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Treating High Blood Pressure and Heart Disease: The Calcium Channel Blockers

Comparing Effectiveness, Safety, and Price

ConsumerReportsHealth.org/BestBuyDrugs



Our Recommendations

Calcium Channel Blockers (CCBs) are used by millions of Americans to treat high blood pressure, angina, and certain heart rhythm abnormalities. The monthly cost for these drugs varies from less than \$20 to more than \$200. This report gives you information that will help you: (a) determine when you might need a CCB; (b) choose the right CCB and dosage; and (c) save \$1,000 to \$1,700 a year if you are currently taking or have been prescribed an expensive brand-name CCB.

CCBs are effective medicines that have been shown to lower blood pressure and help prevent and treat the symptoms of angina (chest pain). In addition, two CCBs are effective in controlling certain heart rhythm problems.

CCBs are typically *not* prescribed as initial or first-line treatment in people with high blood pressure who have no other form of heart disease. Instead, CCBs are often used as a second or third drug to help lower blood pressure when other drugs have failed to bring levels down enough.

CCBs *should* be considered as initial treatment (usually in combination with other drugs) for people who have high blood pressure plus angina and/or a high risk of stroke. CCBs should not be taken by people with heart failure (often called congestive heart failure).

This report compares the effectiveness, safety, and cost of eight CCBs. We have chosen the following four as *Consumer Reports Best Buy Drugs* based on the weight of the scientific evidence for their effectiveness, as well as dosing convenience and their cost in treating the following conditions:

- *For high blood pressure* – diltiazem CD, diltiazem SR, felodipine SR, nifedipine SR, and verapamil SR
- *For angina* – nifedipine SR
- *For heart rhythm abnormalities* – diltiazem CD, diltiazem SR, and verapamil SR

All these medicines are available as low-cost or moderately priced generic drugs. All are as effective as other CCBs.

Welcome

This report on a class of drugs known as calcium channel blockers (CCBs) is part of a Consumers Union and *Consumer Reports* project to help you find safe and effective medicines that give you the most value for your health care dollar. To learn more about the project and drugs we've evaluated, go to ConsumerReportsHealth.org/BestBuyDrugs.

CCBs are used by millions of people everyday. They were the ninth most widely prescribed class of medicines in the United States in 2008, with almost 89 million prescriptions filled. CCBs are primarily used to treat people with high blood pressure, angina (the chest pain caused by reduced blood supply to the heart muscle), and certain heart rhythms abnormalities (especially those where the heart beats too fast and irregularly). But doctors also prescribe CCBs to prevent migraines and treat inadequate blood flow to the hands and feet (called Raynaud's disease), and certain psychiatric disorders.

In this report, we focus on the use of CCBs in treating high blood pressure, angina, and abnormal heart rhythms.

Eight CCBs are available in the U.S. All are available as lower-cost generic drugs in some dosage forms. And many are available in long-acting, sustained or continuous release formulations that need to be taken just once a day, instead of two to four times a day (which can be inconvenient and raise the risk of missed doses). The eight CCBs are:

Generic Name	Brand Name(s)	Available as a Prescription Generic Drug ¹
1. Amlodipine	Norvasc	Yes
2. Diltiazem	Cardizem, Cartia , Dilacor, Diltia, Taztia, Tiazac	Yes
3. Felodipine	Plendil	Yes
4. Isradipine	DynaCirc	Yes
5. Nicardipine	Cardene	Yes
6. Nifedipine	Adalat, Nifedical, Procardia	Yes
7. Nisoldipine	Sular	Yes
8. Verapamil	Calan, Covera-HS, Isoptin, Verelan	Yes

(1) Some dosage forms only

CCBs are just one class of prescription medicine used to treat high blood pressure, angina, or abnormal heart rhythms. Several other classes are commonly used to treat high blood pressure, for example. These include diuretics, alpha-blockers, angiotensin-receptor blockers, beta-blockers and ACE inhibitors. Those drugs plus the CCBs are often used in combination, two or more at a time. Indeed, many people with high blood pressure will require two or more drugs to bring their blood pressure down to a normal level. Likewise, several other kinds of drugs are used to treat angina. The most commonly used are nitroglycerin and beta-blockers.

Talk with your doctor about the right mix of blood pressure medicines for you. The discussion should also include lifestyle changes – such as eating a healthy diet, losing weight if needed, exercise, limiting alcohol use, and quitting smoking. These lifestyle changes are an important part of treatment and can reduce the need for drugs.

Note to Readers: This is one of three reports on prescription medicines to treat high blood pressure and other heart conditions. The other two reports focus on beta-blockers and ACE inhibitors. Sign up for an e-mail alert at ConsumerReportsHealth.org/BestBuyDrugs if you'd like us to tell you when these reports are updated or to learn about other reports posted on this Web site.

You should know that high blood pressure is a leading cause of death. The condition is often called a "silent killer" because its symptoms can go undetected until damage to the body has occurred. Because of this, it is one of the most significantly under-diagnosed and under-treated medical conditions in the U.S. If left uncontrolled, it can raise your risk of heart attack, heart failure, stroke, dementia, vision loss, and kidney failure.

High blood pressure is usually a lifelong condition. Estimates vary, but at least 65 million Americans – including a third of adults aged 18 and over – have the condition. Yet studies show that:

- 30% are *unaware* of their condition and are not getting any treatment
- 15% are aware of their condition but are not getting treatment or taking medicine
- 25% are getting treatment but their high blood pressure is not under control

Those figures mean that only 30% of people with high blood pressure – or more than 21 million people – are getting the medicines, care, and blood pressure control they need. In addition, high blood pressure's dangers are thought to extend to an additional *45 to 60 million* Americans who have "prehypertension," or borderline high blood pressure. (See Table 1 on page 6.)

You should have your blood pressure checked frequently – at least once a year, more often if you are over age 50, and *every time* you visit a doctor no matter what your age.

