

## A Medication Primer for Alternative Health Care Practitioners, Part 3

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*Editor's Note:* As discussed by Dr. Robinson in [part 1](#), the purpose of this article is not to endorse medication use, but rather to arm health care practitioners with the knowledge they can use when evaluating patients, most of whom are likely taking some form of medication.

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When it comes to cardiovascular health, there are three major conditions that may require treatment with medication: hypertension, congestive heart failure and coronary artery insufficiency with angina. As you might expect, there are a variety of medications available to treat each of these conditions, and many work effectively when needed. As you also might expect, they come with a variety of side effects.

### Drugs for Treating Hypertension

The first line of defense in treating hypertension is not drugs. Our first approach is lifestyle modifications: stress reduction or better coping skills, weight control, adequate exercise, and relaxation training in the form of meditation, music therapy, guided imagery, nature walks or bike riding. There is strong emphasis on nurturing relationships and avoiding conflict (conflict resolution training if needed). All Western physicians should follow this non-drug approach (most do, but unfortunately, not all).

*Diuretics:* If drugs are needed because of a high-risk situation (as with a diabetic patient or one with heart disease) the first class of drugs we use are the diuretics (so-called water pills). These reduce blood pressure by decreasing blood volume through increased urine production. All these diuretics enhance water and sodium secretion in the urine. Their effect on other ions depends on the drug, but most diuretics lower body potassium and calcium, and the patient is often put on potassium and calcium supplements (and sometimes magnesium as well).

The leading diuretic is chlorthiazide (Diuril), popular for the past 50 years and still widely used. There are many other drugs in this class with the same actions. They inhibit sodium, chloride and potassium reabsorption in the distal tubules of the kidney nephrons, bringing out water along with the excretion of these ions in the urine. Gentle in their action, mild diuretics are an ideal starting drug for hypertension.

It's always good to avoid pills whenever you can and make up for the potassium loss with the proper foods. Vegetables (especially beans) and milk products are high in calcium and potassium, and bananas are high in potassium. Also high in potassium: dried apricots, raisins, prunes, figs, walnuts, almonds, and Brazil nuts.

Potassium-sparing diuretics are also popular, including spironolactone (Aldactone) and Dyrenium (which turns the urine blue!). More powerful diuretics are used in cases of severe pulmonary edema or fluid retention for other reasons (such as severe congestive heart failure). These include furosemide (Lasix), bumetanide (Bumex) and ethnacrinic acid. These stronger diuretics are also

used in hypertensive crises, along with alpha blocking agents, as discussed below.

Alpha and beta sympathetic blocking drugs are sometimes used to treat hypertension. Alpha blockers relax the blood vessels and lower pressure. These drugs relax smooth muscles in many parts of the body, also improving urine flow in men with prostate enlargement. Examples: Minipres for high blood pressure and Flomax for urinary stream blockage.

*Beta blockers:* This class of drugs slows the heart rate and force of contraction, thereby also reducing blood pressure. Examples include propranolol (Inderal), metoprolol (Lopressor), bisoprolol (Zebeta) and atenolol (Tenormin). These medicines also reduce the risk of some abnormal heart rhythms (they quiet the irritable heart). Their use has been disappointing, however, and they are mostly used today as add-on agents with another drug for refractory cases of hypertension.

Other agents used to treat hypertension include ACE inhibitors and calcium channel blockers. I discuss these drugs in more detail in the following section on the treatment of heart failure.

### Drugs for Treating Heart Failure

Digitalis has been the "gold standard" drug for treating heart failure for a long time. It was first described in the medical literature in 1785 by William Withering. He heard about it from a British village herbalist in Shropshire, who told him about an herbal formula that had magical effects for dropsy. *Dropsy*, meaning "heart failure," comes from the Greek *hydrops*: "swelling of the body." Withering reported to the Royal Society on 156 cases of dropsy successfully treated with digitalis leaf. The paper he wrote on this has been considered the beginning of all modern drug therapy.

