

CHAPTER 23

CARDIOVASCULAR DRUGS

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INTRODUCTION

When people are diagnosed with heart disease, they may be treated in several different ways. Controlling risk factors that can be managed—cutting down on fat and cholesterol and quitting smoking—will be the first changes they will have to make. (See Chapter 3.) Exercise will become part of their lives, if possible. Drug therapy may be the next course of action.

The variety and scope of cardiovascular drugs have increased tremendously in the past few decades, and new drugs are being approved annually. In the 1950s, effective oral diuretics became available. These drugs dramatically changed the treatment of heart failure and hypertension. In the mid-1960s a class of agents called beta blockers was discovered. This led to major changes in physicians' ability to treat patients with hypertension or angina pectoris. Calcium channel blockers and ACE inhibitors became widely used in the 1980s, and they, too, have allowed patients with hypertension, heart failure, and coronary artery disease to be treated more effectively. The development and use of thrombolytics, the "clot busters," have revolutionized our ability to treat patients having a heart attack.

The decade of the 1990s holds even greater promise as the powerful tools of genetic engineering produce new and even more effective drugs to prevent and treat patients with heart disease.

Initially, a person on drug therapy may have to try different drugs to find the one that is the most effective and has the fewest side effects. People with other health problems or physical characteristics may find one type of drug to be more useful than another. (See box, "Factors in Choosing Certain Cardiovascular Drugs.") More than one drug may be used at a time. Once a dose has been established, combination drugs may be used—two or more drugs are combined into a single pill. Whatever the possibilities, a person and his or her physician will have to work together to find the right therapy, whether it is a drug that has been around for 50 years or one that has just become available. A well-informed patient will have a better sense of the treatment process and will be a better consumer when the time comes to purchase the drugs. (See box, "Shopping Around for Prescription Drugs.")

Cardiovascular drugs can be divided into several categories, each of which is discussed below. The listings here are alphabetical by drug families. (See box, "Therapeutic Drug Categories," for listing by disease entities.)

Factors in Choosing Certain Cardiovascular Drugs

For African-Americans	Calcium channel blockers and diuretics are most effective. ACE inhibitors and beta blockers can be made more effective by combining with a diuretic.	For people who have had a stroke or ministroke	Drugs that may cause a decrease in standing blood pressure (orthostatic hypotension), which can result in fainting spells, should probably be avoided or taken with great care. These include alpha blockers such as prazosin (Minipress) or drugs like guanethidine (Ismelin).
For people over 60	Calcium channel blockers and diuretics are generally most effective. Avoid drugs that may cause depression (centrally acting drugs). Those who take guanadrel (Hylorel), guanethidine (Ismelin), doxazosin mesylate (Cardura), prazosin (Minipress), or terazosin (Hytrin) must be careful when standing up quickly; fainting because of low blood pressure (orthostatic hypotension) could result.	For people with a heart rate slower than 50 (bradycardia)	Beta blockers, diltiazem (Cardizem), and verapamil (Calan, Isoptin, Verelan) should be avoided.
For people who experience episodes of severely rapid heartbeats (tachycardia)	The drugs of choice may be a beta blocker or verapamil (Calan, Isoptin, Verelan). If this is not effective, combining with a diuretic may help, but certain blood potassium levels must be monitored in order to detect any harmful decrease.	For people with a history of depression	ACE inhibitors, alpha blockers, diuretics, vasodilators, and drugs like guanethidine (Ismelin) do not worsen or provoke depression. Centrally acting drugs such as clonidine (Catapres), methyl dopa (Aldomet), and especially reserpine (Serpasil) should be avoided; they may cause or exacerbate depression.
For people who experience migraines	Beta blockers or calcium channel blockers may help.	For people with angina pectoris	Beta blockers or calcium channel blockers are especially effective and may be combined with a potassium-sparing diuretic. Drugs that cause rapid heartbeat, such as vasodilators, should be avoided or taken with a beta blocker.
For people who experience sexual dysfunction	ACE inhibitors, alpha blockers, calcium channel blockers, or vasodilators may be preferable to other antihypertensive drugs.	For people with asthma or chronic lung disease such as emphysema	ACE inhibitors and diuretics are acceptable. Calcium channel blockers may protect against asthma that is provoked by exercise. Beta blockers should be avoided.
For people who have had a heart attack	Beta blockers protect against a second heart attack, making them the drugs of choice. If blood pressure needs to be further controlled, a combination of thiazide and potassium-sparing diuretics may be added to the regimen.		

For people with diabetes	ACE inhibitors may have beneficial effects on the kidneys, and alpha blockers are usually well tolerated. Beta blockers should be used with care; they can sometimes mask symptoms of insulin shock. Beta blockers and diuretics may adversely affect blood glucose levels, but this is not common or important in most instances. Potassium-sparing diuretics should be used with caution by people with kidney disease.	For people with kidney failure	Loop diuretics such as furosemide (Lasix) or bumetanide (Bumex), metolazone (Diulo; Mykrox; Zaroxolyn), and vasodilators such as minoxidil (Loniten) may be especially useful. Potassium-sparing diuretics and drugs like guanethidine (Ismelin) should be taken with care.
For people with elevated cholesterol levels	People who take beta blockers or diuretics should have their blood chemistries checked periodically.	For people with osteoporosis (thinning of the bone)	Potassium-sparing and thiazide diuretics may help preserve bone structure.
For people with gout	Diuretics should be avoided or taken with care; they can provoke an acute attack.	For people with Raynaud's phenomenon (white fingers or toes in cold weather)	Beta blockers should be avoided. ACE inhibitors, calcium channel blockers, diuretics, methyldopa (Aldomet), prazosin (Minipress), and reserpine (Serpasil) may be used.
For people with heart failure	ACE inhibitors may be especially effective. Alpha blockers, diuretics, and vasodilators may also have beneficial effects.	For pregnant women	Beta blockers, hydralazine (Apresoline), and methyldopa (Aldomet) appear to be safe and effective. Obstetricians are often reluctant to use diuretics.
		For young people	Beta blockers may be most useful but also may decrease exercise performance in some individuals.

Shopping Around for Prescription Drugs

People who are on long-term drug therapy may have an unavoidably large fixed expense, but they can make sure they get the most for the money. Here are some suggestions.

- Ask your physician if it is possible to substitute a generic for the brand name. The generics are often less expensive.
- Call several pharmacies that are close to home, and compare prices.
- Take notice of factors other than price. Is the service better at one pharmacy? Are the staff

more courteous? Are they able to answer all questions?

- Investigate drug plans that come with health insurance, or check with your state's drug assistance program. Organizations such as the American Association of Retired Persons (AARP) have drug purchase programs that offer good prices and delivery service.

In the end, the goal is to get the best drug at the best price while enjoying the benefits of good service and continuity of care.

Therapeutic Drug Categories			
Drugs to treat angina	Beta blockers, calcium channel blockers, nitrates	Drugs to treat high blood pressure (hypertension)	ACE inhibitors, alpha blockers, alpha and beta blockers, beta blockers, calcium channel blockers, centrally acting drugs, combination drugs, diuretics, peripheral adrenergic antagonists, vasodilators
Drugs to treat blood clot disorders	Anticoagulants	Drugs to treat high cholesterol	Cholesterol-lowering agents
Drugs to treat heart failure	ACE inhibitors, combination drugs, diuretics, digitalis drugs	Post-heart attack drugs	Anticoagulants, thrombolytics, and antiplatelets; beta blockers
Drugs to treat heart rhythm disorders (arrhythmias)	Antiarrhythmic drugs, anticoagulants (for atrial fibrillation), beta blockers, calcium channel blockers, digitalis drugs	Post-heart valve replacement drugs	Anticoagulants

ALPHA-ADRENERGIC BLOCKING DRUGS (ALPHA BLOCKERS)

These drugs work through the autonomic (automatic) nervous system by blocking nerve receptors that are called alpha receptors. Alpha receptors normally promote constriction of the arterioles. Blocking constriction promotes dilation of vessels and lowers blood pressure as well as reducing the work of the heart in some situations. Alpha-blocking drugs also inhibit the actions of one of the adrenal hormones, norepinephrine, that raise blood pressure as part of the fight-or-flight response.

Alpha blockers are usually prescribed along with

other blood-pressure-lowering drugs, such as a beta-blocking drug and/or a diuretic. In general, alpha blockers are not as effective for initial therapy as some of the other blood-pressure-lowering medications. There are now several medications available that combine the effects of blocking both the beta and alpha receptors.

EXAMPLES OF ALPHA BLOCKERS

Generic names (trade names): doxazosin (Cardura)
prazosin (Minipress)
terazosin (Hytrin)

How supplied: doxazosin—tablet (1 mg, 2 mg, 4 mg, 8 mg)

prazosin—capsule (1 mg, 2 mg, 5 mg)
terazosin—tablet (1 mg, 2 mg, 5 mg, 10 mg)

Available as generic: prazosin—yes
doxazosin, terazosin—no

Description: Prazosin is an alpha blocker, antihypertensive, and vasodilator that has been available since 1975. Terazosin also blocks alpha receptors, which causes blood vessels to dilate. Doxazosin, available since early 1991, is the most recently introduced of these three.

Effects: They lower high blood pressure and may reduce the workload of the heart in heart failure.

Possible side effects: One major side effect of alpha blockers is a drop in blood pressure when a person stands up abruptly (orthostatic hypotension); this can result in dizziness or fainting. This may also occur if the person drinks alcohol,

Note: Prices on this and the following pages were obtained from *Medi-Span's Rx Competitive Pricing Guide* (June 1991) or *Medi-Span's Generic Pricing Guide* (2nd Quarter 1991) unless otherwise designated. (See below.)

*These prices come from *Lower Your Blood Pressure and Live Longer* by Marvin Moser, M.D. (New York: Villard, 1989). A 10 percent increase has been added.

**These prices come from *Medi-Span's Prescription Pricing Guide* (June 1991). The cost reflects the average acquisition price paid by pharmacies for the drug. Markups vary from store to store.

