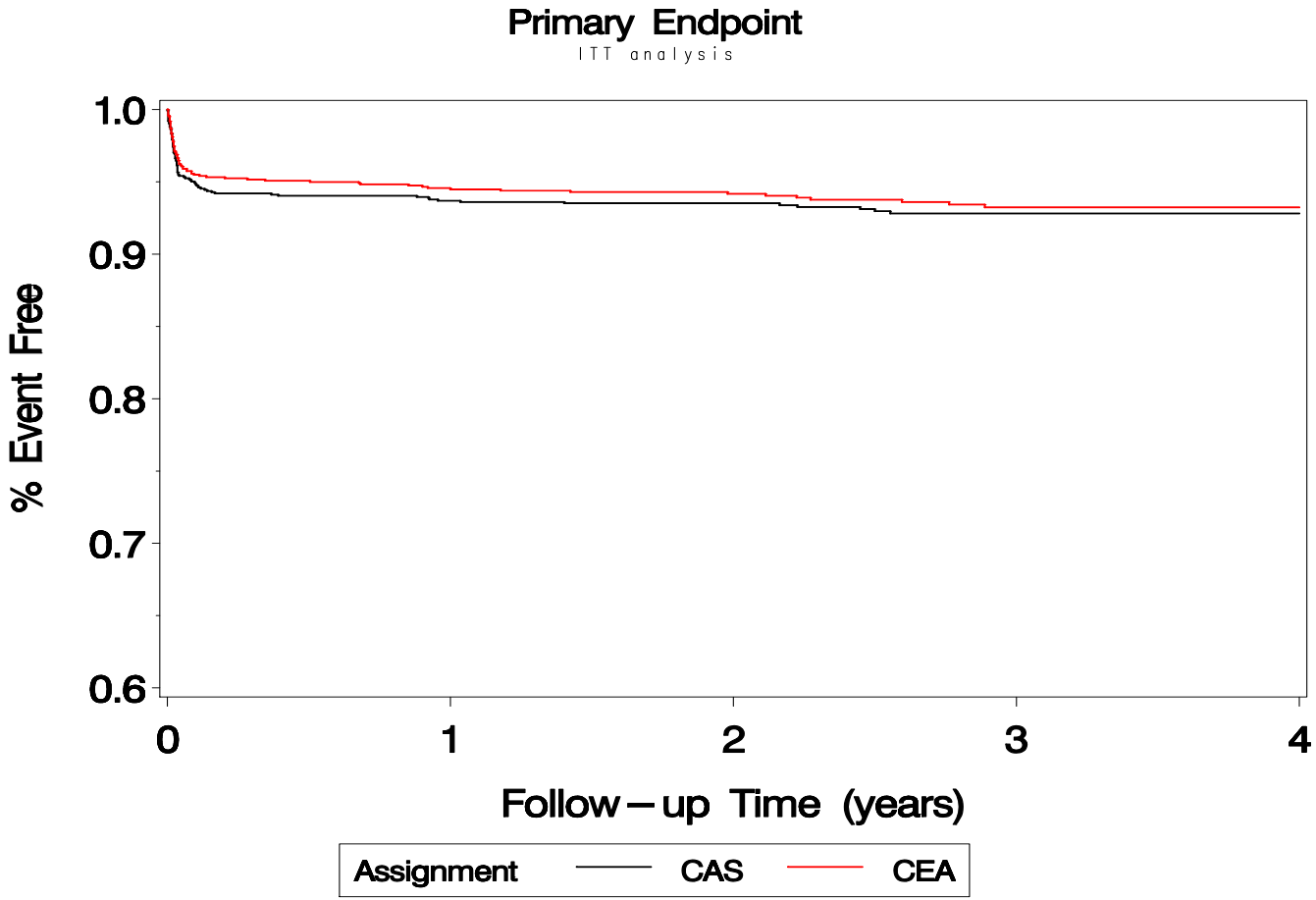
* Trials stopped prematurely

Primary endpoint:

Both stenting and surgery are equally safe and effective

Any death, stroke or MI within the perioperative period plus ipsilateral stroke out to 4 years.