It is the digitalis plant leaf that is used in treating heart disease (some doctors still prescribe digitalis leaf). Digitalis comes in a variety of preparations in terms of onset of action and length of activity. Digoxin (Lanoxin) is regular-acting digitalis. It is a true miracle drug for the heart. It increases the force of contraction by its effects on increasing calcium and sodium in the heart muscle cells. This causes increased cardiac output in a weakened, enlarged heart that is failing from coronary artery disease, myocarditis or other conditions. This results in decreasing heart size as it becomes more efficient. It also decreases edema in the lungs, lower extremities and abdomen, with increased venous return. Digoxin increases renal perfusion and helps the kidneys get rid of extra fluid that has been building up in the body.

A loading dose of digitalis is gradually given to the patient, followed by a smaller maintenance dose. When needed, there is nothing else quite like digitalis. However the possible side effects of this powerful drug are always of great concern. Unfortunately, these side effects are common, including what is known as digitalis intoxication when too much is on board: an abnormally slow heart rate (bradycardia) and an irritable heart muscle that is prone to arrhythmias. Fatal ventricular fibrillation can occur. Nausea and vomiting are also common with overdose, which often helps the patient keep the dose in check before something worse happens from taking too much.

Because of the side effects of digitalis and the need to monitor closely all patients who are taking it, particularly when they start taking it, many other drugs are now replacing digitalis as the first line of treatment for heart failure, and also for hypertension. These drugs are considered less dangerous than digitalis. In severe heart failure, however, digitalis may still work the best (and the patient will be closely monitored, often in the hospital).

Classes of drugs to treat heart failure (some are the same drugs we use for hypertension) include:

- Digitalis (less popular now, as noted above)

- Strong diuretics, such as Lasix
- Beta blockers
- Calcium channel blockers
- ACE inhibitors (angiotensin-converting enzyme inhibitors)
- Angiotensin II receptor blockers
- Renin inhibitors

Strong diuretics include furosemide (Lasix) and bumetanide (Bumex). Nothing else is as powerful as these two drugs in getting unwanted fluid out of the body. These drugs also decrease fluid in the lungs, so the patient can breathe more easily. Patients in severe heart failure can lose as many as 15 pounds in three or four days.

Because diuretics make the body lose potassium, calcium and magnesium, the doctor may also prescribe supplements of these minerals. Frequent lab tests must be obtained to check serum potassium levels.

Potassium-sparing diuretics are also used. These drugs include spironolactone (Aldactone) and eplerenone (Inspra). They are primarily potassium-sparing diuretics, but they have additional properties that help the heart work better, may reverse scarring of the heart and may help people with severe heart failure live longer. Unlike other diuretics (which lower potassium), spironolactone can actually raise the level of potassium in the blood; however, sometimes to dangerous levels. Careful monitoring of potassium is needed. It must not be too high or too low (if it is, it seriously affects the heart).

*Calcium channel blockers:* These drugs also have a role in treating hypertension, but their main usage is in treating heart disease. They block the release of calcium from the muscle cell channels (where it resides when it is inactive), which is an all-important step in smooth and cardiac muscle contraction. When these agents are administered to patients the heart becomes more relaxed and is less irritable. It can beat more smoothly and efficiently. Unlike beta blockers, calcium channel blockers do not make the heart less responsive to the sympathetic nervous system, with all its continuous adjustments. This makes things go more smoothly.

These drugs are especially useful in patients (often young men and women) who suffer from episodes of PAT (also known as SVT: supra-ventricular tachycardia). These episodes feel like a flip-flopping heart and often last for two or three minutes, then resolve. The drug of choice for treating PAT is a calcium channel blocker known as verapamil (Isopten).

Other calcium channel blockers that are widely used include nifedipine (Procardia) and diltiazem (Cardizem). There are also many others in use (a long list). In many cases, a calcium channel blocker may be used in conjunction with a beta blocker in treating heart disease. A cardiologist will individualize such treatment.

