

## CARDIAC and CHOLESTEROL CONCERNS

### What's the Problem, and How Do You Diagnose It?

The cardiac concerns of HIV+ people are now a mixture of what HIV alone can cause, and what the addition of antiretroviral drugs, particularly protease inhibitors, can effect. The most frequent discussions of late have centered on the latter, including blood fat problems—sky-high triglycerides, often combined with increased total cholesterol, increased LDL cholesterol (low density lipoprotein cholesterol, the bad kind), and decreased HDL cholesterol (high density lipoprotein cholesterol, the good kind)—and the growing evidence of increased coronary artery disease (CAD), the blood vessel problems that can lead to heart attacks and strokes. The seriousness of blood fat abnormalities now being seen in so many people on HAART has led many to fear that there is considerable potential for the ultimate development of artery damage and heart disease in a significant percentage of people taking antiretrovirals. The thought is that the heart attacks and strokes so far reported may be just the tip of a much larger iceberg. There have also been reports of an increasing incidence of congestive heart failure in HIV+ people.

Researchers have also reported an increased risk of potentially fatal blood clotting called venous thrombosis in HIV+ people. Venous thromboembolism occurs when a blood clot or other blockage forms in the deep veins of the legs. If the clot breaks free and travels to the lungs, it can block an artery in the lungs (pulmonary embolism). The result is often shortness of breath and other signs of lung illness. In a recent study, researchers found a substantially increased risk for pulmonary embolism in HIV+ people under the age of 50 when compared to HIV-negative patients of similar ages. The reason for this is not clear but the researchers suggested that physicians treating HIV+ people should consider the possibility of venous thromboembolism when they encounter patients with unexplained respiratory symptoms.

**Cardiac diagnostic procedures usually begin with standard tests for blood fats and blood pressure measurements**, but can extend to all the diagnostic measures used for assessing more advanced heart disease, where necessary.

**Blood pressure measurements are a standard starting point for screening for heart disease.** New research has changed the view on what blood pressure is ideal. Although “high blood pressure” warranting treatment has long been defined as a systolic blood pressure measurement (the upper number) of 140 or higher and a diastolic measurement (the lower number) of 90 or higher. High normal has been defined as 130 to 139 over 85 to 89. However, a very large 25-year study of almost 13,000 men in seven countries found that heart attack risk increases by approximately 30 percent for every 10 mm Hg rise in systolic pressure and every 5 mm Hg rise in diastolic pressure, *even within the normal range*. Other studies have found similar increases in women, and have indicated that stroke risk also steadily increases along with blood pressure. The Framingham study has shown that people with high normal blood pressure have a ten-year risk of heart attack or stroke that is almost double the rate of people with optimal blood pressure. Optimal is now defined as systolic less than 120 and diastolic less than 80. Even those with “normal” blood pressure of systolic 120 to 129 mm HG over diastolic 80 to 84 mm Hg have been shown to have a 30 to 50 percent higher risk of heart disease than those with optimal readings.

**The initial lipid (blood fat) screen will look at triglycerides, total cholesterol, HDL cholesterol, LDL cholesterol, and the total cholesterol/HDL cholesterol ratio. Cutting edge cardiologists are now also running tests for homocysteine levels and C-reactive protein. Another test for alpha-lipoprotein (a) is often done by researchers but because it is difficult to do correctly, and the results that might be predictive of heart disease are not well defined or validated, it is not usually done in standard testing.**

After the initial blood test screen, the general approach in the world of cardiology (heart medicine) has always been to individualize followup, based on age. It has long been the case that even for someone with abnormal blood fats, further screening for someone under 30 *with no symptoms* would be unlikely and controversial (to cardiologists, that is). However, with HIV+ people who have the HAART-raised risk, this may be inappropriate. It is well known that cardiac conditions can become advanced before obvious symptoms develop in some people. The fact that a person living with HIV is only, say, 28 years old, may not be very important if HAART is causing serious blood fat elevations, particularly if that person has been on antiretroviral therapy for more than a year. The problem may be to convince an HIV-inexperienced cardiologist of that. With the evidence that HIV disease itself may lead to cardiac problems, even those not on HAART should be monitored closely for any signs of heart disease.

**The standard approach is to do no additional testing, instead just following the recommendations for lipid lowering if LDL is over 160, or if it's over 130 when there are other risk factors.** (This approach would include treatment with lipid lowering agents and recommendations for dietary changes, as discussed below.)

**Blood fat readings that would cause concern include:**

- **Total cholesterol that is greater than 240 on repeated measures (levels between 200 and 240 are considered borderline high and would definitely warrant all the non-drug measures discussed below);**
- **An unfavorable cholesterol/HDL ratio (which is variable, depending on age and sex);**
- **Abnormally high levels of LDL (over 160, or over 130 if there are other risk factors present; recent expert guidelines label LDL levels below 100 as optimal); and**
- **Triglycerides that are significantly above normal (readings below 150 are best, and anything above 200 would be of concern), particularly if they are far above the normal range (especially if they have reached 1,000 or higher at which point this is also a strong risk factor for development of pancreatitis).** Note that triglycerides had long not been thought to be of much concern in the absence of elevated cholesterol, but newer research has shown that elevated triglycerides alone (even when cholesterol is normal) are a risk factor for heart disease.

**Other blood test results that would cause concern include:**

- **Homocysteine that is above normal (normal reference range is 5.4 to 10.4 ).**
- **C-reactive protein that is elevated.**

**The next step in cardiac diagnosis is a stress EKG (an electrocardiogram that compares a baseline resting EKG with one done while exercising on a treadmill), sometimes accompanied by a nuclear scan or echocardiogram.** This is most commonly only recommended for symptomatic patients. However, cardiologists will also look at the list of risk factors that a particular person has, and consider doing the stress EKG in asymptomatic people who have a serious set of such factors. If you don't have other risk factors (see the list below), but are worried that your high blood fats and length of time on a protease inhibitor may be leading you down the path to heart disease, you may have to educate your cardiologist on this. The process will begin with the resting EKG. Then, if that is normal, the stress test will be done. The stress test usually consists of walking on a treadmill, the speed of which is gradually increased. For those unable to do the treadmill exercise, a drug can be used to speed up the heart. The stress EKG is often accompanied by imaging, using either a nuclear scan (in which a radioactive substance is injected followed by X rays done during the testing), or an echocardiogram (the use of an ultrasound to produce a sonogram; sound waves create a picture of the heart during the testing, both before the exercise and immediately afterwards). The imaging is more commonly done in women.

