**Ischemic Heart Disease**

The major goals for the treatment of IHD are to:

• Prevent acute coronary syndromes and death

• Alleviate acute symptoms of myocardial ischemia

• Prevent recurrent symptoms of myocardial ischemia and

• Avoid or minimize adverse treatment effects.

**Non- pharmacological therapy**

Lifestyle modifications include smoking cessation, dietary modifications, increased physical activity, and weight loss.

**Pharmacological Therapy**

Since chronic stable angina usually results from increased myocardial oxygen demand in the face of a relatively fixed reduction in oxygen supply, drug treatment is primarily aimed at reducing oxygen demand.

**Pharmacotherapy to Prevent Acute Coronary Syndromes and Death**

1. **Short- acting nitrates** are indicated to acutely relieve angina. All patients with a history of angina should have sublingual nitroglycerin tablets or spray to relieve acute ischemic symptoms at the onset of an angina attack, a 0.3 to 0.4 mg dose of nitroglycerin (tablet or spray) should be administered sublingually, and repeated every 5 minutes until symptoms resolve.
2. Antiplatelet therapy with aspirin should be considered for all patients without contraindications, particularly in patients with a history of myocardial infarction. Aspirin doses of 75 to 325 mg daily have been shown to be cardioprotective. If aspirin is contraindicated (e.g., aspirin allergy, active peptic ulcer disease, or active internal bleeding) or is not tolerated by the patient, other antiplatelet agents such as clopidogrel should be considered.
3. ACE inhibitors should be considered in ischemic heart disease patients who also have diabetes mellitus, left ventricular dysfunction, history of myocardial infarction, or any combination of these.
4. Patients with chronic stable angina should receive **statin** therapy unless contraindicated.

- statins and angiotensin-converting enzyme (ACE) inhibitors are believed to provide vasculoprotective effects (properties that are generally protective of the vasculature, which may include anti-inﬂammatory effects, antiplatelet effects, improvement in endothelial function, and improvement in arterial compliance and tone), and in addition to aspirin, have been shown to reduce the risk of acute coronary events as well as mortality in patients with IHD

**5-** B Blockers, calcium channel blockers (CCBs), and long acting nitrates are traditionally usedprevent ischemic symptoms, reduce the frequency of angina and improve exercise tolerance.

* B-Blockers are first-line therapy for preventing ischemic symptoms, particularly in patients with a history of myocardial infarction.
* - b-Blockers have been shown to decrease morbidity and improve survival in patients who have suffered an MI.
* Calcium channel blockers are recommended as initial treatment in IHD when B-blockers are contraindicated or not tolerated. In addition, CCBs may be used in combination with b-blockers when initial treatment is unsuccessful.
* Treatment with long-acting nitrates should be added to baseline therapy with either a B-blocker or calcium channel blocker or a combination of the two.

**Interventional Approaches**

- In most patients with IHD, the most effective treatments to improve myocardial oxygen supply are invasive mechanical interventions: **percutaneous** **coronary intervention (PCI)** and **coronary artery bypass graft** **(CABG) surgery**.

Percutaneous Coronary Intervention When drug therapy fails or if extensive coronary atherosclerosis is present, PCI is often performed to restore coronary blood ﬂow, relieve symptoms, and prevent major adverse cardiac events. Patients with one or more critical coronary stenoses (i.e., greater than 70% occlusion of the coronary lumen) detected during coronary angiography may be candidates for PCI. Several catheter-based interventions may be used during PCI, including:

• Percutaneous transluminal coronary angioplasty (PTCA);

• Intracoronary bare metal stent placement;

• Intracoronary drug-eluting stent placement; and

 • Rotational atherectomy.

* In chronic stable angina, percutaneous coronary intervention is reserved for patients who remain symptomatic despite optimal medical therapy, patients unable to tolerate adverse effects of medications, and those with high-risk findings on noninvasive imaging.
* Patients with stable angina who undergo percutaneous coronary intervention should receive clopidogrel for 6 monthes following placement of a drug-eluting stent and for 2 weeks to 1 month following placement of a bare-metal stent; aspirin should be continued indefinitely.
* Coronary Artery Bypass Graft Surgery As an alternative to PCI, CABG surgery, or open-heart surgery, may be performed if the patient is found to have extensive coronary atherosclerosis (generally greater than 70% occlusion of three or more coronary arteries) or is refractory to medical treatment. In the former case, CABG surgery has been shown to reduce mortality from IHD.



