Stable Coronary Artery Disease (SCAD) ESC Guidelines 2013

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2013 ESC guidelines on the management of stable coronary artery disease

The Task Force on the management of stable coronary artery disease of the European Society of Cardiology
What is new compared with 2006?

- Broader consideration of functional CAD as cause of symptoms
- Separate consideration of the processes of diagnosis and risk stratification
- Diagnostic process based on pretest probabilities of SCAD
- New data on pretest probabilities
- Larger role for modern imaging techniques such as CMR and CCTA but with critical appraisal of their limitations
# Main features of SCAD

<table>
<thead>
<tr>
<th>Pathogenesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable anatomical atherosclerotic and/or functional alterations of epicardial vessels and/or microcirculation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Natural history</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable symptomatic or asymptomatic phases which may be interrupted by ACS.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanisms of myocardial ischaemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed or dynamic stenoses of epicardial coronary arteries.</td>
</tr>
<tr>
<td>Microvascular dysfunction.</td>
</tr>
<tr>
<td>Focal or diffuse epicardial coronary spasm.</td>
</tr>
<tr>
<td>The above mechanisms may overlap in the same patient and change over time.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort induced angina caused by:</td>
</tr>
<tr>
<td>• epicardial stenoses • microvascular dysfunction • vasoconstriction at the site of dynamic stenosis • combination of the above.</td>
</tr>
<tr>
<td>Rest angina caused by:</td>
</tr>
<tr>
<td>− Vasospasm (focal or diffuse):</td>
</tr>
<tr>
<td>• epicardial focal • epicardial diffuse • microvascular • combination of the above.</td>
</tr>
<tr>
<td>Asymptomatic:</td>
</tr>
<tr>
<td>• because of lack of ischaemia and/or of LV dysfunction • despite ischaemia and/or LV dysfunction.</td>
</tr>
<tr>
<td>Ischaemic cardiomyopathy</td>
</tr>
</tbody>
</table>
Coronary spasm 1
Coronary spasm 2
What is new compared with 2006?

• Broader consideration of functional CAD as cause of symptoms
• Separate consideration of the processes of diagnosis and risk stratification
• Diagnostic process based on pretest probabilities of SCAD
• New data on pretest probabilities
• Larger role for modern imaging techniques such as CMR and CCTA but with critical appraisal of their limitations
## Diagnostic considerations

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Diagnosis of CAD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sensitivity (%)</td>
</tr>
<tr>
<td>Exercise ECG</td>
<td>45–50</td>
</tr>
<tr>
<td>Exercise stress echocardiography</td>
<td>80–85</td>
</tr>
<tr>
<td>Exercise stress SPECT</td>
<td>73–92</td>
</tr>
<tr>
<td>Dobutamine stress echocardiography</td>
<td>79–83</td>
</tr>
<tr>
<td>Dobutamine stress MRI</td>
<td>79–88</td>
</tr>
<tr>
<td>Vasodilator stress echocardiography</td>
<td>72–79</td>
</tr>
<tr>
<td>Vasodilator stress SPECT</td>
<td>90–91</td>
</tr>
<tr>
<td>Vasodilator stress MRI</td>
<td>67–94</td>
</tr>
<tr>
<td>Coronary CTA</td>
<td>95–99</td>
</tr>
<tr>
<td>Vasodilator stress PET</td>
<td>81–97</td>
</tr>
</tbody>
</table>

CAD = coronary artery disease; CTA = computed tomography angiography; ECG = electrocardiogram; MRI = magnetic resonance imaging; PET = positron emission tomography; SPECT = single photon emission computed tomography.

a Results without/with minimal referral bias.
b Results obtained in populations with medium-to-high prevalence of disease without compensation for referral bias.
c Results obtained in populations with low-to-medium prevalence of disease.
Coronary artery disease timeline

% Reduction in volume flow rate

% Diameter obstruction

anatomy

function

Critical zone

Endothelial dysfunction

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Coronary artery disease timeline

% Diameter obstruction

% Reduction in volume flow rate

prevention

therapy

Critical zone

CAD ↑

Endothelial dysfunction

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normaler Stresstest ≠ Koronare Herzkrankheit
Coronary calcification
normaler stress test

