

# Extracranial carotid ,vertebral and upper extremity artery disease

*ESC Guidelines on the diagnosis and treatment of peripheral artery diseases*

**Marc van Sambeek MD PhD FESC**

Department of Vascular Surgery

*Catharina Hospital*

*Eindhoven, The Netherlands*

**The Task Force on the Diagnosis and Treatment of Peripheral Artery Diseases of the European Society of Cardiology (ESC)**

**Many thanks to the reviewers for their excellent contribution**

Conflict of interest for this presentation

NONE

# Carotid artery disease and stroke

- Ischaemic stroke: major public health impact.
- Carotid artery disease accounts for approximately 20% of ischaemic strokes.
- Carotid artery stenosis is considered symptomatic in the presence of TIA or stroke affecting the corresponding territory within previous 6 months.
- All patients with neurological complaints should be seen as soon as possible by a neurologist.
- Urgent imaging of the brain and supra-aortic vessels is mandatory in all patients presenting with TIA or stroke.

# Carotid artery disease

## Patient assessment

Assessment of a patient with carotid artery stenosis mandates interdisciplinary concertation, including neurologists.

It should include at least:

- assessment of signs or symptoms related to the affected carotid artery,
- measurement of the degree of internal carotid artery stenosis,
- comorbidities,
- life expectancy.

# Carotid artery disease - diagnosis

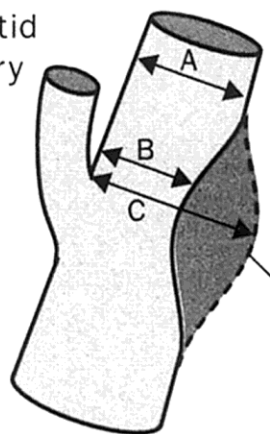
Recommendation for evaluation of carotid artery stenosis	Class	Level
DUS, CTA, and/or MRA are indicated to evaluate carotid artery stenosis	I	A

**DUS** - commonly used as the first step to detect extracranial carotid artery stenosis and to assess its severity

**CTA** - widely available and allows for a differentiation between ischaemic and haemorrhagic stroke

**MRA** - more sensitive in the detection of brain ischaemia

# Calculation of the degree of the carotid stenosis – NASCET and ECST criteria

Difference between NASCET and ECST in measurement of internal carotid artery stenosis			
 <p>External carotid artery</p> <p>Internal carotid artery</p> <p>Estimated position of carotid wall</p> <p>Common carotid artery</p>	NASCET	ECST	
	30	65	
	40	70	
	50	75	
	60	80	
	70	85	
	80	91	
	90	97	
Approximate equivalent degrees of internal carotid artery stenosis used in NASCET and ECST according to recent direct comparisons			
NASCET	$\frac{A-B}{A}$	ECST	$\frac{C-B}{C}$

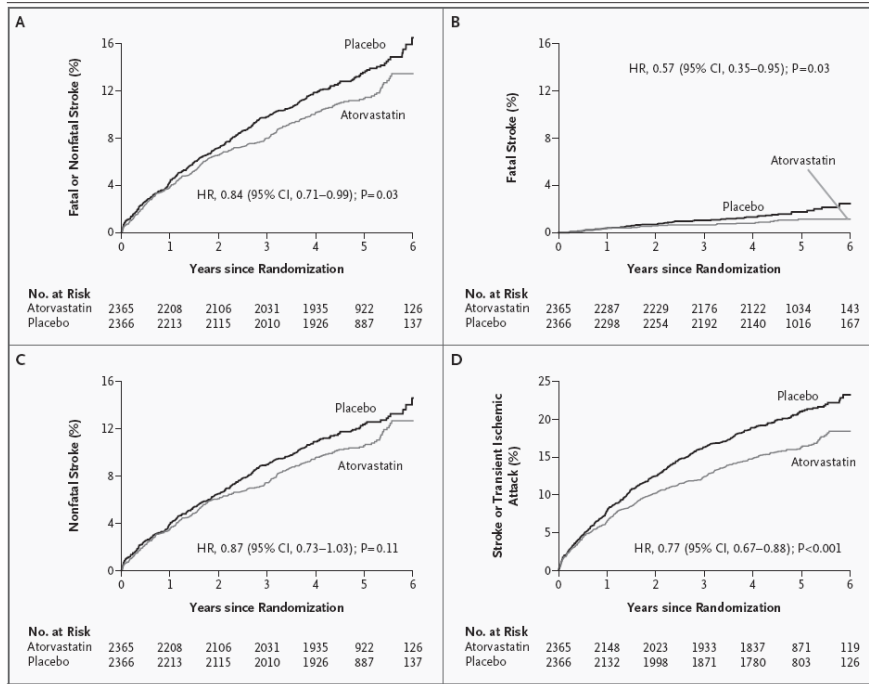
Reproduced with permission from Donnan GA et al. Lancet 1989;351:1372-1373.

