Table 3. Adjunctive Antithrombotic Therapy to Support Reperfusion With Primary PCI

<table>
<thead>
<tr>
<th><strong>Antiplatelet therapy</strong></th>
<th><strong>Aspirin</strong></th>
<th><strong>P2Y₁₂ inhibitors</strong></th>
<th><strong>Loading doses</strong></th>
<th><strong>Maintenance doses and duration of therapy</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>162- to 325-mg load before procedure</td>
<td>Clopidogrel: 600 mg as early as possible or at time of PCI</td>
<td>Clopidogrel: 75 mg daily</td>
<td>Clopidogrel: Continue therapy for 1 y with:</td>
</tr>
<tr>
<td></td>
<td>81- to 325-mg daily maintenance dose (indefinite)*</td>
<td>Prasugrel: 60 mg as early as possible or at time of PCI</td>
<td>Prasugrel: 10 mg daily</td>
<td>Clopidogrel: 75 mg daily</td>
</tr>
<tr>
<td></td>
<td>81 mg daily is the preferred maintenance dose*</td>
<td>Ticagrelor: 180 mg as early as possible or at time of PCI</td>
<td>Ticagrelor: 90 mg twice a day*</td>
<td>Des placed: Continue therapy for 1 y with:</td>
</tr>
</tbody>
</table>

**DES placed:**
- Clopidogrel: 75 mg daily
- Prasugrel: 10 mg daily
- Ticagrelor: 90 mg twice a day*

**BMS placed:**
- Clopidogrel: 75 mg daily
- Prasugrel: 10 mg daily
- Ticagrelor: 90 mg twice a day*

**DES placed:**
- Clopidogrel, prasugrel, or ticagrelor* continued beyond 1 y
- Patients with STEMI with prior stroke or TIA: prasugrel

**IV GP IIb/IIIa receptor antagonists in conjunction with UFH or bivalirudin in selected patients**
- Abciximab: 0.25-mg/kg IV bolus, then 0.125 mcg/kg/min (maximum 10 mcg/min)
- Tirofiban: (high-bolus dose): 25-mcg/kg IV bolus, then 0.15 mcg/kg/min
- Epifibatide: (double bolus): 180-mcg/kg IV bolus, then 2 mcg/kg/min; a second 180-mcg/kg bolus is administered 10 min after the first bolus
- In patients with CrCl <30 mL/min, reduce infusion by 50%
- In patients with CrCl <50 mL/min, reduce infusion by 50%
- Avoid in patients on hemodialysis
- Pre–catheterization laboratory administration of IV GP IIb/IIIa receptor antagonist
- Intracoronary abciximab 0.25-mg/kg bolus

**Anticoagulant therapy**
- UFH:
  - With GP IIb/IIIa receptor antagonist planned: 50- to 70-U/kg IV bolus to achieve therapeutic ACT‡
  - With no GP IIb/IIIa receptor antagonist planned: 70- to 100-U/kg bolus to achieve therapeutic ACT§
- Bivalirudin: 0.75-mg/kg IV bolus, then 1.75-mg/kg/h infusion with or without prior treatment with UFH. An additional bolus of 0.3 mg/kg may be given if needed.
- Reduce infusion to 1 mg/kg/h with estimated CrCl <30 mL/min
- Preferred over UFH with GP IIb/IIIa receptor antagonist in patients at high risk of bleeding
- Fondaparinux: not recommended as sole anticoagulant for primary PCI

*The recommended maintenance dose of aspirin to be used with ticagrelor is 81 mg daily.
†Balloon angioplasty without stent placement may be used in selected patients. It might be reasonable to provide P2Y12 inhibitor therapy to patients with STEMI undergoing balloon angioplasty alone according to the recommendations listed for BMS. (LOE: C).
‡The recommended ACT with planned GP IIb/IIIa receptor antagonist treatment is 200 to 250 s.
§The recommended ACT with no planned GP IIb/IIIa receptor antagonist treatment is 250 to 300 s (HemoTec device) or 300 to 350 s (Hemochron device).
### Table 2. Primary PCI in STEMI