High blood pressure can occur at any age but is far more common in people 35 and over. It is particularly prevalent in African-Americans,

those with a family history of high blood pressure, people who are overweight or obese, people with diabetes, and heavy drinkers. Women taking birth control pills are also at high risk, as are people who take nonsteroidal anti-inflammatory drugs – such as ibuprofen, naproxen, and celecoxib (Celebrex) – over long periods.

Heart failure is also under-diagnosed and under-treated, especially in its early stages. People often assume its symptoms are a sign of normal aging, or are just not serious. And doctors can sometimes misdiagnose these symptoms, which include shortness of breath on exertion, unexplained coughing or wheezing, and ankle swelling.

Angina and heart rhythm abnormalities are also under-diagnosed and under-treated, since, to a lesser extent, they have some apparent symptoms. If you experience occasional or frequent feelings of pressure in your chest, a sense of squeezing or actual pain (sometimes radiating to the jaw, shoulder, arms, or neck), you could have angina and should see a doctor as soon as possible. You may begin to first notice such symptoms when you are exercising or are physically active – such as walking up a flight of stairs – or when you are under stress. The symptoms usually ease when you are at rest, and often can be managed with medicines.

But angina symptoms can also occur when you are not exerting yourself, and that is especially dangerous. *In that case, you should chew and swallow an aspirin tablet, and dial 911 for transportation to the nearest emergency room since you may be having a heart attack.*

Likewise, if you sense your heart is racing and/or you have heart palpitations (forceful or irregular beating of the heart), bouts of dizziness, shortness of breath, lightheadedness, or fainting, you may have what doctors call an arrhythmia (abnormal heart rhythm), of which there are several kinds. One common form is called atrial fibrillation; another is atrial flutter. All arrhythmias require immediate medical attention and can be treated successfully after identification of the particular kind.

This report is based on a comprehensive expert analysis of the medical evidence on CCBs. There's more information on page 15 and at ConsumerReportsHealth.org/BestBuyDrugs about how we conducted our evaluation.

This report was released and last updated in June 2009.



What Are Calcium Channel Blockers and Who Needs Them?

CCBs work by slowing the movement of calcium into the muscle cells of the heart and blood vessel walls. This relaxes blood vessels which makes it easier for the blood to flow. In turn, blood pressure declines. CCBs can directly affect the heart muscle as well. All affect the pumping action or contraction of the heart. And some CCBs reduce the heart rate by slowing the nerve impulse conduction that makes the heart contract.

Importantly, two CCBs (diltiazem and verapamil) have a stronger effect on the heart than on the blood vessels while the others listed in the Welcome section, on page 3, have a stronger effect on the blood vessels and less of an effect on the heart.

CCBs are not the best initial choice for many people with high blood pressure. A diuretic is the best (and least expensive) initial treatment, especially for people who have high blood pressure but no other heart problems. CCBs are very often prescribed early,

however, for people with high blood pressure who also have angina or are at high risk of stroke or coronary heart disease. In this case, CCBs are often used along with other medicines such as diuretics or beta-blockers. Also, your doctor may recommend a CCB if you are already taking a diuretic and need a second drug to lower your blood pressure.

The box on page 7 and Table 1, below, give you some basic information on high blood pressure and its treatment.

As with high blood pressure, CCBs are not usually recommended as the initial treatment for angina. Instead, your doctor may prescribe other medicines first, such as nitrates (nitroglycerin) or beta-blockers. But if you are taking one of those other medicines and you still have angina symptoms, your doctor may prescribe a CCB, too. Importantly, CCBs can help control or prevent the symptoms of angina, but

Table 1. Blood Pressure Levels and Treatment Guidance

Blood Pressure Classification	Systolic Measure (mm Hg)	Diastolic Measure (mm Hg)	General Treatment Guidance
Normal	Below 120	Below 80	<ul style="list-style-type: none"> ■ No treatment needed ■ Healthy lifestyle encouraged to maintain normal blood pressure
Prehypertension	120-139	80-89	<ul style="list-style-type: none"> ■ Lifestyle changes needed: weight loss, quitting smoking, low-salt and low-fat diet, curb excessive alcohol use, and increased exercise ■ Drug treatment <i>not</i> needed except if you have diabetes, kidney, or heart disease
Stage 1 High Blood Pressure	140-159	90-99	<ul style="list-style-type: none"> ■ Lifestyle changes needed, same as above ■ Drug treatment needed. Doctor may start with one medicine (usually a diuretic) to see if it works.
Stage 2 High Blood Pressure	160 or above	100 or above	<ul style="list-style-type: none"> ■ Contact your doctor immediately ■ Drug treatment needed. Two or more medicines usually required to bring blood pressure down ■ Lifestyle changes, as described above, are a critical component of your treatment

Source: Chobanian AV, Bakris GL, Black HR, et al., "The seventh report of the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure," *Journal of the American Medical Association*, 2003; 289(19):2560-2572

The Basics on High Blood Pressure

Americans' health could be markedly improved if they were more alert to the dangers of high blood pressure and the need to have their blood pressure checked regularly.

Blood pressure is the force exerted upon the wall of the arteries when blood is pumped out of the heart. It's measured in millimeters of mercury (abbreviated as mm Hg) and the measurement consists of two numbers. One number, usually given first, is the pressure when the heart contracts. That's called the systolic pressure. The second number is the pressure when the heart is at rest. That's called the diastolic pressure. Your doctor may say or present them, for example, as "120 over 80" or 120/80 mm Hg.

Both the systolic and diastolic pressure are important. High blood pressure – the causes of which are not well understood – is defined, for adults, as a systolic pressure of 140 mm Hg or greater and/or a diastolic pressure of 90 mm Hg or greater. Normal blood pressure is defined as a systolic reading of less than 120 mm Hg and a diastolic reading of less than 80 mm Hg.