For the purpose of these guidelines, the degree of stenosis is according to the NASCET criteria

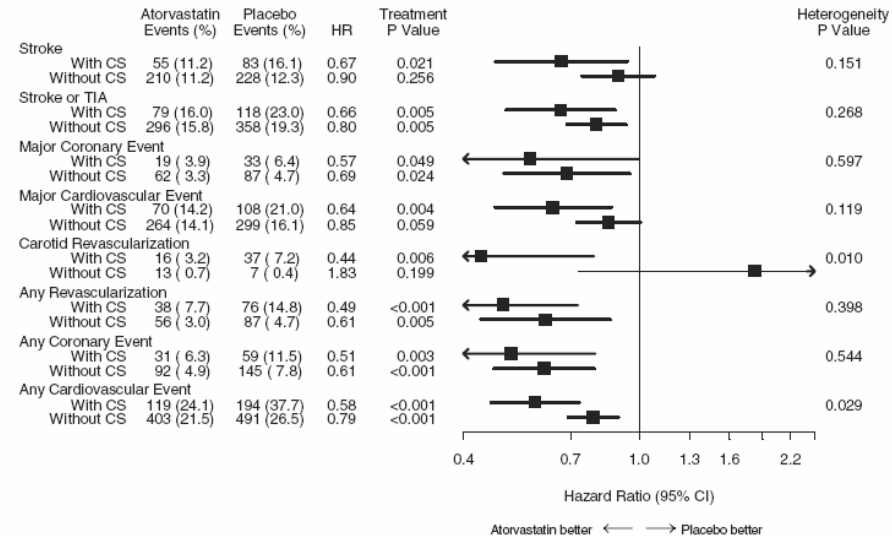
# Management of asymptomatic carotid artery disease

Recommendations	Class	Level
All patients with asymptomatic carotid artery stenosis should be treated with long-term antiplatelet therapy.	I	B
All patients with asymptomatic carotid artery stenosis should be treated with long-term statin therapy.	I	C
In asymptomatic patients with carotid artery stenosis >60%, CEA should be considered as long as the perioperative stroke and death rate for procedures performed by the surgical team is <3% and the patient's life expectancy exceeds 5 years.	IIa	A
In asymptomatic patients with an indication for carotid revascularization, CAS may be considered as an alternative to CEA in high-volume centres with documented death or stroke rate <3%	IIb	B