= 

Niedrige Wahrscheinlichkeit für eine hämodynamisch relevante Stenose und meist vereinbar mit guter Prognose
Prognostic considerations

2013 ESC guidelines on the management of stable CAD
Prognostic considerations 2

2013 ESC guidelines on the management of stable CAD
What is new compared with 2006?

• Broader consideration of functional CAD as cause of symptoms
• Separate consideration of the processes of diagnosis and risk stratification
• Diagnostic process based on pretest probabilities of SCAD
• New data on pretest probabilities
• Larger role for modern imaging techniques such as CMR and CCTA but with critical appraisal of their limitations
Initial diagnostic management of patients with suspected SCAD (1)

- **ALL PATIENTS**
  - Assess symptoms
  - Perform clinical examination
  - Symptoms consistent with unstable angina
  - Follow specific NSTE-ACS guidelines

- **ECG**
- **Bio-Chemistry**
- **Resting echocardiography**
- **CXR in selected patients**

- **Consider comorbidities and QoL**
  - Comorbidities or QoL make revascularization unlikely
  - Medical therapy

- **Cause of chest pain other than CAD?**
  - Yes: Treat as appropriate
  - No: LVEF <50%?
    - Yes: Typical angina?
      - Yes: Offer ICA if revascularization suitable
      - No: See Fig. 2 for selection of test
    - No: Assess pre-test-probability (PTP) (see Table 13) for the presence of coronary stenoses

---

a. May be omitted in very young and healthy patients with a high suspicion of an extracardiac cause of chest pain and in multimorbid patients in whom the echo result has no consequence for further patient management.

b. If diagnosis of SCAD is doubtful, establishing a diagnosis using pharmacologic stress imaging prior to treatment may be reasonable.

Eur Heart J 2013;34:2949–3003
Initial diagnostic management of patients with suspected SCAD (2)

Assess pre-test-probability (PTP) for the presence of coronary stenoses

- Low PTP (<15%)
  - Investigate other causes
  - Consider functional coronary disease
- Intermediate PTP, eg 15-85%
  - Non-invasive testing for diagnostic purposes
- High PTP (>85%)
  - Diagnosis of SCAD established
    - Proceed to risk stratification
      - In patients with severe symptoms or clinical constellation suggesting high risk coronary anatomy initiate guideline-directed medical therapy and offer ICA

ICA = invasive coronary angiography

This slide corresponds to Figure 1 in the full text
Chest pain

| Typical angina (definite) | Meets all three of the following characteristics:  
|                          | • substernal chest discomfort of characteristic quality and duration;  
|                          | • provoked by exertion or emotional stress;  
|                          | • relieved by rest and/or nitrates within minutes. |
| Atypical angina (probable) | Meets two of these characteristics. |
| Non-anginal chest pain    | Lacks or meets only one or none of the characteristics. |

2013 ESC guidelines on the management of stable CAD
Clinical pre-test probabilities in patients with stable chest pain symptoms

<table>
<thead>
<tr>
<th>Age</th>
<th>Typical angina</th>
<th>Atypical angina</th>
<th>Non-anginal pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
</tr>
<tr>
<td>30-39</td>
<td>59</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>40-49</td>
<td>69</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td>50-59</td>
<td>77</td>
<td>47</td>
<td>49</td>
</tr>
<tr>
<td>60-69</td>
<td>84</td>
<td>58</td>
<td>59</td>
</tr>
<tr>
<td>70-79</td>
<td>89</td>
<td>68</td>
<td>69</td>
</tr>
<tr>
<td>&gt;80</td>
<td>93</td>
<td>76</td>
<td>78</td>
</tr>
</tbody>
</table>
Pre-test probability of CAD

Diamond GA et al. NEJM 1979;300:1350-8
Non-invasive testing in suspected SCAD with intermediate PTP

- Consider age of patient versus radiation exposure.
- In patients unable to exercise use echo or SPECT/PET with pharmacologic stress instead.
- CMR is only performed using pharmacologic stress.
- Patient characteristics should make a fully diagnostic coronary CTA scan highly probable (see section 6.2.5.1.2) consider result to be unclear in patients with severe diffuse or focal calcification.
- Proceed as in lower left coronary CTA box.
- Proceed as in stress testing for ischaemia box.

