



Comparing Beta Blockers

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Beta adrenergic receptors are found in the heart (mainly β_1 receptors) and in the smooth muscle that lines blood vessels, lungs, and other organs (β_2 receptors). When activated, these receptors cause the heart to beat faster, with more force, and cause arteries to contract, increasing the resistance to the blood flowing through them. Likewise, when these receptors are blocked, the heart rate slows and the blood pressure falls.

Depending on which of the adrenergic receptors they block, beta blockers have many different uses in medicine. They are used to treat hypertension, angina, irregular heart beats (arrhythmias), bleeding esophageal varices, coronary artery disease, heart failure and migraines, and to prevent heart attacks.

The "[Drug Class Review on Beta Adrenergic Blockers](#)" compares the safety and effectiveness of 14 drugs. A summary of the findings is below.

How do beta blockers compare in hypertension?

All beta blockers have a similar effect on treating high blood pressure, either when used alone or in combination with a diuretic and ACE inhibitor.

Evidence is mixed for the long-term use of beta blockers; they are generally less effective than diuretics and no better than placebo in reducing cardiovascular events such as stroke. The exception is one large trial that found that metoprolol was better than a thiazide diuretic in reducing all-cause mortality. [[full review](#)]

How do beta blockers compare in angina?

In the short term, comparisons of several beta blockers in patients with chronic stable angina have shown that they have similar effects on increasing exercise tolerance and reducing the frequency of angina attacks. The beta blockers compared include carvedilol vs. metoprolol, pindolol vs. propranolol, betaxolol vs. propranolol, and betaxolol vs. metoprolol tartrate.

Some beta blockers, such as acebutolol and pindolol, also have beta agonist properties, known as intrinsic sympathomimetic activity (ISA). Because they reduce the resting heart rate less than other beta blockers do, experts recommend against using beta blockers with ISA in patients with angina. [[full review](#)]

How do beta blockers compare in patients who recently had a coronary artery bypass graft (CABG)?

The long-term use of a beta blocker after CABG does not reduce the risk of death. Other outcomes are also not improved, for example metoprolol given after a CABG does not reduce risk of ischemic events such as unstable angina or myocardial infarction. But overall, the strength of evidence is poor. [\[full review\]](#)

How do beta blockers compare in patients who recently had a heart attack?

Compared to placebo, timolol, acebutolol, metoprolol tartrate, and propranolol all result in similar reductions in the rate of death from all causes in patients who have recently had a myocardial infarction. Additionally, propranolol, metoprolol tartrate and timolol reduce the risk of sudden death. Only metoprolol tartrate and timolol are more effective than placebo in reducing the risk of reinfarction.

Carvedilol is the only beta blocker shown to reduce the rate of death in patients who are stable, have an ejection fraction of 40% or less, and are taking an ACE inhibitor. [\[full review\]](#)

How do beta blockers compare in heart failure?

Compared to placebo, in patients with mild to moderate heart failure, carvedilol, metoprolol succinate, and bisoprolol reduce the risk of death.

In patients with severe heart failure, both carvedilol and metoprolol succinate reduce mortality, but evidence is stronger for carvedilol. [\[full review\]](#)

How do beta blockers compare in atrial arrhythmia?

When directly compared in a head-to-head trial, bisoprolol and carvedilol had a similar effect on preventing relapse back into atrial fibrillation (AF) after cardioversion treatment.

In placebo-controlled trials in patients with long standing AF, atenolol, nadolol, and pindolol were all superior in controlling the ventricular heart rate, whereas labetalol was no better than placebo. Additionally, metoprolol succinate is superior to placebo in preventing relapse back into AF after cardioversion treatment.

In patients with persistent AF and heart failure who have been taking digoxin for 4 months, the addition of carvedilol reduces the 24-hour ventricular heart rate, improves the left ventricular ejection fraction, and improves symptoms. [\[full review\]](#)

How do beta blockers compare in migraines?

In head-to-head trials, direct comparisons of several beta blockers in patients with chronic stable angina have shown that they have similar effects on reducing the frequency and severity of migraine attacks and the need for acute medication. The beta blockers compared include propranolol, atenolol, metoprolol (immediate and extended release), timolol and nebivolol.

Compared to placebo, bisoprolol reduces the frequency of migraine attacks, whereas pindolol does not. [\[full review\]](#)

How do beta blockers compare in bleeding esophageal varices?

Evidence from head-to-head comparisons of beta blockers is limited to one trial that found similar rates of non-fatal/fatal rebleeding and all-cause mortality for atenolol and propranolol. Otherwise, evidence from trials comparing beta blockers to placebo did not find any beta blocker that consistently and significantly reduced these risks.

The risk of rebleeding has been found to be significantly reduced, compared to placebo, when treatment with the following beta blockers was started 14 days or later after the initial bleeding episode: nadolol, propranolol and propranolol long-acting. [\[full review\]](#)

How do beta blockers compare in terms of side effects?

Side effects are common among adults taking beta blockers and although there were some differences in specific adverse events in long term trials, overall, no particular beta blocker was consistently associated with worse side effects than another. [\[full review\]](#)

Does age, gender, or cardiac risk factors influence the safety or effectiveness of beta blockers?

There is no data that suggests that one beta blocker is superior to another in adults of different ages, gender, ethnicity, or in adults taking other medications or having other medical problems. [\[full review\]](#)

Drugs included in this review

Generic Name	Trade Names
Acebutolol	Sectral
Atenolol	Tenormin
Betaxolol	Betoptic Betoptic S
Bisoprolol	Zebeta
Carteolol	Cartrol
Carvedilol Carvedilol phosphate (controlled release)	Coreg Coreg CR
Labetalol	Normodyne Trandate
Metoprolol tartrate Metoprolol succinate (extended release)	Lopressor Toprol XL
Nadolol	Corgard
Nebivolol	Bystolic
Penbutolol	LevatoI
Pindolol	Visken
Propranolol Propranolol long-acting	Inderal Inderal LA Innopran XL
Timolol	Blocadren Timolide

Further information



This PubMed Clinical Q&A was reviewed by Kimberly Peterson, MS.

For the full report and evidence tables, please see:

Helfand M, Peterson K, Christensen V, et al. *Drug Class Review: Beta Adrenergic Blockers: Final Report Update 4* [Internet]. Portland (OR): Oregon Health & Science University; 2009 Jul. Available at: <http://www.ncbi.nlm.nih.gov/books/NBK47172/>.