**If the stress EKG is “positive,” meaning that it shows some risk but not an extreme level, the common recommendation would not include immediate followup testing,** but rather focus on modification of risk factors to the greatest extent possible (quit smoking, improve the diet, exercise, and so on).

**If the EKG is “strongly positive,” the next step would normally be coronary angiography** (this is done via the procedure called cardiac catheterization in which X rays of the arteries are taken after dye is injected; this produces what is called an angiogram; it shows very clearly whether arteries are blocked or not, and to what extent). This test is painful for many people (because you are not allowed to move for a lengthy period of time afterwards, and the result can be cramping and pain) and has some risk, although low, of actually causing a coronary event; thus, it should only be used where necessary and appropriate.

**There are newer approaches to assessing heart disease but they are not yet widely accepted by cardiologists. One of these is the ultra fast CT scan of coronary arteries,** an assessment that is looking for calcium deposits. Most people under the age of 30 don't have such deposits, but if they have coronary artery disease, they would. If this test is negative (does not indicate heart disease) but for whatever reason there is concern about the possibility of cardiac disease, the normal recommendation would be to reduce risk factors, to the greatest extent possible, and follow the person carefully, with more frequent tests of blood fats. If this test is positive (that is, it indicates heart disease), it would be appropriate to have a stress EKG and then follow on from there, as above. Some cardiologists fear that people may become too alarmed by the results seen with the ultrafast CT, and go directly to cardiac catheterization when it may not be necessary.

**Another new approach in cardiac testing is the use of magnetic resonance cardiac imaging (cardiac MRI).** Most cardiologists think that this will one day be a good way to assess cardiac risk since it gives a good picture of the arteries, but that it perhaps needs to be improved to the “next level” before it will be acceptable for standard testing.

Another approach that is being used in some HIV studies now is high-speed mode B ultrasound, the use of ultrasound (to produce a sonogram or echocardiogram) to measure changes in femoral (in the leg) and carotid (in the neck) arteries. The problem is that it is not yet entirely clear what results from this would warrant followup testing. In other words, at what point of changes in the artery that this test might show would you know that you are at low risk or high risk or any risk at all. Cardiologists also point out that patients would be unlikely to have significant carotid disease before coronary disease so this test's usefulness in predicting future heart disease in time to do anything about it might be limited.

It's important to know the possible symptoms of serious cardiac events so that you will know to call 911 immediately if such symptoms appear. But before reading these lists, note very clearly that some people show few if any obvious symptoms, and the ones they do have may be much more subtle than you might presume. As with all other aspects of AIDS in which it appears that anything serious might be developing, it's crucial to always, always, always call your physician and report to the emergency room. And be forewarned: so many cardiologists are lacking in HIV disease knowledge that unless you show up with strikingly obvious symptoms of a heart attack or stroke, they may discount the possibility that HIV+ people, especially those at younger ages, could be in a high-risk category.

\*\*\*\*\*

### **Ticker Trouble: Heart Attack Warning Signs**

- ♥ Uncomfortable pressure, fullness, squeezing or pain in the center of the chest lasting more than a few minutes.
- ♥ Pain spreading to the shoulders, neck or arms.
- ♥ Chest discomfort with lightheadedness, fainting, sweating, nausea or shortness of breath

**Note: you may have only one or two of these, and that may *not* include any chest pain.** In fact, a very large (non-HIV) study of 434,877 heart attack victims found that a surprising one-third showed up at the hospital without chest pain. Women, nonwhites, people older than 75, and those with previous heart failure, stroke, or diabetes were most likely to have such painless heart attacks.

\*\*\*\*\*

### **Brain Alert: Stroke Warning Signs**

- ⊗ Sudden weakness or numbness of the face, arm or leg on one side of the body.
- ⊗ Sudden dimness or loss of vision, particularly in one eye.
- ⊗ Loss of speech, or trouble talking or understanding speech.
- ⊗ Sudden, severe headaches with no apparent cause.
- ⊗ Unexplained dizziness, unsteadiness or sudden falls, especially along with any of the previous symptoms.

\*\*\*\*\*

### **What are the Causes?**

All the most recent studies make it clear that antiretroviral therapy, and particularly the use of protease inhibitors, is tied to the serious abnormalities in blood fats being seen in so many, and the heart disease now being seen in increasing numbers. There is also recent evidence that protease inhibitors are directly toxic to the endothelial cells that line blood vessels. Researchers at Ohio State University and the Columbus Children's Research Institute Center of Developmental Pharmacology and Toxicology in Ohio have reported that protease inhibitors have striking negative effects on these important cells which form a single-cell lining of all blood vessels, and are active in modulating and controlling the extent to which blood vessels contract. The endothelial cells also prevent stickiness and clotting. The finding that protease inhibitors are toxic to these cells may help explain the increasing number of reports of aggressive atherosclerosis in protease inhibitor takers.

Studies that have shown triglyceride increases in HIV-negative people given protease inhibitors have been the best proof that the PI's are also the main cause of the extremely high elevations in triglycerides now being seen in many PI users. There have been countless reports and many studies that have shown seriously elevated triglycerides in people taking these drugs. However, it is important to note that there may be considerable differences between individual protease inhibitors' effects on triglyceride synthesis, with some being much more likely to skyrocket these blood fats than others. Although there's no consensus on this, many people have observed that of the current protease inhibitors, ritonavir (Norvir®) would be the drug most likely to cause high triglycerides, and amprenavir (Agenerase®) would be the PI least likely to cause the problem, with the other drugs falling somewhere in between.

In addition to the negative effects of drugs, it is important to remember that many other factors related to HIV disease and the conditions in the body that it creates may be additive factors in the creation of heart disease. For example, blood fats may be abnormal long before antiretroviral drugs are begun. As was learned back in the pre-HAART era, it is not uncommon for untreated people to develop seriously elevated triglycerides (hypertriglyceridemia) and very low levels of HDL cholesterol (the good kind) and too-high levels of VLDL cholesterol (the bad kind). Pre-HAART, researchers reported increased VLDL synthesis in the liver, as well as a decrease in the body's ability to clear triglycerides.

In addition, the body-wide inflammation that HIV disease causes may be an important contributory factor in the long term development of cardiac disease. Heart disease researchers have clearly shown that inflammation plays a key role in the atherosclerotic (artery damaging and blocking) process via which cardiac disease progresses. Oxidative stress, also common in HIV disease, is another key factor in the development of heart disease. Elevated levels of homocysteine, which can occur as the result of folate or B-12 deficiencies (common in HIV disease), may also be contributing. So it appears that, in general, HAART should be considered an additive factor that may increase the potential for cardiac disease, rather than a sole cause. In some cases, it might well be that the use of HAART is simply keeping people alive long enough to see the negative effects on the heart and arteries of long-term HIV disease.

