



FACT SHEET

BETA-BLOCKERS FOR ACUTE MYOCARDIAL INFARCTION

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Beta-adrenergic receptor blocking agents (β -blockers) are drugs with multiple actions on the heart. Blockade of β -1 receptors results in slowing of heart rate, reduction in myocardial contractility, and lowering of systemic blood pressure. In the context of acute myocardial infarction (AMI), which represents a state of reduced oxygen supply to the affected portion of the heart, these effects may be beneficial as they result in reduced myocardial workload and oxygen demand. Furthermore, β -blockers may reduce the risk of ventricular arrhythmias, which are an important cause of death following AMI.

Several studies have assessed the value of β -blockers in patients with ST-segment elevation MI (STEMI), although they have varied in terms of the other treatment provided to the enrolled patients and the type, dose, and route of administration of the β -blocker.¹ The International Studies of Infarct Survival-1 (ISIS-1) study compared treatment with the β -blocker atenolol (intravenous followed by oral) with placebo in patients within 12 hours of presentation.² Atenolol treatment was associated with lower mortality over 7 days (15% relative reduction, 0.6% absolute reduction, $p=0.05$). The Metoprolol in Acute Myocardial Infarction (MIAMI) trial compared the β -blocker metoprolol (intravenous followed by oral) with placebo, and found reductions in 15-day mortality similar to those found in ISIS-1.³ Both of these trials were performed in patients who did not receive acute reperfusion therapy, which is currently the standard of care for patients with ST-segment elevation MI.

Later studies assessed β -blockers in patients receiving reperfusion therapy. The Thrombolysis in Myocardial Infarction Phase II (TIMI-II) trial compared early treatment with metoprolol (IV followed by oral) with oral metoprolol started six days after presentation in patients who received thrombolytic therapy.⁴ Patients treated early had lower rates of reinfarction and recurrent ischemia. The outcome of death and reinfarction was reduced in those patients who were treated particularly early (i.e. within 2 hours) with intravenous metoprolol. In contrast, other studies of early β -blockade were not able to demonstrate the benefits of early intravenous treatment (TIMI-IIB, and a post-hoc analysis of the Global Utilization of Streptokinase and t-PA for Occluded Coronary Arteries or GUSTO-I).^{5, 6}

The data for patients with other acute coronary syndromes (ACS), including non-ST-segment elevation MI (NSTEMI) and unstable angina are less well established. However, a summary analysis of randomized trials with threatened or evolving MI showed lower rates of progression to MI with beta-blocker treatment.⁷

Based upon these data, the current guidelines for ST-elevation MI give the highest recommendation (Class I) to oral β -blocker therapy administered promptly to patients without a contraindication regardless of whether or not reperfusion therapy is provided.¹ Intravenous beta-blockers are considered reasonable for patients without a contraindication, particularly in patients with high heart rates or blood pressures. This latter recommendation is considered IIa (i.e. where there is conflicting evidence or divergent opinion, but where the weight of the evidence is in favor of efficacy). Thus, although intravenous β -blockers are not necessarily



recommended for all patients, the early treatment of all patients without contraindications with a β -blocker is strongly supported by evidence and guidelines. For patients with NSTEMI, the guidelines provide the highest recommendation to β -blockers, initially intravenously and then orally, if there is ongoing chest pain and no contraindications to therapy.⁸

Although β -blockers may be useful in many patients with AMI, some patients have contraindications to the use of this class of drugs. Relative contraindications include heart rate <60 bpm, systolic blood pressure <100 mmHg, moderate or severe left ventricular failure, shock, PR-interval on the electrocardiogram >0.24 seconds, second- or third-degree heart block, active asthma/reactive airways disease.

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