That leaves a gap between "normal" and "high." If your blood pressure rates fall into that gap, the condition is called "prehypertension," and based on recent studies, you are at risk of developing high blood pressure and you already have some elevated risk of heart disease and stroke. So, it's important for your health to lower your blood pressure. Table 1, on page 6, presents these levels of blood pressure and general treatment guidance. If your blood pressure levels are prehypertensive and you have heart disease, kidney disease, or diabetes, you may need drug treatment to lower your blood pressure.

Note: Both numbers – systolic and diastolic – don't have to be high at the same time, and often are not. Even if only one is elevated, you are considered to have high blood pressure. Indeed, in people aged 50 and over, a high systolic reading appears to be much more strongly linked to a higher risk of heart disease and heart attack than a high diastolic blood pressure reading.

High blood pressure's relationship to stress, anxiety, nervousness, or feeling tense is often misunderstood. Feeling excited, anxious, or fearful can indeed raise blood pressure, but usually only temporarily – due to the surge of adrenaline that often accompanies these feelings. But those are *not* symptoms of high blood pressure. You can be a calm, relaxed person who never gets anxious or fearful and still have high blood pressure. And you will probably not have the feeling that anything is wrong. Most of the time, people don't have any noticeable symptoms that their blood pressure is high, so the only reliable way to detect the condition is to have your blood pressure checked regularly using a blood pressure arm cuff. (go to ConsumerReportsHealth.org for more information and Ratings of blood pressure monitors)

they do not stop it once it starts. Your doctor will usually prescribe nitroglycerin for that purpose.

If you have been diagnosed with a rapid heart arrhythmia – called "supraventricular tachycardia" – your doctor may consider prescribing a CCB. Only two CCBs are indicated for this condition, however – diltiazem and verapamil. Both have been shown to effectively slow that particular abnormal heart rhythm.

Your doctor will also likely discuss with you alternative methods to change the heart rhythm back to normal. You should know that if you take a CCB for an abnormal heart rhythm, you should be monitored very closely by your physician. If you are also taking a beta-blocker (for any reason), discuss the choice of a CCB with your doctor: using these two types of medicines together can slow the heart rate excessively and lead to light-headedness and possible fainting spells.

Choosing a Calcium Channel Blocker – Our *Best Buy* Picks

The choice of a CCB depends on what it is being used to treat. If you have two or more of the medical conditions for which CCBs are indicated – such as high blood pressure and angina or heart beat irregularities – your doctor will make a judgment about which CCB to use and at what dosage. Your doctor will also decide if you need other medicines.

The information in this report will help you discuss with your doctor which treatment is right for you, and which may cost you the least amount of money out-of-pocket.

People respond to the various CCBs differently. So you may have to try more than one if your doctor judges that the drug initially prescribed is not work-

ing. In addition, CCBs, while generally safe, can have side effects and you may respond to one CCB better than another. Side effects include dizziness, headache, constipation, flushing, gum enlargement, and swollen ankles. Less commonly, they can cause diarrhea, drowsiness, fatigue, and nausea. Also, some of the CCBs can cause dangerously low heart rates.

Starting with the lowest dosage possible of a CCB can reduce your risk of side effects. Indeed, doctors commonly start with a low dosage of a CCB and then increase it over time to get the best results without triggering side effects. It may take several weeks before you experience the full benefit of a CCB, no matter what dose you take.

Table 2. Summary of Evidence on the CCBs

Generic Name (Daily Dose - Range)	Brand Name(s)	Proven to Lower Blood Pressure?	Proven to Reduce Angina?	Proven to Reduce Heart Rate?	Approved for Treatment of:
Diltiazem 180 to 240 mg	Cardizem, Cartia XT, Dilacor XR, Diltia XT, Taztia, Tiazac	Yes	Yes	Yes	<ul style="list-style-type: none"> ■ HBP¹ ■ Angina ■ Fast irregular heart rhythms
Felodipine 5 to 10 mg	Plendil	Yes	Likely ²	No	<ul style="list-style-type: none"> ■ HBP¹
Isradipine 5 to 10 mg	DynaCirc	Yes	Likely ²	No	<ul style="list-style-type: none"> ■ HBP¹
Nicardipine 60 to 120 mg	Cardene	Yes	Yes	No	<ul style="list-style-type: none"> ■ HBP¹ ■ Angina
Nisoldipine 10 to 40 mg	Sular	Yes	Likely ²	No	<ul style="list-style-type: none"> ■ HBP¹
Verapamil 120 to 240 mg	Calan, Covera-HS, Isoptin SR, Verelan	Yes	Yes	Yes	<ul style="list-style-type: none"> ■ HBP¹ ■ Angina ■ Fast irregular heart rhythms

1. HBP stands for high blood pressure

2. "Likely" means that studies have not yet proved effectiveness, but doctors may prescribe it for this condition.

You and your doctor should choose a CCB based primarily on its potential benefits and risks to you (this must be individually determined), the strength of the evidence that it is both safe and effective for your condition, and whether it is approved by the Food and Drug Administration (FDA) to treat that condition.

Where the evidence is unclear or suggests equal effectiveness and safety, cost may be a deciding factor, especially if you don't have drug coverage under a health insurance plan. The CCBs vary in cost from less than \$20 per month to more than \$200. Fortunately, all of the CCBs are now available as inexpensive generics in some dosages.

For many people, the convenience of once-a-day dosing of a CCB also may be important. In this report, our *Best Buy* picks give priority to once-a-day doses for two reasons: (a) people are more likely to comply with this dose regimen, and (b) evidence suggests that the once-a-day, long-acting (or sustained-release) formulations of CCBs may be safer and yield better results in reduction of heart attack and stroke risk.

Table 2, on page 8, and the discussion below summarize the strength of the evidence on CCBs and should help guide your choice. Note that the proof of effectiveness for some CCBs is confined to some dose strengths. That does not mean that lower or higher dose strengths aren't effective.