<table>
<thead>
<tr>
<th>Condition</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischemic symptoms &lt;12 h</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Ischemic symptoms &lt;12 h and contraindications to fibrinolytic therapy irrespective of time delay from FMC (First Medical Contact)</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Cardiogenic shock or acute severe HF irrespective of time delay from MI onset</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>Evidence of ongoing ischemia 12 to 24 h after symptom onset</td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>PCI of a noninfarct artery at the time of primary PCI in patients without hemodynamic compromise</td>
<td></td>
<td>B</td>
</tr>
</tbody>
</table>

### Table 4. Fibrinolysis Indications When There Is >120-Min Delay From FMC to Primary PCI

<table>
<thead>
<tr>
<th>Condition</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischemic symptoms &lt;12 h</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Evidence of ongoing ischemia 12 to 24 h after symptom onset and a large area of myocardium at risk or hemodynamic instability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST depression, except if true posterior (inferobasal) MI is suspected or when associated with ST elevation in lead aVR</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 7. Adjunctive Antithrombotic Therapy to Support Reperfusion With Fibrinolytic Therapy

**Antiplatelet therapy**

**Aspirin**
- 162- to 325-mg loading dose                      | I   | A   |
- 81- to 325-mg daily maintenance dose (indefinite) | I   | A   |
- 81 mg daily is the preferred maintenance dose    | I   | IIa A |

**P2Y12 receptor inhibitors**
- Clopidogrel:
  - Age ≤75 y: 300-mg loading dose
    - Followed by 75 mg daily for at least 14 d and up to 1 y in absence of bleeding | I   | A (14 d) |
    - Age >75 y: no loading dose, give 75 mg
    - Followed by 75 mg daily for at least 14 d and up to 1 y in absence of bleeding | I   | A |

**Anticoagulant therapy**

**UFH:**
- Weight-based IV bolus and infusion adjusted to obtain aPTT of 1.5 to 2.0 times control for 48 h or until revascularization. IV bolus of 60 U/kg (maximum 4000 U) followed by an infusion of 12 U/kg/h (maximum 1000 U) initially, adjusted to maintain aPTT at 1.5 to 2.0 times control (approximately 50 to 70 s) for 48 h or until revascularization | I   | C   |

**Enoxaparin:**
- If age <75 y: 30-mg IV bolus, followed in 15 min by 1 mg/kg subcutaneously every 12 h (maximum 100 mg for the first 2 doses)
- If age ≥75 y: no bolus, 0.75 mg/kg subcutaneously every 12 h (maximum 75 mg for the first 2 doses)
- Regardless of age, if CrCl <30 mL/min: 1 mg/kg subcutaneously every 24 h
- Duration: For the index hospitalization, up to 8 d or until revascularization

**Fondaparinux:**
- Initial dose 2.5 mg IV, then 2.5 mg subcutaneously daily starting the following day, for the index hospitalization up to 8 d or until revascularization
- Contraindicated if CrCl <30 mL/min
### Table 8. Indications for Transfer for Angiography After Fibrinolysis

<table>
<thead>
<tr>
<th>Indication</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate transfer for cardiogenic shock or severe acute HF irrespective of time delay from MI onset</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Urgent transfer for failed reperfusion or reocclusion</td>
<td>Ila</td>
<td>B</td>
</tr>
<tr>
<td>As part of an invasive strategy in stable* patients with PCI between 3 and 24 h after successful fibrinolysis</td>
<td>Ila</td>
<td>B</td>
</tr>
</tbody>
</table>

*Clinical stability is defined by absence of low output, hypotension, persistent tachycardia, apparent shock, high-grade ventricular or symptomatic supraventricular tachyarrhythmia, & spontaneous recurrent ischemia.