This slide corresponds to Figure 2 in the full text.
Non-invasive testing in suspected SCAD with intermediate PTP

- Consider age of patient versus radiation exposure.
- In patients unable to exercise use echo or SPECT/PET with pharmacologic stress instead.
- CMR is only performed using pharmacologic stress.
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- Proceed as in stress testing for ischaemia box.

a. Consider age of patient versus radiation exposure.
b. In patients unable to exercise use echo or SPECT/PET with pharmacologic stress instead.
c. CMR is only performed using pharmacologic stress.
d. Patient characteristics should make a fully diagnostic coronary CTA scan highly probable (see section 6.2.5.1.2) consider result to be unclear in patients with severe diffuse or focal calcification.
e. Proceed as in lower left coronary CTA box.
f. Proceed as in stress testing for ischaemia box.

This slide corresponds to Figure 2 in the full text.
What is new compared with 2006?

• Broader consideration of functional CAD as cause of symptoms
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• Larger role for modern imaging techniques such as CMR and CCTA but with critical appraisal of their limitations
Anamnese

- 42 jährige Patientin
- Seit ca. 15 Jahren rez. selbstlimitierende Tachykardie bis max. 2-Stunden Dauer, alle 1-2 Monate. Vorstellung auf dem Notfall, da HA zum 1. Mal eine Tachykardie dokumentiert hat
- Spontankonversion auf dem Weg ins Spital
- cvRF: keine
- PA: Depression
- Allergien: keine bekannt
- Kein Nikotin, kein Alkohol
- Medikamente: Paronex 20 mg Tbl. 1-0-0-0
EKG in Tachykardie
Labor/ TTE

• Bei Eintritt:
  – Hb 157 g/l, Lc 6.2 G/l, Tc 182 G/l
  – Krea 68 umol/l, Na 142 mmol/l, K 3.5 mmol/l
  – CK 119 U/l
  – Trop 0.082 ug/l, nach 3h 0.192 ug/l
  – BNP 62.1 ng/l
  – TSH 1.23 mIU/l

• TTE: Normale LV (LVEF 65%) und RV Funktion, normale Dimensionen, keine Vitien, normale diastolische Funktion
Fragestellung bei dieser Patientin?
Fragstellung bei dieser Patientin?

• Ausschluss einer koronaren Herzkrankheit bei erhöhtem Troponin, resp. Troponindynamik
CT coronary angiography

- Ca Score = 0
- Kein Koronarstenose
### Classes of recommendations

<table>
<thead>
<tr>
<th>Classes of recommendations</th>
<th>Definition</th>
<th>Suggested wording to use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.</td>
<td>Is recommended/is indicated</td>
</tr>
<tr>
<td>Class II</td>
<td>Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.</td>
<td></td>
</tr>
<tr>
<td>Class IIa</td>
<td>Weight of evidence/opinion is in favour of usefulness/efficacy.</td>
<td>Should be considered</td>
</tr>
<tr>
<td>Class IIb</td>
<td>Usefulness/efficacy is less well established by evidence/opinion.</td>
<td>May be considered</td>
</tr>
<tr>
<td>Class III</td>
<td>Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.</td>
<td>Is not recommended</td>
</tr>
</tbody>
</table>

### Level of evidence

<table>
<thead>
<tr>
<th>Level of evidence A</th>
<th>Data derived from multiple randomized clinical trials or meta-analyses.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of evidence B</td>
<td>Data derived from a single randomized clinical trial or large non-randomized studies.</td>
</tr>
<tr>
<td>Level of evidence C</td>
<td>Consensus of opinion of the experts and/or small studies, retrospective studies, registries.</td>
</tr>
</tbody>
</table>
When to use coronary CT

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary CTA should be considered as an alternative to stress imaging techniques for ruling out SCAD in patients within the lower range of intermediate PTP for SCAD in whom good image quality can be expected.</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Coronary CTA should be considered in patients within the lower range of intermediate PTP for SCAD after a non conclusive exercise ECG or stress imaging test or who have contraindications to stress testing in order to avoid otherwise necessary invasive coronary angiography if fully diagnostic image quality of coronary CTA can be expected.</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Coronary calcium detection by CT is not recommended to identify individuals with coronary artery stenosis.</td>
<td>III</td>
<td>C</td>
</tr>
<tr>
<td>Coronary CTA is not recommended in patients with prior coronary revascularization.</td>
<td>III</td>
<td>C</td>
</tr>
<tr>
<td>Coronary CTA is not recommended as a 'screening' test in asymptomatic individuals without clinical suspicion of coronary artery disease.</td>
<td>III</td>
<td>C</td>
</tr>
</tbody>
</table>

CTA = computed tomography angiography; ECG = electrocardiogram; PTP = pre-test probability; SCAD = stable coronary artery disease.