***These are average wholesale prices from *The 1991 Redbook*, published by *Drug Topics* magazine. Markups vary from pharmacy to pharmacy.

stands for long periods of time, exercises, or is exposed to hot weather. Care must be taken to avoid sudden changes in position, especially when first taking the drugs. Other side effects that are less common include nausea, headache, and palpitations.

Approximate cost: for bottle of 100,
doxazosin—average wholesale price, 1.06***;
1 mg, \$63.06***;
2 mg, \$63.06***; 4 mg, \$66.21***;
8 mg, \$69.52***
prazosin—1 mg, \$32.59 to \$45.37 (generic,
\$14.63 to \$31.17); 2 mg, \$42.99 to \$60.53
(generic, \$19.13 to \$38.69)
terazosin—2 mg, \$77*

Dosage: doxazosin—1 mg to 16 mg once per day
prazosin—2 mg to 15 mg per day divided into
two or three doses
terazosin—1 mg to 5 mg per day

Notes:

- Diuretics increase the blood-pressure-lowering effect of these drugs.
- Excessively low blood pressure may develop in people who are also receiving a beta blocker such as propranolol.
- Unlike some other antihypertensives, prazosin does not slow heart rate and may actually increase it.
- Terazosin may act to relax bladder outlet muscles.

EXAMPLE OF ALPHA AND BETA BLOCKERS

These may occasionally be used as initial therapy in hypertension. They are most often used if other medications are not effective.

Generic *name* (trade names): labetolol (Normodyne, Trandate)

How supplied: tablet (100 mg, 200 mg, 300 mg),
injection (5 mg/ml in 20 ml or 40 ml vials and
4 ml or 8 ml prefilled syringes)

Available *as generic*: no

Description: It is an alpha and beta blocker introduced in 1984. Reduces the rate and force of the heartbeat and widens arteries to increase the flow of blood.

Effect: Lowers elevated blood pressure and relieves angina.

Possible side effects: Nausea and indigestion; these usually subside with long-term use. Less frequent effects are cold hands and feet, temporary impotence, and nightmares. Dizziness may occur initially or as dosage is increased.

Approximate cost: for 100 100-mg tablets, \$24-33*

Dosage: 200 mg to 800 mg per day (300 mg per day if injected)

Notes:

- Labetolol should be used with caution by people with lung problems, asthma, or diabetes.
- Monoamine oxidase inhibitors (MAOIS) may cause a severe rise in blood pressure when taken in conjunction with labetolol.
- Cimetidine (Tagamet) may increase effect of labetolol.

ANGIOTENSIN-CONVERTING ENZYME (ACE) INHIBITORS

These drugs act to prevent production of a hormone, angiotensin II, that constricts blood vessels. They belong to the class of drugs called vasodilators—drugs that dilate blood vessels, an effective way to lower blood pressure. ACE inhibitors first became available in the early 1970s and are now commonly used to treat several heart conditions.

ACE inhibitors improve blood flow to various organs and decrease the workload on the heart in heart failure. In addition to dilating blood vessels, ACE-inhibiting medications may produce some beneficial effects indirectly by preventing the abnormal rise in hormones associated with heart disease, such as aldosterone. Aldosterone acts on the kidneys to retain salt and water. Some of these effects remain unproved.

ACE inhibitors are widely used to treat high blood pressure, or hypertension, a major risk factor for cardiovascular disease. Used alone or in combination with other drugs, ACE inhibitors have also proved effective in the treatment of congestive heart failure. They interfere with excessive constriction of blood vessels that occurs during heart failure, allowing the heart to distribute blood more effectively to all body organs. ACE inhibitors are among the few medications that have been shown to prolong patients' lives in addition to treating the symptoms of heart failure.

Although their relatively high cost may be a drawback for many people, ACE inhibitors may be among the first-choice drugs for hypertensive patients with diabetes or heart failure. They may also be an appropriate alternative for patients who suffer impotence from beta blockers and other medications. They are less effective in African-Americans than in whites. They are most effective when combined with small doses of a diuretic, and this is available in a combination drug. A dry hacking cough is a common side effect.

EXAMPLES OF ACE INHIBITORS

Generic names (trade names): captopril (Capoten)
enalapril (Vasotec)
lisinopril (Prinivil, Zestril)

How supplied: captopril—tablet (12.5 mg, 25 mg, 50 mg, 100 mg)

enalapril—tablet (2.5 mg, 5 mg, 10 mg, 20 mg)

lisinopril—tablet (5 mg, 10 mg, 20 mg, 40 mg)

Available as generic: no

Description: Captopril was the first of the ACE inhibitors. They block the agent that constricts blood vessels by interfering with a chain of chemical reactions called the renin-angiotensin system. This improves the flow of blood. ACE inhibitors also prevent an abnormal rise in hormones associated with heart failure, such as adrenaline and aldosterone.

Effects: They dilate the blood vessels and improve the flow of blood, thus lowering high blood pressure, relieving vascular muscle spasm, and reducing the workload of the heart.

Possible side effects: Common side effects are dizziness or weakness, loss of appetite, a rash, itching, a hacking, unpredictable cough, and swelling.

Approximate cost: for 100 tablets,
captopril—12.5 mg, \$45.87 to \$64.83; 25 mg,
\$54.99 to \$76.79; 50 mg, \$75.17 to \$108.49
enalapril—5 mg, \$77 to \$99*
lisinopril—10 mg, \$60.50 to \$66*

Dosage: captopril—12.5 to 37.5 mg per day
starting dose; 75 to 150 mg per day
maintenance dose; must be taken at least
twice a day

enalapril—2.5 mg or 5 mg to 30 mg per day
lisinopril—5 mg to 30 mg once daily

Notes:

- Cimetidine (Tagamet) may increase side effects and decrease captopril's effectiveness.
- For people with certain kidney abnormalities, ACE inhibitors may further disrupt kidney function.
- Should probably not be taken along with potassium-sparing diuretics.

ANTIARRHYTHMIC DRUGS

These drugs correct an irregular heartbeat and slow a heart that is beating too fast. "Poisons in small doses are the best medicines: wrote a physician in 1789,

"and useful medicines in too large doses are poisons." This general principle of sound pharmacology holds especially true for antiarrhythmic drugs. The compounds used to treat heart rhythm disorders are potent medications. Regardless of the type of antiarrhythmic drug, patients should never take more than prescribed. Conversely, because the effectiveness of these drugs depends on maintaining the optimum level of medication in the blood, the patient should be sure to take them according to the physician's instructions. (See Chapter 16.)

Each of the antiarrhythmic drugs maybe used to treat many different rhythm disorders, and two patients taking the same medication do not necessarily have the same problem. Many patients tolerate antiarrhythmic medications quite well, but ail of these drugs may cause side effects, so patients should promptly report any new sensations, symptoms, or difficulties to the doctor.

Although the vast majority of patients benefit from antiarrhythmic drugs, heart arrhythmias may paradoxically worsen in 5 to 10 percent of patients. For that reason and the fact that the more serious heart rhythm abnormalities occur in sick patients, antiarrhythmic drugs are often first given in the hospital, so the effects on heart rhythm can be carefully monitored. These may be measured by an electrocardiogram, Helter monitor, telemetry, and/or electrophysiology studies. Most of the time, however, these drugs can be continued safely without hospitalization.

The heart's response to a given medication may change over time, making regular follow-up visits essential. Changes in treatment regimen, either to relieve side effects or to increase effectiveness, are common. Because different antiarrhythmic drugs may interact in undesirable ways, patients should make sure that any doctor prescribing a new medication knows about any other antiarrhythmic drugs that have already been prescribed.

EXAMPLES OF ANTIARRHYTHMICS

Generic name (trade name): amiodarone
(Cordarone)

How supplied: tablet (200 mg)

Available as generic: no

Description: It is the most potent antiarrhythmic agent in use. Acts as a beta blocker, alpha blocker, calcium channel blocker, and antihyperthyroid.

Effects: Suppresses all types of arrhythmias.

Possible side effects: Most serious side effect is lung inflammation. Also causes liver inflammation, muscle degeneration and weakness, loss of balance, and slow heart rate. Skin may become more susceptible to sunburn and may take on a blue-gray discoloration. Paradoxically, amiodarone can cause both thyroid underactivity—with symptoms of fatigue, intolerance to cold, constipation, and weight gain—or hyperthyroidism—characterized by sleeplessness, heat intolerance, sweats, weight loss, and rapid heart rate. Other side effects are rash, weight loss, nausea, constipation, dizziness, fainting, palpitations, and changes in vision.

Approximate cost: for 60/200-mg tablets, average wholesale price, \$139.39**

Dosage: 200 mg to 600 mg per day

Notes:

- Because of its many side effects, amiodarone is approved only for the treatment of serious arrhythmias that do not respond to other drugs. Researchers are seeking a less toxic form of amiodarone that may one day prove a highly beneficial antiarrhythmic agent.
- Doses of digitalis drugs or warfarin-type anticoagulant drugs should be reduced in conjunction with amiodarone.

Generic name (trade name): digoxin (Lanoxin)

How supplied: tablet (0.125 mg, 0.25 mg, 0.5 mg), capsule (0.05 mg, 0.1 mg, 0.2 mg), elixir (0.05 mg per ml, 60-ml bottle), injection (0.5 mg in 2 ml, 0.1 mg in 1 ml)

Available as generic: yes

Description: It is a digitalis drug extracted from the leaves of the foxglove plant.

Effects: Relieves heart failure and corrects some abnormal heart rhythms.

Possible side effects: Side effects are tiredness, nausea, loss of appetite, confusion, vision disturbances, and palpitations,

Approximate cost: for 100 tablets, 0.125 mg, \$5.59 to \$8.63; 0.25 mg, \$5.99 to \$10.19

Dosage: 0.125 mg to 0.25 mg per day for adults; reduced dosage for children based on weight and age

Notes:

- Check with doctor before combining with any other medication. There are numerous drug interactions.
- People taking digoxin should be monitored because an effective digoxin dose may be near the toxic dose.

Generic name (trade name): disopyramide phosphate (Norpace)

How supplied: capsule (100 mg, 150 mg) and extended-release capsule (100 mg, 150 mg)

Available as generic: yes

Description: It is a synthetic drug that reduces the force of the heartbeat (similar to procainamide and quinidine).

