Η απεικόνιση των καρωτίδων στην πρωτογενή και δευτερογενή πρόληψη. Υπάρχει θέση?

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Γ.Ν.Ν.Θ.Α. «ΣΩΤΗΡΙΑ»
• No conflict of interest
Estimation of total cardiovascular risk

Recommendations for cardiovascular risk assessment

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systematic CV risk assessment is recommended in individuals at increased CV risk, i.e. with family history of premature CVD, familial hyperlipidaemia, major CV risk factors such as smoking, high BP, DM or raised lipid levels) or comorbidities increasing CV risk.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>It is recommended to repeat CV risk assessment every 5 years, and more often for individuals with risks close to thresholds mandating treatment.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Systematic CV risk assessment may be considered in men &gt;40 years of age and in women &gt;50 years of age or post-menopausal with no known CV risk factors.</td>
<td>IIb</td>
<td>C</td>
</tr>
<tr>
<td>Systematic CV risk assessment in men &lt;40 of age and women &lt;50 years of age with no known CV risk factors is not recommended.</td>
<td>III</td>
<td>C</td>
</tr>
</tbody>
</table>

Piepoli et al. European Heart Journal (2016) 37, 2315–2381
Estimation of total cardiovascular risk and intervention according to CV risk

- SCORE, is recommended for adults >40 yrs, unless they are automatically categorised as being at high-risk or very high-risk based on documented
  - 1. CVD
  - 2. DM (>40 years of age)
  - 3. Kidney disease
  - 4. Highly elevated single risk factor
- Low- to moderate-risk persons (calculated SCORE <5%): should be offered lifestyle change
- High-risk persons (calculated SCORE ≥5% and <10%): qualify for intensive lifestyle advice and may be candidates for drug treatment.
- Very-high-risk persons (calculated SCORE ≥10%): drug treatment is more frequently required.

Piepoli et al. European Heart Journal (2016) 37, 2315–2381
Main points of medical history for assessment of peripheral arterial diseases

- **Family history of CVD** (coronary artery disease, cerebrovascular disease, aortic aneurysm, LEAD), and **premature CVD** (fatal or non-fatal CVD event or/and established diagnosis of CVD in first degree male relatives before 55 years or female relatives before 65 years).

- **Personal history of:**
  - Hypertension
  - Diabetes
  - Dyslipidaemia
  - Smoking (present and/or past), passive smoking exposure
  - Chronic kidney disease
  - Sedentary life
  - Dietary habits
  - History of cancer radiation therapy
  - Psycho-social factors
  - Prior CVD

- **Transient or permanent neurological symptoms.**

- **Arm exertion pain,** particularly if associated with dizziness or vertigo.

- **Symptoms suggesting angina,** dyspnoea.
Reported rate ranges of other localizations of atherosclerosis in patients with a specific arterial disease

- CAD
- Carotid stenosis >70%
- LEAD (ABI <0.90)
- RAS >75%

Cardiovascular Imaging Modifiers of total cardiovascular risk

- Risk factor improves risk classification [e.g. by calculation of a net reclassification index (NRI)] and if the assessment is feasible in daily practice. Reclassification is of most value when the individual’s risk lies close to a decisional threshold, such as a SCORE risk of 5%.

- Routine screening with imaging modalities to predict future CV events is generally not recommended in clinical practice.

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*Piepoli et al. European Heart Journal (2016) 37, 2315–2381*
Progressive increase of CV risk according to Carotid Ultrasound findings

Belcaro G et al. Atheroscleroris 2001
Carotid IMT

- IMT is primarily a result of the hypertensive thickening of smooth muscles in the arterial media layer, rather than the subintimal changes which are indicative of atherosclerosis.
- IMT value at the carotid bifurcations (reflecting primarily atherosclerosis) and for the IMT value at the level of the common carotid artery (reflecting primarily hypertension-related hypertrophy).
- high variability and low intra-individual reproducibility
- the systematic use of carotid IMT in CV risk assessment is no longer recommended by the ESC guidelines on CV prevention 2016.