* Class of recommendation.

* Level of evidence.
Management based on risk determination for prognosis in patients with chest pain and suspected SCAD

<table>
<thead>
<tr>
<th>Event Risk</th>
<th>Management Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low event risk (mortality &lt;1%/year)</td>
<td>OMT and consider ICA (based on co-morbidities and patient preferences)</td>
</tr>
<tr>
<td>Intermediate event risk (mortality ≥1% but &lt;3%/year)</td>
<td>ICA (+ FFR when required) (+ revascularization when appropriate) + OMT</td>
</tr>
<tr>
<td>High event risk (mortality ≥3%/year)</td>
<td>Intensify medical treatment</td>
</tr>
</tbody>
</table>

- **Confirmed diagnosis SCAD**
  - PTP 15–85% → test information will already be available
  - PTP >85% → additional testing for risk stratification only in patients who have mild symptoms with medical management but following adequate information wish to proceed to revascularization in case of high risk

- **Trial of OMT**
  - Yes → Continue OMT
  - No → Symptoms improved?
    - Yes → Intensify medical treatment
    - No → Symptoms improved?
# Definitions of risk for various test modalities

<table>
<thead>
<tr>
<th>Exercise stress ECG&lt;sup&gt;b&lt;/sup&gt;</th>
<th>High risk</th>
<th>Intermediate risk</th>
<th>Low risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Cardiovascular mortality &gt;3%/year.</td>
<td>• Cardiovascular mortality between 1 and 3%/year.</td>
<td>• Cardiovascular mortality &lt;1%/year.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ischaemia imaging</th>
<th>High risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Area of ischaemia &gt;10% (&gt;10% for SPECT; limited quantitative data for CMR – probably ≥2/16 segments with new perfusion defects or ≥3 dobutamine-induced dysfunctional segments; ≥3 segments of LV by stress echo).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ischaemia imaging</th>
<th>Intermediate risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Area of ischaemia between 1% and 10% or any ischaemia less than high risk by CMR or stress echo.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ischaemia imaging</th>
<th>Low risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• No ischaemia.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coronary CTA&lt;sup&gt;c&lt;/sup&gt;</th>
<th>High risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Significant lesions of high risk category (3VD with <strong>proximal</strong> lesions, LM, and proximal anterior descending CAD).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coronary CTA&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Intermediate risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Significant lesion(s) in large and proximal coronary artery(ies) but not high risk category.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coronary CTA&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Low risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Normal coronary artery or plaques only.</td>
</tr>
</tbody>
</table>

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a. For detailed explanation on rationale for risk stratification scheme see web addenda.
b. From nomogram (see web addenda, Figure W1) or [http://www.cardiology.org/tools/medcalc/duke/](http://www.cardiology.org/tools/medcalc/duke/)
c. Consider possible overestimation of presence of significant multivessel disease by coronary CTA in patients with high intermediate PTP (≥50%) and/or severe diffuse or focal coronary calcifications and consider performing additional stress testing in patients without severe symptoms before ICA.
Treatment
Medical management

- 2 goals: reduce symptoms and improve prognosis
- Medical management of CAD patients encompasses:
  - Lifestyle modification
  - Control of CAD risk factors
  - Evidence-based pharmacological therapy
  - Patient education
Medical management of patients with SCAD

Event prevention

- Lifestyle management
- Control of risk factors
  + Educate the patient

- Aspirin
- Statin
- Consider ACEI or ARBs

ACEI = angiotensin converting enzyme inhibitors
ARB = angiotensin receptor blocker
aIf intolerance, consider clopidogrel