Whether there will ultimately be large numbers of HAART-takers developing coronary artery disease (CAD) and heart attacks or strokes is not yet clear, in part simply because heart disease is slow to develop and no one has yet been on HAART for a really long time. However, multiple studies have now shown not only marked abnormalities in blood fats, but also significant increases in other measures known to be predictive of heart disease, including diastolic blood pressure and thrombotic markers (those that indicate an increased risk for development of the blood clots that can cause heart attacks) such as tissue plasminogen activator (tPA) and plasminogen activator inhibitor I (PAI-1). In addition, increased carotid intimal-medial thickness (a blood vessel measurement that reflects artery damage) has been shown among HIV+ people using protease inhibitors.

Of most concern are the several studies that have actually shown increased risk of heart disease in people using protease inhibitors. In a French study, HIV+ people who had been using a protease inhibitor for more than 30 months had a substantially higher risk of having a heart attack when compared to those who had been using a PI for less than 18 months. In the very large ongoing U.S. HIV Outpatient Study (HOPS), two groups (3000 HIV+ people each) were examined retrospectively, one of which included people on PI-containing regimens, and the other consisting of people on non-PI regimens (any combination of nucleoside analogue reverse transcriptase inhibitors and non-nucleoside reverse transcriptase inhibitors). Those taking PI's had a substantially increased risk of heart attack when compared to those on non-PI regimens. So it does seem likely that the PI drugs are substantially contributing to cardiac problems, most likely due at least in part to the increased blood fats and glucose that the drugs cause in many takers.

However, it is important to note again that you should be wary of absolute generalizations. One of the NNRTI's, efavirenz (Sustiva) has also been shown to cause elevated blood fats and with longer term experience with that drug, it is possible that it, too, could be tied to increased cardiac risk.

Added to the evidence of increasing cardiac disease shown by studies are the numerous anecdotal reports from clinicians of PI users developing angina—chest pain and pressure that can be an early warning of heart disease—and arterial blockage—the clogging up of blood vessels that can ultimately lead to a heart attack. Many HIV specialists have reported that an increasing number of their patients have experienced heart attacks or strokes, or have been diagnosed as needing artery-clearing surgeries. Of particular concern is the fact that such problems are being seen even in HIV+ people in their 30s and 40s, much younger than the typical age at which cardiovascular disease normally occurs.

It is also very important to remember that cardiac disease risk is cumulative, and that the likelihood of developing serious cardiac disease will be increased by every additional risk factor that is present. For HIV+ people, the number of years living with the disease (and the inflammation and oxidative stress that it causes) and the use of antiretrovirals that cause elevated blood fats would be two important risk factors.

Other factors may also contribute. One multicenter study found that a higher intake of alcohol was associated with higher levels of LDL cholesterol so for those who drink much alcohol this could be adding to cardiac risk. Another study showed that a higher intake of polyunsaturated fats and a lower intake of dietary fiber were strongly associated with insulin resistance which could, in turn, increase cardiac risk. There are also many studies in the general population that have tied cardiac disease to a long list of risk factors.

### Cardiac Risk Factors

- The blood fat changes that are considered of most concern are elevated triglycerides, elevated serum total cholesterol and, in particular, elevated low-density lipoprotein (LDL) cholesterol and very low-density lipoprotein (VLDL) cholesterol, and low levels (less than 35 mg/dL ) of high-density lipoprotein (HDL) cholesterol. Cardiologists will consider both the current readings, and the history of blood fat abnormalities.**
- Age (male over the age of 45, or female over the age of 55 or female who has experienced premature menopause without estrogen replacement therapy)**
- Previous history of coronary artery disease (CAD)**
- Family history of premature CAD (definite heart attack or sudden death before age 55 in male parent or sibling, or before age 65 in female parent or sibling)**
  
- Hypertension (high blood pressure)**
- Diabetes**
- Current cigarette smoking**
- Obesity (being significantly overweight)**
- Intake of partially hydrogenated fats (found in many margarines, shortenings, baked goods and snack foods)**
- Physical inactivity.**

### What are the possible treatments?

Addressing the blood fat problems—sky-high triglycerides, often combined with increased total cholesterol, increased LDL and VLDL cholesterol (the bad kinds), and decreased HDL cholesterol (the good kind)—that so many people on HAART are developing is crucially important to help provide long term protection against artery damage and heart disease. Addressing oxidative stress and inflammation will also be key in heart disease prevention.

It is important to distinguish between therapies that may help prevent heart disease, and the much more difficult therapies that may be necessary for people with advanced heart disease. For the first, an integrated approach that combines nutrient therapies with exercise and, where appropriate, lipid-lowering drugs might help to prevent, or at least slow the development of coronary artery disease. When heart disease becomes too advanced for such therapies to help, the surgical interventions that open up arteries, or replace hopelessly blocked arteries with clear ones, may be necessary.

### Key Therapies

**Dietary Changes.** The standard medical advice for high blood fats would usually begin with advising dietary changes to lower fat intake, but the experience of most clinicians, as well as the findings from most of the studies so far done, indicate that changing what people are eating is unlikely to be of substantial benefit for lowering the sky-high blood fats that some HAART meds cause. However, one multicenter study did find that both a higher intake of polyunsaturated fats (like corn oil and safflower oil and all the foods made with such polyunsaturated fats; read food labels to identify these) and a lower intake of dietary fiber (which comes from using white instead of whole-grain products, and eating too few fruits and vegetables) were strongly associated with insulin resistance. (*Clin Infect Dis* 2001; 33:710-717) Since insulin resistance is a risk factor for heart disease, moving toward a better diet that emphasizes monounsaturated fats (like olive oil) instead of polyunsaturated fats, as well as whole foods that are high in fiber (whole grains, fruits and vegetables) may help. (See NYBC's *Self Care Guide* for specifics on these dietary suggestions.)

The same researchers also found that a higher intake of alcohol was associated with higher levels of low-density lipoprotein cholesterol (LDL, the bad kind) so limiting or eliminating alcohol may be useful for improving blood fats.

In general, people in North America tend to eat diets too high in fat (usually of all the wrong kinds) so if you're living on a French fry, milk-shake, cheeseburger meal plan, then this might certainly be at least contributing to the high blood fats. In such cases, again, aiming for less fat intake, along with increases in fruits and vegetables and whole grains, especially oats—all of which contribute soluble fiber that can block cholesterol absorption—could help. Soluble fiber sources like psyllium seed (Metamucil) or citrus fiber (Citrucel) or apple pectin powder may also be useful.