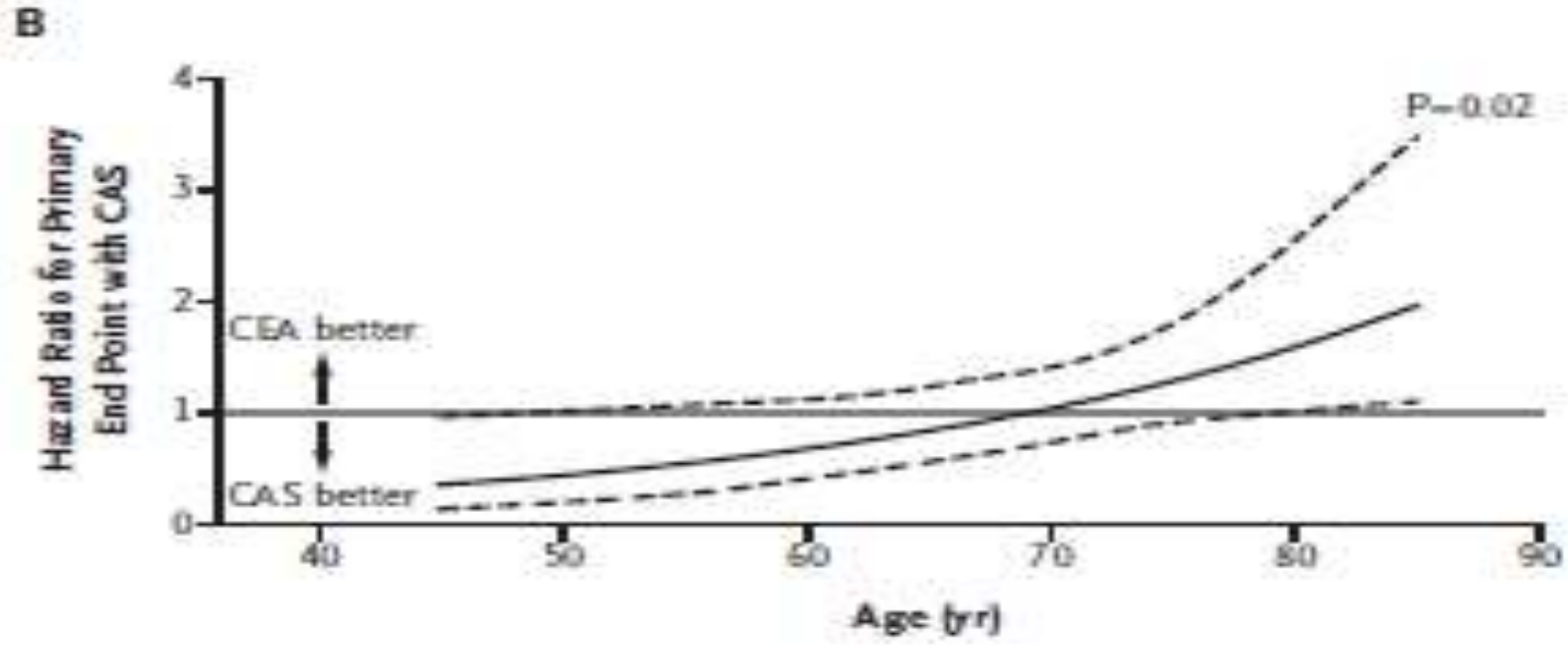
CAS	CEA	Hazard Ratio	P-value
7.2%	6.8%	HR:1.11; 95% CI: 0.81-1.51	0.51



Age and peri-procedural results

- Statement from NIH Press Release:

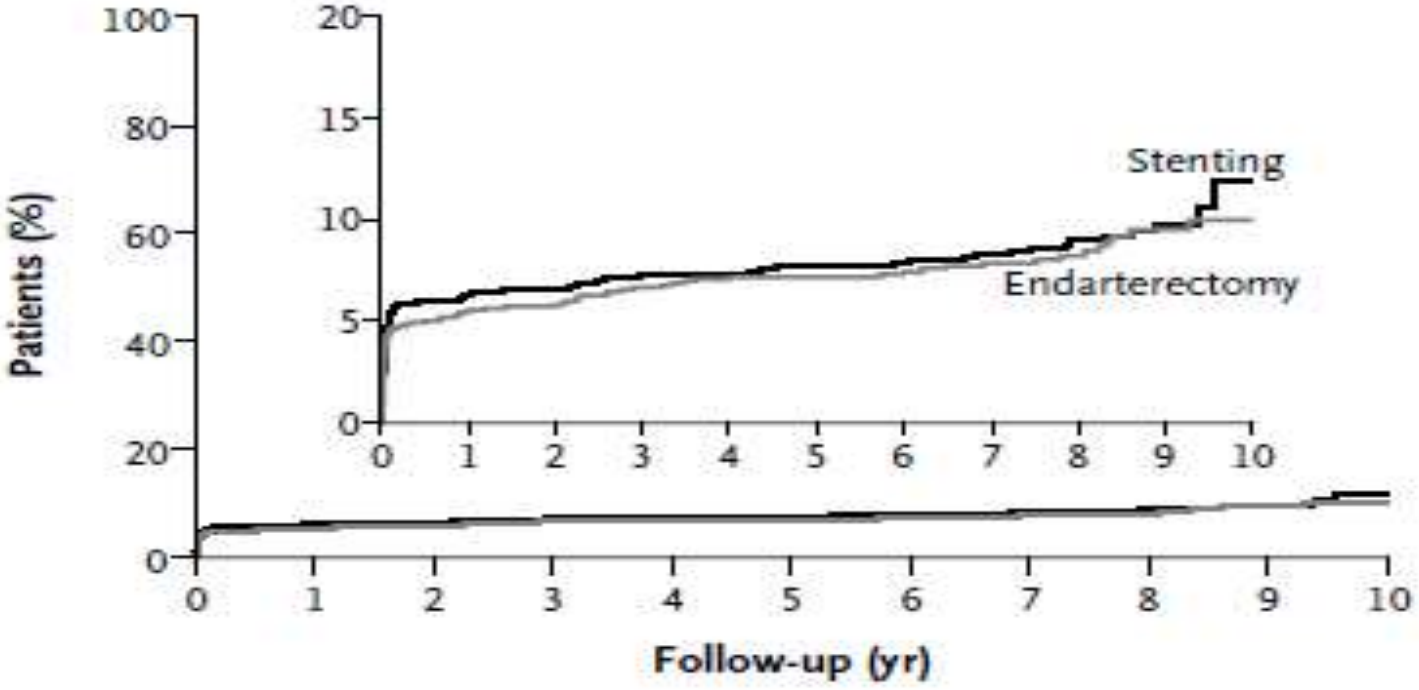
  "The study also found that the age of the patient made a difference. **At approximately age 69 and younger, CAS results were slightly better with a larger benefit for stenting the younger the age of the patient. For patients older than 70, surgical results were slightly superior to stenting with** a larger benefit for surgery the older the age of the patient."



