

Congestive Heart Failure The Exception to Our Success?

Congestive heart failure (CHF) seems to be the exception when it comes to our national battle against heart disease. While other forms of heart disease, including coronary artery disease (CAD), are becoming less common, the rates of CHF continue to rise. The rate of hospitalization for CHF increased 3- to 4-fold between 1971 and 1999 (American Heart Association 2004; McCullough PA et al 2002). It is the leading cause of hospitalization among people over the age of 65, accounting for about 20 percent of the hospital admissions in this group (Jessup M et al 2003).

CHF occurs when the heart cannot pump efficiently enough to supply the body with freshly oxygenated blood. It affects about 5 million people in the United States. Within 5 years, medical experts predict that about half of these patients will have died of their conditions (American Heart Association 2004). Hoping to prolong survival, patients with CHF are typically treated with an array of powerful medications that have been shown to increase survival, often at a high cost. The conventional drugs used to treat CHF have significant adverse effects and, in many cases, implantation of a lifesaving medical device, or even having a heart transplant, may be necessary.

The increase in CHF is partly because of a graying population and our success in treating other forms of heart disease. In many instances, cases of CAD and high blood pressure that would have once resulted in fatal heart attacks are successfully managed, only to have the patient later develop CHF.

Even as CHF becomes more common, it remains very dangerous. According to statistics from the multigenerational Framingham Heart Study, 80 percent of men and 70 percent of women under the age of 65 who are diagnosed with CHF will die within 8 years. Within 1 year of diagnosis, 20 percent of patients will die. The 5-year mortality is about 50 percent (American Heart Association 2004).

Risk Factors for CHF

A number of conditions may lead to CHF, including:

- CAD
- History of heart attack
- Advanced age
- Irregular heartbeats, or arrhythmias
- Heart valve disease
- Thyroid disease
- Diabetes
- Drug or alcohol abuse
- Cardiomyopathy
- Congenital heart defects
- Chronic high blood pressure

Unfortunately, CHF is difficult to diagnose because it often occurs in conjunction with, or as a result of, other forms of heart disease. The best hope for patients with CHF is to catch the disease early, before it has caused permanent enlargement of the heart. The symptoms of CHF include fatigue, shortness of breath, coughing, swelling, and, when severe, bluish extremities.

Once CHF has been diagnosed, physicians usually rely on a constellation of pharmaceuticals to address its symptoms and slow its progression. The exact drugs used depend on the kind and severity of CHF, but some of the more common drugs include:

- **Diuretics** —Sometimes called water pills, diuretics remove excess fluid from the body. Diuretics are often the first line of treatment. A significant side effect is the loss of potassium in the urine, which may result in electrolyte abnormalities (Braunwald E 2001).
- **Angiotensin-converting enzyme (ACE) inhibitors** —These drugs have been shown to improve survival among patients with CHF by lowering blood pressure. Side effects include dangerously low blood pressure, dizziness, coughing, and birth defects (Kostis JB et al 1994).

- **Beta blockers** —These drugs slow the heart rate by making it less sensitive to adrenaline (epinephrine). This medication may be given after a patient's condition has been made stable on ACE inhibitors. Side effects may include weight gain, tiredness, dizziness, and sensitivity to cold. Patients who have a slow heart rate, elevated systolic blood pressure, peripheral vascular disease, asthma, or chronic obstructive pulmonary disease, or who have had certain heart rhythm abnormalities should not take beta blockers (Hunt SA et al 2002).
- **Digoxin** —Digoxin is used to control the symptoms of some forms of CHF and to control heart rate irregularities (Hunt SA et al 2002). Side effects include abdominal pain, nausea or vomiting, diarrhea, and, rarely, dangerous heart rhythm abnormalities.

These drugs may be prescribed in an emergency setting while the physician works to stabilize the patient's condition and in the long-term management of CHF. While these drugs are proven to extend the lives of patients with CHF, they also cause a wide range of side effects that often require even more drug therapy. Despite such intensive drug therapy, the conditions of most patients with CHF will eventually worsen, requiring more serious measures. A physician may recommend insertion of a pacemaker or left ventricular assist device. In extreme cases, the patient may require a heart transplant.