In addition, as mentioned in the section on Oxidative Stress, it is very important to eliminate partially hydrogenated fats (often called “trans” fats) from the diet. These are chemically modified fats that are found in most margarines, vegetable shortening, and a large percentage of commercial baked goods (including most breads, crackers, cookies, pastries, etc.) and snack foods. Everyone who cares about protecting their cardiovascular system needs to read labels (look for the words “partially hydrogenated” followed by any oil) and try to avoid these artery-damaging fats to the greatest extent possible. Instead, stick with the fats Mother Nature made, especially the monounsaturated fats like olive oil. If flavor is an issue to you in terms of oil choices, note that olive oil is available in the more full-flavored green varieties, as well as in lighter versions that have little or none of the usual olive taste. For baking or other cooking where you don't want the traditional olive oil flavor, the latter would be a good choice. There are other monounsaturated oils that would be good choices, including walnut oil and almond oil. Some of the other monounsaturated oils are less desirable. For example, canola oil is heavily processed (using heat and chemicals) in ways that make it less appealing for those seeking the best oil for cardiovascular health.

To find baked goods and snack foods that don't contain partially hydrogenated fats, you may need to seek out a whole foods supermarket or one of the large supermarket chains (Safeway and King Sooper's and other national chains) that now carry a substantial amount of “health foods” or “natural foods.” Luckily, some of these stores now have entire aisles of healthy foods, and their bread sections include some of the organic whole-grain breads that generally don't have any trans fats on their lists of ingredients.

There are other fats that could be helpful in reducing cardiac disease risk. Eating fatty fish (such as salmon, mackerel, sardines, tuna, cod and halibut) is a good source of omega-3 fatty acids. Studies of the general population (not HIV-specific) have shown reduced triglycerides and reduced incidence of heart disease in those who consume several helpings of such fish weekly. Note that the use of fish oils has not been studied in those with PI-caused high triglycerides, so it is not known if they would work as well in this population, but there would still be an overall cardiac benefit from regular intake of such fatty fish.

Dietary changes can also help to lower blood pressure significantly. Two large studies have now shown that the DASH diet (Dietary Approaches to Stop Hypertension) can significantly reduce blood pressure. This is a diet that is high in fruits, vegetables, whole grains, and low-fat dairy products, and is moderately low in fat. The recommendation is to consume 7 to 12 servings of fruits and vegetables daily (with the exact number dependent on how large and how active you are), 6 to 13 servings of whole grains daily, 1 to 3 servings daily of meat, poultry, or fish, 2 to 4 servings of oil or other fats daily, and 3 to 7 servings per week of nuts, seeds, or beans. For those who are sodium sensitive (and not everyone is), reducing salt to very low levels will further lower blood pressure.

**Drug switches.** Several switch studies have shown that blood fats that were elevated during protease inhibitor therapy fell after people switched from the protease inhibitor (PI) to either the non-nuke nevirapine (Viramune) or the nuke abacavir (Ziagen®, ABC). Switching to the non-nuke efavirenz (Sustiva) has *not* been shown to consistently improve blood fat levels. Thus, some “PI-sparing” regimens may work better than others, although much more research will be required to determine what really may be best in this regard. It will be very important to take into account the treatment history for anyone considering switching drugs, since some people may really need the PI(s) to maintain viral control.

**Human growth hormone (Serostim).** Numerous studies and anecdotal reports have shown that human growth hormone (Serostim) often effectively shrinks big bellies. Since belly fat is known to be associated with the risk of heart attacks, reducing the fat with Serostim might be one way to reduce cardiac risk. As with other aspects of lipodystrophy, there has not yet been sufficient data collected to see if those so treated eventually develop less heart disease but for now, eliminating this belly fat would seem wise, where possible. For a full discussion of the pros and cons of growth hormone use, see the entry entitled *Human Growth Hormone (Serostim)* under *Key Treatments* in the *Body Distortions* section of this guide.

**Insulin Sensitizing Therapies.** Because insulin insensitivity (which elevates insulin levels in artery-damaging ways) and elevated blood sugar (which also causes damage to blood vessels) are risk factors that heighten the chances of developing heart disease, using all the therapies known to help prevent or reverse insulin resistance may help to counter artery damage and slow the progression of that to full-blown heart disease. **In fact, of all the things that HIV+ people might do to help prevent the long-term development of cardiac problems, this may be one of the very most important.**

(For a discussion of the specifics on the therapies that may work for this, see *Blood Sugar Problems, Insulin Resistance, and Diabetes*.)

**Lipid Lowering Agents and other Cardiovascular Medications.** With high cholesterol readings, the drugs that act as cholesterol lowering agents are often recommended. It is encouraging that we've now had a number of reports on the successful use of such drugs but the specific agents need to be chosen carefully because of the potential for drug interactions with the protease inhibitors.

**Statin** drugs help prevent the chemical conversion of fats into cholesterol, and work well to lower LDL cholesterol. However, some of these drugs use the same liver enzyme pathway used by protease inhibitors (CYP 3A4) while others do not, so the risk of negative interactions with PIs varies considerably between the different drugs. Currently, it is thought that the most acceptable choices are pravastatin or atorvastatin, with fluvastatin considered a secondary possibility. Lovastatin and simvastatin should not be given with PIs. It is also important to be careful about interactions with herbs. The heavily promoted cholesterol-lowering herbal compound called Cholestin works similarly to the statins and may cause similar interaction problems. **Note: All statin drugs severely deplete coenzyme Q-10. Supplementation with 100 to 400 mg daily is needed by anyone on these drugs.**

**Fibrates** are another class of lipid-lowering drugs which may help with blood fat abnormalities. They are considered the best choice for those who have only elevated triglycerides (but no cholesterol problems). Some believe that of the available fibrate drugs, fenofibrate may be preferable to gemfibrozil because it is easier to take and may do a better job lowering elevated LDL cholesterol. Sometimes the two classes of fat-lowering drugs (statins and fibrates) are used together to improve effectiveness, but it is important to know that this increases the risk of muscle toxicity, a side effect of statins. **Note: some fibrates, including gemfibrozil, deplete both vitamin E and coenzyme Q-10 so these nutrients should be supplemented in anyone using these drugs.**

The **B vitamin niacin** can lower overall cholesterol, LDL cholesterol and triglycerides. Niacin actually works better than the statin drugs to raise HDL cholesterol. However, there are several potential problems with niacin. First, the dose of niacin required to lower blood fats is quite high, usually from 1,000 to 3,000 mg daily. Even at much lower dosage levels, many people experience flushing, redness, warmth and, in some people, painful stinging and itching for a period of a half-hour or more after the niacin is taken. liver toxicity. Also liver enzyme tests should be done to watch for such toxicity, a possibility that exists even at the 1,000 mg daily dose (the minimum dose that is generally necessary for improving blood fats), and increases with higher doses. Blood glucose (blood sugar) levels should also be monitored because niacin has the potential to increase insulin resistance and, thus, raise blood sugar. Some experts say that this characteristic makes it inadvisable for HAART takers since many people on HAART will develop insulin problems, and that this is particularly true for anyone already showing signs of blood sugar problems.