Long-Term Results of Stenting versus Endarterectomy for Carotid-Artery Stenosis

CREST, NEJM 2016

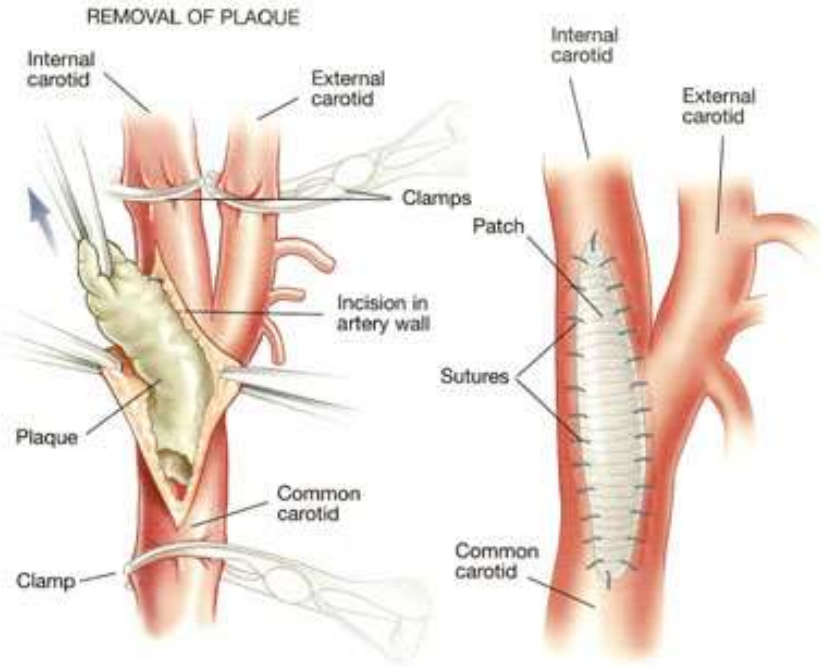
Over 10 years of follow-up, we did not find a significant difference between patients who underwent stenting and those who underwent endarterectomy with respect to the risk of periprocedural stroke, myocardial infarction, or death and subsequent ipsilateral stroke. The rate of postprocedural ipsilateral stroke also did not differ between groups. (Funded by the National Institutes of Health and Abbott



Key Learnings

- CREST represents the largest, most rigorous, prospective randomized trial and shows **both stenting and surgery are safe and effective**.
- It is the standard by which these therapies should be measured.
- This study represents the highest level of medical evidence.
- Both treatment groups had very low event rates confirming safety and efficacy.
- <u>No data for modern conservative therapy.</u>