*The renin-angiotensin system:* This system works to maintain blood pressure at the proper level, even when external conditions would tend to lower it. Examples: dehydration, with reduced fluid volume in the body; blood loss (trauma, GI bleeding, excessive vaginal bleeding, severe nosebleed); severe vomiting or diarrhea; shock with low blood pressure from an anaphylactic reaction (bee sting, allergy to peanuts, strawberries, penicillin, etc.); and shock from a severe illness, such as peritonitis or pancreatitis.

Anything causing a reduced blood flow (either low flow rate or reduced pressure) affects the kidneys: renin is released into the bloodstream from specialized cells near the glomerulus of the kidney (juxtaglomerular cells). This sets in motion a cascade of reactions that combat shock:

- Renin activates angiotensinogen, a protein always circulating in the bloodstream, changing it into angiotensin I.
- Angiotensin I is converted in the lungs to angiotensin II, due to the action of angiotensin-converting-enzyme (ACE).
- Angiotensin II is the most powerful vasoconstrictor known. It constricts the blood vessels throughout the body, raising the blood pressure.
- It also causes the adrenal glands to secrete aldosterone, which causes the kidneys to retain water and sodium, also raising blood pressure.
- Angiotensin II also activates the sympathetic nervous system, also helping to raise the blood pressure and combat shock.

*Angiotensin-converting enzyme (ACE) inhibitors:* These drugs block the formation of angiotensin II, so there is less vasoconstriction. This is helpful when the heart is struggling to pump blood against a high pressure in the systemic circulation. ACE inhibitors thus decrease the workload on the heart. Examples include enalapril (Vasotec), lisinopril (Prinivil, Zestril) and captopril (Capoten). They are widely used to treat high blood pressure.

*Angiotensin II receptor blockers:* These drugs block the receptors in the smooth muscle cells that surround the blood vessels, so they do not respond to angiotensin II. Examples are losartan (Cozaar) and valsartan (Diovan). They have many of the same benefits as ACE inhibitors. They may be an alternative for people who can't tolerate ACE inhibitors (due to nausea, diarrhea, skin rashes).

*Renin inhibitors:* A new class of drugs is now in use that block the action of renin on angiotensinogen so it does not ever get converted to angiotensin I. Examples are aliskirin (Tekturna) and remikirin (brand name not yet available). These are proving to be effective drugs (though still being studied). The main side effects are diarrhea or headaches (these are generally well-tolerated, and diminish with time)

Several large international longitudinal studies comparing drugs used in treating heart failure and hypertension are in progress, such as the ALLHAT Study. They will take years longer to complete. So far in all these studies, no clear winner has emerged, although mild diuretics are strongly holding their own.

## Drugs for Treating Coronary Artery Disease

With narrowing of the coronary arteries, there is decreased blood flow to the heart muscle, causing ischemia (decreased oxygen to heart muscle cells). This is what causes angina (severe chest pain). It also causes ECG changes: ST segment depression (the ECG complex is labeled P-Q-R-S-T). Curiously, an actual heart attack often causes ST segment elevation in the leads closest to the area of myocardial cell death.

*Anti-angina coronary artery dilators:* Nitroglycerin remains the most commonly used agent for angina; usually it is placed under the tongue for rapid onset of action. Liquid nitroglycerin will explode if shaken, and liquid nitroglycerin mixed with diatomaceous earth makes dynamite! However, nitroglycerin has been used since the late 1800s for medical uses. It reaches its peak effect in 1-2 minutes and lasts about 30 minutes. Isorbide dinitrate (Isordil) is longer acting and is used to prevent attacks. Because it takes five minutes to become effective, it is not used for acute attacks.

Side effects of nitroglycerin are few, but sometimes include hypotension, with the possibility of rebound tachycardia because of falling blood pressure, which can then make the angina worse. Nitroglycerin is far more likely to cause this reaction if the patient is taking Viagra or Cialis.

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Part 1 of this article appeared in the [Nov. 18, 2012](#) issue of *DC*; part 2 ran in the [July 1, 2013](#) issue. Part 4 concludes this article series and reviews antibiotics, antifungal agents, antiviral agents, anti-inflammatory drugs and immune-suppressant drugs.

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