Effects: Corrects some abnormal heart rhythms, particularly rapid heartbeats.

Possible side effects: Its most serious side effect is weakening of heart contractions in hearts that are already mildly to moderately weak. Dry mouth is common, constipation can occur, and men can sometimes have difficulty urinating. (These three can often be reversed by giving a drug called pyridostigmine [Mestinon] as well.) Low blood sugar has also been noted, and certain forms of glaucoma may become worse.

Approximate cost: for 100 100-mg capsules, average wholesale price, \$45.20**; for 100 100-mg extended-release capsules, average wholesale price, \$54.45**

Dosage: 100 mg three to four times per day

Notes:

- Phenytoin (Dilantin) and rifampin (Rifadin, Rifamate, Rimactane) may reduce the effect of disopyramide.
- People with diabetes should use disopyramide with caution.
- Disopyramide has drug interactions with drugs having anticholinergic effects, such as a belladonna and phenobarbital mix (Donnatal) or propantheline bromide (Pro-banthine).

Generic names (trade names): flecainide (Tambocor)

propafenone (Rhythmol)

How supplied: flecainide-tablet (50 mg, 100 mg, 150 mg)

propafenone—tablet (150 mg, 300 mg)

Available as generic: no

Description: These are highly potent drugs used only for serious ventricular arrhythmias that fail to respond to other medications and never in patients with a history of heart attack or congestive heart failure.

Effects: Suppresses vigorous potentially dangerous ventricular arrhythmias.

Possible side effects: May worsen some arrhythmias, weaken cardiac pumping, slow heart rate, or increase blood sugar. May cause fever, rash, liver inflammation, confusion, loss of concen-

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tration, dizziness, a metallic taste in the mouth, or changes in vision.

Approximate cost: for 100 capsules or tablets, flecainide-50 mg, average wholesale price, \$48.66**

propafenone—150 mg, average wholesale price, \$59.16***; 300 mg, average wholesale price, \$107.34***

Dosage: flecainide-100 mg to 200 mg twice a day
propafenone—150 mg to 300 mg three times a day

Notes:

- Never used in patients who have already had a heart attack.
- Drug interactions are minimal.
- May decrease the effectiveness of a permanent pacemaker, requiring an increase in the pacing threshold.
- Digoxin levels should be reduced in conjunction with flecainide.

Generic name (trade name): lidocaine (Xylocaine)

How supplied: injection (50-mg and 100-mg prefilled 5-ml syringes, 100-mg 1-ml ampules, 100-mg/ml 5-ml ampules, or in larger vials for intravenous infusion)

Available as generic: yes

Description: Introduced in 1949, lidocaine is a powerful local anesthetic and antiarrhythmic when given by injection or intravenous infusion.

Effects: Controls abnormal heart rhythms, particularly after heart attack, during heart surgery, or after an overdose of digitalis drugs.

Possible side effects: Side effects are infrequent but may include anxiety or restlessness, confusion or memory loss, nausea or vomiting, twitching or tremors, shallow breathing, or seizures.

Approximate cost: 50-mg prefilled 5-ml syringe, average wholesale price, \$79.09***; 100-mg prefilled 5-ml syringe, average wholesale price, \$82.65***

Dosage: varies

Generic name (trade name): mexiletine (Mexitil)

How supplied: capsule (150 mg, 200 mg, 250 mg)

Available as generic: no

Description: It is a local anesthetic and antiarrhythmic that came into use in the 1980s. Related to the drug lidocaine.

Effects: Suppresses ventricular arrhythmias.

Possible side effects: Fever, rash, lower blood platelet count, liver inflammation, nausea, confusion,

loss of concentration, dizziness, tremors, and changes in vision may occur.

Approximate cost: for 100 150-mg capsules, average wholesale price, \$57.95**

Dosage: 150 to 300 mg three to four times per day

Notes:

- Adverse effects can be reduced by taking the drug with meals.
- Drug interactions are minimal.

Generic name (trade names): procainamide

(Procan SR, Pronestyl, Pronestyl SR)

How supplied: capsule or tablet (250 mg, 375 mg, 500 mg), sustained-release tablet (250 mg, 500 mg, 750 mg, 1,000 mg), injection (100 mg/ml in 10-ml vial or 500 mg/ml in 2-ml vial)

Available as generic: yes

Description: It is a synthetic antiarrhythmic, anesthetic-type drug in use since 1951.

Effects: Corrects some abnormal heart rhythms, especially a too rapid heartbeat in the ventricles. Also used in the treatment of Wolff-Parkinson-White syndrome. (See Chapter 16.)

Possible side effects: Fever, rash, liver inflammation, weight loss, nausea, confusion, and loss of concentration may occur. Prolonged use of procainamide can cause drug-induced lupus, especially in people who metabolize the drug slowly (a tendency that can be determined with a blood test). Can result in a positive lupus blood test. Symptoms of lupus, an autoimmune syndrome, are fever, joint pain, low blood counts, and inflammation of the linings of the lungs or heart (felt as chest pain on deep inhalation).

Approximate cost: for 100 500-mg tablets, generic, \$12.83 to \$20.97

Dosage: short-acting, 250 mg to 750 mg every four hours; sustained-release, 500 mg to 2,000 mg every six hours

Notes:

- Procainamide can depress white blood cell counts, increasing the risk of infection.

Generic name (trade names): quinidine gluconate (Duraquin, Quinaglute Dura-Tabs, Quinalan Sustained-Release)

quinidine sulfate (Quinidex Extentabs)

How supplied: quinidine gluconate—tablet (sustained-release 324 mg, 330 mg)

quinidine sulfate—tablet (200 mg, 300 mg), extended-release tablet (300 mg), capsule (325 mg)

Available as generic: yes

Description: Used since 1918, this is one of the oldest antiarrhythmics. It is derived from the bark of the South American cinchona tree.

Effects: It controls many different abnormal heart rhythms, especially those that are fast or irregular.

Possible side effects: Diarrhea is the most common side effect. In rare cases, may cause a drop in blood platelets, causing bruises or bleeding. Other possible effects are fever, rash, dizziness, and ringing in the ears.

Approximate cost: quinidine sulfate—100/200-mg tablets, generic, \$10.67 to \$16.43

Dosage: 200 mg to 400 mg three to four times per day

Notes:

- Digoxin dosage should be cut in half if taken with quinidine.
- Quinidine may increase bleeding if taken in conjunction with warfarin (Coumadin).
- Phenobarbital and rifampin reduce the effect of quinidine.

Generic name (trade name): tocainide (Tonocard)

How supplied: tablet (400 mg, 600 mg)

Available as generic: no

Description: It came into use in the 1980s and is related to lidocaine.

Effects: It suppresses ventricular arrhythmias.

Possible side effects: Most significant common side effects are weight loss, nausea, and tremors. Other less common effects are fever, rash, depressed white blood cell count, liver inflammation, confusion, loss of concentration, dizziness, and disturbances in vision. About 0.1 to 0.2 percent of patients suffer lung inflammation, a potentially serious side effect.

Approximate cost: for 100 400-mg tablets, average wholesale price, \$75.20**

Dosage: 200 mg to 600 mg three times per day

Notes:

- Collectively, tocainide's more serious side effects have discouraged its use as a frontline drug.

ANTICOAGULANTS, ANTIPLATELETS

AND THROMBOLYTICS

These drugs are sometimes referred to as “blood thinners,” but this term is not truly accurate. They

inhibit the ability of the blood to clot—preventing clots from forming in blood vessels and from getting bigger. Under a number of different circumstances, it becomes necessary to stop clotting. Anticoagulants, antiplatelet agents, and thrombolytics each have specific indications and uses.

Any patient who has had a heart valve replaced with a mechanical valve (see Chapter 13) requires lifelong oral anticoagulants in order to prevent clots from forming on the valve. Patients who develop atrial fibrillation (see Chapter 16) may require anticoagulants; clot formation in the left atrium is a potential hazard of this rhythmic disturbance. Oral anticoagulants are prescribed for patients who develop thrombophlebitis, an inflammation of the veins in the legs or pelvis. (See Chapter 17.) One of the dangers of this condition is the development of blood clots that may travel to the lungs and cause pulmonary emboli. Lastly, some patients who have a serious heart attack involving the front surface of the heart are prescribed an anticoagulant to prevent clots from forming on the inner lining of the scar.

Heparin is an anticoagulant that is administered intravenously when rapid anticoagulation is necessary. All patients undergoing open-heart surgery are treated with heparin while their blood is being oxygenated by the heart-lung machine. At the end of the operation, medication is given to reverse the effects of heparin. (See Chapter 11.)

When a person first develops thrombophlebitis, heparin is often used because its action is almost immediate. It also is used in people who have had a heart attack and have been treated with thrombolytic therapy. Keeping the affected artery open often requires vigorous anticoagulation.

Aspirin is not an anticoagulant but has a profound effect on a component of the blood called platelets—blood cells that stick together and cause clots to form. Platelets are important in blood clotting and are in large part responsible for allowing us to stop bleeding when we cut ourselves. Platelets are also in part responsible for the formation of a clot in a coronary artery—a phenomenon that initiates many heart attacks. Because of aspirin's ability to inhibit the clotting action of platelets, it is designated as an antiplatelet and is frequently prescribed in patients who have recovered from a heart attack, in order to prevent clots from forming in the veins used for coronary bypass surgery.

The most recent and exciting class of drugs that are useful for people with heart attacks are the thrombolytic drugs. These agents are given intravenously as soon as possible with the goal of dissolving the

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offending clot within a coronary artery. A patient having a heart attack can be helped considerably if the clot can be dissolved before it causes permanent, debilitating damage. The three most commonly used thrombolytics are t-PA, streptokinase, and APSAC. They are generally used only in hospitals or in emergency situations.