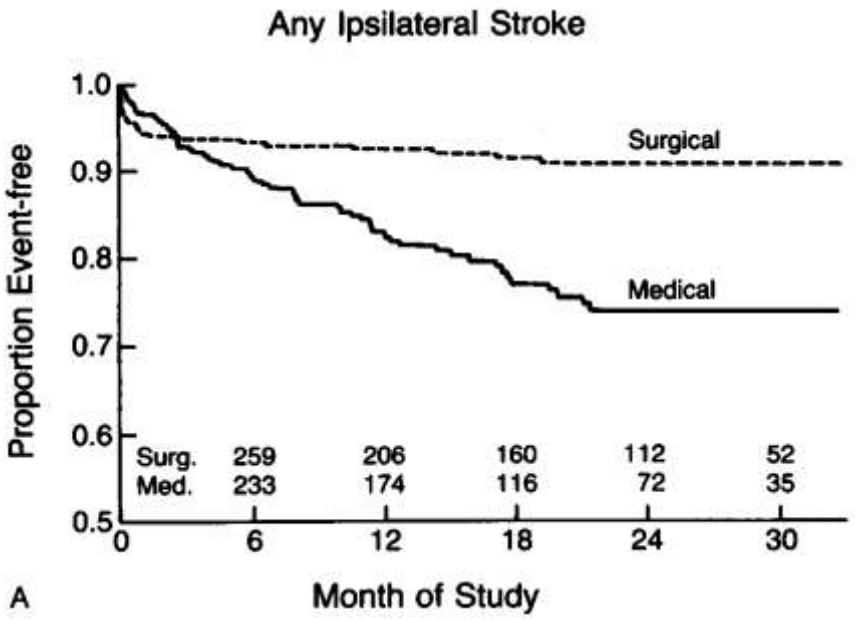
Endarterectomy



CAE of symptomatic stenosis –NASCET (1991) and ECST (1998) trials

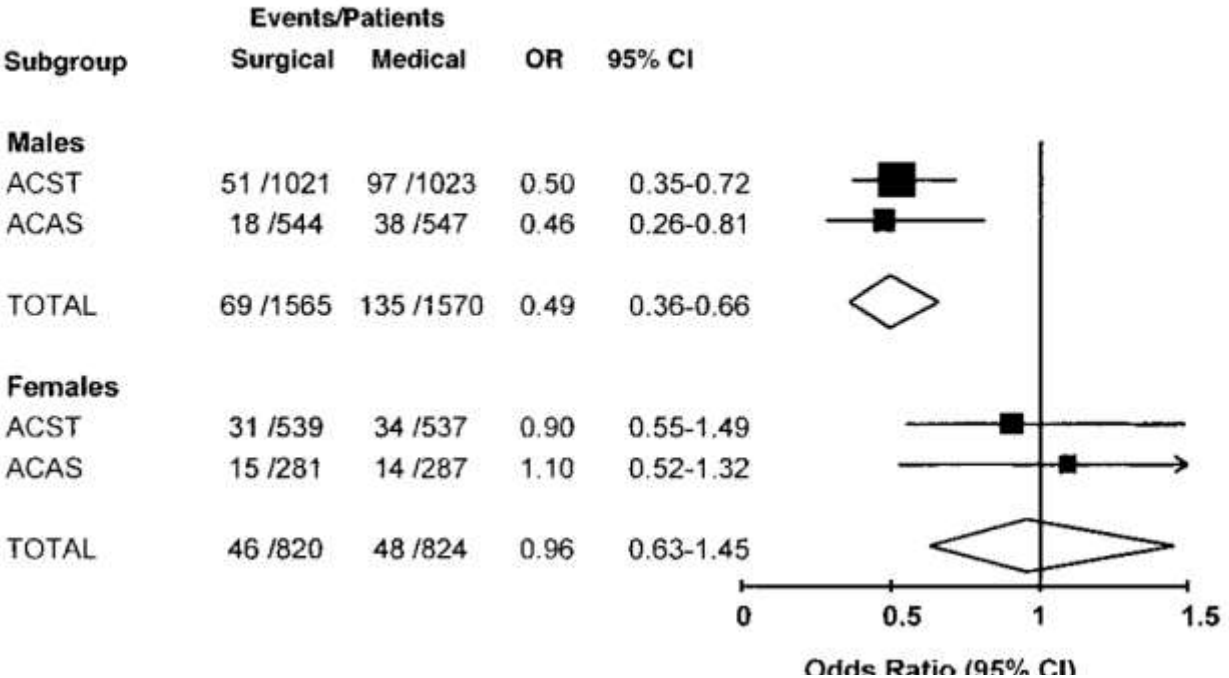
Table 2. First Adverse Events and Actuarial Failure Rates at Two Years of Follow-up, According to the Event Defining Treatment Failure.

Event Defining Failure*	Medical Patients (N = 331)	Surgical Patients (N = 328)	Absolute Difference ±SE	Relative-Risk Reduction
	events (event rate, %†)		%	%
Any ipsilateral stroke	61 (26.0)	26 (9.0)	17.0±3.5‡	65
Any stroke	64 (27.6)	34 (12.6)	15.0±3.8‡	54
Any stroke or death	73 (32.3)	41 (15.8)	16.5±4.2‡	51
Major or fatal ipsilateral stroke	29 (13.1)	8 (2.5)	10.6±2.6‡	81
Any major or fatal stroke	29 (13.1)	10 (3.7)	9.4±2.7‡	72
Any major stroke or death	38 (18.1)	19 (8.0)	10.1±3.5§	56



Symptomatic stenosis = stroke or TIA in previous 6 months + ipsilateral ICA stenosis 50-99%.
NNT = 6 in 70-99% stenosis, NNT = 15 in 50-70% stenosis.