Carotid plaques

Plaques are focal structures encroaching into the arterial lumen of at least 0.5mm, or 50% of the adjacent wall thickness, or demonstrating a thickness >1.5mm as measured from intima-lumen to media-adventitia interfaces.

Carotid plaques

• Carotid plaque, compared with IMT, more accurately predicts CV risk both stroke and MI, independent of traditional CV risk factors.
• The presence of carotid plaques will automatically reclassify patients from intermediate to high risk, however, routine carotid imaging is not recommended unless clinically indicated (i.e. presence of carotid bruit, previous TIA or cerebrovascular disease, or as part of the assessment of patients with evidence of vascular disease).
• Plaque characterization could have some prognostic implications on stroke.

Plaques may be characterized by their number, thickness, size/area, irregularity (smooth, irregular, ulcerated) echodensity (echolucent vs. calcified).

**Table 1. Quantification of carotid plaque for cardiovascular risk**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Quantification</th>
<th>End points</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>MCPT ≥ 1.9 mm vs. no plaque (reference)</td>
<td>Combines vascular events</td>
<td>HR 2.8 (2.04–3.84)</td>
</tr>
<tr>
<td>Number</td>
<td>1–2 plaques and &gt; 4 plaque vs. no plaque (reference)</td>
<td>All-cause mortality</td>
<td>HR 2.9 (0.96–8.69) and 4.9 (1.69–14.15)</td>
</tr>
<tr>
<td>Area</td>
<td>0.12–0.45, 0.46–1.18, and 1.19–6.73 cm² vs. 0.00–0.11 cm² (reference)</td>
<td>The combined 5-year risk of stroke, MI, and vascular death</td>
<td>RR 1.9 (1.1–3.3), 2.5 (1.4–4.4), and 3.5 (1.8–6.7)</td>
</tr>
<tr>
<td>Echogenicity</td>
<td>Echogenic and echolucent plaque with carotid stenosis vs. no stenosis (reference)</td>
<td>Cerebrovascular events</td>
<td>RR 1.84 (0.30–11.23) and 4.56 (1.10–18.93)</td>
</tr>
<tr>
<td>Texture</td>
<td>Hyperechogenic vs. hypoechoic plaque by DPTA</td>
<td>Microembolism during endarterectomy</td>
<td>OR 0.32 (0.12–0.89)</td>
</tr>
<tr>
<td>Volume</td>
<td>Plaque volume &lt; 0.09 mL vs. thickness &lt; 1.35 mm</td>
<td>Absence of CAD</td>
<td>NPV (%): 93.3 vs. 75.0</td>
</tr>
</tbody>
</table>
Carotid plaque echolucency

Uematsu et al. Circ J 2014; 78: 151 – 158
Carotid IMT thickness and presence or absence of plaque improves prediction of coronary heart disease risk in the Atherosclerosis Risk (ARIC) study

Atherosclerosis Risk In Communities (ARIC) trial showed that the addition of plaque to cIMT resulted in a net reclassification improvement of 9.9% in the overall population and 21.7% in the intermediate risk group

*Note: The table data and calculations are not provided in the image.*

# Echocardiography

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>A resting transthoracic echocardiogram is recommended in all patients for:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) exclusion of alternative causes of angina;</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>b) identification of regional wall motion abnormalities suggestive of CAD;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) measurement of LVEF for risk stratification purpose;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) evaluation of diastolic function.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultrasound of the carotid arteries should be considered to be performed by adequaely trained clinicians to detect increased IMT and/or plaque in patients with suspected SCAD without known atherosclerotic disease.</td>
<td>Ila</td>
<td>C</td>
</tr>
</tbody>
</table>

CAD = coronary artery disease; IMT = intima-media thickness; LVEF = left ventricular ejection fraction; SCAD = stable coronary artery disease.