Taking effectiveness, safety, dosing convenience, and cost into account, we have selected the following CCBs as *Consumer Reports Best Buy Drugs* for these medical conditions:

- *For high blood pressure* – diltiazem CD, diltiazem SR, felodipine SR, nifedipine SR, and verapamil SR
- *For angina* – nifedipine SR
- *For heart rhythm abnormalities* – diltiazem CD, diltiazem SR, and verapamil SR

Treating high blood pressure. As presented in Table 2, all the CCBs are approved for and have been shown effective in lowering blood pressure. However, no studies have directly compared the effectiveness and safety of one CCB to another as to

how well they work or their track record in reducing the risk of heart attack or stroke in people with high blood pressure. Most of the evidence from studies suggests that, on average, people's response to the various CCBs (when they are taken to lower blood pressure) does not differ substantially.

Again, CCBs may not be optimal as a first line treatment if you have high blood pressure but no other form of heart disease. They are typically used as a second drug if you have especially high blood pressure or if your blood pressure is not lowered by a single drug, such as a diuretic.

Our choice of four *Best Buy* CCBs for high blood pressure – **diltiazem CD, diltiazem SR, felodipine SR, nifedipine SR, and verapamil SR** – is based primarily on cost and dosing convenience. These four give you adequate choice if you need to try another CCB. All are available as relatively low-cost generics or “branded generic” formulations in one-a-day capsules or tablets. They range in cost from \$22 to \$128 a month, depending on dose. There is no reason to take the more expensive brand-name versions of any of these medicines. Note: A “branded generic” is still a generic copy of an original drug. See Table 3, beginning on page 10.

Treating angina. Five of the eight CCBs have been both proven to reduce angina and are FDA-approved for angina treatment. As with high blood pressure, CCBs are typically prescribed as a second- or third-tier treatment for angina, along with other drugs.

While no studies have shown any one CCB to be better than another in treating angina, less evidence exists for felodipine, isradipine, nisoldipine, and the sustained-release or continuous-release formulations of diltiazem and verapamil. The effectiveness of these drugs is likely similar to other CCBs, but our analysis found the evidence lacking to date. So, you might want to talk to your doctor about alternatives if you are taking one of these medicines for angina. Also, if the *only* medicine you are currently taking for angina is a CCB, ask your doctor if a beta-blocker or a nitrate might be a more cost-effective alternative.

Our choice of one *Best Buy* CCB for treating angina – **nifedipine SR** – is based on the strength of evidence, dosing convenience, and cost. This medicine is available as a relatively low-cost generic or brand-

ed-generic formulation taken just once a day. The various generic versions and doses range in cost from \$38 to \$79 a month.

Treating abnormal heart rhythms. Only two CCBs have proven safe and effective for the treatment of specific abnormal heart rhythms. These are diltiazem and verapamil. None of the other CCBs should be used for this purpose. Taken as a whole, studies do not indicate that one of these two drugs is better than another when used to treat rapid abnormal heart rate.

Our choice of three sustained release or continuous release versions of these two drugs as *Best Buys* – **diltiazem SR**, **diltiazem CD**, and **verapamil SR** – is based on proof of effectiveness, dosing convenience, and cost. Cost-effective generic or branded-generic formulations of all three are available that need to be taken just once a day. They range in cost from \$22 to \$128 a month.

Table 3, below, presents the average monthly costs for all the CCBs at a wide variety of doses, and their *Best Buy* indications.

Table 3. CCB Cost Comparison and *Best Buy* Indication

Generic name, dosage strength and form	Brand Name ¹	Drug a Generic (Yes) or Branded Generic (BG) ²	Frequency per day ³	Average monthly cost	<i>Best Buy</i> Indication
Amlodipine 2.5 mg tablet	Generic	Yes	One	\$32	
Amlodipine 2.5 mg tablet	Norvasc	No	One	\$78	
Amlodipine 5 mg tablet	Generic	Yes	One	\$30	
Amlodipine 5 mg tablet	Norvasc	No	One	\$75	
Amlodipine 10 mg tablet	Generic	Yes	One	\$42	
Amlodipine 10 mg tablet	Norvasc	Yes	One	\$102	
Diltiazem 30 mg tablet	Generic	Yes	Four	\$16	
Diltiazem 30 mg tablet	Cardizem	No	Four	\$152	
Diltiazem 60 mg tablet	Generic	Yes	Four	\$32	
Diltiazem 60 mg tablet	Cardizem	No	Four	\$228	
Diltiazem 90 mg tablet	Generic	Yes	Four	\$32	
Diltiazem 90 mg tablet	Cardizem	No	Four	\$296	
Diltiazem 120 mg tablet	Generic	Yes	Four	\$52	
Diltiazem 120 mg tablet	Cardizem	No	Four	\$388	
 Diltiazem CD 120 mg capsule ⁵	Generic	Yes	One	\$30	Heart rhythm abnormalities and high blood pressure
Diltiazem CD 120 mg capsule	Dilt-CD	BG	One	\$34	
Diltiazem CD 120 mg capsule	Cartia XT	BG	One	\$35	
Diltiazem CD 120 mg capsule	Cardizem CD	No	One	\$96	
 Diltiazem CD 180 mg capsule	Generic	Yes	One	\$35	Heart rhythm abnormalities and high blood pressure
Diltiazem CD 180 mg capsule	Dilt-CD	BG	One	\$41	
Diltiazem CD 180 mg capsule	Cartia XT	BG	One	\$41	
Diltiazem CD 180 mg capsule	Cardizem CD	No	One	\$115	
 Diltiazem CD 240 mg capsule	Generic	Yes	One	\$46	Heart rhythm abnormalities and high blood pressure
Diltiazem CD 240 mg capsule	Dilt-CD	BG	One	\$47	
Diltiazem CD 240 mg capsule	Cartia XT	BG	One	\$57	