# Rationale for statins in carotid artery disease



**SPARCL Study**  
**NEJM 2006;355:549**  
**Stroke 2008;39:3297**





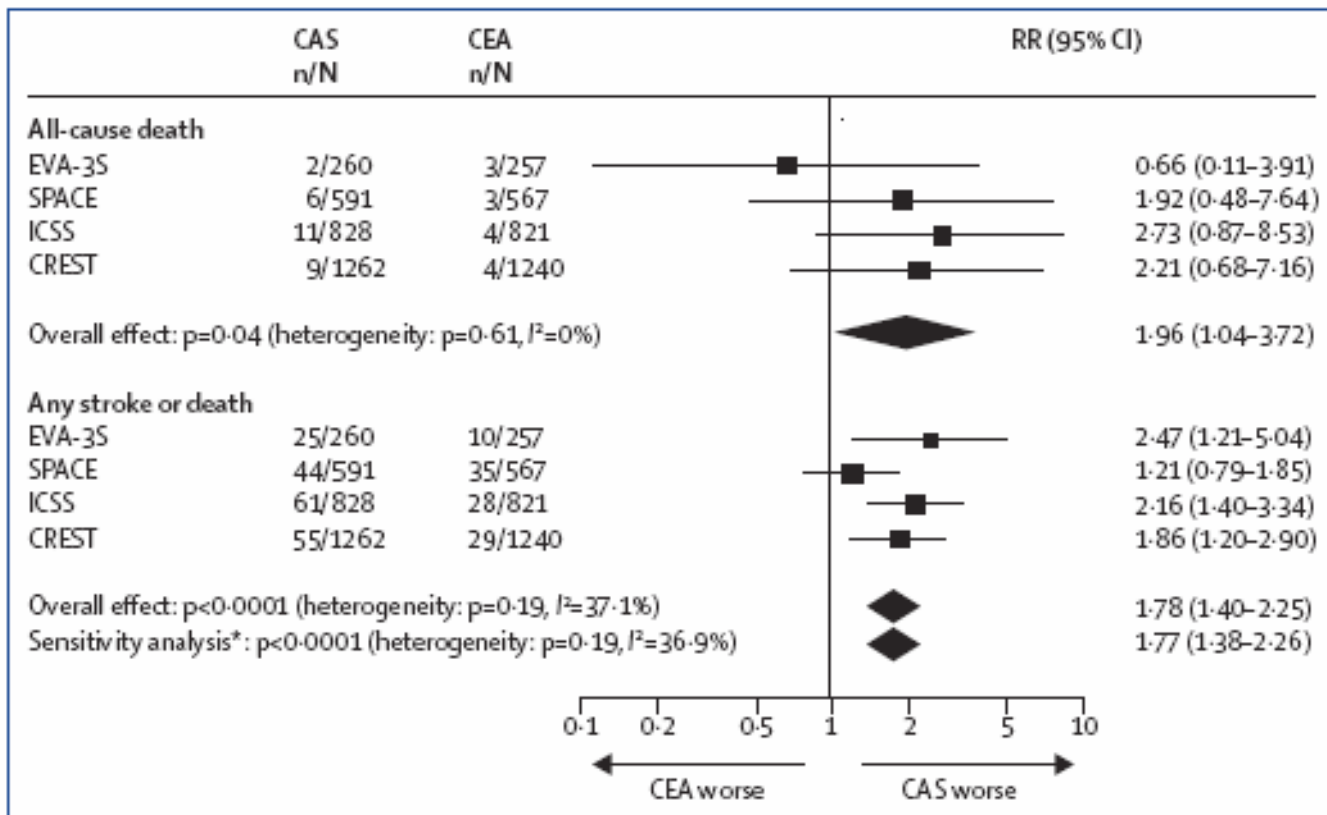
# Randomized trials of carotid endarterectomy in asymptomatic patients

	<u>CASANOVA</u>	<u>VAACET</u>	<u>ACAS</u>	<u>ACST</u>
<b>Patients</b>	<b>410</b>	<b>444</b>	<b>1662</b>	<b>3120</b>
<b>Perioperative stroke/death (%)</b>	<b>6.9</b>	<b>4.3</b>	<b>2.3</b>	<b>3.1</b>
<b>Follow-up (mo)</b>	<b>42</b>	<b>48</b>	<b>30</b>	<b>60</b>
<b>End point surgical (%)</b>	<b>10.7</b>	<b>8.0</b>	<b>5.1</b>	<b>6.4</b>
<b>Endpoint medical (%)</b>	<b>11.3</b>	<b>20.6</b>	<b>11.0</b>	<b>11.8</b>
<b>Absolute risk reduction (%)</b>	<b>0.4</b>	<b>12.6</b>	<b>5.9</b>	<b>5.4</b>