This slide corresponds to Table 9 in the full text.

www.escardio.org/guidelines

Routine carotid imaging is not recommended unless clinically indicated carotid bruit, previous TIA, cerebrovascular disease or as part of the assessment of patients with evidence of vascular disease.
**Focus on echovascular imaging assessment of arterial disease: complement to the ESC guidelines (PARTIM 1) in collaboration with the Working Group on Aorta and Peripheral Vascular Diseases**

### Table 2  Main indications for Duplex ultrasounds of cervicocerebrovascular arteries

<table>
<thead>
<tr>
<th>Symptons</th>
<th>Clinical examination</th>
<th>Surveillance</th>
<th>Cardiovascular risk assessment</th>
<th>Screening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke/TIA</td>
<td>Cervical bruit</td>
<td>&gt;50% carotid stenosis</td>
<td>Patients with coronary artery disease and/or lower extremity artery disease (see PARTIM II)</td>
<td></td>
</tr>
<tr>
<td>Visual disturbances/amaurosis fugax</td>
<td>Discrepancy in blood pressure taken in both upper extremities</td>
<td>Carotid endarterectomy or stenting</td>
<td>Personal history of neck irradiation</td>
<td></td>
</tr>
<tr>
<td>Suspicion of carotid or vertebral dissection/recent Claude–Bernard–Horner syndrome</td>
<td>Pulsatile tinnitus</td>
<td>In intermediate risk patients</td>
<td>Giant cell disease, Takayasu disease</td>
<td></td>
</tr>
<tr>
<td>Vertebral insufficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pulsatile tinnitus</td>
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<td>In intermediate risk patients</td>
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<td></td>
<td></td>
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<tr>
<td>Giant cell disease, Takayasu disease</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
MR and CT angiography
Carotid artery stenosis refers to a ≥50% stenosis of the extracranial internal carotid artery (ICA), with stenosis severity estimated using the North American Symptomatic Carotid Endarterectomy Trial (NASCET).

Carotid stenosis is defined as:
- ‘symptomatic’ if associated with symptoms in the preceding 6 months
- ‘asymptomatic’ if no prior symptoms can be identified or when symptoms occurred >6 months ago.
Plaque morphological evaluation using MRI or DUS
- echolucency,
- intraplaque haemorrhage,
- surface irregularity
may identify patients with asymptomatic stenoses at higher risk of ipsilateral ischaemic stroke
Value of carotid screening in CAD

• The presence of plaque, especially hypoechogenic or echolucent (lipid-rich) plaque,

• *is associated with an unstable or high-risk cardiovascular status*

_Aboyans V Presse Med 2009;38:977–986._
CS prior CABG: Increased risk for stroke!!!

- unilateral 50–99% carotid stenosis was found in 11% of patients
- bilateral 50–99% stenosis in 5.6%
- unilateral occlusion in 1.3%