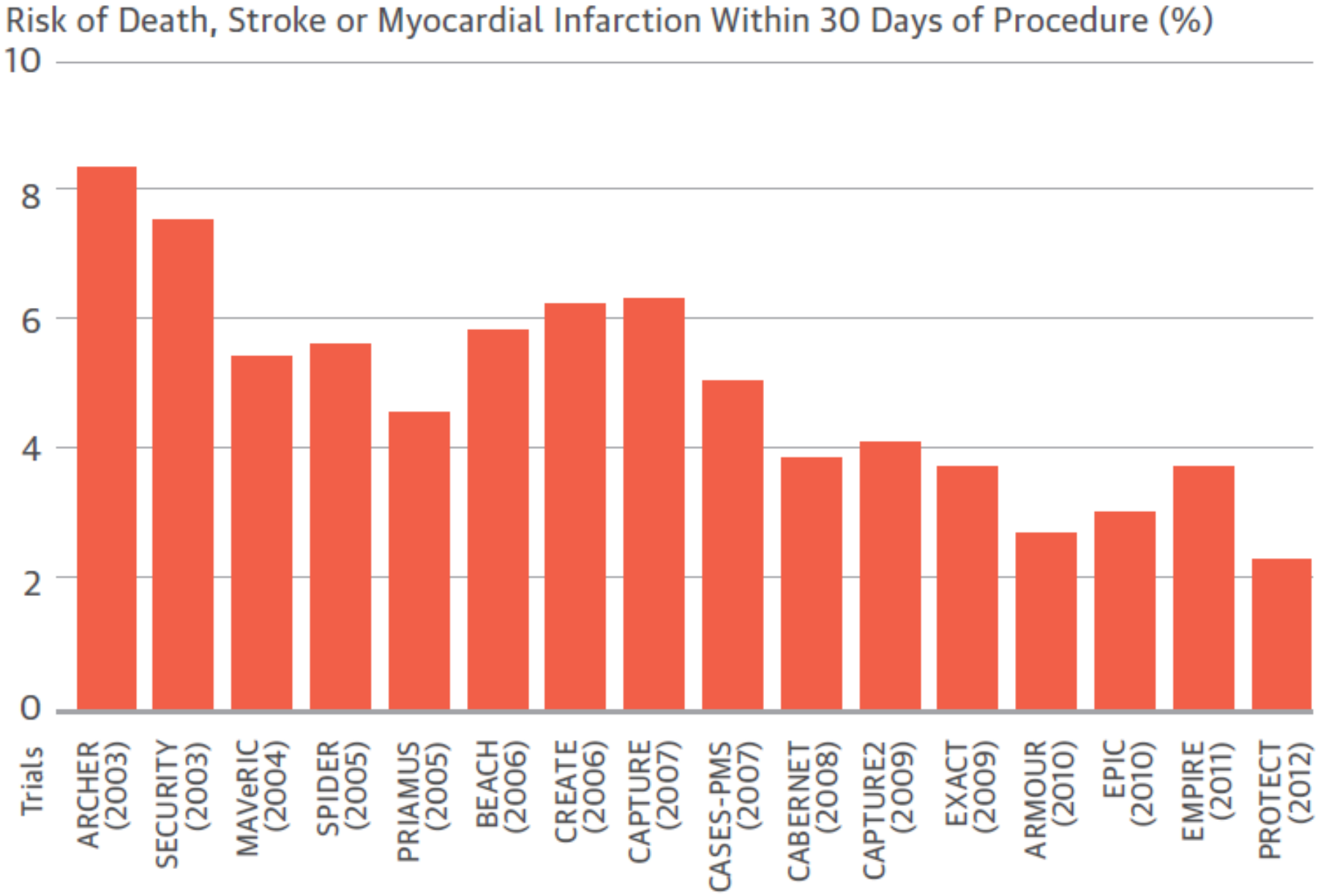
CEA of asymptomatic stenosis – ACAS (1993) a ACST (2004) trials



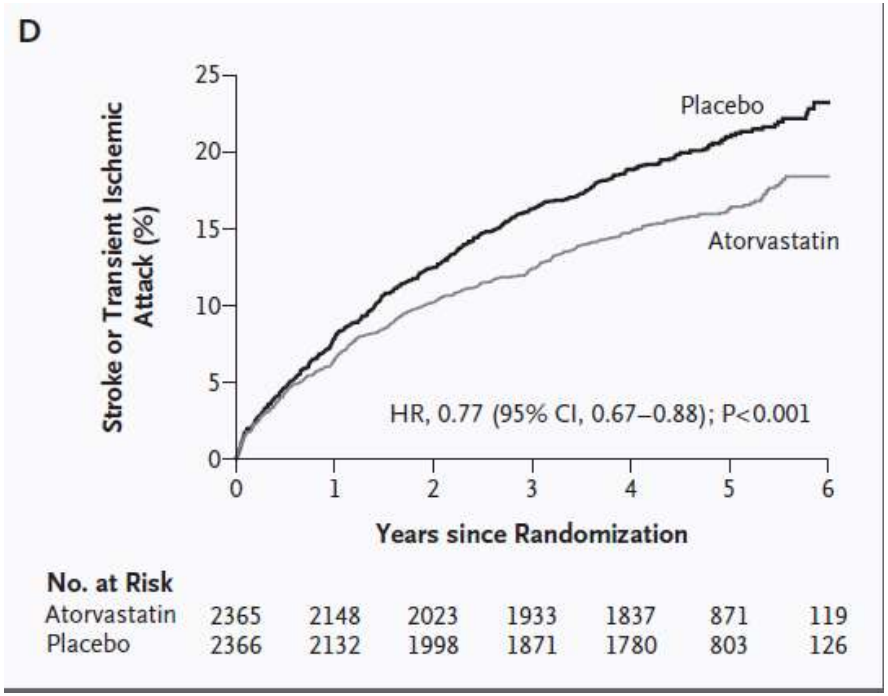
In the asymptomatic patients ≤ 75y of age with 70-99% stenosis of ICA performing CEA halved the risk of ipsilateral stroke (12% vs. 6%) (with 3% of peroperative strokes). The benefit was only seen in men.