Vitamins and dietary supplements have also been shown to ease the symptoms of CHF—often without the debilitating side effects of more powerful pharmaceuticals (Witte KK et al 2005). Coenzyme Q10 (CoQ10) has been widely studied in CHF and found to increase heart function, while L-carnitine and taurine have been shown to improve cardiac function and lessen the heart's workload (Fugh-Berman A 2000; Schaffer SW et al 2000). Other dietary supplements and nutrients, including minerals (such as magnesium and potassium), antioxidants (such as alpha-lipoic acid and vitamins C and E), and herbs (such as hawthorn) may help ease symptoms of CHF. Each of these will be discussed in detail later in this chapter.

The hormonal system is also affected by CHF. In the early stages of CHF, studies have shown that the body tries to compensate for reduced cardiac function with a series of neurohormonal adaptations that work to maintain normal blood pressure and increase the output of the heart (Dzau VJ et al 1981; Dzau VJ 1987). As the disease progresses, however, this hormonal response is overwhelmed, and the body's delicate hormonal balance is damaged. While there is still much to learn about the interaction of the hormonal system and CHF, hormonal therapy may offer an option for treatment.

It is important to make lifestyle changes that will slow the progression of CHF. These changes include limiting salt intake (sometimes severely), losing weight to reduce the workload on the heart, avoiding alcohol or drugs, and monitoring water intake. As always, no program of dietary supplementation and lifestyle changes should be launched without the consent of a physician.

What You Have Learned So Far...

- The rate of CHF is increasing, at least partly because of our ability to treat other forms of heart disease and partly because of the aging population.
- Half of all patients with CHF die within 5 years of diagnosis.
- Most patients with CHF have other underlying forms of heart disease, especially CAD. This complicates both the diagnosis and treatment of CHF.
- CHF cannot be reversed, but its severity can be improved. At best, conventional medicine uses a constellation of powerful drugs to slow it down. These drugs have side effects that range from mild to severe and may reduce one's quality of life dramatically.
- Besides drugs, CHF can be treated with surgical interventions such as implantation of a pacemaker or even with a heart transplant.
- Some nutrients and supplements—such as CoQ10, L-carnitine, and taurine—have been shown to increase the heart's function or reduce the side effects of drugs used to treat CHF.
- Lifestyle changes, including dietary modifications and avoiding drugs and alcohol (which might stress the heart), are an important part of any heart-healthy program. Patients may also be advised to limit their intake of salt and water.

CLASSES OF CHF

CHF is classified in several ways. It may be identified by the regions of the heart that are affected, by the severity of the disease, or by the area of the cardiac cycle that is compromised. The treatment program will depend on what form of CHF is present and how severe it is.

CHF severity is usually measured according to the New York Heart Association (NYHA) classification system. This model has been used by the American College of Cardiology and the American Heart Association to develop treatment guidelines (Ahmed A 2003). The different classes of CHF include:

- **Class I** —No limitation and no symptoms with ordinary physical activity.

- **Class II** —Slight limitation and symptoms with ordinary physical activity. Comfortable at rest.
- **Class III** —More pronounced limitation because of symptoms, even with less than ordinary physical activity. Comfortable only at rest.
- **Class IV** —Severe to complete limitation of physical activity. Symptoms are present with any degree of physical activity and also appear at rest.

CHF is also described by the region of the heart affected. The heart has four chambers, two each on the right and left sides. Each side of the heart has a filling chamber (atria) and a pumping chamber (ventricle). A complete cardiac cycle, or heartbeat, has all of these chambers working in concert to move blood through the body.

The right side of the heart is responsible for accepting oxygen-poor blood from the body, then pumping it through the right ventricle, into the pulmonary arteries and into the lungs, where carbon dioxide is exchanged for oxygen. After the blood travels through the lungs, it returns to the left side of the heart through the pulmonary veins. Here, the heart's main pumping chamber (the left ventricle) pumps the freshly oxygenated blood through the aorta and out to the rest of the body.

CHF that occurs on the right side of the heart is called cor pulmonale, or right-sided heart failure. It is characterized by an expanded right ventricle. Symptoms include swelling as the blood pools in the legs and lower body.

CHF that occurs on the left side of the heart is characterized by an enlarged and weakened left ventricle. Left-sided heart failure may result in inadequate amounts of blood being pumped through the body and includes symptoms such as shortness of breath and fatigue.

CHF can also be described by the phase of the heartbeat that is affected. A normal heartbeat has two phases: filling and contraction. The filling phase of the heartbeat, when the ventricles are relaxed and filling with blood, is called diastole. If the lower chambers of the heart, particularly the left ventricle, cannot fill properly, it is known as diastolic heart failure.