### Table 3: Multivariate Correlates of Doppler-Defined CAS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mild CAS OR (95% CI)</th>
<th>p Value</th>
<th>Moderate CAS OR (95% CI)</th>
<th>p Value</th>
<th>Severe CAS or Total Occlusion OR (95% CI)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal or nonobstructive CAD</td>
<td>1.00 (reference)</td>
<td></td>
<td>1.00 (reference)</td>
<td></td>
<td>1.00 (reference)</td>
<td></td>
</tr>
<tr>
<td>1-vessel CAD</td>
<td>1.86 (1.26–2.74)</td>
<td>0.002</td>
<td>1.26 (0.49–3.25)</td>
<td>0.639</td>
<td>1.85 (0.60–5.71)</td>
<td>0.283</td>
</tr>
<tr>
<td>2-vessel CAD</td>
<td>2.26 (1.56–3.29)</td>
<td>&lt;0.001</td>
<td>3.92 (1.81–8.46)</td>
<td>0.001</td>
<td>2.50 (0.88–7.13)</td>
<td>0.087</td>
</tr>
<tr>
<td>3-vessel CAD</td>
<td>2.49 (1.68–3.68)</td>
<td>&lt;0.001</td>
<td>3.91 (1.79–8.57)</td>
<td>0.001</td>
<td>4.20 (1.53–11.52)</td>
<td>0.005</td>
</tr>
<tr>
<td>Left main CAD</td>
<td>2.47 (1.27–4.79)</td>
<td>0.008</td>
<td>8.77 (3.18–24.16)</td>
<td>&lt;0.001</td>
<td>7.20 (2.00–25.95)</td>
<td>0.003</td>
</tr>
<tr>
<td>History of smoking</td>
<td>1.68 (1.27–2.23)</td>
<td>&lt;0.001</td>
<td>1.88 (1.14–3.11)</td>
<td>0.013</td>
<td>3.25 (1.80–5.85)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Age (for each 10-yr increase)</td>
<td>1.98 (1.74–2.26)</td>
<td>&lt;0.001</td>
<td>2.77 (2.17–3.53)</td>
<td>&lt;0.001</td>
<td>2.42 (1.79–3.26)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Male</td>
<td>0.80 (0.58–1.09)</td>
<td>0.160</td>
<td>0.65 (0.38–1.11)</td>
<td>0.116</td>
<td>0.57 (0.29–1.09)</td>
<td>0.088</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1.14 (0.88–1.47)</td>
<td>0.328</td>
<td>1.31 (0.82–2.08)</td>
<td>0.261</td>
<td>1.23 (0.68–2.21)</td>
<td>0.490</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>1.31 (1.01–1.68)</td>
<td>0.041</td>
<td>1.58 (1.02–2.47)</td>
<td>0.042</td>
<td>1.83 (1.05–3.19)</td>
<td>0.034</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>0.94 (0.71–1.25)</td>
<td>0.670</td>
<td>0.94 (0.55–1.61)</td>
<td>0.829</td>
<td>1.21 (0.57–2.57)</td>
<td>0.613</td>
</tr>
<tr>
<td>Post-MI</td>
<td>0.94 (0.70–1.27)</td>
<td>0.689</td>
<td>1.22 (0.75–2.01)</td>
<td>0.423</td>
<td>1.53 (0.84–2.78)</td>
<td>0.165</td>
</tr>
<tr>
<td>Post-stroke</td>
<td>1.44 (0.68–3.04)</td>
<td>0.343</td>
<td>2.59 (0.94–7.16)</td>
<td>0.066</td>
<td>4.71 (1.69–13.15)</td>
<td>0.003</td>
</tr>
<tr>
<td>Post-CABG</td>
<td>1.36 (0.91–2.04)</td>
<td>0.131</td>
<td>1.59 (0.87–2.87)</td>
<td>0.129</td>
<td>1.99 (0.99–4.02)</td>
<td>0.055</td>
</tr>
<tr>
<td>CRF</td>
<td>1.15 (0.66–2.02)</td>
<td>0.621</td>
<td>2.77 (1.36–5.61)</td>
<td>0.005</td>
<td>1.81 (0.72–4.54)</td>
<td>0.205</td>
</tr>
</tbody>
</table>

*Steinvil, J Am Coll Cardiol 2011;57:779–83*
The available data regarding the prevalence of carotid stenosis in CAD patients and the lack of evidence of any effect on outcome leads to the conclusion that

- Carotid screening in patients with CAD is not recommended other than in candidates for coronary artery bypass grafting (CABG).
Management of carotid stenosis in patients undergoing CABG

Recommendations

It is recommended that the indication (and if so the method and timing) for carotid revascularization be individualized after discussion within a multidisciplinary team, including a neurologist.

In patients scheduled for CABG, **with recent (<6 months) history of TIA/stroke:**

- Carotid revascularization should be considered in patients with 50–99% carotid stenosis.

<table>
<thead>
<tr>
<th>Class</th>
<th>Level</th>
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<tbody>
<tr>
<td>IIa</td>
<td>B</td>
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</table>

- Carotid revascularization with CEA should be considered as first choice in patients with 50–99% carotid stenosis.

<table>
<thead>
<tr>
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<th>Level</th>
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<tbody>
<tr>
<td>IIa</td>
<td>B</td>
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</tbody>
</table>

- Carotid revascularization is not recommended in patients with carotid stenosis <50%.