EXAMPLES OF ANTICOAGULANTS, ANTIPLATELETS, AND THROMBOLYTICS

Generic name (trade names): acetylsalicylic acid or aspirin (Alka-Seltzer, Anacin, Ascriptin, Bayer, Bufferin, Easprin, Ecotrin, St. Josephs, Zorprin)

How supplied: tablet (81 mg, 325 mg, 650 mg), capsule (325 mg, 650 mg), rectal suppository (325 mg, 650 mg)

Available as generic: yes

Description: It is a nonnarcotic analgesic and antiplatelet used since 1899.

Effects: Helps prevent blood clots. Also treats pain, fever, arthritis, colds, menstrual cramps, headaches, and joint and muscular aches.

Possible side effects: Indigestion is the most common side effect.

Approximate cost: Varies greatly. Generic may cost only pennies per pill. Shop around for best over-the-counter drug values.

Dosage: to inhibit clotting, 81 mg to 325 mg per day

Notes:

- Aspirin can cause Reye's syndrome, a rare brain and liver disorder that usually occurs in children.
- Aspirin may increase the effect of other anticoagulant drugs.

Generic name (trade name): dipyridamole (Persantine)

How supplied: tablet (25 mg, 50 mg, 75 mg)

Available as generic: yes

Description: It is an antiplatelet and antianginal drug first introduced in the late 1970s.

Effects: Helps keep blood clots from forming in people who have just had a heart attack, heart surgery, a stroke, or a heart valve replacement (usually given with aspirin or warfarin).

Possible side effects: Adverse effects are rare, but may include nausea, headache, flushing, dizziness or faintness, or rash.

Approximate cost: For 100 tablets, 25 mg, \$26.17 to \$36.39 (generic, \$4.97 to \$11.13); 50 mg, \$40.87 to \$65.99 (generic, \$9.13 to \$16.87)

Dosage: 75 mg to 400 mg per day

Note:

- Dipyridamole may increase the effect of other anticoagulants.

Generic name (trade names): warfarin (Coumadin, Panwarfin)

How supplied: tablet (1 mg, 2 mg, 2.5 mg, 5 mg, 7.5 mg, 10 mg)

Available as generic: yes

Description: Warfarin is the prototype oral anticoagulant. It and some drugs related to it have been used for nearly 50 years.

Effects: Prevents blood clots, especially in the leg and pelvic veins where blood flow is at its slowest. Also used in people with atrial fibrillation or after a heart valve replacement.

Possible side effects: Excessive bleeding is the most common adverse effect. Nausea or vomiting, loss of appetite, abdominal pain or diarrhea, rash or bruising, and hair loss are also possible.

Approximate cost: For 100 5-mg tablets, \$48.29 to \$61.13 (generic, \$28.33 to \$37.37)

Dosage: 15 mg on the first day of treatment, 10 mg on the second, and 2.5 mg to 7.5 mg per day thereafter

Note:

- Interacts with a variety of drugs. Check with your physician and pharmacist.

BETA-ADRENERGIC BLOCKING DRUGS (BETA BLOCKERS)

These drugs probably reduce blood pressure by reducing the output of blood from the heart (or perhaps by blocking the production of angiotensin). They were first introduced in the United States in the 1960s to treat angina and to lower blood pressure. Specifically, they block responses from the beta nerve receptors. This serves to slow down the heart rate and to lower blood pressure.

Beta blockers also block the effects of some of the hormones that regulate blood pressure. During exercise or emotional stress, adrenaline and norepinephrine are released and normally stimulate the beta receptors—sensors that transmit messages to the heart to speed up and pump harder. By blocking the receptors, beta blockers act to reduce heart muscle oxygen demands during physical activity or excite-

ment, thus reducing the possibility of angina caused by oxygen deprivation.

Beta blockers may be prescribed as the initial drugs to lower blood pressure, or they may be given along with a diuretic or other antihypertensive drug. In general, beta blockers are more effective in younger patients. Because they relieve angina, they may be the drug of choice for people who have this problem along with high blood pressure. Beta blockers also damp heart rate increases caused by stress, exercise, or anxiety. Stage performers occasionally take them to combat the heart palpitations, voice cracking, or fine tremors of the hands that may be associated with stage fright.

For reasons that are not fully understood, African-Americans do not seem to respond as well as whites to beta blockers, although there are exceptions. Because beta blockers may actually constrict peripheral blood vessels, they generally are not recommended for people with circulatory problems in their hands or legs. They also are not prescribed for people with asthma. Their use tends to result in a spasm of the bronchial tubes in the lungs of susceptible persons.

Most patients tolerate beta blockers well, especially if they are administered in low doses along with a diuretic or other antihypertensive drug. The effects of beta blockers are particularly complemented by nitrate therapy for angina.

EXAMPLES OF BETA BLOCKERS

Generic names (trade names): acebutolol (Sectral)

atenolol (Tenormin)
metoprolol (Lopressor)
nadolol (Corgard)
pindolol (Visken)
propranolol (Inderal)

How supplied: acebutolol—capsule (200 mg, 400 mg)

atenolol—tablet (50 mg, 100 mg), injection (0.5 mg/ml, 10-ml ampule)

metoprolol—tablet (50 mg, 100 mg), injection (1 mg/ml, 5-ml ampule)

nadolol—tablet (20 mg, 40 mg, 80 mg, 120 mg, 160 mg)

pindolol—tablet (5 mg, 10 mg)

propranolol—tablet (10 mg, 20 mg, 40 mg, 60 mg, 80 mg, 90 mg), sustained-release capsule (60 mg, 80 mg, 120 mg, 160 mg)

Available as generic: acebutolol, atenolol, metoprolol, nadolol, pindolol—no

propranolol—yes

Description: Acebutolol, atenolol, and metoprolol are cardioselective (acting mainly on the heart as

opposed to both heart and lungs) beta blockers that were first introduced in 1985, 1981, and 1978 respectively. Nadolol was introduced in 1980. Pindolol is one of the newer beta blockers. Propranolol was introduced in 1968 and was the first beta blocker to be available in the United States.

Effects: They treat hypertension, angina, some abnormal heart rhythms, palpitations, and tremors caused by overactivity of the thyroid gland, and anxiety such as stage fright. May protect the heart from further damage after a heart attack. May help prevent migraine headaches.

Possible side effects: Lethargy and cold hands and feet because of reduced circulation may occur. Also may cause nausea, nightmares or vivid dreams, and impotence. May also precipitate asthmatic attack.

Approximate cost: For 100 tablets or capsules, acebutolol—200 mg, average wholesale price, \$58.2***; 400 mg, average wholesale price, \$77.40***

atenolol—50 mg, \$66.59 to \$92.99; 100 mg, \$107.37 to \$147.99

metoprolol—50 mg, \$35.97 to \$53.37; 100 mg, \$61.57 to \$83.99

nadolol—40 mg, \$73.99 to \$103.33

pindolol—5 mg, average wholesale price, \$54.48***; 10 mg, average wholesale price, \$69.60***

propranolol—20 mg, \$27.77 to \$45.93 (generic, \$10.47 to \$17.43); 40 mg, \$38.27 to \$56.57 (generic, \$12.69 to \$23.27); 80 mg long-acting, \$70.60 to \$93.73 (generic, \$41.23 to \$57.87)

Dosage: acebutolol—200 mg to 600 mg per day

atenolol—25 mg to 100 mg per day

metoprolol—50 mg to 150 mg per day

nadolol—40 mg to 160 mg per day

pindolol—10 mg to 40 mg per day

propranolol—40 mg to 240 mg per day

Notes:

- None of the beta blockers should be used by asthmatics or people with chronic lung disease.
- Beta blockers should be used with caution in insulin-dependent diabetics and people with peripheral vascular disease.

Altogether, there are about 10 beta blockers currently on the market in the United States, including betaxolol (Kerlone), carteolol (Cartrol), penbutolol (Levitol), and timolol maleate (Blocadren). For more complete information on these less commonly pre-

scribed or newly released medications, consult your physician or pharmacist.

CALCIUM CHANNEL BLOCKERS

Calcium plays a central role in the electrical stimulation of cardiac cells and in the mechanical contraction of smooth muscle cells in the walls of arteries. Calcium channel blockers are relatively new synthetic drugs that work by blocking the passage of calcium into the muscle cells that control the size of blood vessels. All muscles need calcium in order to constrict; by preventing the muscles of the arteries from constricting, blood vessels open up (dilate), allowing blood to flow through them more easily. Blood pressure is reduced.

Calcium channel blockers are effective in initial treatment of high blood pressure in about 30 to 40 percent of patients with hypertension. They may be added to a diuretic or other antihypertensive medication. They are generally well tolerated (even by people with asthma), but they are more costly than diuretics or beta blockers. Thus, many doctors still recommend that other drugs be tried first.

EXAMPLES OF CALCIUM CHANNEL BLOCKERS

Generic name (trade name): diltiazem (Cardizem)
How supplied: tablet (30 mg, 60 mg, 90 mg, 120 mg), sustained-release capsule (60 mg, 90 mg, 120 mg)

Available *as generic*: no

Description: It is a calcium channel blocker and antianginal drug, introduced in 1984.

Effects: Reduces the frequency of angina attacks and lowers blood pressure.

Possible side effects: Headache, nausea, tiredness, ankle swelling, dizziness, and rash can occur.

Approximate *cost*: for 100 tablets, 30 mg, \$31.99 to \$43.69; 60 mg, \$49.63 to \$65.43; 90 mg, \$67.57 to \$88.63

Dosage: 60 mg to 240 mg per day

Generic names (trade names): nifedipine (Cardene)

nifedipine (Procardia, Procardia XL)

How supplied: nifedipine—capsule (20 mg, 30 mg) nifedipine—capsule (10 mg, 20 mg), extended-release tablet (30 mg, 60 mg, 90 mg)

Available *as generic*: no

Description: Nicardipine is one of the more recently introduced calcium channel blockers. Nifedipine is a calcium channel blocker and antianginal and antihypertensive drug introduced in 1982.

Effects: They help relieve anginal pain and prevent attacks, reduce blood pressure, and help improve circulation in the limbs.

Possible *side effects*: May cause redness of face and neck, headache, palpitations, dizziness, nausea, low blood pressure, ankle swelling, and rash.