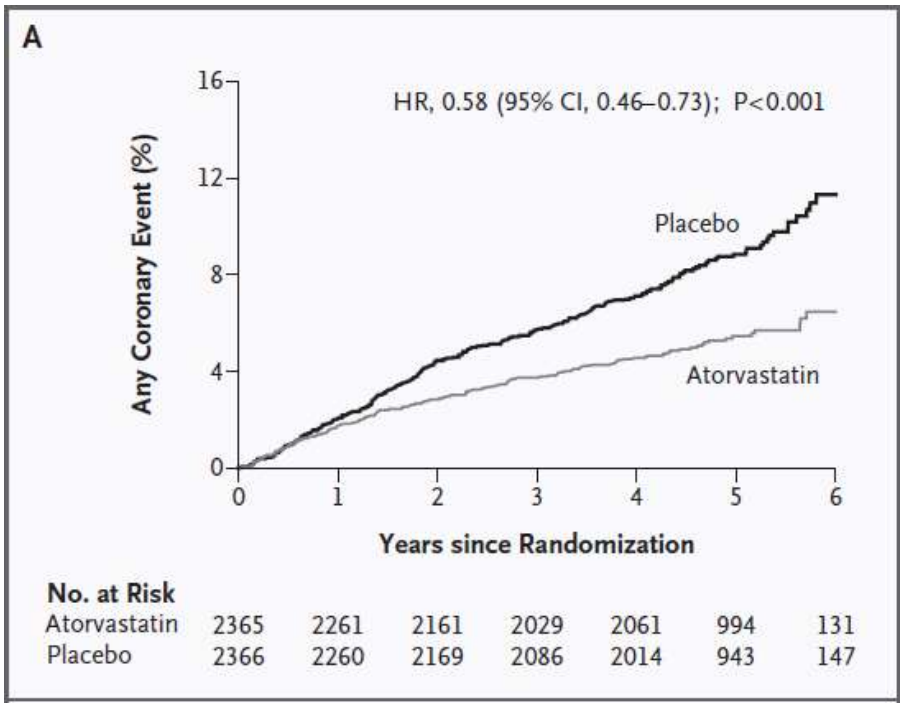
NNT = 17.

Improvement in CAS outcomes 2003-2012



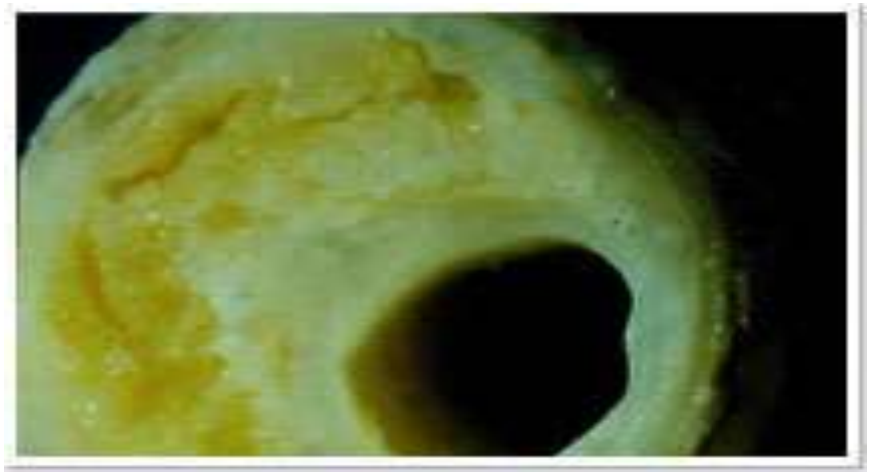
Optimální medikamentosní terapie





Pts. who had had stroke or TIA and LDL ≥ 2,6 mmol/l, atorvastatin 80mg vs. placebo.
In 1007 (21%) pts. with carotid stenosis was the largest benefit of statin therapy – 33% RRR of stroke or TIA and 43% RRR of MI or coronary revascularization.