Table 3. CCB Cost Comparison and *Best Buy* Indication (Continued)

	Generic name, dosage strength and form	Brand Name ¹	Drug a Generic (Yes) or Branded Generic (BG) ²	Frequency per day ³	Average monthly cost	<i>Best Buy</i> Indication
	Diltiazem CD 240 mg capsule	Cardizem CD	No	One	\$164	
CR BEST BUY	Diltiazem CD 300 mg capsule	Generic	Yes	One	\$63	Heart rhythm abnormalities and high blood pressure
	Diltiazem CD 300 mg capsule	Dilt-CD	BG	One	\$63	
	Diltiazem CD 300 mg capsule	Cartia XT	BG	One	\$75	
	Diltiazem CD 300 mg capsule	Cardizem CD	No	One	\$199	
CR BEST BUY	Diltiazem CD 360 mg capsule	Generic	Yes	One	\$63	Heart rhythm abnormalities and high blood pressure
	Diltiazem CD 360 mg capsule	Cardizem CD	No	One	\$260	
	Diltiazem SR 120 mg tablet ⁵	Cardizem LA	No	One	\$96	
	Diltiazem SR 180 mg tablet	Cardizem LA	No	One	\$108	
	Diltiazem SR 240 mg tablet	Cardizem LA	No	One	\$120	
	Diltiazem SR 300 mg tablet	Cardizem LA	No	One	\$180	
	Diltiazem SR 360 mg tablet	Cardizem LA	No	One	\$174	
	Diltiazem SR 420 mg tablet	Cardizem LA	No	One	\$179	
CR BEST BUY	Diltiazem SR 60 mg capsule	Generic	Yes	One	\$22	Heart rhythm abnormalities and high blood pressure
	Diltiazem SR 60 mg capsule	Cardizem SR	No	One	Not Available	
CR BEST BUY	Diltiazem SR 90 mg capsule	Generic	Yes	One	\$28	Heart rhythm abnormalities and high blood pressure
CR BEST BUY	Diltiazem SR 120 mg capsule	Generic	Yes	One	\$31	Heart rhythm abnormalities and high blood pressure
	Diltiazem SR 120 mg capsule	Diltzac ER	BG	One	\$34	
	Diltiazem SR 120 mg capsule	Dilt-XR	BG	One	\$22	
	Diltiazem SR 120 mg capsule	Diltia-XT	BG	One	\$29	
	Diltiazem SR 120 mg capsule	Taztia XT	BG	One	\$37	
	Diltiazem SR 120 mg capsule	Tiazac	No	One	\$54	
	Diltiazem SR 120 mg capsule	Dilacor XR	No	One	\$99	
CR BEST BUY	Diltiazem SR 180 mg capsule	Generic	Yes	One	\$35	Heart rhythm abnormalities and high blood pressure
	Diltiazem SR 180 mg capsule	Diltzac	BG	One	\$39	
	Diltiazem SR 180 mg capsule	Dilt-XR	BG	One	\$24	
	Diltiazem SR 180 mg capsule	Diltia-XT	BG	One	\$32	
	Diltiazem SR 180 mg capsule	Taztia XT	BG	One	\$42	
	Diltiazem SR 180 mg capsule	Tiazac	No	One	\$60	
	Diltiazem SR 180 mg capsule	Dilacor XR	No	One	\$98	
CR BEST BUY	Diltiazem SR 240 mg capsule	Generic	Yes	One	\$40	Heart rhythm abnormalities and high blood pressure

Table 3. CCB Cost Comparison and *Best Buy* Indication (Continued)

Generic name, dosage strength and form	Brand Name ¹	Drug a Generic (Yes) or Branded Generic (BG) ²	Frequency per day ³	Average monthly cost	<i>Best Buy</i> Indication
Diltiazem SR 240 mg capsule	Diltzac	BG	One	\$46	
Diltiazem SR 240 mg capsule	Dilt-XR	BG	One	\$27	
Diltiazem SR 240 mg capsule	Diltia-XT	BG	One	\$22	
Diltiazem SR 240 mg capsule	Taztia XT	BG	One	\$58	
Diltiazem SR 240 mg capsule	Tiazac	No	One	\$85	
Diltiazem SR 240 mg capsule	Dilacor XR	No	One	\$98	
CR BEST BUY Diltiazem SR 300 mg capsule	Generic	Yes	One	\$62	Heart rhythm abnormalities and high blood pressure
Diltiazem SR 300 mg capsule	Diltzac	BG	One	\$59	
Diltiazem SR 300 mg capsule	Taztia XT	BG	One	\$79	
Diltiazem SR 300 mg capsule	Tiazac	No	One	\$106	
CR BEST BUY Diltiazem SR 360 mg capsule	Generic	Yes	One	\$56	Heart rhythm abnormalities and high blood pressure
Diltiazem SR 360 mg capsule	Diltzac	Yes	One	\$65	
Diltiazem SR 360 mg capsule	Taztia XT	BG	One	\$78	
Diltiazem SR 360 mg capsule	Tiazac	No	One	\$105	
CR BEST BUY Diltiazem SR 420 mg capsule	Generic	Yes	One	\$84	Heart rhythm abnormalities and high blood pressure
Diltiazem SR 420 mg capsule	Tiazac	No	One	\$121	
CR BEST BUY Felodipine SR 2.5 mg tablet	Generic	Yes	One	\$41	High blood pressure
Felodipine SR 2.5 mg tablet	Plendil	No	One	\$65	
CR BEST BUY Felodipine SR 5 mg tablet	Generic	Yes	One	\$41	High blood pressure
Felodipine SR 5 mg tablet	Plendil	No	One	\$67	
CR BEST BUY Felodipine SR 10 mg tablet	Generic	Yes	One	\$71	High blood pressure
Felodipine SR 10 mg tablet	Plendil	No	One	\$104	
Isradipine 2.5 mg capsule	Generic	Yes	Two	\$88	
Isradipine 5 mg capsule	Generic	Yes	Two	\$122	
Isradipine 5 mg capsule	DynaCirc	No	Two	Not Available	
Isradipine SR 5 mg tablet	DynaCirc CR	No	One	\$101	
Isradipine SR 10 mg tablet	DynaCirc CR	No	One	\$152	
Nicardipine 20 mg capsule	Generic	Yes	Three	\$33	
Nicardipine 30 mg capsule	Generic	Yes	Three	\$42	
Nicardipine SR 30 mg capsule	Cardene SR	No	Two	\$100	
Nicardipine SR 45 mg capsule	Cardene SR	No	Two	\$166	
Nicardipine SR 60 mg capsule	Cardene SR	No	Two	\$192	