Approximate *cost*: for 100 tablets, nifedipine—20 mg, \$44 to \$49.50 nifedipine—10 mg, \$40.27 to \$57.13; 20 mg, \$79.97 to \$111.37; 30 mg XL, \$92.99 to \$118.23; 60 mg XL, \$164.63 to \$215.89

Dosage: nicardipine—60 mg to 120 mg per day nifedipine—30 mg to 120 mg per day

Generic name (trade name): nimodipine (Nimotop)

How supplied: capsule (30 mg)

Available as generic: no

Description: It is a calcium channel blocker, available since 1989, that is used to treat people who have had a burst blood vessel in the head (known as subarachnoid hemorrhage or ruptured aneurysm). (See Chapter 18.)

Effects: It may help relax constricted blood vessels (known as vasospasm), a condition that can lead to a recurrence of stroke.

Possible side effects: Dizziness or lightheadedness, headache, nausea, fast heart rate, skin rash, or swelling of the lower extremities may occur.

Approximate *cost*: for 100 30-mg capsules, average wholesale price, \$480.19***

Dosage: 60 mg, every four hours for 21 consecutive days

Generic name (trade names): verapamil (Calan, Isoptin, Verelan)

How supplied: tablet (40 mg, 80 mg, 120 mg), sustained-release tablet (180 mg, 240 mg), capsule (120 mg, 240 mg), sustained-release caplet (180 mg, 240 mg), injection (5-mg/ml and 10-mg/ml ampules, 5-mg/2ml and 10-mg/4ml vials)

Available *as generic*: yes

Description: It is a calcium channel blocker, antianginal drug, and antiarrhythmic drug introduced in 1981.

Effects: Suppresses some arrhythmias, helps prevent anginal attacks, and reduces high blood pressure.

Possible side effects: Excessively slow heart rate, low blood pressure, headache, swelling of feet, and constipation may occur.

Approximate cost: for 100 80-mg tablets, generic, \$19.87 to \$32.69

for 100 240-mg SR capsules, \$100.37 to \$136.67

Dosage: 120 mg to 360 mg per day

CENTRALLY ACTING DRUGS

Drugs in this category act on the brain centers to reduce nerve impulses that constrict blood vessels. Vessels open up (dilate); they may also cause the heart to beat more slowly.

Centrally acting drugs are not widely used in initial treatment of high blood pressure; instead, they are given along with a diuretic or other antihypertensive drugs when these drugs alone do not produce an adequate reduction in blood pressure.

EXAMPLES OF CENTRALLY ACTING DRUGS

(Central Alpha-Adrenergic Agents)

Generic names (trade names): clonidine (Catapres, Catapres-TTS)

guanabenz (Wytensin)

guanfacine (Tenex)

How supplied: clonidine—tablet (0.1 mg, 0.2 mg, 0.3 mg), 7-day transdermal patch (0.1 mg/day, 0.2 mg/day, 0.3 mg/day)

guanabenz—tablet (4 mg, 8 mg)

guanfacine—tablet (1 mg)

Available as generic: clonidine—yes

guanabenz, guanfacine—no

Description: These are antihypertensives that reduce the stimulator nerve impulses from the brain to the heart.

Effects: Lower blood pressure.

Possible side effects: Drowsiness or sedation, constipation, dry mouth, headache, dizziness or weakness, rash, depression, ankle swelling, cold hands, and impotence may occur.

Approximate cost: for 100 tablets, clonidine—generic, 0.1 mg, \$11.73 to \$25.27

guanabenz—4 mg, \$44 to \$46.20

guanfacine—1 mg, average wholesale price, \$45.47***

Dosage: clonidine—0.1 mg to 1 mg per day
guanabenz—4 mg to 24 mg per day divided into two doses

guanfacine—1 mg to 3 mg per day

Note:

⚠ Clonidine also may minimize withdrawal symptoms during smoking cessation or alcohol detoxification and may relieve hot flashes that occur during menopause.

Generic name (trade name): methyldopa (Aldomet)

How supplied: tablet (125 mg, 250 mg, 500 mg), suspension (50 mg/ml in a 473-ml bottle)

Available as generic: yes

Description: It was introduced in the 1960s and is still a widely used antihypertensive.

Effects: It lowers blood pressure.

Possible side effects: Dizziness or lightheadedness, drowsiness, headache, dry mouth or stuffy nose, swelling of ankles or feet, tiredness or weakness, fever, depression, and liver inflammation may occur.

Approximate cost: for 100 tablets, generic, 250 mg, \$12.13 to \$20.47; 500 mg, \$23.47 to \$38.37

Dosage: 250 mg to 1,000 mg per day divided into two doses

Note:

- Methyldopa may be suitable for treating high blood pressure in women during late pregnancy.

CHOLESTEROL-LOWERING AGENTS

To determine whether drug treatment for a blood cholesterol problem is necessary, the level of blood cholesterol must be measured. If it is over 200 mg/dl, your doctor may wish to repeat the test for confirmation and to perform additional measurements of the levels of HDL and LDL cholesterol (the “good and “bad” components) and triglycerides (blood fats).

There is some question whether or not the new limits of cholesterol levels for defining risk are appropriate for elderly people or those with no other risk factors for heart disease. The reduction in life expectancy may not be of significance, for example, if the cholesterol level of a 70-year-old man or woman is 260 or 270, unless other factors are present.

The first step in treatment for elevated blood cholesterol is a diet low in saturated fat and cholesterol. Other measures may also be recommended, including loss of excess weight, regular moderate exercise, smoking cessation, and reduction of excessive alcohol intake. In general, drug therapy is prescribed to reduce elevated levels of cholesterol or other blood

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fats only after several months of dietary modification alone have failed to do the job adequately.

How high a level of blood cholesterol warrants drug therapy? This is a decision made by the physician, based on a person's individual health profile—including age, overall health status, cardiovascular risk factors, history of heart disease, and many other factors.

Remember, cholesterol-lowering medication is considered an adjunct to dietary modification, not a replacement for it. If a person on drug therapy for high blood cholesterol continues to eat a high-fat, high-cholesterol diet, the effects of the medication may be undermined or undone. Once drug therapy for elevated blood cholesterol is begun, the therapy may have to be continued indefinitely. This is why the decision to begin cholesterol-lowering drug therapy calls for careful consideration.

Drugs that lower cholesterol do so in various ways and have differing effects on the various components of total blood cholesterol (including HDL and LDL cholesterol and triglycerides). An individual's "lipid profile: or the levels of various fats in the bloodstream, helps determine which drug or drugs to prescribe. (Sometimes physicians use the ratio of total to HDL cholesterol, or of LDL to HDL, in assessing risk and determining a course of treatment.) Other factors in drug selection include cost, side effects, convenience, safety, effectiveness, and impact on cardiovascular risk as shown in clinical trials.

EXAMPLES OF CHOLESTEROL-LOWERING AGENTS

Generic names (trade names): cholestyramine (Questran, Questran Light)
colestipol (Colestid)

How supplied: cholestyramine—powder (carton of 60 9-gin packets or can of 378 gm)
colestipol—granules (box of 30 5-gm packets; bottle of 500 gin)

Available *as generic*: no

Description: These drugs, called bile acid sequestrants, work in the intestine to bind bile acids, which are then excreted. This stimulates the liver to remove more LDL cholesterol from the blood in order to manufacture more bile acids. The medications are in powder form and must be taken mixed with water or some other liquid such as orange juice. They are available in packets or in bulk, with a scoop equal to one packet.

Effects: Total cholesterol may be reduced 15 to 20 percent on an average regimen. However, these

drugs do not reduce triglycerides and, in fact, may raise them in some people.

Possible side effects: Constipation, bloating, heartburn, nausea, vomiting, headaches, and interference with absorption of other drugs may occur. Many people are unable to tolerate dosages high enough to produce the desired effect.

Approximate *cost*: cholestyramine powder—\$63.74 per carton of 60 packets**;

\$27.92 per can (378 gin)**
colestipol—\$27.99 per box of 30 packets**;

\$62.29 per bottle (500 gm)**

Dosage: 2 to 4 packets or scoops twice daily; most effective when taken with meals

Notes:

- May interfere with absorption of several drugs, including thiazide diuretics, digoxin, warfarin, beta blockers, thyroid medications, and antibiotics. Patients taking any of these drugs may be advised to take them one hour before or several hours after a dose of bile acid sequestrant.
- To decrease the possibility of constipation, increase intake of fluids and dietary fiber. If constipation still occurs, ask the physician about taking a psyllium-based stool softener or other laxative.
- With a long record of safety and effectiveness, these drugs are listed among the first choices for cholesterol-lowering therapy. Inconveniences include the gritty powder form of the medication and the common side effects of constipation and other gastrointestinal disorders.

Generic name (trade name): gemfibrozil (Lopid)

How supplied: capsule (600 mg)

Available as generic: no

Description: This drug, which belongs to a class of agents known as fibric acids, works by breaking down a component of blood cholesterol called very-low-density lipoprotein (VLDL).

Effects: Gemfibrozil is prescribed to lower elevated levels of blood triglycerides and to increase HDL. However, the drug may also cause a moderate reduction in LDL cholesterol. Thus, it may be indicated for individuals who have very low levels of HDL cholesterol in addition to high total or LDL cholesterol levels.

Possible side effects: Muscle aches or weakness, abdominal pain or discomfort, diarrhea, and nausea may occur.

Approximate *cost*: for 100 600-mg capsules, \$88.23 to \$122.17

Dosage: 600 mg twice daily (most effective when

taken 30 minutes before morning or evening meals)

Notes:

- Gemfibrozil may increase the effect of warfarin and other anticoagulant drugs; if you take an anticoagulant drug, your physician may need to readjust the dosage.
- Offers convenience and relative lack of side effects; however, increases chance of developing gallstones or liver dysfunction.
- Another drug in this class, fenofibrate (Lipidil), may soon be available in the United States.

Generic name (trade name): lovastatin (Mevacor)

How supplied: tablet (20 mg, 40 mg)

Available as generic: no

Description: The drug restricts the liver's production of cholesterol by inhibiting the action of an enzyme called HMG-COA reductase. As the liver synthesizes less cholesterol, it absorbs more LDL ("bad") cholesterol from the bloodstream.