Once the ventricles have filled with blood, they contract forcefully. This phase is called systole. If the heart cannot contract forcefully enough to expel the majority of the blood in the ventricles, it is called systolic heart failure. Systolic heart failure is the most common form of CHF.

DIAGNOSING CHF

Just as there is no single treatment for CHF, there is no single test used for diagnosis. Instead, physicians have traditionally relied on a patient's medical history, along with the presence of symptoms associated with CHF, and a variety of diagnostic tests.

The most common test remains the echocardiogram. This test uses sound waves to visualize the structures of the heart, allowing physicians to see the heart chambers and measure cardiac function. It also helps physicians determine how well the heart is functioning and how far the disease has progressed.

An electrocardiogram (ECG) or cardiac catheterization may also be recommended. The ECG measures electrical signals within the heart, while cardiac catheterization determines blood pressure from within the heart's chambers. In some cases, patients with CHF may have a heartbeat that is too slow (bradycardia) or too fast (tachycardia). An ECG can help physicians determine if medications to control the heart rate are necessary. Physicians may also recommend a standard exercise stress test, to evaluate an ECG reading while a patient is walking or running, or an exercise stress test that involves radionuclide scanning after injection of a radioactive substance.

While the standard test used to measure CHF is an echocardiogram (ultrasound), newer tests are showing promise. One blood test in particular may be helpful in the diagnosis of CHF. In response to CHF, the body releases a substance called natriuretic peptide. By measuring blood levels of this peptide, physicians may be able to better diagnose CHF, as well as distinguish among the various kinds of CHF (Adlam D et al 2005; Steg PG et al 2005).

Once CHF has been diagnosed, it is often tracked through regular checkups and routine echocardiograms. The most common measurement used to track systolic, left-sided heart failure is the ejection fraction. Determined during an echocardiogram, this is a measurement of how much blood is expelled from the left ventricle during the heart's contraction phase. Any measurement below 55 percent signals weakness in the ventricle's pumping action.

Importantly, patients with diastolic CHF who may not have severe CHF symptoms will have a normal or near-normal ejection fraction. In this case, heart catheterization may be needed to diagnose CHF (Zile MR et al 2002).

STRENGTHENING THE HEART MUSCLE: THE POWER OF COQ10

Studies have shown that nutrients and supplements can strengthen the heart muscle, with fewer side effects than the powerful pharmaceuticals often used to treat the condition. CoQ10 is one of the most powerful.

The goal with nutrients and supplements is the same as with conventional medication: to slow the gradual enlargement and weakening of the heart. This process, which occurs in all forms of CHF, is called cardiac remodeling. During cardiac remodeling, the heart gradually changes shape, becoming larger and thinner. Cardiac remodeling is the driving force behind the reduced quality of life experienced by patients with CHF (Fedak PW et al 2005; Weisberg AD et al 2005).

By reinforcing the heart's function, it may be possible to slow cardiac remodeling. In this regard, CoQ10 has been studied since the middle 1960s. Present in high quantities throughout the heart muscle, CoQ10 has many beneficial effects, including energy production (Awata N et al 1980; Crane FL et al 1997; Nakamura Y et al 1982; Naylor WG 1980), an antioxidant effect (Frei B et al 1990), and stabilizing the heart membrane (Ondarroa M et al 1986).

The following studies have examined CoQ10 in CHF and found that it can improve heart function:

- One meta-analysis looked at all the published studies between 1966 and 2005 of CoQ10 in CHF. It found that CoQ10 had an overall value in improving ejection fraction and diastolic volume. Although the authors called for more large studies to confirm these results, they noted that CoQ10 is generally well tolerated, with few side effects (Weant KA et al 2005).
- Researchers reviewed clinical trials involving 1,000 patients with CHF and found a significant improvement in exercise tolerance and a reduced NYHA class among those receiving CoQ10 (Mortensen SA 2003).
- A study of 32 patients with NYHA class IV CHF who were waiting for a heart transplant showed improved cardiac function and a reduction of symptoms after CoQ10 supplementation (Berman M et al 2004).
- Among patients with CHF who had a low ejection fraction (of less than 45 percent) and an elevated left ventricular diastolic volume, CoQ10 has been shown to reduce diastolic volume, which is associated with increased survival among patients undergoing coronary artery bypass surgery (Jeejeebhoy F et al 2002). The degree of benefit associated with CoQ10 among these patients was shown to correlate to the severity of their CHF (Taggart DP et al 1996).