# Management of symptomatic carotid artery disease

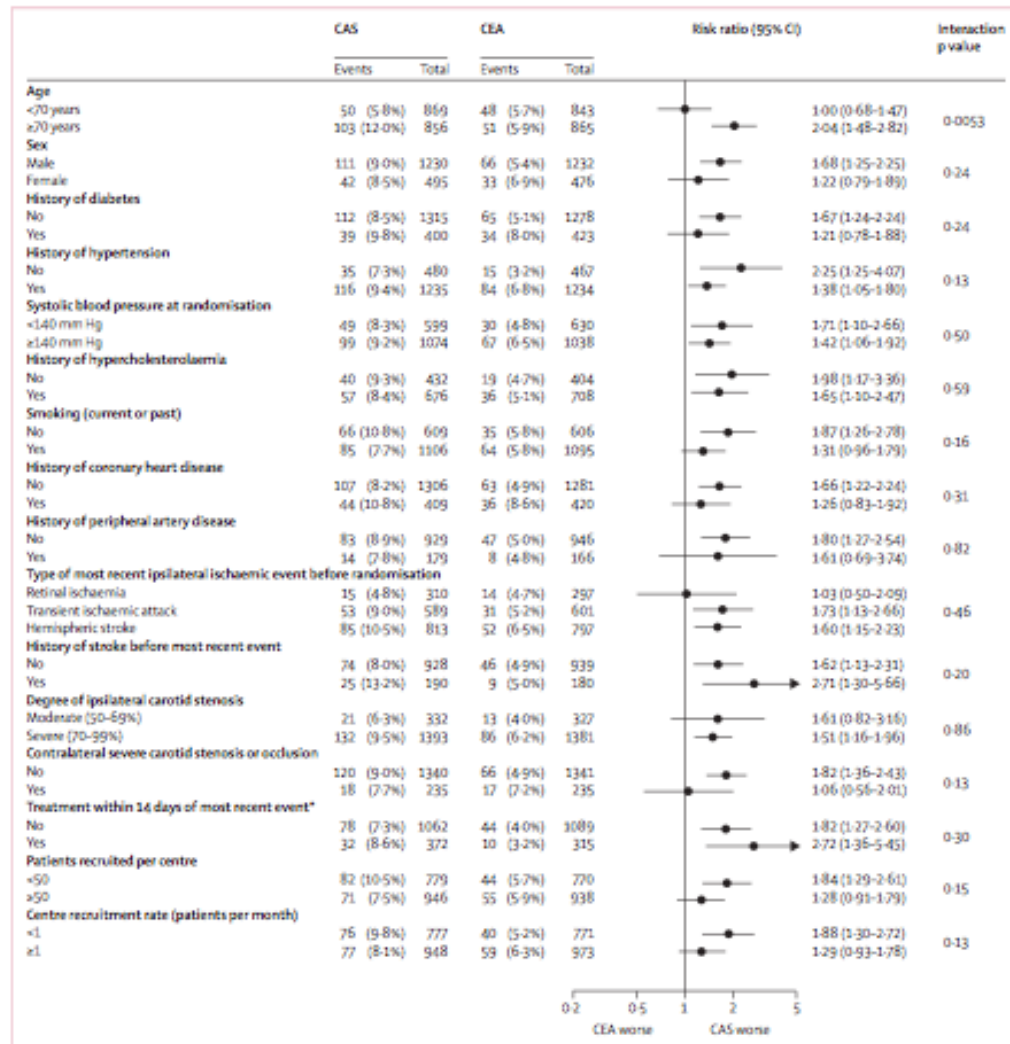
Recommendations	Class	Level
All patients with symptomatic carotid stenosis should receive long-term antiplatelet therapy.	I	A
All patients with symptomatic carotid stenosis should receive long-term statin therapy.	I	B
In patients with symptomatic 70–99% stenosis of the internal carotid artery, CEA is recommended for the prevention of recurrent stroke.	I	A
In patients with symptomatic 50–69% stenosis of the internal carotid artery, CEA should be considered for recurrent stroke prevention, depending on patient-specific factors.	IIa	A
In symptomatic patients with indications for revascularization, the procedure should be performed as soon as possible, optimally within two weeks of the onset of symptoms.	I	B
In symptomatic patients at high surgical risk requiring revascularization, CAS should be considered as an alternative to CEA.	IIa	B
In symptomatic patients requiring carotid revascularization, CAS may be considered as an alternative to CEA in high-volume centres with documented death or stroke rate <6%.	IIb	B