The newly available **policosanols** derived from rice wax (or often sugar cane wax) have been used with some success in people with high LDL cholesterol. **However, data in 2006 from a large German study cast considerable doubt on their efficacy.** They are a mix of higher aliphatic alcohols. (Aliphatic means a chain of carbon atoms rather than a ring.) In one small study of healthy volunteers, treatment with 5 or 10 mg per day of policosanol showed a benefit in preventing lipid oxidation of LDL. Rat and other studies have demonstrated no toxicity. There are anti-platelet aggregation activities, so be very cautious or avoid this if you are using blood thinners such as warfarin (Coumadin). **Please note that NYBC is considering discontinuing this product. If you want to try it, it is inexpensive and pretty safe—so start at the time of new blood work and see if it works. LET US KNOW WHAT HAPPENS!**

**The amino acid L-carnitine** (the prescription form of which is Carnitor) is an important possibility for lowering triglycerides. Not yet studied for HAART-caused problems, several studies in the pre-HAART era showed it to be effective in normalizing HIV-elevated triglycerides when used in doses of 6,000 mg per day. It is important to remember that the elevated triglycerides being seen today may result from some combination of HIV effects and drug side effects so this pre-HAART evidence would seem to indicate that at the least, the contribution of HIV to the elevated blood fats might be countered by carnitine. Note that the standard carnitine dose that is approved in the U.S. for elevated blood fats is 3,000 mg daily (three 333 mg capsules, three times daily). For complex reasons (related more or less to biochemical barriers that need to be pushed past), the researchers who found effectiveness in lowering triglycerides with the 6,000 mg dosing believe that lower doses may be insufficient to achieve the improvement. This would mean that you might need to take twice the approved amount in order to see the improvements you're seeking. Some doctors have found that using a combined approach with Carnitor (3,000 to 6,000 mg daily) or L-acetyl-carnitine (500 mg, three times daily, or 1,000 mg twice daily) and one of the lipid-lowering drugs can result in normalization of blood fats when drugs alone do *not* do the job, so that is another approach that might be worth considering.

Carnitine may also help with other aspects of cardiac disease. It helps improve the metabolism of heart muscle cells, and there is research showing that supplementation with L-carnitine may improve symptoms of angina and help reverse congestive heart failure and intermittent claudication (inadequate circulation in the legs, often leading to clotting).

If you don't have coverage that will reimburse the cost of Carnitor, note that the over-the-counter L-acetyl-carnitine can also help, and at lower doses. The reason is that acetyl-carnitine will release four times the amount of free carnitine into the blood, when you compare equivalent doses of standard L-carnitine (Carnitor) and L-acetyl-carnitine. So if you're paying for it, this is the way to go. The only possible side effect from carnitine is diarrhea at higher doses so watch for this (the dosing at which this might occur is individual so your personal results will have to be your guide).

**WARNING: Many drugs prescribed for various aspects of cardiac disease can cause nutrient deficiencies in the body. Some of these deficiencies are of the nutrients already likely to be deficient in HIV disease, potentially making the deficiency in an HIV-positive person even more severe than it might be in an HIV-negative person taking the drug. The effects on nutrient levels of some of the drugs most likely to be prescribed in HIV+ people with cardiac disease are listed here.**

- **Loop diuretics (for example, furosemide) can increase the excretion of a number of nutrients, leading to the depletion of magnesium, potassium, thiamine, B-6, and vitamin C.**
- **Some ACE inhibitors (for example, Captopril) can cause increased zinc excretion and, thus, lead to a zinc deficiency.**
- **All beta-blockers (for example, propranolol) and all the thiazide diuretics lead to depletion of coenzyme Q-10 and, thus, deficiency of this important nutrient; the thiazides also cause magnesium and potassium deficiencies.**
- **All statin drugs severely deplete coenzyme Q-10. Supplementation with 100 to 400 mg daily is needed by anyone on these drugs.**
- **Some fibrates, including gemfibrozil, deplete both vitamin E and coenzyme Q-10.**
- **Bile acid sequestrants lead to multiple fat-soluble nutrient deficiencies, including vitamins A, D, E, and K.**

**Many of these nutrients are the very ones that people need in order to improve cardiovascular protection. Anyone taking these drugs should supplement with the nutrients that may be affected.** For more information on this, see *Drug-Induced Nutrient Depletion Handbook*, by Ross Pelton, RPH, James LaValle, RPH, Ernest Hawkins, RPH, and Daniel Krinsky, RPH; Publisher: Lexi-Comp; order by calling 800-837-5394; [www.lexi.com](http://www.lexi.com).

**Nutrient therapy.** There are multiple nutrients that can be useful for cardiovascular protection. Some of these are nutrients that have been found to be commonly deficient in HIV+ people, making supplementation with them even more important for those seeking to protect their heart and arteries.

**Magnesium**, which Canadian researchers have found is deficient in a large percentage of HIV+ people, can help prevent arterial damage and protect the heart in doses of 500-600 mg daily. Magnesium works as a vasodilator, thus potentially lowering blood pressure, and is involved in energy pathways in the body and, thus, may boost energy and improve heart efficiency.

**Potassium** is essential for regulating the heartbeat and helping to maintain normal blood pressure. Most of your potassium intake should come from your diet. The best sources of potassium are fruits and vegetables. Particularly potassium-rich foods include apricots, bananas, cantaloupes, potatoes, and spinach. Supplemental potassium can also be used under the direction of a physician.

**Also very important are the antioxidants** (including vitamins E and C, bioflavonoids, selenium, carotenoids, N-acetyl-cysteine, coenzyme Q-10, and alpha-lipoic acid). These nutrients help to counter oxidative stress and prevent the chemical changes in the blood vessels and the blood fats that are required for the fat to be deposited into the lining of the blood vessels, thus helping to prevent damage to the arteries. So even if you can't fully normalize your cholesterol readings, you can help to prevent damage to the blood vessels by having a plentiful supply of all these nutrients in the body.