<table>
<thead>
<tr>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>C</td>
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</tbody>
</table>
Management of carotid stenosis in patients undergoing CABG (continued)

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>In neurologically asymptomatic patients scheduled for CABG:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Routine prophylactic carotid revascularization in patients with a 70-99% carotid stenosis is not recommended.</td>
<td>III</td>
<td>B</td>
</tr>
<tr>
<td>• Carotid revascularization may be considered in patients with bilateral 70-99% carotid stenoses or 70-99% carotid stenosis + contralateral occlusion.</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>• Carotid revascularization may be considered in patients with a 70–99% carotid stenosis, in the presence of one or more characteristics that may be associated with an increased risk of ipsilateral stroke, in order to reduce stroke risk beyond the perioperative period.</td>
<td>IIb</td>
<td>C</td>
</tr>
</tbody>
</table>

Using CUS/imaging criteria
Carotid plaques predict prognosis in CAD

Echolucency of Carotid Plaque Is Useful for Assessment of Residual CV Risk in Patients With Chronic CAD and LDL-C Goals on Statin Therapy

- IMT and plaque echolucency with integrated backscatter (IBS) analysis performed in 357 chronic CAD patients with LDL-C <100 mg/dl on statin therapy.
- During a mean follow-up of 32±18 months, 33 coronary events occurred (cardiac death, non-fatal myocardial infarction, or unstable angina).
- On multivariate analysis, plaque echolucency (lower IBS value) was a significant predictor of coronary events (HR, 0.44; 95% CI: 0.29–0.73; P=0.009), whereas maxIMT was not.
- The addition of plaque echolucency to traditional risk factors improved net reclassification improvement (NRI) and integrated discrimination improvement (IDI; NRI, 0.59; P=0.0013; IDI, 0.075; P=0.0009).

*Uematsu et al. Circ J 2014; 78: 151 – 158*
Carotid Ultrasound Findings on CV Events in Patients with CAD during Seven-Year Follow-Up

Carotid plaque and thick CIMT group had a higher cardiac mortality rate (20.7% vs. 13.1%, 9.4% and 3.9%, respectively, p<0.001) and higher major adverse cardiovascular events (MACE) including death, acute myocardial infarction, and stroke (27.8% vs. 18.8%, 15.5% and 9.3%, respectively, p<0.001) than any other groups.

Multivariate analysis showed that the presence of carotid plaque with thick CIMT had the highest hazard ratio (HR) compared to other groups (HR 2.23 vs. 1.81, 2.01) for cardiac mortality.

Carotid plaque had a higher HR than CIMT for mortality (HR 1.56 vs. 1.37) and MACE (HR 1.54 vs. 1.36) in the total study population.

Carotid plaque is a more important prognostic factor than CIMT in patients with CAD, and adding a thick CIMT to carotid plaque increases the prognostic power for cardiac events.

Korean Circ J 2015;45(1):28-37
Incremental prognostic value of coronary and systemic atherosclerosis after MI

544 prospective MI patients undergoing cor ang.
Longitudinal coronary atherosclerotic extent, expressed as Sullivan extent score (SES)
Non-invasive screening for ECAD in the carotid, aortic, renal and lower limb.

- Extensive systemic atherosclerosis, as the combination of extensive coronary disease (SES ≥ 17) and ECAD, was associated with higher risk for all-cause mortality compared to limited systemic atherosclerosis (SES < 17 and no ECAD) (hazard ratio [HR] 2.9, P < 0.001, adjusted for Global Registry of Acute Coronary Events risk score parameters.
- The risk for the composite endpoint of cardiovascular death or hospitalization was significantly higher in patients with extensive systemic atherosclerosis compared to patients with limited systemic atherosclerosis (HR 3.1, 95% CI P < 0.001, adjusted HR 1.9, P = 0.004).
- Coexistence of extensive coronary disease and ECAD defines a group with particularly poor prognosis after MI

Echolucent carotid plaques predict in-stent stenosis

Table 3
The association of in-stent restenosis (ISR) and target lesion revascularization (TLR) with calibrated intravascular ultrasound (IBS), clinical, lesion and procedural variables assessed by multivariate logistic regression analysis

<table>
<thead>
<tr>
<th></th>
<th>ISR</th>
<th>TLR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Calibrated IBS (≤−13.7 dB)</td>
<td>3.8</td>
<td>1.9–7.3</td>
</tr>
<tr>
<td>MLD after PCI (&lt;2.75 mm)</td>
<td>2.6</td>
<td>1.3–5.2</td>
</tr>
<tr>
<td>Infarct related artery</td>
<td>2.2</td>
<td>1.0–4.7</td>
</tr>
<tr>
<td>Number of stents (≥2 stents)</td>
<td>1.9</td>
<td>0.8–4.2</td>
</tr>
<tr>
<td>Lesion type (B2/C)</td>
<td>1.5</td>
<td>0.7–3.0</td>
</tr>
</tbody>
</table>

IBS, integrated backscatter; ISR, in-stent restenosis; TLR, target lesion revascularization OR, odds ratio; CI, confidence interval.