This slide corresponds to Figure 4 in the full text

Diet intakes and control of risk factors

- Saturated fatty acids to account for <10% of total energy intake, through replacement by polyunsaturated fatty acids.
- Trans unsaturated fatty acids <1% of total energy intake.
- <5 g of salt per day.
- 30-45 g of fibre per day, from wholegrain products, fruits and vegetables.
- 200 g of fruit per day (2-3 servings).
- 200 g of vegetables per day (2-3 servings).
- Fish at least twice a week, one being oily fish.
- Consumption of alcoholic beverages should be limited to 2 glasses per day (20 g/day of alcohol) for men and 1 glass per day (10 g/day of alcohol) for non-pregnant women.

This box corresponds to Table 25 in the full text.

- Smoking cessation
- Weight management
- Physical and sexual activity
- Lipid management
- Treatment of hypertension
- Treatment of diabetes
- Cardiac rehabilitation
Anti-anginal: mechanisms of action

In addition to short-acting nitrates, beta-blockers and calcium channel blockers as first-line treatment

Medical management of patients with SCAD

**Angina relief**

*1st line*

- Short-acting nitrates, *plus*
  - Beta-blockers *or* CCB-heart rate↓
  - Consider CCB-DHP *if* low heart rate or intolerance/contraindications
  - Consider beta-blockers + CCB-DHP *if* CCS angina >2

**Event prevention**

- Lifestyle management
- Control of risk factors
  - + Educate the patient

- Aspirin^a^
- Statin
- Consider ACEI or ARBs

---

ACEI = angiotensin converting enzyme inhibitors; ARB = angiotensin receptor blocker; CCB = calcium channel blockers; CCS = Canadian Cardiovascular Society; DHP = dihydropyridines.

^a^If intolerance, consider clopidogrel

---

This slide corresponds to Figure 4 in the full text.
Medical management of patients with SCAD

**Angina relief**

1st line

- Short-acting nitrates, *plus*
- Beta-blockers *or* CCB-heart rate ↓
- Consider CCB-DHP *if* low heart rate or intolerance/contraindications
- Consider beta-blockers + CCB-DHP *if* CCS angina >2

2nd line

- May add or switch (1st line for some cases)
- Ivabradine
- Long-acting nitrates
- Nicorandil
- Ranolazine
- Trimetazidine

**Event prevention**

- Lifestyle management
- Control of risk factors
- + Educate the patient
- Aspirin
- Statin
- Consider ACEI or ARBs

ACEI = angiotensin converting enzyme inhibitors; 
ARB = angiotensin receptor blocker; 
CCB = calcium channel blockers; 
CCS = Canadian Cardiovascular Society; 
DHP = dihydropyridines; 
aData for diabetics 
If intolerance, consider clopidogrel

This slide corresponds to Figure 4 in the full text.

### Major side-effects, contraindications, drug–drug interactions and precautions of anti-ischaemic drugs

<table>
<thead>
<tr>
<th>Drug class</th>
<th>Side-effects&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Contraindications</th>
<th>DDI</th>
<th>Precautions</th>
</tr>
</thead>
</table>
| Short-acting and long-acting nitrates | • Headache  
• Flushing  
• Hypotension  
• Syncope and postural hypotension  
• Reflex tachycardia  
• Methaemoglobinaemia | • Hypertrophic obstructive cardiomyopathy | • PDE5 inhibitors (sildenafil or similar agents)  
• α-adrenergic blockers  
• CCBs |                                                                  |
| β-blockers<sup>b</sup>              | • Fatigue, depression  
• Bradycardia  
• Heart block  
• Bronchospasm  
• Peripheral vasoconstriction  
• Postural hypotension  
• Impotence  
• Hypoglycaemia/mask hypoglycaemia signs | • Low heart rate or heart conduction disorder  
• Cardiogenic shock  
• Asthma  
• COPD caution; may use cardioselective β-blockers if fully treated by inhaled steroids and long-acting β-agonists  
• Severe peripheral vascular disease  
• Decompensated heart failure  
• Vasospastic angina | • Heart-rate lowering CCB  
• Sinus-node or AV conduction depressors | • Diabetics  
• COPD |