Appropriate heart-protective doses might be vitamin E (800 to 1,200 IU daily), vitamin C (2,000 to 6,000 mg daily, spread across three meals), bioflavonoid complex (1 capsule with each meal), carotenoid complex (1 capsule with each meal), selenium (400 to 600 mcg daily, total from all sources, including your multiple), N-acetyl-cysteine (500 mg, three times daily), coenzyme Q-10 (100 to 500 mg daily), and alpha-lipoic acid (200 to 400 mg, three times daily).

**The B complex vitamins are also very important, particularly B-12, folic acid, and B-6** because adequate levels of these can prevent elevation of homocysteine levels in the blood. Elevated homocysteine can cause damage to arterial walls and is a known risk factor for heart disease. Doses of B-12 (1,000 mcg given daily via pills, or one to several times weekly (or at least monthly) by prescription Nascobal nasal gel or injections) and folic acid (800 mcg daily via pills) and B-6 (50 mg, three times daily; this amount is found in many B complex and potent multivitamin formulas) may be very important for cardiovascular protection, even when tests do not indicate obvious deficiencies. The injections or nasal gel forms of B-12 bypass absorption problems that may be present in many HIV+ people due to problems with the parietal cells that produce the intrinsic factor needed for absorption of B-12 consumed orally.

Since B-12 deficiency has been shown in many studies to be widespread in HIV disease—and researchers have noted that standard blood test results frequently do *not* accurately reflect deficiencies—supplementation with B-12 and folic acid would seem to be appropriate for anyone seeking long-term cardiovascular protection. Because other B vitamins are often deficient in HIV disease (some of which, including B-6, are also important for cardiovascular protection) and because it is always best to avoid taking any B vitamin alone (without the rest of the B complex), it is always recommended that supplementation with B-12 and folic acid should be accompanied by taking the full B complex (as found in a potent multiple or in a separate B complex supplement). And again, do remember that you should never take folic acid without B-12 since using it alone can prevent the cellular changes that would otherwise indicate a B-12 deficiency. For more information on these **Antioxidants** please see this *Guides' Introduction* and *NYBC's Basic Nutrient Protocols*.

**A metabolite of pantothenic acid (a B vitamin) called pantethine may also be very useful.** In several studies in non-HIV+ people, pantethine supplementation has been shown to lower both total cholesterol (by an average of about 15 percent) and triglycerides (by an average of about 30 percent). The doses used in these studies were in the range of 600 to 1,200 mg daily. Other studies (also in non-HIV+ people) have shown that pantethine may help inhibit the formation of dangerous blood clots and help prevent irregular heart beats. Although unstudied in HIV+ people with elevated blood fats, the use of pantethine as part of a total approach to lowering blood fats would seem appropriate.

**To prevent congestive heart failure, Coenzyme Q-10 is very important.** Although well-studied in Japan where its successful use for reversal of congestive heart failure has been frequently published leading to its acceptance as a standard therapy, there has been little attention to this antioxidant in the U.S. The biggest problem with its use is the high cost of the doses used in Japan for heart failure, doses which range from 500 mg up to 6,000 mg daily. However, it is certainly possible that lower doses of 100 to 500 mg daily might at least help prevent heart problems. For those who can afford it, the Japanese research would seem to indicate that higher amounts would likely be considerably more useful. Coenzyme Q-10 may also help lower blood pressure and reduce angina. [For additional information on all of these nutrients, see *A Basic Nutrient Protocol* in this guide's Introduction.]

**Phosphatidyl choline 35% from lecithin may also help with cholesterol problems.** This phospholipid is found in both capsules and food-grade lecithin granules, and early reports based on animal research had led to many claims about its possible usefulness in heart disease. However, the research in humans has been inconsistent. It appears that part of the problem may be that the lecithin granules used in most studies actually contain a number of different phospholipids and fatty acids, and may not always have the concentration of phosphatidyl choline that might be necessary to achieve benefits. More recent research using high-potency phosphatidyl choline (rather than the common lecithin granules) has shown that it may raise the levels of HDL cholesterol (the good kind).

**Essential fatty acids** (especially omega 3; fish oils): Foods and supplements rich in EFAs reduce the internal production of pro-inflammatory prostaglandins and increase the production of anti-inflammatory prostaglandins. EFAs are specific for lowering cholesterol, inhibiting platelet aggregation, and reducing inflammation. Rich sources of EFAs include: Oily fish (sardines, herrings, mackerel, salmon); oils of the seeds of black currant, borage, cannabis, evening primrose, and flax. When taking EFAs, it is important to take a mixed EFA supplement.

**Dosage:** 6-12 g daily for several months. Caution: When supplementing with EFAs it is important to increase intake of antioxidants (vitamins A, C, E, zinc, selenium, N-acetyl cysteine). When taking fish oils increase intake of antioxidant nutrients, especially vitamin C.

**Anti-inflammatories.** Research has made it clear that inflammation plays a key role in the atherosclerotic (artery damaging and blocking) process via which cardiac disease progresses. HIV disease is known to cause significant inflammation in the body, often as a result of the elevated production of inflammatory cytokines, cell-produced chemicals that are released as part of the body's immune response. Thus, the idea of countering this inflammation as part of an overall approach to lowering cardiac risk would seem to be appealing.

Daily doses of low-dose aspirin (81 mg, once daily) have long been recommended as a way to help prevent cardiac disease. Although aspirin is known to have anti-inflammatory effects in higher doses, researchers believe that the low-dose aspirin's cardioprotective effect is related to other mechanisms rather than to an effect on inflammation. There are a number of much more potent drugs that suppress inflammation but cardiac researchers don't believe that we yet have sufficient research on the long-term use of anti-inflammatory drugs to know what might be effective versus what might be needlessly risky. One problem is that over-suppressing the inflammatory response might increase the risk for infections (since the inflammation is part of the immune system's way of countering infections). In addition, anti-inflammatory drugs can cause many side effects, particularly gastrointestinal bleeding.

Lipid-lowering drugs may help because simply lowering LDL cholesterol helps stop the beginning of the process that leads to inflammation in the arteries. Studies of the statin drugs have shown that they do, indeed, lessen inflammation, both by lowering LDL and by limiting the availability of chemicals that would otherwise participate in the inflammatory process. The research on this is too limited to make any wide recommendations for using statin drugs simply for their anti-inflammatory effects. However, for those being given the drugs to lower blood fats, this may be an important additional benefit. Don't forget that, as discussed in *Lipid Lowering Agents and other Cardiovascular Medications*, for anyone on statin drugs, supplementation with coenzyme Q-10 is crucially important. Doses of 100 to 500 mg daily would be appropriate.