Table 3. CCB Cost Comparison and *Best Buy* Indication (Continued)




Generic name, dosage strength and form	Brand Name ¹	Drug a Generic (Yes) or Branded Generic (BG) ²	Frequency per day ³	Average monthly cost	<i>Best Buy</i> Indication
Nifedipine 10 mg capsule	Generic	Yes	Three	\$75	
Nifedipine 10 mg capsule	Procardia	No	Three	\$135	
Nifedipine 20 mg capsule	Generic	Yes	Three	\$120	
Nifedipine 20 mg capsule	Procardia	No	Three	Not Available	
Nifedipine SR 30 mg tablet	Adalat CC	No	One	\$60	
Nifedipine SR 30 mg tablet	Afeditab CR	BG	One	\$32	
 Nifedipine SR 30 mg tablet	Generic	Yes	One	\$38	Angina and high blood pressure
Nifedipine SR 30 mg tablet	Nifediac CC	BG	One	\$37	
Nifedipine SR 30 mg tablet	Nifedical XL	BG	One	\$44	
Nifedipine SR 30mg tablet	Procardia XL	No	One	\$75	
Nifedipine SR 60 mg tablet	Adalat CC	No	One	\$94	
 Nifedipine SR 60 mg tablet	Generic	Yes	One	\$59	Angina and high blood pressure
Nifedipine SR 60 mg tablet	Afeditab CR	BG	One	\$56	
Nifedipine SR 60 mg tablet	Nifediac CC	BG	One	\$63	
Nifedipine SR 60 mg tablet	Nifedical XL	BG	One	\$76	
Nifedipine SR 60 mg tablet	Procardia XL	No	One	\$136	
Nifedipine SR 90 mg tablet	Adalat CC	No	One	\$116	
 Nifedipine SR 90 mg tablet	Generic	Yes	One	\$79	Angina and high blood pressure
Nifedipine SR 90 mg tablet	Nifediac CC	BG	One	\$84	
Nifedipine SR 90 mg tablet	Procardia XL	BG	One	\$150	
Nisoldipine SR 8.5 mg tablet	Sular ⁷	No	One	\$85	
Nisoldipine SR 17 mg tablet	Sular	No	One	\$104	
Nisoldipine SR 20 mg tablet	Generic	Yes	One	\$81	
Nisoldipine SR 25.5 mg tablet	Sular	No	One	\$117	
Nisoldipine SR 30 mg tablet	Generic	Yes	One	\$84	
Nisoldipine SR 34 mg tablet	Sular	No	One	\$111	
Nisoldipine SR 40 mg tablet	Generic	Yes	One	\$84	
Verapamil 40 mg tablet	Generic	Yes	Three	\$30	
Verapamil 40 mg tablet	Calan	No	Three	\$81	
Verapamil 80 mg tablet	Generic	Yes	Three	\$12	
Verapamil 80 mg tablet	Calan	No	Three	\$111	
Verapamil 120 mg tablet	Generic	Yes	Three	\$12	
Verapamil 120 mg tablet	Calan	No	Three	\$153	

Table 3. CCB Cost Comparison and Best Buy Indication (Continued)

	Generic name, dosage strength and form	Brand Name ¹	Drug a Generic (Yes) or Branded Generic (BG) ²	Frequency per day ³	Average monthly cost	Best Buy Indication
CR BEST BUY	Verapamil SR 120 mg tablet	Generic	Yes	One	\$25	Heart rhythm abnormalities, high blood pressure
	Verapamil SR 120 mg tablet	Calan SR	No	One	\$68	
	Verapamil SR 120 mg tablet	Isoptin SR	No	One	\$65	
	Verapamil SR 120 mg capsule	Verelan	No	One	\$124	
CR BEST BUY	Verapamil SR 180 mg tablet	Generic	Yes	One	\$21	Heart rhythm abnormalities, high blood pressure
	Verapamil SR 180 mg tablet	Covera-HS	No	One	\$74	
	Verapamil SR 180 mg tablet	Calan SR	No	One	\$89	
	Verapamil SR 180 mg tablet	Isoptin SR	No	One	\$83	
	Verapamil SR 180 mg capsule	Verelan	No	One	\$125	
CR BEST BUY	Verapamil SR 240 mg tablet	Generic	Yes	One	\$21	Heart rhythm abnormalities, high blood pressure
	Verapamil SR 240 mg tablet	Isoptin SR	No	One	\$95	
	Verapamil SR 240 mg tablet	Covera-HS	No	One	\$102	
	Verapamil SR 240 mg tablet	Calan SR	No	One	\$98	
CR BEST BUY	Verapamil SR 100 mg capsule	Generic	Yes	One	\$69	Heart rhythm abnormalities, high blood pressure
CR BEST BUY	Verapamil SR 100 mg capsule	Generic (PM) ⁶	Yes	One	\$64	Heart rhythm abnormalities, high blood pressure
	Verapamil SR 100 mg capsule	Verelan PM	No	One	\$93	
CR BEST BUY	Verapamil SR 200 mg capsule	Generic	Yes	One	\$95	Heart rhythm abnormalities, high blood pressure
CR BEST BUY	Verapamil SR 200 mg capsule	Generic (PM)	Yes	One	\$76	Heart rhythm abnormalities, high blood pressure
	Verapamil SR 200 mg capsule	Verelan PM	No	One	\$114	
	Verapamil SR 240 mg capsule	Verelan	No	One	\$137	
CR BEST BUY	Verapamil SR 300 mg capsule	Generic	Yes	One	\$128	Heart rhythm abnormalities, high blood pressure
CR BEST BUY	Verapamil SR 300 mg capsule	Generic (PM)	Yes	One	\$122	Heart rhythm abnormalities, high blood pressure
	Verapamil SR 300 mg capsule	Verelan PM	No	One	\$172	
	Verapamil SR 360 mg capsule	Verelan	No	One	\$182	