### Table 9. Angiography Indications after Fibrinolysis or Without Reperfusion Therapy

<table>
<thead>
<tr>
<th>Indication</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiogenic shock or acute severe HF that develops after initial presentation</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Intermediate- or high-risk findings on predisharge noninvasive ischemia testing</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Spontaneous or easily provoked myocardial ischemia</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Failed reperfusion or reocclusion after fibrinolytic therapy</td>
<td>Ila</td>
<td>B</td>
</tr>
<tr>
<td>Stable* patients after successful fibrinolysis, before discharge and ideally between 3 and 24 h</td>
<td>Ila</td>
<td>B</td>
</tr>
</tbody>
</table>

### Table 10. Indications for PCI of an Infarct Artery in Patients Who Were Managed With Fibrinolytic Therapy or Who Did Not Receive Reperfusion Therapy

<table>
<thead>
<tr>
<th>Indication</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiogenic shock or acute severe HF</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Intermediate- or high-risk findings on predisharge noninvasive ischemia testing</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Spontaneous or easily provoked myocardial ischemia</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Patients with evidence of failed reperfusion or reocclusion after fibrinolytic therapy ASAP</td>
<td>Ila</td>
<td>B</td>
</tr>
<tr>
<td>Stable* patients after successful fibrinolysis, ideally between 3 and 24 h</td>
<td>Ila</td>
<td>B</td>
</tr>
<tr>
<td>Stable* patients &gt;24 h after successful fibrinolysis</td>
<td>Ila</td>
<td>B</td>
</tr>
<tr>
<td>Delayed PCI of a totally occluded infarct artery &gt;24 h after STEMI in stable patients</td>
<td>III: No Benefit</td>
<td>B</td>
</tr>
</tbody>
</table>

### Table 5. Fibrinolytic Agents

<table>
<thead>
<tr>
<th>Fibrinolytic Agent</th>
<th>Dose</th>
<th>Fibrin Specificity</th>
<th>Antigenic</th>
<th>Patency Rate (90-min TIMI 2 or 3 flow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tissue plasminogen activator (tPA)</td>
<td>Single IV weight-based bolus†</td>
<td>+ + + +</td>
<td>No</td>
<td>85%</td>
</tr>
<tr>
<td>Reteplase (rPA)</td>
<td>10 U–10-IV IU boluses given 30 min apart</td>
<td>+ +</td>
<td>No</td>
<td>84%</td>
</tr>
<tr>
<td>Alteplase (tPA)</td>
<td>90-min weight-based infusion‡</td>
<td>+ +</td>
<td>No</td>
<td>73% to 84%</td>
</tr>
<tr>
<td>Non–fibrin-specific:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Streptokinase §</td>
<td>1.5 million units IV given over 30–60 min</td>
<td>No</td>
<td>Yes</td>
<td>60% to 68%</td>
</tr>
</tbody>
</table>

†30mg for wt 60kg; 35mg for 60–69kg; 40mg for 70–79kg; 45mg for 80–89kg; & 50mg for 90kg.
‡Bolus 15mg, infusion 0.75mg/kg for 30 min (max 50mg), then 0.5mg/kg (max 35mg) over the next 60 min; total dose not to exceed 100 mg.
§Streptokinase is no longer marketed in the United States but is available in other countries. Streptokinase is highly antigenic and absolutely contraindicated within 6 mo of previous exposure because of the potential for serious allergic reaction.

### Table 6. Contraindications to Fibrinolysis

**Absolute contraindications**
- Any prior ICH
- Known structural cerebral vascular lesion (e.g., arteriovenous malformation)
- Known malignant intracranial neoplasm (primary or metastatic)
- Ischemic stroke within 3 mo
  - EXCEPT acute ischemic stroke within 4.5 h
- Suspected aortic dissection
- Active bleeding or bleeding diathesis (excluding menses)
- Significant closed-head or facial trauma within 3 mo
- Intracranial or intraspinal surgery within 2 mo
- Severe uncontrolled hypertension (unresponsive to emergency therapy)
- For streptokinase, prior treatment within the previous 6 mo