Klíčem je složení plátu



Rizikové faktory dosud asymptomatické stenosy

Clinical[a]	• Contralateral TIA/stroke[121]
Cerebral imaging	• Ipsilateral silent infarction[122]
Ultrasound imaging	• Stenosis progression (> 20%)[123] • Spontaneous embolization on transcranial Doppler (HITS)[124] • Impaired cerebral vascular reserve[125] • Large plaques[b126] • Echolucent plaques[96] • Increased juxta-luminal black (hypoechogenic) area[127]
MRA	• Intraplaque haemorrhage[128] • Lipid-rich necrotic core

ESC 2017

Závěry evidence

Nedostatek kvalitních dat ve vztahu CAS vs CEA.

Výborné výsledky ve zkušených rukou.

Nejistota stran CAS vs CEA vs OMT.

Neškodit

Ne všechny „atraktivní“ stenosy je třeba ošetřit.

Tři praktické rady

Dobrá rada č. 1
SELEKCE PACIENTŮ

75-85 LET

ASYMPTOMATICKÁ LÉZE

OPAKOVANÁ CMP

SNÍŽENÁ CV REZERVA

SNÍŽENÁ KVALITA ŽIVOTA

BUDE PROFITOVAT ???

Dobrá rada č. 2
SELEKCE LÉZE

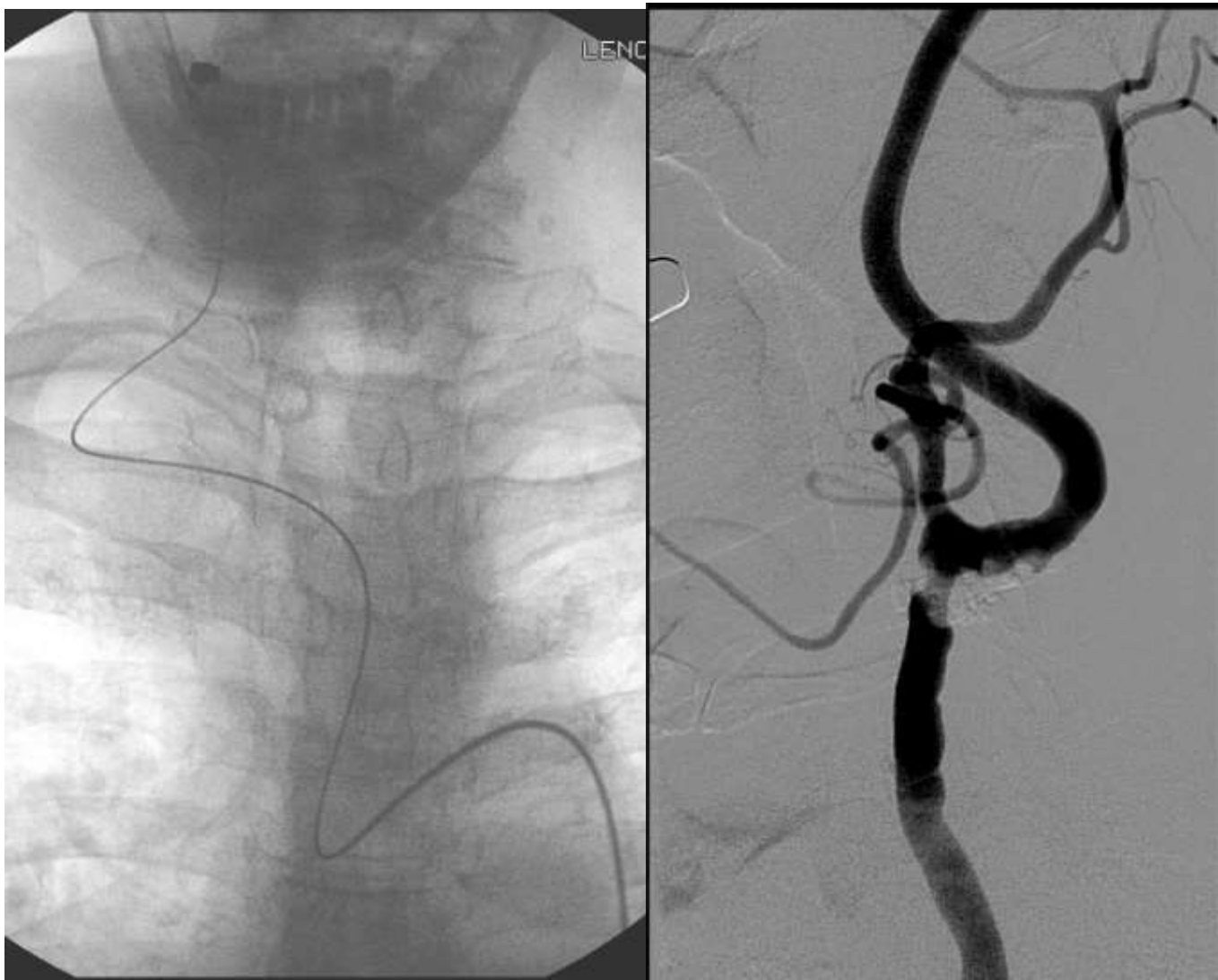
TORTUOSITY

KALCIFIKACE

TYP OBLOUKU

TROMBUS

LIPIDOVÉ JÁDRO?