Kitta Y. Atherosclerosis. 2008;197(1):177-8
2017 ESC Guidelines on the Diagnosis and Treatment of Peripheral Arterial Diseases, in collaboration with the European Society for Vascular Surgery (ESVS)

Recommendation on screening for coronary artery disease in patients with carotid disease

<table>
<thead>
<tr>
<th>Class&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Level&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>In patients undergoing elective CEA, preoperative CAD screening, including coronary angiography, may be considered.</td>
<td>IIb</td>
</tr>
</tbody>
</table>

<sup>a</sup>Class: 1, strong recommendation; 2, weak recommendation.  
<sup>b</sup>Level: A, evidence from randomized clinical trials; B, evidence from nonrandomized clinical trials; C, evidence from nontherapeutic observational studies; D, evidence from therapeutic observational studies; E, expert opinion.

Conclusions

• Carotid imaging for reclassification of CV risk close to a decisional threshold, (such as a SCORE risk of 5%)
• Routine screening to predict future CV events is generally not recommended in clinical practice.
• Surveillance of atherosclerosis/carotid stenosis progression/effect of treatment?
• Screening in CAD candidates for CABG
• Screening in selected CAD patients
  – Prior CABG
  – 3-vessel CAD, LMS
  – Old>70y
  – Diabetic, smoker
  – Coexisting PAD
• Screening in CAD for prognostic information (complex, echolucent plaques)
ΚΑΡΔΙΟΛΟΓΙΑ ΤΟΥ ΑΥΡΙΟ
ΣΑΧΧΑΡΩΔΗΣ ΔΙΑΒΗΤΗΣ ΚΑΙ ΚΑΡΔΙΑΚΗ ΑΝΕΠΑΡΚΕΙΑ

Σύγχρονες Μέθοδοι Πρόληψης, Τεχνικές Απεικόνισης & Θεραπείες, Παρουσίαση Περιπτώσεων

30 Μαρτίου 2019
CROWNE PLAZA ΑΤΗΝΣ ΚΙΤΤΙΟΝΗ ΧΕΝΤΡΙ ΗΟΤΕΛ ΆΘΗΝΑ
3ο SEMINARIO
Εξειδικευμένων Ηχωκαρδιογραφικών Τεχνικών

Δυναμική (Stress Echo)
Ηχωκαρδιογραφία & Αντίθεσης (Contrast Echo)
Εφαρμογές στην κλινική πράξη

19-20 Απριλίου 2019
Κεντρικό Αμφιθέατρο
251 Γενικού Νοσοκομείου Αεροπορίας
Αθήνα

ΗΧΩΚΑΡΔΙΟΓΡΑΦΙΚΟ ΕΡΓΑΣΤΗΡΙΟ
ΓΕΝΙΚΟ ΝΟΣΟΚΟΜΕΙΟ ΑΘΗΝΩΝ
"ΚΟΡΩΝΕΛΕΟ - ΜΠΕΝΑΚΕΙΟ, ΕΛΛΗΝΙΚΟ ΕΡΥΘΡΟ ΣΤΑΥΡΟΣ"

ΕΜΑΔΑ "HEART IMAGERS OF TOMORROW" ΕΛΛΑΔΑΣ

ΔΙΟΡΓΑΝΩΝΟΝ ΕΛΛΗΝΙΚΟ ΟΛΟΚΛΗΡΩΤΙΚΟ ΚΑΡΔΙΟΛΟΓΙΑΣ
Cardio-Cath Meeting 2019
Live Demonstration Course

27-29 Ιουνίου/June 2019

Συνέδριο
Ελληνικού Κολλεγίου Καρδιολογίας

Course Directors:
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