# Meta-analysis CEA versus CAS

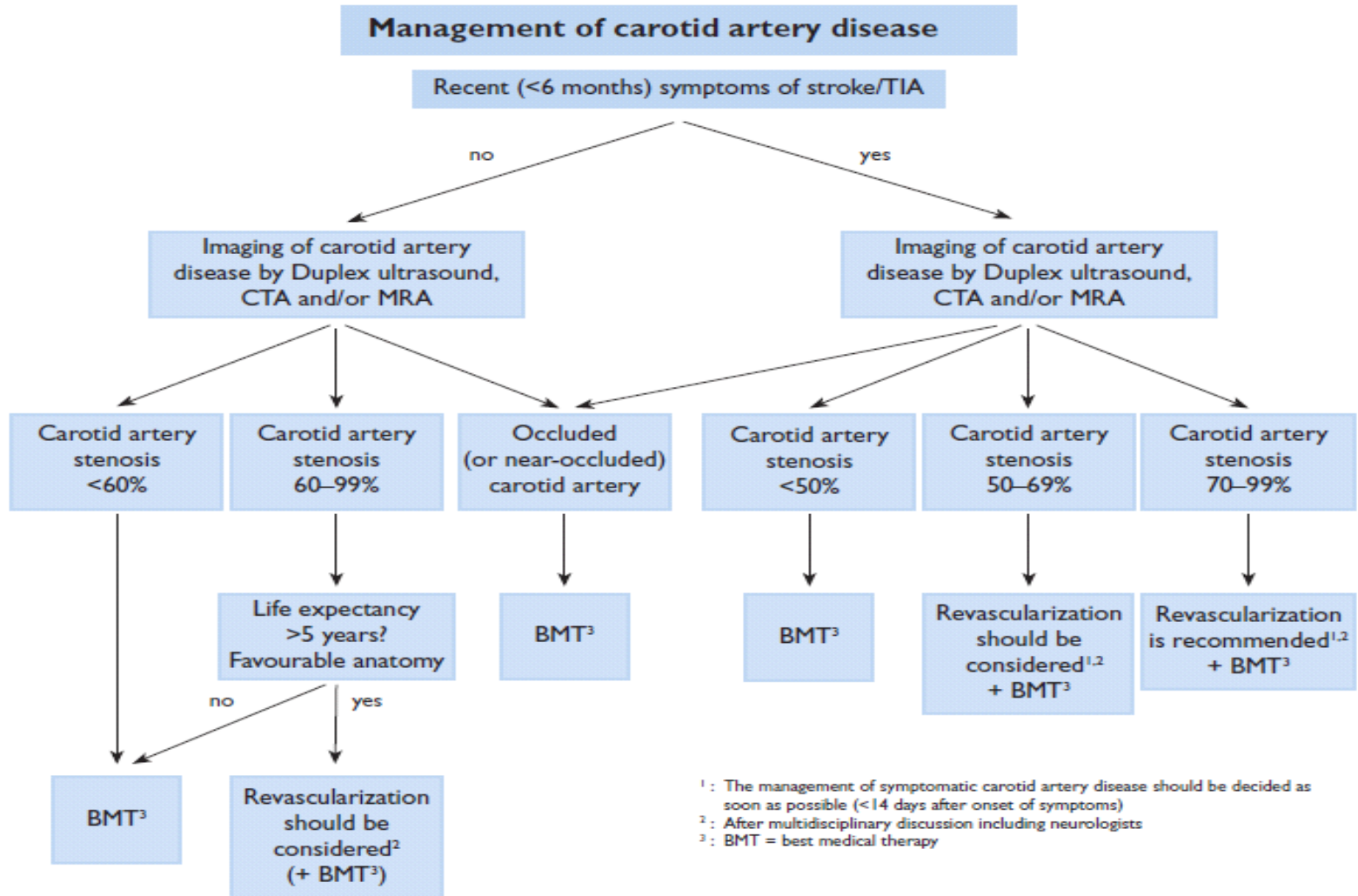


*Lancet 2010;376:1028-31*

# Subgroup analysis EVA-3S, SPACE and ICSS



# Algorithm



# Patients undergoing CAS

Recommendations	Class	Level
Dual antiplatelet therapy with aspirin and clopidogrel is recommended for patients undergoing CAS.	I	B
The use of EPDs may be considered in patients undergoing CAS.	IIb	B

# Vertebral artery disease

- Vertebral artery stenosis may account for up to 20% of vertebrobasilar strokes or TIAs.
- Data on the accuracy of non-invasive imaging are limited.
  - MRA - better sensitivity and specificity than DUS.
  - CTA increasingly used, still needs validation.
  - Both MRA and CTA may be inadequate for ostial VA lesions.
- Aspirin (or if not tolerated clopidogrel) and statins should be administered in all patients, irrespective of symptoms.

# Revascularization in patients with vertebral artery stenosis

Recommendations	Class	Level
In patients with symptomatic extracranial VA stenosis, endovascular treatment may be considered for lesions >50% in the case of recurrent ischaemic events despite optimal medical management.	IIb	C
Revascularization of an asymptomatic VA stenosis is not indicated, irrespective of the degree of severity.	III	C



# Upper extremity artery disease (UEAD)

- UEAD can be caused by a number of conditions, involving different levels of the extremity. Subclavian artery and brachiocephalic trunk are most common locations for atherosclerotic lesions.