Effects: May lower LDL cholesterol by 30 to 40 percent. At higher doses, it may moderately decrease triglycerides and increase HDL cholesterol as well.

Possible side **effects:** Headache, rash, muscle ache or weakness, dizziness, lightheadedness, cataracts, and liver function abnormalities may occur.

Approximate cost: for 100 20-mg tablets, \$167.63 to \$215.27

Dosage: 20 mg to 80 mg

Notes:

- Lovastatin causes relatively few side effects in most people. However, as a newer drug, it has a shorter track record of safety than some other agents.
- It is possible that lovastatin may cause liver dysfunction or cataracts. For this reason, liver function tests every six to eight months and annual eye examinations may be recommended for people taking the drug.
- Other drugs in the category of HMG-COA reductase inhibitors that may become available in the future include simvastatin (Zocor), pravastatin (Pravachol), and fluvastatin (LoChol), pending FDA approval for prescription use.

Generic names (trade names): nicotinic acid, niacin (Nia-Bid, Niacels, Niacor, Niaplus, Nicolac, Nicobid, Slo-Niacin)

How supplied: tablet (100 mg, 250 mg, 500 mg), sustained-release capsule (250 mg, 500 mg,

750 mg), timed-release preparation (125 mg, 250 mg, 500 mg)

Available as generic: yes

Description: Nicotinic acid, a B vitamin, works in the liver in a manner that is still unclear.

Effects: It lowers triglycerides and LDL cholesterol; raises HDL cholesterol.

Possible side **effects:** Itching, rash, or flushing of the skin, gastrointestinal distress, dizziness, lightheadedness, and rapid heartbeat may occur.

Approximate **cost:** for 100 500-mg tabs, \$43.52** (Generics may be a fraction of the cost of brand names. Shop around for best over-the-counter drug values.)

Dosage: 500 mg to 1,000 mg or more, three times a day (usually taken with meals). Dosage usually starts low (for example, 100 mg three times a day) and increases slowly over several weeks to minimize side effects.

Notes:

- It can be purchased without a prescription, but should not be taken as a cholesterol-lowering medication unless prescribed by a physician. At the high doses necessary to lower cholesterol, niacin is as powerful as any prescription drug, and should be monitored accordingly for effects and side effects.
- It is safe and effective, but often causes side effects, particularly flushing and itching at the outset of therapy. This can be minimized by taking aspirin once a day; ask your physician. At high doses, liver function abnormalities may occur; periodic testing of liver enzymes, blood sugar, and uric acid may be necessary.
- Skipping doses may increase side effects when the drug is next taken. If you stop taking the drug for more than two days, ask your physician about re-starting at a lower dose.
- Sustained-release form occasionally has caused severe liver damage, even at low doses (500 mg).

Generic name (trade name): probucol (Lorelco)

How supplied: tablet (250 mg, 500 mg)

Available as generic: no

Description: Probucol works in the bloodstream to alter the makeup of LDL cholesterol, causing it to be removed more quickly from the blood.

Effects: It lowers total and LDL cholesterol, but it also may lower beneficial HDL cholesterol. May inhibit the oxidation of LDL cholesterol and thus help keep it from being deposited in artery walls.

Possible side effects: Indigestion, diarrhea, headache, rash, and insomnia may occur.

Approximate *cost*: for 120 250-mg tablets, \$65.82**;
for 100 500-mg tablets, \$94.86**

Dosage: 500 mg twice daily

DIGITALIS DRUGS

Like many drugs, digitalis was originally derived from a plant, in this case the foxglove. Digitalis has the primary effect of strengthening the force of contractions in *weakened* hearts, but it is *not* a cardiac vitamin that can make a strong heart stronger. It is also used in the control of atrial fibrillation. The most commonly used digitalis products are digoxin and digitoxin.

Physicians and folk healers have used digitalis preparations for more than 200 years to treat various ailments. The major benefits of foxglove extracts in patients with heart disease were believed to be a result of their ability to control abnormally fast heart rhythms. At the turn of the 20th century, however, it was recognized that digitalis improves the function of the failing heart independently of its effects on the heart rhythm.

The drug penetrates all body tissues and reaches a high concentration in the muscle of the heart. Its molecules bind with cell receptors that regulate the concentration of sodium and potassium in the spaces between tissue cells and in the bloodstream. These two minerals determine the level of calcium—a potent stimulator of heart contractions—within muscle cells. Digitalis preparations act by increasing the amount of calcium supplied to the heart muscle and thus enhancing its contractions.

Digitalis drugs also affect electrical activity in cardiac tissues. They control the rate at which electric impulses are released and the speed of their conduction through the chamber walls.

These two actions determine the two major uses of digitalis drugs in heart disease—treatment of heart failure and control of abnormal heart rhythms.

Digitalis preparations are a major class of drugs used in the treatment of heart failure. By increasing the force of heart contractions, they increase the amount of blood pumped with each beat. The improved pumping capacity offsets the mechanisms that lead to the enlargement of the failing heart. A more efficient heart pumps more effectively, reducing the tendency for fluid retention and tissue congestion.

When patients with heart failure start taking digitalis, their symptoms improve significantly, particularly the breathlessness that results from congestion of fluids in the lungs. Digitalis drugs also reduce swelling in the legs, alleviate fatigue as blood and oxygen are delivered more effectively to body organs, and increase the person's overall capacity to perform daily activities and exercise.

Digitalis may be given on a short-term basis in acute heart failure or over a long period of time to treat chronic heart failure. Physicians usually prescribe digitalis together with diuretics, which further promote removal of fluids from body tissues. Newer classes of drugs, particularly ACE inhibitors, are now also combined with digitalis and diuretics in the treatment of heart failure.

The availability of other heart failure medications allows physicians to prescribe digitalis drugs at doses that are less likely to produce serious side effects. However, digitalis remains the standard against which the effectiveness of new heart failure therapies is measured.

Digitalis drugs can be used to treat disturbances of the heartbeat, particularly the abnormally rapid contractions of the atria referred to as atrial or supraventricular arrhythmias (especially atrial fibrillation). The drugs restore the normal heartbeat either by interrupting the abnormal rhythm or by slowing down the rapid beats to a rate at which effective and coordinated heart contractions are possible.

EXAMPLES OF DIGITALIS PREPARATIONS

Generic name (trade names): digoxin (Lanoxicaps, Lanoxin)

How supplied: tablet (0.125 mg, 0.25 mg, 0.5 mg), capsule (0.05 mg, 0.1 mg, 0.2 mg), elixir (0.05 mg per ml, 60-ml bottle), injection (0.5 mg in 2 ml, 0.1 mg in 1 ml)

Available as generic: **yes**

Description: It is a digitalis drug extracted from the leaves of the foxglove plant. It slows the heart rate so that each beat is more effective in pumping blood.

Effects: It treats heart failure and corrects some abnormal heart rhythms.

Possible side effects: Some side effects include tiredness, nausea, loss of appetite, and disturbances in vision.

Approximate *cost*: for 100 tablets, 0.125 mg, \$5.59 to \$8.63; 0.25 mg, \$5.99 to \$10.19

Dosage: 0.125 mg to 0.25 mg per day for adults; reduced dosage for children based on weight and

age; up to 3 times a day to start and then once daily

Notes:

- Check with doctor before combining with any other medication. There are numerous drug interactions.
- People taking digoxin must be carefully monitored, because an effective digoxin dose may be near the toxic dose.

Generic name (trade names): digitoxin (Crystodigin, Purodigin)

How supplied: tablet (0.05 mg, 0.1 mg)

Available as generic: yes

Description: A digitalis drug from the foxglove plant, it strengthens the force of the heart's contractions.

Effects: See digoxin.

Possible side effects: See digoxin.

Approximate cost: for 100 0.05-mg tablets, average wholesale price, \$2.68***; O. 1-mg tablets, average wholesale price, \$4.32***

Dosage: 0.05 mg to 0.2 mg per day; every 6 to 8 hours for first few doses, then once daily

Note:

- See digoxin.

Diuretics

Diuretics, commonly referred to as water pills, lower blood pressure by increasing the kidney's excretion of sodium and water, which in turn reduces the volume of blood. These are among the older antihypertensive agents, having been introduced for use in the United States in 1957. They are still widely used, either alone or in conjunction with other antihypertensive drugs. Diuretics are also highly effective in the treatment of heart failure.

There are several types of diuretics, which are classified according to their site of action in the kidney. The thiazide diuretics work in the tubules (the structures that transport urine in the kidneys).

The loop diuretics are more potent than the thiazide diuretics. They are so named because they work in the area of the kidney called the loop of Henle. They are usually prescribed when a thiazide diuretic proves insufficient or for patients with heart failure or compromised kidney function.

A third class, the potassium-sparing diuretics, work in the area where potassium is excreted. They

prevent the excessive loss of potassium that sometimes occurs with the thiazides. They are most often given in conjunction with a thiazide or loop diuretic.

Diuretics are highly effective, generally well tolerated, and less expensive than most other antihypertensive medications. They were the medications used in all of the long-term hypertension treatment studies that demonstrated a marked decrease in strokes and heart failure.

EXAMPLES OF THIAZIDE DIURETICS

Generic name (trade name): chlorthalidone (Hygroton)

How supplied: tablet (25 mg, 50 mg, 100 mg)

Available as generic: yes

Description: It is a thiazide diuretic introduced in 1960. It removes excess water and sodium from the body.

Effects: It reduces fluid retention in people with heart failure, kidney disorders, liver disease, or premenstrual tension, and it lowers blood pressure.

Possible side effects: Although uncommon, lethargy, cramps, rash, or impotence may occur. Some of these effects may be caused by loss of potassium and may be avoided by including a potassium supplement or potassium-sparing agent in the regimen.

Approximate cost: for 100 tablets, generic, 25 mg, \$8.87 to \$18.07; 50 mg, \$9.77 to \$18.47

Dosage: 12.5 mg or 25 mg to 50 mg per day

Notes:

- If potassium loss is excessive and digitalis drugs are also being taken, the side effects of those drugs may be increased.
- It interacts with lithium to cause lithium toxicity.
- It may prevent calcium kidney stones or help prevent osteoporosis.
- It may cause uric acid level or glucose level in blood to increase (leading to or aggravating gout or diabetes, respectively). It may also adversely affect lipids.