**Botanicals and nutraceuticals .** There are effective botanical and other nutraceuticals therapies that can help prevent, reduce, and potentially reverse, the damages of atherosclerosis (damaged veins and arteries). There are three primary effects of these therapies: 1. Lower cholesterol; 2. Thin the blood; 3. Provide antioxidant protection.

**Arjuna (*Terminalia arjuna*):** Arjuna is a primary botanical used in Ayurvedic medicine for the treatment of heart disease in general and specifically for hypertension, angina, and a failing heart in the elderly. It increases the contractile force of the heart, lowers cholesterol, and is rich in flavonoids which have antioxidant activity and a strengthening effect on the vascular system in general.

**Caution:** May potentiate the effects of conventional cardiovascular medications.

**Artichoke Leaf (*Cynara scolymus*):** Increases flow of bile, inhibits cholesterol biosynthesis and lowers serum lipids, antioxidant, increases liver regeneration, protects liver cells from chemical damage. Specific indications include: Dyspeptic complaints, nausea, vomiting, spasmodic abdominal pain, stomach ache, loss of appetite, constipation, bloating. The recommended dose is the equivalent of 4-6 g daily.

**Bilberry (*Vaccinium myrtillus*):** Bilberry is closely related to the common blueberry and is rich in proanthocyanidins that have powerful antioxidant activity. It is most widely researched for its beneficial effects in reducing the progression of macular degeneration and diabetic retinopathy. Its antioxidant activity and high degree of safety makes it an ideal botanical for supporting a healthy cardiovascular system. The recommended dose is the equivalent of 320 mg of proanthocyanidins daily.

**Cholestatin:** Cholestatin is a concentrate of plant sterols, which may help sustain healthy blood fat levels and lower levels of the inflammatory cytokine IL-6. It is not recommended for those who have had organ or bone marrow transplants. Also, diabetics may need to monitor blood insulin levels.

**Coleus (*Coleus forskolii*):** Coleus is rich in a group of constituents known as diterpenoids, most notably, forskolin, which improves the contractility of the heart and lowers blood pressure. It has specifically been studied for the treatment of congestive heart failure and additionally has vasodilator and blood thinning activity.

**Caution:** Use with care in those with bleeding disorders or on blood thinning medication. May potentiate the effects of conventional cardiovascular medications.

**Cramp bark (*Viburnum opulus*):** Studies have shown cramp bark to relax the coronary artery. Specific for spasmodic pain.

**Flax Fiber** is ground flax meal and may be helpful primarily as a means to improve digestion. It can also provide some polyunsaturated fatty acids. It contains soluble and insoluble fibers as well as lignans. Other fiber products may work as well; look for one containing both water soluble and insoluble forms of fiber. Insoluble fiber is found in wheat bran, whole-wheat products, popcorn, nuts, seeds, corn, and raw fruits and vegetables; soluble fiber is found in oat bran, apples or applesauce, oatmeal, citrus fruits, beans, apricots, pears or peaches without the skin, and many other vegetables and fruits. Those currently suffering from diarrhea should emphasize soluble fiber and avoid insoluble fiber, which can be too irritating and may worsen the diarrhea.

**Hawthorn (*Crataegus* spp.):** One of the primary botanicals for the general health of the cardiovascular system. Most clinical studies have focused on its ability to promote coronary blood flow. It is also rich in flavonoids and proanthocyanins that have strong antioxidant activity which support cardiovascular health. Naturopathic physicians use hawthorn as a cardiogenic. They report that hawthorn can lower blood pressure and strengthen the heart's contractions (so then the heart doesn't have to pump as frequently, thus increasing the efficiency of cardiac output). The end result is that it calms and strengthens the heart. Naturopathic physicians often prescribe this preventively for those with cardiovascular risk, and as a treatment for congestive heart failure as part of a combined approach that may include other nutrients like coenzyme Q-10, lifestyle modifications (diet and exercise changes) and other therapies, as needed. Please use Hawthorn extracts yielding 2.2% flavonoids. The recommended dose is 900 mg daily of an extract yielding 2.2% flavonoids.

**Caution:** May potentiate the effects of conventional cardiovascular medications.

**Lecithin** (phosphatidylcholine) is a phospholipid, a type of fat important in the structure of all membranes. They are beneficial to myelin sheath production and, thus, nerve protection. Cell membranes are largely composed of phosphatidylcholine, as are the protective sheaths surrounding the brain. Food-grade lecithin is a substance commonly used as a food additive and nutritional supplement that contains phosphatidylcholine, as well as other phospholipids, including phosphatidylinositol and phosphatidylethanolamine. [To avoid confusion, note that to a chemist lecithin is phosphatidylcholine; we are using the term here to refer to the food-grade lecithin granules available in health food stores as a supplement. It consists mostly of the B-vitamins choline and inositol along with linoleic acid and other fatty acids, glycerin, and phosphorus.

Although lecithin is a lipid, it is partly water-soluble and thus acts as an emulsifying agent. It has a pleasant if bland flavor and can be added to shakes and smoothies for a creamy effect. Most lecithin is derived from soybeans, but egg lecithin (from egg yolks) is also available; some studies show that this form is more beneficial for HIV+ people. Other sources of lecithin include brewer's yeast, grains, legumes, fish, and wheat germ.

**Magnesium glycinate** may help to increase magnesium level in red blood cells. Apparently, it is better absorbed than forms such as magnesium oxide or citrate which may cause diarrhea. Check other sources of supplements for magnesium levels. There are few data to support its use in humans.

**Pantethine.** There are human clinical studies of this relative of pantothenic acid (vitamin B5) that show a benefit in lowering LDL cholesterol, including in children (20%). A dose of about 900 mg may be necessary to achieve any benefit — but that is using it as a monotherapy. Some of the combination therapy approaches proposed here may permit use of a lower dose.

The newly available **Policosanols**, derived from rice wax (or often sugar cane wax) have been used with some success in people with high LDL cholesterol. They are a mix of higher aliphatic alcohols. (Aliphatic means a chain of carbon atoms rather than a ring.) In one small study of healthy volunteers, treatment with 5 or 10 mg per day of policosanol showed a benefit in preventing lipid oxidation of LDL. Rat and other studies have demonstrated no toxicity. An important Cuban study in humans showed that policosanol administration (10mg) actually worked better than lovastatin in terms of reducing LDL, total cholesterol and improving HDL. Triglycerides and fibrinogen levels were also reduced. Another Cuban study, however, showed it did not work quite as well as atorvastatin, though it was less toxic and better able to increase HDL. In that study, however, policosanol was observed to result in a reduced CPK (kidney function), glucose and AST (liver enzyme) levels. There are anti-platelet aggregation activities, so be very cautious or avoid this if you are using blood thinners such as warfarin (Coumadin).