<sup>a</sup>Very frequent or frequent; may vary according to specific drugs within the therapeutic class.  
<sup>b</sup>Atenolol, metoprolol CR, bisoprolol, carvedilol.  
This slide corresponds to Table 27 in the full text.
Medical management of patients with SCAD

Angina relief

1st line
Short-acting nitrates, plus

- Beta-blockers or CCB-heart rate↓
- Consider CCB-DHP if low heart rate or intolerance/contraindications
- Consider beta-blockers + CCB-DHP if CCS Angina >2

2nd line
May add or switch (1st line for some cases)

Ivabradine
Long-acting nitrates
Nicorandil
Ranolazine\(^a\)
Trimetazidine\(^a\)

+ Consider angio ➔ PCI
Stenting or CABG

Event prevention

- Lifestyle management
- Control of risk factors

+ Educate the patient

- Aspirin\(^b\)
- Statin
- Consider ACEI or ARBs

ACEI = angiotensin converting enzyme inhibitors; 
ARB = angiotensin receptor blocker; 
CABG = coronary artery bypass graft; 
CCB = calcium channel blockers; 
CCS = Canadian Cardiovascular Society; 
DHP = dihydropyridines; 
PCI = percutaneous coronary intervention.
\(^a\)Data for diabetics. 
\(^b\)If intolerance, consider clopidogrel.

This slide corresponds to Figure 4 in the full text

## Optimal medical therapy vs cath in SCAD

### Table W3  Decision making according to severity of symptoms/ischaemia

<table>
<thead>
<tr>
<th>Severe: Angina CCS III–IV or ischaemia &gt;10%</th>
<th>catheterization laboratory.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate-to-severe: Angina CCS II or ischaemia 5–10%</td>
<td>OMT&lt;sup&gt;a&lt;/sup&gt; only or catheterization laboratory.</td>
</tr>
<tr>
<td>Mild-to-moderate: Angina CCS I or ischaemia &lt;5%</td>
<td>OMT&lt;sup&gt;a&lt;/sup&gt; first and defer catheterization laboratory.</td>
</tr>
</tbody>
</table>

<sup>a</sup>If symptoms and/or ischaemia are markedly reduced/eliminated by OMT, then OMT may be continued; if not, catheterization should follow.  
CCS = Canadian Cardiovascular Society; OMT = optimal medical therapy.

See Web addenda

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Mortality rates in relation to CAD extent

Annual Mortality with Medical Therapy

- 1-Vessel
- 2-Vessel
- 1-Vessel, >95% proximal LAD
- 2-Vessel, >95% proximal LAD
- 3-Vessel
- 3-Vessel, >95% in at least 1
- 3-Vessel, >75% proximal LAD
- 3-Vessel, >95% proximal LAD

Percentage (%)
**Use of FFR, IVUS, and OCT in SCAD**

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFR is recommended to identify haemodynamically relevant coronary lesion(s) when evidence of ischaemia is not available.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Revascularization of stenoses with FFR &lt;0.80 is recommended in patients with angina symptoms or a positive stress test.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>IVUS or OCT may be considered to characterize lesions.</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>IVUS or OCT may be considered to improve stent deployment.</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>Revascularization of an angiographically intermediate stenosis without related ischaemia or FFR &lt;0.80 is not recommended.</td>
<td>III</td>
<td>B</td>
</tr>
</tbody>
</table>

FFR = fractional flow reserve; IVUS = intravascular ultrasound; OCT = optical coherence tomography; SCAD = stable coronary artery disease.
This slide corresponds to Table 31 in the full text.

**Revascularization of SCAD patients on OMT**

(Adapted from the ESC/EACTS 2010 Guidelines)