Generic name (trade names): hydrochlorothiazide {Esidrix, Hydrodiuril, Oretic}

How supplied: tablet (25 mg, 50 mg, 100 mg)

Available as generic: yes

Description: It is a thiazide diuretic introduced in 1958. It removes excess water and sodium from the body.

Effects: It reduces fluid retention in people with heart failure, kidney disorders, liver disease, or pre-

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menstrual tension, and it lowers blood pressure.

Possible side effects: See chlorthalidone.

Approximate *cost*: for 100 tablets, generic, 50 mg, \$3.67 to \$7.59

Dosage: 25 mg to 50 mg per day

Notes:

- See chlorthalidone.

Generic name (trade names): metolazone (Diulo, Mykrox, Zaroxolyn)

How supplied: tablet (0.5 mg, 2.5 mg, 5 mg, 10 mg)

Available as generic: yes

Description: It is a thiazide diuretic. See chlorthalidone.

Effects: See chlorthalidone.

Possible side effects: See chlorthalidone.

Approximate *cost*: for 100 0.5-mg tablets, \$35.20

Dosage: 2.5 mg to 10 mg per day

Notes:

- Metolazone is longer-acting than most thiazide diuretics.
- See chlorthalidone.

EXAMPLES OF LOOP DIURETICS

Generic name (trade name): bumetanide (Bumex)

How supplied: tablet (0.5 mg, 1 mg, 2 mg), injection (0.25 mg/ml 2-ml ampules or 0.25 mg/ml 2-, 4-, and 10-ml vials)

Available as generic: no

Description: It is a short-acting loop diuretic.

Effects: It reduces fluid retention resulting from heart failure, liver disease, or kidney disorders, and it lowers elevated blood pressure. In emergencies, it relieves fluid retention in the lungs.

Possible side effects: See chlorthalidone.

Approximate *cost*: for 100 1-mg tablets, \$31.27 to \$43.39

Dosage: 0.5 mg to 2.5 mg per day divided into two doses

Notes:

- Larger doses maybe required for people with kidney disease.
- See chlorthalidone.

Generic name (trade name): furosemide (Lasix)

How supplied: tablet (20 mg, 40 mg, 80 mg), oral solution (10 mg/ml, 60-ml or 120-ml bottle), injection (10 mg/ml, 4-ml or 10-ml prefilled syringes, ampules, or vials)

Available as generic: yes

Description: It is a short-acting loop diuretic that has been in use for more than 20 years.

Effects: See chlorthalidone.

Possible side effects: See chlorthalidone.

Approximate *cost*: for 100 tablets, 20 mg, \$9.87 to \$17.69 (generic, \$6.17 to \$11.53); 40 mg, \$13.89 to \$22.37 (generic, \$6.53 to \$12.27)

Dosage: 20 mg to 40 mg per day divided into two doses

Notes:

- Larger doses maybe required for people with kidney disease.
- See chlorthalidone.

EXAMPLES OF POTASSIUM-SPARING DIURETICS

Generic name (trade name): amiloride (Midamor)

How supplied: tablet (5 mg)

Available as generic: yes

Description: It is a potassium-sparing diuretic that is rarely used alone.

Effects: Combined with thiazide or loop diuretics, it treats high blood pressure and fluid retention resulting from heart failure or liver disease.

Possible side effects: If excessive potassium is retained, muscle weakness and numbness may result. The drug also can cause upset stomach, lethargy, or rash.

Approximate *cost*: for 100 5-mg tablets, average wholesale price, \$37.76***

Dosage: 5 mg to 10 mg per day

Note:

- It should not be taken in conjunction with lithium.

Generic name (trade name): spironolactone (Aldactone)

How supplied: tablet (25 mg, 50 mg, 100 mg)

Available as generic: yes

Description: It is a potassium-sparing diuretic introduced in 1959, and it is rarely used alone.

Effects: Combined with thiazide or loop diuretics, it treats elevated blood pressure and fluid retention resulting from heart failure, liver disease, or a kidney disorder (nephrotic syndrome).

Possible side effects: If too much potassium is retained, muscle weakness and numbness may result. Nausea and vomiting are fairly common. Side effects may also include diarrhea, lethargy, irregular menstruation, breast enlargement in men, impotence, or rash.

Approximate *cost*: for 100 tablets, 25 mg, \$10.03 to \$17.13

Dosage: 25 mg to 50 mg, given 3 to 4 times per day

Note:

- Interacts with lithium and digoxin.

Generic *name* (trade name): triamterene (Dyrenium)

How supplied: capsule (50 mg, 100 mg)

Available as generic: no

Description: It is a potassium-sparing diuretic introduced in 1964 that is rarely used alone.

Effects: See spironolactone.

Possible side effects: If too much potassium is retained, muscle weakness and numbness may result. It also can cause upset stomach, lethargy, or rash.

Approximate cost: for 100 capsules, average wholesale price, 50 mg, \$28.50***; 100 mg, \$35.85***

Dosage: 50 mg to 100 mg per day

Note:

- All of the potassium-sparing diuretics are available in combination tablets with thiazide diuretics. Examples include Dyazide and Maxzide, which combine triamterene and hydrochlorothiazide, or Moduretic, which combines amiloride and hydrochlorothiazide. These and other diuretic combinations are among the most commonly used medications in the treatment of hypertension. See section entitled "Combination Drugs" near the end of this chapter.

NITRATES

The oldest and most frequently used coronary artery medications are the nitrates. Nitrates are potent vein and artery dilators, causing blood to pool in the veins and the arteries to open up, thus reducing the amount of blood returning to the heart. This has the effect of decreasing the work of the left ventricle and lowering the blood pressure. Nitrates may also increase the supply of oxygenated blood by causing the coronary arteries to open more fully, thus improving coronary blood flow. Nitrates effectively relieve coronary artery spasm. They do not, however, appear to affect the heart's contractions.

EXAMPLES OF NITRATES

Generic name (trade *names*): nitroglycerin (Deponit NTG, Minitran, Nitro-Bid, Nitrogard,

Nitroglyn, Nitrol, Nitrolingual, Nitrong, Nitrostat, Transderm-Nitro, Tridil)

How supplied: sublingual (dissolves under tongue) tablet (0.15 mg, 0.3 mg, 0.4 mg, 0.6 mg); controlled-release buccal (dissolves in the cheek) tablet (1 mg, 2 mg, 3 mg); controlled-release oral tablet (2.6 mg, 6.5 mg); controlled-release swallowable capsule (2.5 mg, 6.5 mg, 9 mg, 13 mg); ointment (2 percent or 15 mg per inch in 1-gin, 3-gin, 20-gm, 30-gm, or 60-gm tubes); oral metered-dose spray (0.4 mg/spray in 14.49 gm/200-dose container); skin patch (0.1 mg/hour, 0.2 mg/hour, 0.4 mg/hour, 0.6 mg/hour)

Available *as generic*: *yes*

Description: This antianginal drug and vasodilator was introduced in the late 1800s.

Effects: Temporarily relieves and prevents anginal pain.

Possible side *effects*: Headaches, flushing, and dizziness may occur.

Approximate cost: For 100 tablets or capsules, average wholesale price, 0.4 mg SL, \$3.94***; 1 mg to 3 mg buccal, \$16.09 to \$19.32***; 2.6 mg to 6.5 mg controlled-release oral, \$4.95 to \$5.40***; 2.5 mg to 6.5 mg controlled-release capsule, \$7.81 to \$7.88*** for a 2 percent, 60-gm tube of ointment, \$4.50 to \$8***; for 14.49 gm/200-dose container of oral spray, \$15.88***; for 30 skin patches, 0.2 mg/hour, \$36.24***

Dosage: 2.6 mg to 27 mg per day (oral tablets); 0.15 mg to 0.6 mg per dose (sublingual); 1 mg to 2 mg per dose (buccal); 1 to 2 inches of 2 percent ointment per dose, or one skin patch daily

Notes:

- Nitroglycerin interacts with antihypertensive drugs to lower blood pressure.
- Nitroglycerin cannot be stored for long periods of time without losing its effectiveness.
- Nitroglycerin skin patches should be used intermittently to avoid the development of tolerance to the drug. Leaving the patch off overnight is usually sufficient.

Generic name (trade names) isosorbide dinitrate (Dilatrate-SR, Iso-Bid, Isordil, Sorbitrate, Sorbitrate SA)

How supplied: Sublingual (dissolves under the tongue) tablet (2.5 mg, 5 mg, 10 mg); chewable tablet (5 mg, 10 mg); swallowable tablet (5 mg, 10 mg, 20 mg, 30 mg, 40 mg); controlled-release tablet (40 mg); controlled-release capsule (40 mg)

METHODS OF TREATMENT

Available as generic: yes

Description: It is a nitrate vasodilator and antianginal drug introduced in the late 1970s; it is a longer-acting form of nitroglycerin.

Effects: It relieves and prevents angina.

Possible side effects: Headaches, flushing, or dizziness may occur. Less frequently, fainting may occur.

Approximate cost: for 100 tablets, generic, 5 mg, \$3.89 to \$9.29; 10 mg, \$4.73 to \$10.77; 20 mg, \$6.19 to \$13.17

Dosage: for relief of angina, 5 mg to 10 mg per dose; for prevention of angina, 40 mg to 160 mg daily

Notes:

- Alcohol and other antidepressants may further lower blood pressure.
- Unlike nitroglycerin, isosorbide dinitrate can be stored for long periods of time without losing its effectiveness.

PERIPHERAL ADRENERGIC ANTAGONISTS

These drugs, which are among the older antihypertensive agents, lower blood pressure by inhibiting the release of adrenaline or by blocking its effect on the nerve endings. Dilation of blood vessels results. They have a sedating effect at high dosages. This remains a major drawback to the continuing use of the drug to treat high blood pressure. This is the least expensive of all the antihypertensive medications, and, in combination with a diuretic, is effective in lowering blood pressure.