Other studies have shown that withdrawing CoQ10 from patients with CHF resulted in decreased cardiac function and more severe symptoms (Judy WV et al 1991).

INCREASING ENERGY AND BLOOD FLOW AND REDUCING SWELLING: L-CARNITINE AND TAURINE

Like CoQ10, the levels of L-carnitine and taurine in the heart muscle have been shown to decline among patients with CHF. By raising blood levels of both amino acids, patients with CHF have responded with fewer symptoms and improved cardiac function.

L-carnitine is essential for the transport of fatty acids into the heart muscle and mitochondria for energy production and is sensitive to the level of oxygen in the heart muscle. Studies have shown that patients with CHF who take L-carnitine have improved ejection fraction (Goa KL et al 1987; Mancini M et al 1992; Pucciarelli G et al 1992). There is evidence that L-carnitine helps the heart by preventing the enlargement of the left ventricle, which is a critical step in the progression of CHF. Studies have shown that L-carnitine can help prevent left ventricular enlargement after bypass surgery in patients who have had a heart attack (Taggart DP et al 1996). The same results were found among patients who have had an acute heart attack (Colonna P et al 2000). By improving ejection fraction and preventing enlargement of the left ventricle, L-carnitine addresses two of the most serious problems associated with CHF.

Taurine acts by a different mechanism. Patients with CHF often have swelling caused by excessive fluid buildup in the tissues, which puts additional pressure on the heart and accelerates CHF. Diuretics, one of the standard pharmaceutical therapies in CHF, are basically designed to flush excess fluid from the body. Taurine, through well-documented pathways, has a similar effect and has been shown to help reduce fluid levels, reducing the workload on the heart (Schaffer SW et al 2000).

Taurine has a number of other positive influences as well, including minimizing the effect of the protein angiotensin II (Schaffer SW et al 2000). Angiotensin II causes blood vessels to constrict. This is the same protein targeted by ACE inhibitors, which are a mainstay of conventional CHF treatment. By minimizing the effect of angiotensin II, taurine may reduce cardiac remodeling (Schaffer SW et al 2000).

COVERING ALL THE BASES: COMPLEMENTARY APPROACHES TO TREATING CHF

Managing CHF means coordinating many influences and factors. The idea is to first stabilize the patient's condition (especially if the patient has acute CHF that may lead to cardiac arrest), then develop a pharmaceutical and lifestyle program specially suited for the patient's metabolism. Dosages of the most popular medications often start at the lower end of their recommended range and are frequently adjusted by physicians until they get the right mix of medications to prevent symptoms, slow the disease, and keep side effects under control. A major problem with these medications is their significant side effects, which may severely reduce a patient's quality of life.

In terms of lifestyle changes, patients may be advised to limit their salt intake to 2 grams per day and their water intake to 1.5 to 2 liters per day. A heart-healthy diet—including increased intake of monosaturated oils (such as extra virgin olive oil), fruits and vegetables, fiber, and essential fatty acids—is also recommended. Finally, patients may be advised to increase their intake of garlic, onions, and celery, all of which have been shown to lower blood pressure.

A successful complementary approach uses the same principles but relies on nutrients and supplements that have far fewer side effects than conventional pharmaceuticals. The goal of complementary treatment is to:

- Restore neurohormonal and metabolic integrity.
- Improve the pumping action of the heart and increase myocardial efficiency.
- Decrease oxidative stress throughout the body.
- Restore mineral balance (especially sodium/potassium ratios).
- Decrease vascular resistance to improve blood flow.
- Lower the risk of blood clots.
- Lower the risk of abnormal heart rhythms.