<table>
<thead>
<tr>
<th>Indication</th>
<th>To improve prognosis</th>
<th>To improve symptoms persistent on OMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Heart Team approach to revascularization is recommended in patients with unprotected left main, 2–3 vessel disease, diabetes or comorbidities.</td>
<td>I C</td>
<td>I C</td>
</tr>
<tr>
<td>Left main &gt;50% diameter stenosis(^b).</td>
<td>I A</td>
<td>I A</td>
</tr>
<tr>
<td>Any proximal LAD &gt;50% diameter stenosis(^b).</td>
<td>I A</td>
<td>I A</td>
</tr>
<tr>
<td>2–3 vessel disease with impaired LV function/CHF.</td>
<td>I B</td>
<td>IIa B</td>
</tr>
<tr>
<td>Single remaining vessel (&gt;50% diameter stenosis(^b)).</td>
<td>I C</td>
<td>I A</td>
</tr>
<tr>
<td>Proven large area of ischaemia (&gt;10% LV(^c)).</td>
<td>I B</td>
<td>I B</td>
</tr>
<tr>
<td>Any significant stenosis with limiting symptoms or symptoms non responsive/intolerant to OMT.</td>
<td>NA NA</td>
<td>I A</td>
</tr>
<tr>
<td>Dyspnoea/cardiac heart failure with &gt;10% ischaemia/viability(^c) supplied by stenosis &gt;50%.</td>
<td>IIb B</td>
<td>IIa B</td>
</tr>
<tr>
<td>No limiting symptoms with OMT in vessel other than left main or proximal LAD or single remaining vessel or vessel subtending area of ischaemia &lt;10% of myocardium or with FFR ≥0.80.</td>
<td>III A</td>
<td>III C</td>
</tr>
</tbody>
</table>

CHF = congestive heart failure; FFR = fractional flow reserve; LAD = left anterior descending; LV = left ventricular; OMT = optimal medical therapy; SCAD = stable coronary artery disease. \(^a\)In asymptomatic patients, the decision will be guided by the extent of ischaemia on stress testing. \(^b\)With documented ischaemia or FFR for angiographic diameter stenoses 50–90%. \(^c\)As assessed by non-invasive test (SPECT, MRI, stress echocardiography). This slide corresponds to Table 32 in the full text.
PCI or CABG surgery in SCAD with left main coronary artery involvement

Left main coronary artery with relevant stenosis

±1 vessel disease

±2 or 3 vessel disease

Ostium/mid shaft

Distal bifurcation

Syntax score ≤32

Syntax score ≥33

Heart Team Discussion

High surgical risk

PCI

Low surgical risk

CABG

CABG = coronary artery bypass graft; PCI = percutaneous coronary intervention.

a>50% stenosis and proof of ischaemia, >70% stenosis in two angiographic views, or fractional flow reserve = 0.80.

bPreferred option in general. According to local practice (time constraints, workload) direct decision may be taken without formal multidisciplinary discussion, but preferably with locally agreed protocols (adapted from ESC/EACTS Guidelines on Myocardial Revascularization 2010). This slide corresponds to Figure 7 in the full text.
PCI or CABG surgery in SCAD in different CAD scenarios

Number of coronary arteries with relevant stenosis in proximal segment

1 or 2 vessel disease

Proximal LAD involvement

No

PCI

Yes

3 vessel disease

Syntax score ≤22

Syntax score ≥23

Heart Team Discussion®

Low surgical risk

CABG
Follow-up of revascularized stable coronary artery disease patients (2)

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Imaging management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In symptomatic patients, stress imaging (stress echocardiography, MRI or MPS)</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>is indicated rather than stress ECG.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In patients with low risk ischaemic findings (&lt;5% of the myocardium) at stress</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>imaging, optimal medical therapy is recommended.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In patients with high risk ischaemic findings (&gt;10% of myocardium) at stress</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>imaging, coronary angiography is recommended.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late (6 months) stress imaging test after revascularization may be considered to</td>
<td>IIb</td>
<td>C</td>
</tr>
<tr>
<td>detect patients with restenosis after stenting or graft occlusion irrespective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of symptoms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After high risk PCIs (e.g. LM disease) late (3-12 months) control angiography</td>
<td>IIb</td>
<td>C</td>
</tr>
<tr>
<td>may be considered, irrespective of symptoms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systematic control angiography, early or late after PCI, is not recommended.</td>
<td>III</td>
<td>C</td>
</tr>
</tbody>
</table>

ECG = electrocardiogram; LM = left main; MPS = myocardial perfusion scintigraphy; MRI = magnetic resonance imaging; PCI = percutaneous coronary intervention.

*Specific patient subsets indicated for early stress testing:
  – patients with safety critical professions (e.g. pilots, drivers, divers) and competitive athletes.
  – patients who would like to engage in activities for, which high oxygen consumption is required.