- Unequal arm pressures is most common manifestation for subclavian arterial occlusive disease.
- When subclavian or brachiocephalic trunk lesion becomes symptomatic, it may cause:
  - Ischaemia of the upper extremity
  - Stroke related to the carotid and vertebral territories
  - Myocardial ischaemia as the manifestation of subclavian steal in post CABG patients with LIMA graft

# Imaging in patients with UEAD

- DUS is of particular value in differentiating occlusion from stenosis, determining the direction of vertebral blood flow, and screening for concurrent carotid artery stenosis. Subclavian steal can be present in the absence of retrograde vertebral flow at rest. Dynamic test can change the vertebral flow direction.
- MRI and MRA enable acquisition of both functional and morphological information.
- Upper limb atherosclerosis can be imaged in excellent detail using CTA.

# Management of UEAD

Recommendations	Class	Level
Revascularization is indicated in symptomatic patients.	I	C
When revascularization is indicated, endovascular-first strategy is recommended in patients with atherosclerotic lesions of the upper extremities.	I	C
Surgery should be considered after failed endovascular treatment in low-surgical-risk patients.	IIa	C
Revascularization may be considered in asymptomatic patients with former or future mammary-coronary bypass or to monitor blood pressure in bilateral upper limb occlusions.	IIb	C