**Relative contraindications**
- History of chronic, severe, poorly controlled hypertension
- Significant hypertension on presentation (SBP > 180mmHg or DBP > 110mmHg)
- History of prior ischemic stroke > 3 mo
- Dementia
- Intracranial pathology not in absolute contraindications
- Traumatic or prolonged (> 10 min) CPR
- Major surgery (< 3 wks)
- Recent (within 2 to 4 wks) internal bleeding
- Noncompressible vascular punctures
- Pregnancy
- Active peptic ulcer
- Oral anticoagulant therapy
<table>
<thead>
<tr>
<th>Table 11. Adjunctive Antithrombotic Therapy to Support PCI After Fibrinolytic Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antiplatelet therapy</strong></td>
</tr>
<tr>
<td><em>Aspirin</em></td>
</tr>
<tr>
<td>- 162- to 325-mg loading dose given with fibrinolytic agent (before PCI).</td>
</tr>
<tr>
<td>- 81- to 325-mg daily maintenance dose after PCI (indefinite)</td>
</tr>
<tr>
<td>- 81 mg daily is the preferred daily maintenance dose</td>
</tr>
</tbody>
</table>

**P2Y₁₂ receptor inhibitors**

**Loading doses**

*For patients who received a loading dose of clopidogrel with fibrinolytic therapy:*

- Continue clopidogrel 75 mg daily without an additional loading dose | I C |

*For patients who have not received a loading dose of clopidogrel:*

- If PCI is performed ≤24 h after fibrinolytic therapy: clopidogrel 300-mg loading dose before or at the time of PCI | I C |
- If PCI is performed >24 h after fibrinolytic therapy: clopidogrel 600-mg loading dose before or at the time of PCI | I C |
- If PCI is performed >24 h after treatment with a fibrin-specific agent or >48 h after a non–fibrin-specific agent: prasugrel 60 mg at the time of PCI | IIa B |

*For patients with prior stroke/TIA: prasugrel* | III: Harm B |

**Maintenance doses and duration of therapy**

*DES placed: Continue therapy for at least 1 y with:*

- Clopidogrel: 75 mg daily | I C |
- Prasugrel: 10 mg daily | IIa B |

*BMS* placed: Continue therapy for at least 30 d and up to 1 y with:

- Clopidogrel: 75 mg daily | I C |
- Prasugrel: 10 mg daily | IIa B |

**Anticoagulant therapy**

- Continue UFH through PCI, administering additional IV boluses as needed to maintain therapeutic ACT depending on use of GP IIb/IIIa receptor antagonist† | I C |
- Continue enoxaparin through PCI: |
  - No additional drug if last dose was within previous 8 h | I B |
  - 0.3-mg/kg IV bolus if last dose was 8 to 12 h earlier | IIa B |
- Fondaparinux: |
  - As sole anticoagulant for PCI | III: Harm C |

---

*Balloon angioplasty without stent placement may be used in selected patients. It might be reasonable to provide P2Y12 inhibitor therapy to patients with STEMI undergoing balloon angioplasty after fibrinolysis alone according to the recommendations listed for BMS. (LOE: C)*

†The recommended ACT with no planned GP IIb/IIIa receptor antagonist treatment is 250–300 s (HemoTec device) or 300–350 s (Hemochron device).
7.2. Timing of Urgent CABG in Patients With STEMI in Relation to Use of Antiplatelets:

**CLASS I**
1. Aspirin should not be withheld before urgent CABG. *(LOE: C)*
2. Clopidogrel or ticagrelor: stop at least 24 hours before urgent on-pump CABG. *(LOE: B)*
3. Eptifibatide/Tirofiban: stop least 2-4 h, Abciximab: at least 12 h before urgent CABG. *(LOE: B)*

**CLASS IIb**
1. Urgent off-pump CABG within 24 hours of clopidogrel or ticagrelor, if necessary. *(LOE: B)*
2. Urgent CABG within 5 days of clopidogrel/ticagrelor, 7 days of prasugrel, if necessary. *(LOE: C)*

8. Routine Medical Therapies. Table 12. Selected Routine Medical Therapies
9.1.1. Treatment of Cardiogenic Shock:

CLASS I
1. Emergency revascularization, PCI or CABG, in suitable patients irrespective of time delay. (LOE: B)
2. Fibrinolytics, if not contraindicate, for patients unsuitable for PCI or CABG. (LOE: B)

CLASS IIa
1. IABP for patients who do not quickly stabilize with pharmacological therapy. (LOE: B)