Dobrá rada č. 3
SELEKCE LÉKAŘE

LEARNING CURVE

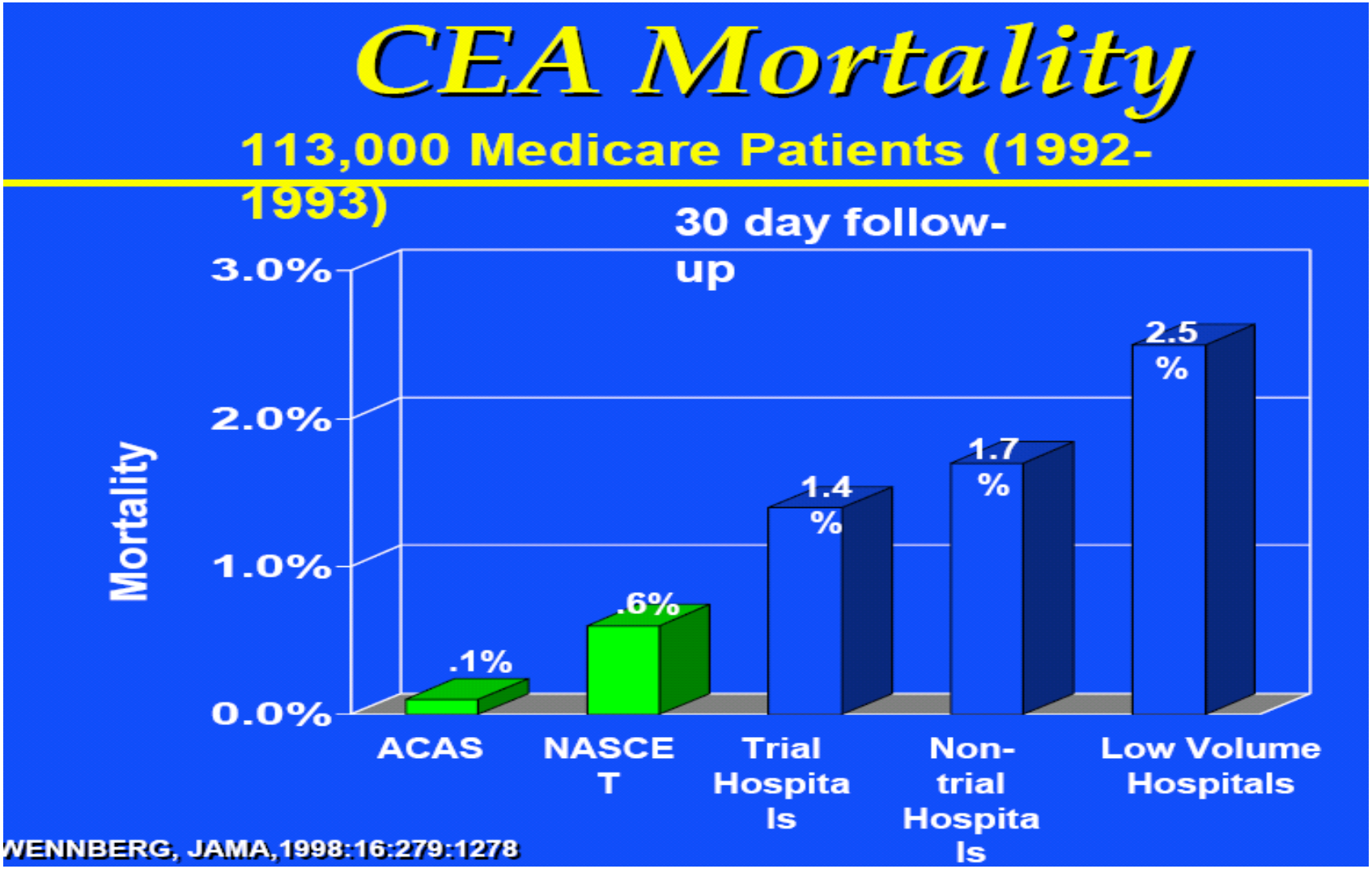
VLASTNÍ VÝSLEDKY

MEZIOBOROVÁ SPOLUPRÁCE

TÝMOVÁ SPOLUPRÁCE

REGISTR

Jak vypadá reálný život?



Take-home messages

- Některé karotické stenosy způsobují CMP.
- Čím vyšší riziko aterosklerosy, tím vyšší riziko karotické stenosy.
- CAS vs CEA vs OMT: zatím nevyřešené dilema.
- Incidence CMP po revaskularizaci je nízká:
  - ACT I – CAS 0.4% per year, CEA 0.5% per year.
  - CREST – CAS 0.7% per year, CEA 0.6% per year.
  - (navíc 2-4% periprocedurální CMP/AIM/smrt)
- Klíčem bude riziková stratifikace dle složení plátu.