**Cholestatin:** Cholestatin is a concentrate of plant sterols, which may help sustain healthy blood fat levels and lower levels of the inflammatory cytokine IL-6. It is not recommended for those who have had organ or bone marrow transplants. Also, diabetics may need to monitor blood insulin levels.

**Artichoke Leaf (*Cynara scolymus*):** Increases flow of bile, inhibits cholesterol biosynthesis and lowers serum lipids, antioxidant, increases liver regeneration, protects liver cells from chemical damage. Specific indications include: Dyspeptic complaints, nausea, vomiting, spasmodic abdominal pain, stomach ache, loss of appetite, constipation, bloating. The recommended dose is the equivalent of 4-6 g daily

**Salvia (*Salvia miltiorrhiza*):** One of the primary Chinese botanicals for enhancing coronary circulation. It slows the heart rate, has cholesterol-lowering and blood-thinning properties, antioxidant activity, and reduces blood pressure. One mechanism of action is its ability to stimulate the release of nitric oxide from endothelial cells thus promoting vasorelaxation.

**Caution:** Not to be used in conjunction with blood thinning medications or in those with bleeding disorders. May potentiate the effects of conventional cardiovascular medications.

**NYBC Antioxidant Heart Supplements:**

Allicin 20mg x 30	1-3/d (0-1B, 0-1L, 0-1D)
See Anti-inflammatories & Antioxidants	
Bilberry 25% 80mg x 100	320 mg anthocyanins daily.
CoEnzyme Q 10 100mg x 60	1-5/d (0-1B,0-2L,1-2D)
Hawthorn 5:1 500mg x 100	3/d (1B,1L,1D)
Omega-3 1,000mg x 200	6-12/d (2-4B, 2-4L, 2-4D)
Pure Gar 5000mcg allicin enteric x 90	3/d (1B, 1L, 1D)
Salvia Extract x 100 grams	2 teaspoons daily in water

**NYBC Supplements to Lower Cholesterol and/or Triglycerides:**

Allicin 20mg x 30	1-3/d (0-1B, 0-1L,1D)
Arjuna Extract 2% 500mg x 90	3/d (1B,1L,1D)
Artichoke 15% 500mg x 180	3-6/d (1-2B, 1-2L, 1-2D)
Cholestatin .400 mg x 100	3/d (1B,1L,1D)
Flax Fiber x 12oz	1/3-1/2oz/d
Lecithin 35% 1200mg x 200	3-6/d (1-2B, 1-2L, 1-2D)
Magnesium glycinate 220mg x 120	2-3/d (0-1B, 1L, 1D)
Omega-3 1,000mg x 200	6-12/d (2-4B, 2-4L, 2-4D)
Pantethine 300mg x 60	2-4/d (0-1B,1L, 0-2D)
Policosanols 20mg x 100	1/d at bedtime

**NYBC Nutraceuticals for Heart Support and/or Lowering Blood Pressure:**

Arjuna Extract 2% 500mg x 90	3/d (1B,1L,1D)
Coleus Extract 10% 250mg x 90	3/d (1B, 1L, 1D)
Pur Gar 5,000mcg enteric x 90	3/d (1B, 1L, 1D)
Salvia Extract x 100 grams	2 teaspoons daily in water
Hawthorn 5:1 500mg x 100	3/d (1B, 1L, 1D)
Allicin 20mg x 30	1-3/d (0-1B, 0-1L,1D)
CoEnzyme Q 10 100mg x 60	1-5/d (0-1B, 0-2L, 1-2D)

**NYBC Nutraceuticals for Angina:**

Cramp Bark x 2oz	30-60 drops 3x/d
------------------	------------------

**Exercise.** Countless studies have shown the value of exercise for preventing heart disease in the general population. It can strengthen the heart, lower blood pressure, improve blood fats, and decrease the risk of coronary artery disease. Only a few small studies have so far been done in HIV+ people but their results are promising for those willing to do serious workouts. In a Washington University Medical School study of 18 HIV-positive men on protease inhibitor combos, four months of serious weight lifting (for one to one and one-half hours, four times weekly) resulted in a significant decline in triglyceride levels (from an average of 281 mg/dl down to 204 mg/dl). The men also gained strength and whole body lean

mass, although the 14 of 18 men who had excess central fat did not lose it. The researchers concluded that their findings imply that resistance exercise training-induced muscle growth may promote triglyceride clearance from the circulation of HAART-taking men with elevated triglycerides.

In another small study, a combination of resistance and aerobic exercise lowered both triglycerides and total cholesterol. Based on all we currently know, it seems clear that establishing a regular exercise program for yourself, preferably one that combines aerobic exercise (ideally daily, but at least 3 to 4 times weekly) with weight training (every other day), is very important for long-term protection against cardiovascular problems. [For specific information on exercise, see NYBC's *Self Care Guide*.]

**Emotional support.** Research has shown that both depression and anger are linked to an increased risk of heart disease. Stress is known to raise blood pressure, and has been linked to increases in homocysteine levels and cholesterol. On the other hand, a recent study of older men showed that the most optimistic ones had less than half the risk for heart disease as the pessimists. For all these reasons, using relaxation techniques such as meditation, yoga, or breathing exercises may be useful for preventing heart disease. Using techniques such as affirmations or self-hypnosis which are aimed at creating an optimistic hopeful outlook may also help. Where these are not enough, a professional therapist can often greatly help.

**Weight loss.** Being overweight is clearly tied to an increased risk of high blood pressure and heart disease. If you are significantly overweight, working to eliminate the excess pounds may significantly lower your cardiac risk.

**Smoking cessation.** If you smoke, you no doubt already know this but we'll say it anyway. For long-term protection against cardiac disease, quitting smoking is hugely important. Get whatever will help you to finally and completely stop this artery-damaging habit. Many people have found that some combination of nicotine patches, acupuncture, counseling, group support, hypnosis, and/or drugs have helped. Discuss these options with your physician. A strong dose of willpower will also be needed so motivate yourself in whatever way works best for you. And don't keep waiting until tomorrow to do this. Tomorrow never comes. Today is the day you need to quit.