Working with a knowledgeable physician, patients with CHF may consider adding any of these supplements to their program:

- **Hawthorn** —This plant extract has been shown to improve the symptoms of patients with NYHA class II or III CHF (Tauchert M 2002). Hawthorn's benefits include relaxing blood vessels to lower blood pressure, increasing blood flow to the heart, and controlling heart rate in a way that is similar to digoxin (Schwinger RH et al 2000; Tauchert M 2002). Hawthorn helps improve exercise tolerance (Tauchert M et al 1999) and has shown promise in the treatment of left ventricular dysfunction (Leuchtgens H 1993; Schmidt U et al 1994; Tauchert M et al 1999; Weikl A et al 1996).
- **Magnesium and potassium** —Patients who are treated with a common diuretic (furosemide) often develop low magnesium and potassium levels, which may cause cardiac arrhythmias. Many physicians recommend that patients who are on furosemide also be given potassium to help prevent arrhythmias (Braunwald E 2001). Studies have also shown that magnesium supplementation may normalize potassium and magnesium levels within the heart (Cohen N et al 2000). Blood tests can help determine if magnesium or potassium levels are low in response to diuretic therapy.
- **Antioxidant vitamins** —The dangerous effects of oxygen-free radicals on the body are well known. Elderly populations with higher blood levels of antioxidants such as vitamins C and E have been shown to have a lower incidence of heart disease (Maxwell SR 1993). Among people who have had a heart attack, supplementation with vitamins C and E has been shown to diminish the formation of free radicals and reduce damage to the heart (Eichholzer M et al 1992). These studies demonstrate that heart health is related to antioxidant levels. Because these antioxidants are well tolerated and slow the progression of CHF, it may be prudent to consider adding them to a CHF supplementation program.
- **Alpha-lipoic acid** —Alpha-lipoic acid is an antioxidant that stimulates the creation of glutathione, another powerful antioxidant (Patrick L 2002). Because oxidative stress is associated with decreased cardiac function (Maxwell SR 1993), alpha-lipoic acid might be another valuable addition to the CHF antioxidant regimen.
- **Fish oil** —Although fish oil, which is rich in omega-3 polyunsaturated fatty acids, has not been studied extensively in patients with CHF, there are many studies showing its value to overall cardiac health. For example, patients who take fish oil before heart surgery may avoid acute degeneration of heart tissue (Berger MM et al 2003). Fish oil has also been shown to reduce the frequency of sudden cardiac death in patients who have recently had a heart attack (Witte KK et al 2004). Researchers in the United Kingdom have launched studies to examine fish oil's ability to improve myocardial function in patients with CHF (Witte KK et al 2004).

For More Information

CHF usually occurs in the presence of other forms of heart disease, especially CAD. Also, conditions such as hyperhomocysteinemia (elevated homocysteine levels) and hypercholesterolemia (high cholesterol) are associated with CHF. Patients with CHF who also have underlying cardiac disease may wish to read the following chapters and design a program that will address the full range of their cardiac problems:

- Atherosclerosis
- Coronary Artery Disease
- Hypercholesterolemia
- Hyperhomocysteinemia
- Managing High Blood Pressure
- Inflammation and Heart Disease

CHF AND THE HORMONAL CONNECTION

Many people think of the heart as a simple pump that keeps blood flowing through the body. While this is true, it is also a vast oversimplification of the heart's role in the body. In fact, the heart is a highly complex organ that is responsive to all sorts of influences, including hormones. For example, when people are stressed, the body is flooded with adrenaline (epinephrine), a hormone that stimulates the heart to contract more forcefully and raises blood pressure.

Although there is still much to learn, there is a clear connection between the hormonal system and cardiac health. Studies have shown that early in CHF, the body tries to compensate for reduced cardiac function with a series of neurohormonal adaptations. These changes cause certain blood vessels throughout the body to constrict (resulting in more blood flow to vital organs) and boost the output of the heart by increasing its contractile strength and heart rate (Dzau VJ et al 1981; Dzau VJ 1987).

These changes, however, have significant drawbacks. Elevated blood pressure may lead to swelling (one of the symptoms of CHF) or to congestion in the lungs that leads to coughing (another symptom). The increased force of the heartbeat may also aggravate CAD. Overall, scientists believe that the net effect of these neurohormonal adaptations is negative. The adaptations may help short term, but they ultimately make the condition worse (Benedict CR et al 1994).

Patients with CHF have been shown to have low levels of dehydroepiandrosterone (DHEA) (Moriyama Y et al 2000), testosterone, and insulin-like growth factor I (IGF-I) (Kontoleon PE et al 2003). These hormonal deficiencies reflect an imbalance in the catabolic (destructive) and anabolic (constructive) hormonal systems (Anker SD et al 1997). The body's main catabolic hormone is cortisol, while one of the body's main anabolic hormone is testosterone.