This slide corresponds to Table 34 in the full text.
### Table 33: Comparison of Recent Randomized Trials in Stable Angina

<table>
<thead>
<tr>
<th></th>
<th>TIME</th>
<th>MASS II</th>
<th>SWISSI II</th>
<th>COURAGE</th>
<th>BARI-2D</th>
<th>JSAP</th>
<th>FAME-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study size (n)</td>
<td>301</td>
<td>611</td>
<td>201</td>
<td>2287</td>
<td>2368</td>
<td>384</td>
<td>888</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>80</td>
<td>60</td>
<td>55</td>
<td>61</td>
<td>62</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>Angina CCS</td>
<td>II-IV</td>
<td>II-III</td>
<td>0</td>
<td>0-III</td>
<td>0-II</td>
<td>0-II</td>
<td>I-IV</td>
</tr>
<tr>
<td>Stress ischaemia (% of patients)</td>
<td>69</td>
<td>NA</td>
<td>100</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>100</td>
</tr>
<tr>
<td>Prior MI (% of patients)</td>
<td>47</td>
<td>44</td>
<td>100</td>
<td>39</td>
<td>38</td>
<td>15</td>
<td>37</td>
</tr>
<tr>
<td>Mean LVEF (%)</td>
<td>52</td>
<td>67</td>
<td>57</td>
<td>62</td>
<td>NA</td>
<td>65</td>
<td>16% with EF&lt;0.50</td>
</tr>
<tr>
<td>Angiographic selection</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Mandatory documented ischaemia</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Revascularization</td>
<td>PCI or CABG</td>
<td>PCI or CABG</td>
<td>PCI</td>
<td>PCI</td>
<td>PCI or CABG</td>
<td>PCI</td>
<td>PCI</td>
</tr>
<tr>
<td>Primary Endpoint (PEP)</td>
<td>Angina</td>
<td>Death/MI/refractory angina</td>
<td>Death/MI/revasc</td>
<td>Death/MI</td>
<td>Death</td>
<td>Death/ACS</td>
<td>Death/MI/urgent revasc</td>
</tr>
<tr>
<td>Revascularization better on PEP</td>
<td>Yes</td>
<td>No at 1 year</td>
<td>Yes at 5 years (CABG)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Legend:**
- CABG = coronary artery bypass graft; CCS = Canadian Cardiovascular Society; LVEF = left ventricular ejection fraction; MI = myocardial infarction; PCI = percutaneous coronary intervention; revasc = revascularization
- This slide corresponds to Table 33 in the full text.

## Peri-procedural antiplatelet strategies in SCAD patients

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>DES is recommended in SCAD patients undergoing stenting if there is no contraindication to prolonged DAPT.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Aspirin is recommended for elective stenting.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Clopidogrel is recommended for elective stenting.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Prasugrel or ticagrelor should be considered in patients with stent thrombosis on clopidogrel without treatment interruption.</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>GP IIb/IIIa antagonists should be considered for bailout situation only.</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Platelet function testing or genetic testing may be considered in specific or high risk situations (e.g. prior history of stent thrombosis; compliance issue; suspicion of resistance; high bleeding risk) if results may change the treatment strategy.</td>
<td>IIb</td>
<td>C</td>
</tr>
<tr>
<td>Prasugrel or ticagrelor may be considered in specific high risk situations of elective stenting (e.g. left main stenting; high risk of stent thrombosis; diabetes).</td>
<td>IIb</td>
<td>C</td>
</tr>
<tr>
<td>Pretreatment with clopidogrel (when coronary anatomy is not known) is not recommended.</td>
<td>III</td>
<td>A</td>
</tr>
<tr>
<td>Routine platelet function testing (clopidogrel and aspirin) to adjust antiplatelet therapy before or after elective stenting is not recommended.</td>
<td>III</td>
<td>A</td>
</tr>
<tr>
<td>Prasugrel or ticagrelor is not recommended in low risk elective stenting.</td>
<td>III</td>
<td>C</td>
</tr>
</tbody>
</table>

DATP = dual antiplatelet therapy; SCAD = stable coronary artery disease.  
This slide corresponds to Table 30 in the full text.