EXAMPLE OF PERIPHERAL ADRENERGIC ANTAGONISTS

Generic name (trade name); reserpine (Serpasil)

How supplied: tablet (0.1 mg, 0.25 mg)

Available *as generic*: yes

Description: This is the oldest drug in this category. It is derived from the rauwolfia plant.

Effects: It lowers moderately high blood pressure. It is rarely used by itself; usually used with a diuretic.

Possible side effects: Drowsiness, diarrhea, nausea, dry mouth, dizziness, headache, depression, muscular aches, temporary impotence, weight gain, and rash may occur.

Approximate cost: for 100 tablets, average

wholesale price, 0.1 mg, \$5.19***; 0.25 mg, \$8.81***

Dosage: 0.1 mg to 0.5 mg per day

Notes:

- Reserpine is a component of several combination drugs. See the section entitled "Combination Drugs."
- The rauwolfia plant has been used in India and other Asian countries for many years as a sedative.
- Reserpine is also used for some psychiatric disorders.
- The drug should not be used by people with a history of mental depression.
- The use of reserpine in conjunction with digitalis drugs or quinidine may cause abnormal heart rhythms.

OTHER VASODILATORS

As their name indicates, these drugs lower blood pressure by opening up or dilating arteries, thereby facilitating blood flow through them. Vasodilators are rarely used as initial therapy and are usually prescribed along with other drugs such as a beta blocker and a diuretic. Some produce a very rapid reduction in blood pressure, especially when administered by injection. Thus, they may be useful in treating a hypertensive crisis. For chronic use, several office visits may be needed to fine-tune the dosage. Side effects may be annoying, and lowering of blood pressure may be less when these drugs are used as initial treatment.

EXAMPLES OF MISCELLANEOUS VASODILATORS

Generic name (trade name): hydralazine (Apresoline)

How *supplied*: tablet (10 mg, 25 mg, 50 mg, 100 mg), injection (20 mg/ml-ml ampule)

Available as generic: yes

Description: It is an antihypertensive and vasodilator introduced in the 1950s.

Effects: It lowers moderately to severely high blood pressure.

Possible side effects: Side effects include nausea and vomiting, headaches, dizziness, and irregular heart beat. Less frequently, loss of appetite, rash, flushing, or joint pains will occur. Prolonged use of hydralazine can cause drug-in-

duced lupus, especially in people who metabolize the drug slowly (a tendency that can be determined with a blood test). Symptoms of lupus, an autoimmune syndrome, are fever, joint pains, low blood counts, and inflammation of the linings of the lungs or heart (felt as chest pain on deep inhalation).

Approximate cost: for 100 tablets, 25 mg, \$4.03 to \$7.43; 50 mg, \$5.73 to \$10.23

Dosage: 50 mg to 100 mg daily, generally up to a maximum of 200 mg daily

Generic name (trade name): minoxidil (Loniten)

How supplied: tablet (2.5 mg, 10 mg)

Available in generic: yes

Description: This antihypertensive and vasodilator is never used by itself; it is usually used with a diuretic and other drugs.

Effects: In combination, it controls dangerously high blood pressure and pressure that is rising very rapidly.

Possible side effects: It increases hair growth, especially on the face, back, etc.; other common side effects are fluid retention and shortness of breath. R can cause tiredness, dizziness or light-headedness, nausea, headache, or rash.

Approximate cost: for 100 10-mg tablets, \$71.50 to \$82.50*

Dosage: 5 mg to 20 mg per day

Notes:

- It is always prescribed with a diuretic and often with a beta blocker.
- Ž Because of its side effect of increasing hair growth, it is now available in a solution to treat baldness (Rogaine).

COMBINATION DRUGS

When a person begins drug treatment for heart ailments, his or her physician must first determine the correct dose of the particular drug or drugs that are most effective. Cardiovascular drugs often work best in combination, so the physician may prescribe several different combinations and different doses before achieving optimal results.

In some cases, drugs that are commonly prescribed together are available in a single pill, which may, in some cases, be less expensive than its separate components. Convenience is a major advantage to combination therapy: If a person is on a long-term

regimen including two or three drugs in dosages that are available in a single medication, the physician may prescribe the combination drug to save the person time and effort in his or her daily routine. It should be stressed, however, that combination drugs are usually not prescribed for initial drug therapy.

Some examples of combination drugs now available are listed below. Further information is available by finding each component in other sections of this chapter.

EXAMPLES OF COMBINATION DRUGS

Generic name (trade name): amiloride/
hydrochlorothiazide (Moduretic)

How supplied: tablet (5 mg/50 mg)

Description: It is a potassium-sparing diuretic/
thiazide diuretic.

Approximate cost: for 100 tablets, \$38.50*

Generic name (trade name): atenolo/chlorthalidone
(Tenoretic)

How supplied: tablet (100 mg/25 mg, 50 mg/25 mg)

Description: It is a beta blocker/thiazide diuretic.

Approximate cost: for 100 tablets, 50 mg/25 mg,
\$81.73 to \$112.29

Generic name (trade name): captopril/
hydrochlorothiazide (Capozide)

How supplied: tablet (25 mg/15 mg, 25 mg/25 mg,
50 mg/15 mg, 50 mg/25 mg)

Description: It is an ACE inhibitor/thiazide diuretic.

Approximate cost: for 100 tablets, 25 mg/15 mg,
\$63.80 to \$66*

Generic name (trade name): clonidine/
chlorthalidone (Combipres)

How supplied: tablet (0.1 mg/15 mg, 0.2 mg/15 mg,
0.3 mg/15 mg)

Description: It is a centrally acting drug/thiazide
diuretic.

Approximate cost: for 100 tablets, 0.1 mg/15 mg,
\$27.50 to \$49.50*

Generic name (trade names): chlorthalidone/
reserpine (Demi-Regroton, Regroton)

How supplied: tablet (25 mg/0.125 mg,
50 mg/0.25 mg)

Description: It is a thiazide diuretic peripheral
adrenergic agonist.

Approximate cost: for 100 tablets, average
wholesale price, 25 mg/0.125 mg, \$92.59***;
50 mg/0.25 mg, \$105.50***

METHODS OF TREATMENT

Generic name (trade name): enalapril/
hydrochlorothiazide (Vaseretic)
How supplied: tablet (10 mg/25 mg)
Description: It is an ACE inhibitor/thiazide diuretic.
Approximate **cost:** for 100 tablets, \$88 to \$93.50

Generic name (trade name): hydralazine/
hydrochlorothiazide (Apresazide)
How supplied: capsule (25 mg/25 mg, 50 mg/50 mg, 100 mg/50 mg)
Description: It is a miscellaneous vasodilator/thiazide diuretic.
Approximate **cost:** for 100 capsules, average wholesale price, 25 mg/125 mg, \$32.83***; 50 mg/50 mg, \$49.06***; 100 mg/50 mg, \$59.77***

Generic name (trade name): hydrochlorothiazide/
reserpine (Hydropres)
How supplied: tablet (25 mg/0.125 mg, 50 mg/0.125 mg)
Description: It is a thiazide diuretic/peripheral adrenergic antagonist.
Approximate **cost:** for 100 tablets, average wholesale price, 25 mg/0.125 mg, \$22.83***; 50 mg/0.125 mg, \$35.61***

Generic name (trade names): labetalol/
hydrochlorothiazide (Normozide, Trandate HCT)
How supplied: tablet (100 mg/25 mg, 200 mg/25 mg, 300 mg/25 mg)
Description: It is an alpha- and beta-blocking drug/thiazide diuretic.
Approximate **cost:** for 100 tablets, average wholesale price, 100 mg/25 mg, \$33.21***; 200 mg/25 mg, \$48.72***; 300 mg/125 mg, \$64.83***

Generic name (trade name): lisinopril/
hydrochlorothiazide (Zestoretic)
How supplied: tablet (20 mg/12.5 mg, 20 mg/25 mg)
Description: It is an ACE inhibitor/thiazide diuretic.
Approximate **cost:** for 100 tablets, average wholesale price, 20 mg/12.5 mg, \$87.24***; 20 mg/25 mg, \$88.32***

Generic name (trade name): methyldopa/
hydrochlorothiazide (Aldoril)
How supplied: tablet (250 mg/15 mg, 250 mg/25 mg, 500 mg/30 mg, 500 mg/50 mg)
Description: It is a centrally acting drug/thiazide diuretic.
Approximate **cost:** for 100 tablets, generic, 250 mg/25 mg, \$16.83 to \$29.47

Generic name (trade names,): propranolol/
hydrochlorothiazide (Inderide, Inderide LA)
How supplied: tablet (40 mg/25 mg, 80 mg/25 mg), long-acting capsule (80 mg/50 mg, 120 mg/50 mg, 160 mg/50 mg)
Description: It is a beta blocker/thiazide diuretic.
Approximate **cost:** for 100 tablets, 40 mg/25 mg, \$33*; for 100 long-acting capsules, 80 mg/50 mg, \$55 to \$60.50*

Generic name (trade name): reserpine/hydralazine/
hydrochlorothiazide (Ser-Ap-Es)
How **supplied:** tablet (0.1 mg/25 mg/15 mg)
Description: It is a peripheral adrenergic antagonist vasodilator/thiazide diuretic.
Approximate **cost:** for 100 tablets, generic, \$7.57 to \$12.63

Generic name (trade name): spironolactone/
hydrochlorothiazide (Aldactazide)
How supplied: tablet (25 mg/25 mg; 50 mg/50 mg)
Description: It is a potassium-sparing diuretic/thiazide diuretic.
Approximate **cost:** for 100 tablets, generic, 25 mg/25 mg, \$10.03 to \$17.13

Generic name (trade name): triamterene/
hydrochlorothiazide (Dyazide, Maxzide)
How **supplied:** tablet (37.5 mg/25 mg, 50 mg/25 mg, 75 mg/50 mg)
Description: It is a potassium-sparing diuretic/thiazide diuretic.
Approximate **cost:** for 100 tablets, Dyazide-\$24.37 to \$35.49
Maxzide-\$54.47 to \$80.73
generic-75 mg/50 mg, \$17.73 to \$28.07