CLASS IIb
1. LV assist devices for circulatory support in patients with refractory cardiogenic shock. (LOE: C)

9.6.1. Management of Pericarditis After STEMI:

CLASS I
1. ASA is recommended for treatment of pericarditis after STEMI. (LOE: B)

CLASS IIb
1. Acetaminophen, colchicine, or narcotics if aspirin, even in higher doses, is not effective. (LOE: C)

CLASS III: HARM
1. Glucocorticoids and NSAIDs are harmful for treatment of pericarditis after STEMI. (LOE: B)

9.7.1.1. ANTIICOAGULATION:

CLASS I
1. Warfarin for AF, CHADS2 ≥ 2, mech valve, VTE, or hypercoagulable disorder. (LOE: C)
2. The duration of triple antithrombotics: warfarin, ASA, & P2Y12 should be minimized. (LOE: C)

CLASS IIa
1. Warfarin with asymptomatic LV mural thrombi. (LOE: C)

CLASS IIb
1. Warfarin with anterior apical akinesis or dyskinesis. (LOE: C)
2. INR 2.0-2.5 in patients on DAPT. (LOE: C)

¶ Without stenting (POBA, fibrinolysis alone, or no reperfusion), consider 14 days of DAPT.

10.1. Use of Noninvasive Testing for Ischemia Before Discharge:

CLASS I
1. Stress testing predischARGE if no angio was done, & no high-risk clinical features present. (LOE: B)

CLASS IIb
1. Stress testing predischARGE to evaluate significance of a noninfarct artery stenosis. (LOE: C)
2. Stress testing predischARGE to guide postdischarge exercise prescription. (LOE: C)

10.2. Assessment of LV Function:

CLASS I
1. LVEF should be measured in all patients with STEMI. (LOE: C)

10.3. Assessment of Risk for SCD:

CLASS I
1. LVEF reevaluation ≥ 40 days postdischarge for initially low EF patients candidate for ICD. (LOE: B)

11.1. Posthospitalization Plan of Care:

CLASS I
1. Systems of care to prevent readmits & facilitate effective, coordinated outpatient care. (LOE: B)
2. Exercise-based cardiac rehabilitation/secondary prevention programs. (LOE: B)
3. Plan of care promoting med adherence, f/u, dietary/physical activities. (LOE: C)
4. Encouragement and advice to stop smoking, & avoid secondhand smoke. (LOE: A)

2004 ACCF/AHA Guideline for the Management of STEMI

The physician should provide explicit advice about to previous activities & employment:

1. Daily walking can be encouraged immediately.

2. Sexual activity with the usual partner can be resumed within 7-10 days, in stable patients.

3. Driving can begin 1 week post-discharge if patient is judged to be in compliance with state law. States’ DMVs mandate criteria, e.g. need to be accompanied, avoid stressful circumstances such as rush hour, inclement weather, night driving, heavy traffic, & high speeds. For complicated STEMI (requiring CPR or accompanied by hypotension, serious arrhythmias, high degree block, or CHF), driving should be delayed 2-3 weeks after symptoms have resolved.

4. Air travel within the first 2 weeks of STEMI should be undertaken only if there is no angina or dyspnea at rest or fear of flying. Patient must have a companion, carry NTG, and request airport transportation to avoid rushing. Commercial aircraft are pressurized to 7500-8000 feet, so could cause hypoxia due to low alveolar oxygen tension. Emergency medical kit/+AED was mandated in April 12, 2004 in all aircraft that carry ≥ 30 passengers & have at least 1 flight attendant.

5. Return to work: In PAMI-II primary PTCA study in low-risk STEMI patients (age < 70 yrs, EF > 0.45, 1-2-vessel disease & good PTCA result), patients were encouraged to return to work at 2 wks. Actual timing of return to work was not reported, however no adverse events occurred. To aid occupational physicians in making return-to-work decisions, Froom et al. studied incidence of post-MI events at 1, 2, 4, 6, 9, & 12 months. Events included cardiac death, recurrent MI, CHF, & USA. They found the incidence of events reached a low steady state at 10 wks.