 **The treatment algorithm for ischemic heart disease**

**Acute Coronary Syndromes**

**Reperfusion therapy**

* Early reperfusion therapy with either primary percutaneous coronary intervention (PCI) or administration of a fibrinolytic agent within 3 hours of symptom onset is the recommended therapy for patients presenting with STE ACS.
* Fibrinolytic therapy is preferred over primary PCI in patients presenting within 3 hours of symptom onset where there is a delay in “door-to-primary PCI” less than 90 minutes. either alteplase, reteplase, or tenecteplase are acceptable as first-line agents.
* It is not necessary to obtain the results of biochemical markers before initiating fibrinolytic therapy
* **Early Pharmacologic Therapy for ST-Segment Elevation Acute Coronary Syndromes:** in addition to reperfusion therapy,early pharmacotherapy of STE should include:
1. **intranasal oxygen** (if oxygen saturation is less than 90%),
2. **Nitrates:** One sublingual nitroglycerin tablet should be administered every 5 minutes for up to three doses in order to relieve myocardial ischemia.
3. aspirin, initial dose of 160 to 325 mg is required to achieve rapid platelet inhibition, long-term therapy with doses of 75 to 150 mg daily are as effective as higher doses.
4. **Thienopyridines :** Administration of clopidogrel is recommended for all patients with STE ACS
5. **Anticoagulants**
* Unfractionated heparin, administered as a continuous infusion, is a first-line anticoagulant for treatment of patients with STE ACS, both for medical therapy and for patients undergoing PCI.
* Unfractionated heparin should be initiated in the emergency department and continued for 48 hours or longer in patients who will be bridged over to receive chronic warfarin **Morphine** is administered as an analgesic and a venodilator that lowers preload. This agent should be administered early, while the patient is still in the emergency department.
1. **Beta-Blockers**

Intravenous or oral doses of a -blocker should be administered early in the care of a patient with STE ACS, and then oral agents should be continued indefinitely.

8- **Glycoprotein IIb/IIIa Receptor Inhibitors**

Abciximab is a first-line glycoprotein IIb/IIIa receptor inhibitor for patients undergoing primary PCI who have not received fibrinolytics. It should not be administered for medical management of the STE ACS patient who will not be undergoing PCI

**Early Pharmacotherapy for Non–ST-Segment Elevation Acute Coronary Syndromes**

According to the ACC/AHA non–ST-segment elevation ACS practice guidelines, in the absence of contraindications, early pharmacotherapy of NSTE ACS should include

1. intranasal oxygen (if oxygen saturation is low),
2. **Nitrates** Sublingual NTG followed by intravenous NTG should be administered to patients with NSTE ACS and ongoing ischemia
3. **Aspirin.** aspirin reduces the risk of death or developing MI by about 50% (compared to no antiplatelet therapy) in patients with NSTE ACS. Therefore, aspirin remains the cornerstone of early treatment for all ACS. Dosing of aspirin for NSTE ACS is the same as that for STE ACS . Aspirin is continued indefinitely.
4. **Thienopyridines**

For patients with NSTE ACS, clopidogrel started on the first day of hospitalization as a 300 to 600 mg loading dose and followed the next day by 75 mg orally per day for 9 to 12 months.

1. **Beta-Blockers**

Intravenous -blockers followed by oral -blockers should be administered to all patients with NSTE ACS in the absence of contraindications.

1. **Anticoagulants**

Either UFH or LMWH should be administered to patients with NSTE ACS. Therapy should be continued for up to 48 hours or until the end of the angiography or PCI procedure.

1. Morphine is also administered to patients as described previously.
2. **Fibrinolytic Therapy:** Fibrinolytic therapy is not indicated in any patient with NSTE

ACS, as increased mortality has been reported with fibrinolytics compared to controls in clinical trials in which fibrinolytics have been administered to patients with NSTE ACS (patients with

normal or ST-segment depression ECGs).

1. **Glycoprotein IIb/IIIa Receptor Inhibitors**

Administration of tirofiban or eptifibatide is recommended for high-risk NSTE ACS patients as medical therapy without planned revascularization and for patients with continued or recurrent ischemia despite treatment with aspirin and an anticoagulant. In these patients, the benefit of glycoprotein IIb/IIIa

inhibitors appears to be limited to those undergoing PCI.

 Abciximab should not be used in this setting, because its use in such a setting has not been shown to be beneficial.

1. **Calcium Channel Blockers**

calcium channel blockers should not be administered to most patients with ACS. Their role is a second-line treatment for patients with certain contraindications

to B-blockers and those with continued ischemia despite B-blocker and nitrate therapy. Administration of either amlodipine, diltiazem, or verapamil is preferred. Agent selection is based on heart rate and left ventricular dysfunction (diltiazem and verapamil are contraindicated in patients with bradycardia, heart block, or systolic heart failure).

**Secondary Prevention Following Myocardial Infarction**

Pharmacotherapy, which has been proven to decrease mortality, heart failure, reinfarction, or stroke, should be initiated prior to hospital discharge. for secondary prevention, Guidelines from the ACC/AHA suggest that in the absence of contraindications, following MI from either STE ACS or NSTE ACS, patients should receive indefinite treatment with aspirin, a b-blocker, and an ACE inhibitor. For NSTE ACS, most patients should receive clopidogrel, in addition to aspirin, for up to 9 months.

Most patients will receive a statin to reduce low-density lipoprotein cholesterol to less than 100 mg/dL.

Selected patients will also be treated with long term warfarin anticoagulation. For all ACS patients, treatment and control of modifiable risk factors such as hypertension, dyslipidemia, and diabetes mellitus is essential.