While hormonal supplementation is somewhat controversial among heart patients, there is evidence that supportive testosterone therapy can restore testosterone levels to normal. In one study, testosterone therapy was shown to significantly improve exercise capacity and quality of life in men who had moderate to severe CHF. During the study, the men were given testosterone therapy in small doses for 12 months, enough to restore levels to within physiologic range (Pugh PJ et al 2004). Hormonal restoration therapy has also shown promise in lowering cholesterol levels in patients with CHF (Dzugas SA et al 2002). A youthful hormonal profile is closely associated with good overall health. Undoubtedly, the future will expand our understanding of the complicated interaction between hormones and CHF.

LIFE EXTENSION FOUNDATION RECOMMENDATIONS

CHF is a serious condition that requires close cooperation with a physician to manage. The goal of therapy is to strengthen cardiac function, impede cardiac remodeling, and reduce the severity of symptoms. In scientific studies, various supplements have been shown to help patients with CHF slow the progression of their disease and increase their quality of life. The Life Extension Foundation suggests:

- **CoQ10**—100 to 300 milligrams (mg) daily
- **L-carnitine**—1 to 3 grams (g) daily
- **Taurine**—2 to 3 g daily
- **Hawthorn**—3000 mg daily
- **Magnesium citrate**—160 mg (in capsule form) 1 to 6 times daily
- **Potassium** (if low potassium levels are confirmed by a blood test)
- **Vitamin C**—1000 mg daily
- **Vitamin E**—800 international units (IU) daily
- **Alpha-lipoic acid**—150 mg daily
- **Fish oil**—700 to 1400 mg of eicosapentaenoic acid (EPA) and 500 to 1000 mg of docosahexaenoic acid (DHA)

CHF SAFETY CAVEATS

An aggressive program of dietary supplementation should not be launched without the supervision of a qualified physician. Several of the nutrients suggested in this protocol may have adverse effects. These include:

Acetyl-L-Carnitine

- Acetyl-L-carnitine can cause gastrointestinal symptoms such as nausea and diarrhea.

Coenzyme Q10

- See your doctor and monitor your blood glucose level frequently if you take CoQ10 and have diabetes. Several clinical reports suggest that taking CoQ10 may improve glycemic control and the function of beta cells in people who have type 2 diabetes.
- Statin drugs (such as lovastatin, simvastatin, and pravastatin) are known to decrease CoQ10 levels.

EPA/DHA

- Consult your doctor before taking EPA/DHA if you take warfarin (Coumadin). Taking EPA/DHA with warfarin may increase the risk of bleeding.
- Discontinue using EPA/DHA 2 weeks before any surgical procedure.

Hawthorn

- High doses of hawthorn are toxic and may induce sedation and abnormally low blood pressure.
- Do not take hawthorn if you take digoxin. Hawthorn can interfere with the effects of digoxin.

Lipoic Acid

- Consult your doctor before taking lipoic acid if you have diabetes and glucose intolerance. Monitor your blood glucose level frequently. Lipoic acid may lower blood glucose levels.

Magnesium

- Do not take magnesium if you have kidney failure or myasthenia gravis.

Vitamin C

- Do not take vitamin C if you have a history of kidney stones or of kidney insufficiency (defined as having a serum creatine level greater than 2 milligrams per deciliter and/or a creatinine clearance less than 30 milliliters per minute).
- Consult your doctor before taking large amounts of vitamin C if you have hemochromatosis, thalassemia, sideroblastic anemia, sickle cell anemia, or erythrocyte glucose-6-phosphate dehydrogenase (G6PD) deficiency. You can experience iron overload if you have one of these conditions and use large amounts of vitamin C.

Vitamin E

- Consult your doctor before taking vitamin E if you take warfarin (Coumadin).
- Consult your doctor before taking high doses of vitamin E if you have a vitamin K deficiency or a history of liver failure.
- Consult your doctor before taking vitamin E if you have a history of any bleeding disorder such as peptic ulcers, hemorrhagic stroke, or hemophilia.
- Discontinue using vitamin E 1 month before any surgical procedure.

For more information see the Safety Appendix

not use the information on this site for diagnosis or treatment of any health problem or for prescription of any medication or other treatment. You should consult with a healthcare professional before starting any diet, exercise or supplementation program, before taking any medication, or if you have or suspect you might have a health problem. You should not stop taking any medication without first consulting your physician.