1. "Generic" indicates that this drug is sold as a generic under the generic or chemical name.

2. "Yes" means it is a generic, sold under the chemical name. "BG" means it is a branded generic, which is still a generic copy of an original drug. "No" means it is a brand-name drug not yet available as a generic or a branded generic.

3. Frequency per day reflects usual frequency; some medicines may be used more or less frequently.

4. Prices reflect nationwide cash prices of retail average for February 2009, rounded to the nearest dollar. Information derived by *Consumer Reports Best Buy Drugs* from data provided by Wolters Kluwer Health, Pharmaceutical Audit Suite®. Wolters Kluwer Health is not involved in our analysis or recommendations.

5. "SR" stands for sustained release, "CD" stands for continuous delivery.

6. PM is a type of extended-release formulation that is usually taken at night in order to reduce high blood pressure in the morning hours.

7. The manufacturers of Sular have discontinued 10 mg, 20 mg, 30 mg and 40 mg dosages. However, these dosages remain temporarily available in some markets.

The Evidence

This section presents more information on the effectiveness and safety of calcium channel blockers.

This report is based on an analysis of the scientific evidence on calcium channel blockers. Almost 3,500 studies were identified that were published in peer-reviewed journals from 1970 to 2004, or submitted by pharmaceutical companies. An additional 1,533 studies were evaluated that contained references to calcium channel blockers. From both groups of studies, the analysis focused on the results of 188, most of which were medium- to large-scale controlled clinical trials or detailed “meta-analyses” of many clinical trials. A meta-analysis combines the results of previous individual studies and tries to draw conclusions based on all of them. In addition, an update to this initial analysis considered studies conducted between 2006 and late 2008.

How Effective Are CCBs?

CCBs are widely accepted as effective medicines. They have been proven to lower blood pressure, help prevent and reduce angina pain, and slow the heart rate in people with certain heart rhythm abnormalities. Although none of the CCBs has been *proven* to *reduce deaths* from heart attack or stroke in people who have high blood pressure or angina, evidence points in that direction and such a benefit is assumed. Indeed, several important studies have shown CCBs to be superior at lowering the risk of strokes.

Even so, a vigorous debate continues about the relative merits of CCBs compared to other medicines, particularly in treating high blood pressure. That's largely because a few studies indicate that CCBs (and particularly high doses taken over long periods) may be associated with a somewhat higher risk of heart attacks and heart failure compared to other medicines, such as diuretics, beta-blockers, and ACE inhibitors.

This does not mean that CCBs are causing heart attacks or heart failure (also called congestive heart failure, which occurs when the heart muscle weakens, limiting the heart's pumping ability). It means

that they may not be preventing as many deaths from these conditions as other medicines. It could also mean that some CCBs (diltiazem and verapamil, in particular, which slow heart rate) are given in some cases to the wrong kinds of patients, such as those with heart failure. Studies continue on this issue, and it's generally agreed that more evidence is needed.

In the meantime, such concerns have led to more cautious use of CCBs, and are the reason many doctors avoid them as first line treatment. It is also why they are no longer advised for people with heart failure. ACE inhibitors are the strongly preferred drug in such patients.

One problem in that regard is that heart failure often goes unrecognized, especially in its early stages. People often mistakenly believe its symptoms are a sign of normal aging, and are nothing to worry about. In addition, doctors sometimes misdiagnose symptoms of heart failure, such as fatigue, weakness, shortness of breath, unexplained coughing or wheezing, and swelling of the legs.

If you have these symptoms, you should see a doctor as soon as possible.

Your doctor is likely to be aware of the debate over which drugs are best for high blood pressure, and he or she may well have an opinion about recent studies that have yielded conflicting results.

If you have significantly elevated blood pressure and one or more additional heart problems, this ongoing debate is of vital importance. *Taking the right medicines at the right doses can be literally a life and death issue.* Unfortunately, it is not possible yet to say with certainty what the best combination of heart drugs is for many people who have several heart ailments.

How Safe Are CCBs?

CCBs are generally safe medicines, with nearly two decades of widespread use around the world. In general, other than those discussed above, no significant

differences have been found among the CCBs in terms of their safety, adverse events related to the drugs, or the side effects they cause.

All the CCBs can cause side effects. Most are minor. The most common are: dizziness, headache, flushing, and mild ankle swelling. These side effects often go away as the body adjusts to the medicine but, if persistent, may require some adjustment in dose or even discontinuing the medicine. One side effect may be first noticed by your dentist. Enlargement of the gums tissue (called gingival hyperplasia) can lead to bleeding and erosion of the gums. In such cases, you may have to stop taking your CCB.

More serious side effects can also occur, especially if you have heart failure. If any of the following symptoms occur while taking a CCB, contact your doctor:

- Breathing problems
- Irregular, fast heart beat
- A slow heart beat (less than 50 beats per minute)

In general, as mentioned above, people with heart failure should not be taking a CCB. And among the CCBs, diltiazem and verapamil are especially dangerous for those people because they are more likely to slow your heart rate.

In fact, if you are taking either of these two drugs, you should ask your doctor to instruct you on how to count your pulse rate and check it regularly. If it is much slower than usual, or less than 50 beats per minute, check with your doctor immediately. A pulse rate that is too slow can cause severe lightheadedness and fainting.

Doctors and researchers have also been looking closely at the relative merits of the short-acting versus the long-acting (extended, sustained, or continuous release) versions of the CCB drugs. The evidence to date is inconclusive but most experts agree that the long-acting forms of CCBs are preferred in the treatment of chronic high blood pressure.

Since you will probably be taking a CCB along with other medicines, you should know that you are more likely to have side effects from taking any combination of drugs versus one drug alone. You may want to talk to your doctor about what side effects to watch for if a CCB is added to your prescription drug regimen. The chief reason to do this is to prevent you from discontinuing one or more of your medicines.

You should never stop taking your blood pressure medicines without consulting your doctor. This could lead to a fatal stroke or heart attack.

In particular, diltiazem and verapamil can interact with beta-blockers to cause excessive slowing of the heart rate. CCBs also can have adverse interactions with the following medicines:

- Digitalis
- Drugs to correct irregular heartbeat, such as quinidine (Quinidex), disopyramide (Norpace), or procainamide (Procan, Pronestyl)
- Anti-seizure medications, such as carbamazepine (Tegretol)

Grapefruit and grapefruit juice can also increase the side effects of some CCBs.

Age, Race, and Gender Differences

Mounting evidence suggests that African-Americans with high blood pressure respond better to CCBs (usually combined with a diuretic) than they do to ACE Inhibitors. This is emerging as conventional wisdom in clinical practice as well. Any African-American taking an ACE Inhibitor who has struggled to control their blood pressure should discuss switching to a CCB with their doctor.

That said, people older than 65 and various ethnic groups have been under-represented in most studies of CCBs. Taken altogether, these studies could not detect if any one CCB is more or less effective in older patients or people of a particular race or gender.

Talking With Your Doctor

It's important for you to know that the information we present in this report is not meant to substitute for a doctor's judgment. But we hope it will help your doctor and you arrive at a decision about which calcium channel blocker drug, and at what dosage, is best for you.

Bear in mind that many people are reluctant to discuss the cost of medicines with their doctors and that studies show doctors do not routinely take price into account when prescribing medicines. Unless you bring it up, your doctors may assume that cost is not a factor for you.

Many people (including many physicians) also believe that newer drugs are always or almost always better. While that's a natural assumption to make, the fact is that it's not true. Studies consistently show that many older medicines are as good as, and in some cases better than, newer medicines. Think of them as "tried and true," particularly when it comes to their safety record. Newer drugs have not yet met the test of time, and unexpected problems can and do crop up once they hit the market.

Of course, some newer prescription drugs are indeed more effective and safer. Talk with your doctor about the pluses and minuses of newer versus older medicines, including generic drugs.

Prescription medicines go "generic" when a company's patents on a drug expires, usually after about 12 to 15 years from when a drug is released to the market. At that point, other companies can make and sell the drug.

Generics are almost always much less expensive than newer brand name medicines, but they are not lesser-quality drugs. Indeed, most generics remain useful medicines even many years after first being marketed. That is why today more than half of all prescriptions in the U.S. are for generics.

Another important issue to talk with your doctor about is keeping a record of the drugs you are taking. There are several reasons for this:

- First, if you see several doctors, they may not always tell each other which drugs have been prescribed for you.
- Second, it is very common for doctors today to prescribe several medicines for you before finding one that works well or best, mostly because people vary in their response to prescription drugs.
- Third, more and more people today take several prescription medications, nonprescription drugs and dietary supplements all at the same time. Many of these interact in ways that can be very dangerous.
- And fourth, the names of prescription drugs—both generic and brand—are often hard to pronounce and remember.

For all these reasons, it's important to keep a list of the drugs you are taking, both prescription and nonprescription, and include dietary supplements.

Always be sure, too, that you understand the dose of the medicine being prescribed for you and how many pills you are expected to take each day. Your doctor should tell you this information. When you fill a prescription at the pharmacy, or if you get it by mail, you may want to check to see that the dose and the number of pills per day on the pill bottle match the amounts that your doctor told you.

How We Picked the *Best Buy* CCBs

Our evaluation is based in large part on an independent review of the scientific evidence on the effectiveness, safety, and adverse effects of calcium channel blockers. A team of physicians and researchers at Oregon Health & Science University Evidence-based Practice Center conducted the analysis. A consultant to *Consumer Reports Best Buy Drugs* is also a member of the Oregon-based research team, which has no financial interest in any pharmaceutical company or product.

The prescription drug costs we cite were obtained from a healthcare information company that tracks the sales of prescription drugs in the U.S. Prices for a drug can vary quite widely, even within a single city or town. All the prices in this report are national averages based on sales of prescription drugs in retail outlets. They reflect the cash price paid for a month's supply of each drug in February 2009.

Consumers Union and *Consumer Reports* selected the *Best Buy Drugs* using the following criteria. The drug had to:

- Be as effective or more effective than other calcium channel blockers
- Have a safety record equal to or better than other calcium channel blockers
- Cost roughly the same or less than other calcium channel blockers

The *Consumers Reports Best Buy Drugs* methodology is described in more detail in the methods section at ConsumerReportsHealth.org/BestBuyDrugs.

About Us

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Consumer Reports Best Buy Drugs[™] is a public education project administered by Consumers Union. It is partially grant funded. Principal current outside funding comes from the state Attorney General Consumer and Prescriber Education Grant Program, which is funded by the multi-state settlement of consumer fraud claims regarding the marketing of the prescription drug Neurontin.

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A more detailed explanation of the project is available at www.ConsumerReportsHealth.org.

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