The Life Changing Power of D-RIBOSE

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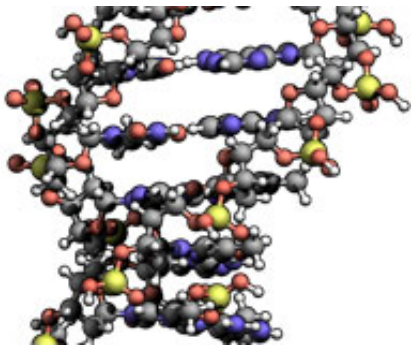
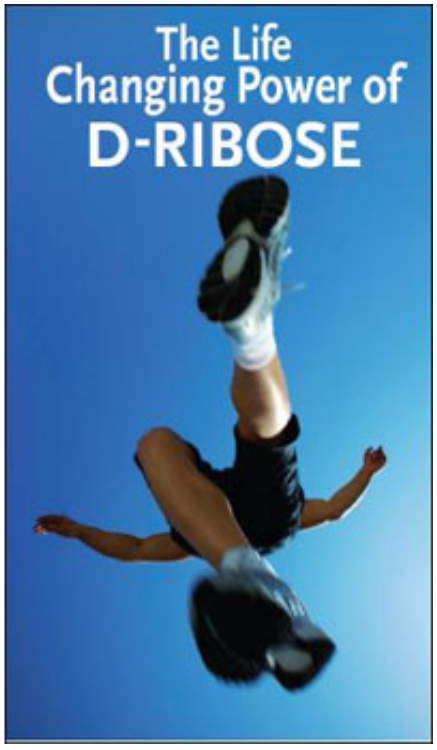


For us to stay healthy and active our bodies need energy…lots of energy. The energy produced by each of the trillions of cells in our bodies keeps our hearts beating, our muscles contracting, our brains functioning to send signals to the far reaches of our bodies, and our nerves carrying those signals to each of our organs to sustain life. Each day, our bodies produce and consume extraordinary amounts of energy. Let's take the heart for example.

At any given moment an average heart contains less than one gram of stored energy, about 0.7-grams to be exact. But every day our hearts consume almost 6,000-grams of energy in performing its ceaseless work of pumping blood and delivering life-giving oxygen to tissues throughout our bodies. Think about the magnitude of this feat! Six-thousand grams is more than 10 times the average weight of a heart and almost 10,000 times the amount of energy that is normally found in the heart at any one time. Ask yourself, "Where does this energy come from?" and "How can the heart produce such an extraordinary volume of energy?"



In large part, the answers to these questions are found with D-ribose, as you will see.

ATP —The Currency of Life

The energy that fuels our bodies is held in a small molecule with a large name. Adenosine triphosphate, or simply ATP, is the compound found in every cell in our bodies that gives us energy. In fact, virtually all the energy used by our bodies comes from ATP. Because of its universal importance in the body, ATP is commonly referred to as the "energy currency" of the cell. In each cell, ATP is made, consumed, and re-processed in a cycle that keeps a continual supply of energy flowing. And our bodies have developed very elaborate metabolic processes to make sure we don't run out. These processes efficiently recycle energy as it is used, making fresh energy constantly available to sustain life.

As chemical compounds in the body go, ATP is simple. It is made of three basic parts. The first is D-ribose, commonly called Ribose. Ribose provides the structural foundation upon which ATP is built and starts the process of ATP synthesis in the body. Without ribose ATP could not be formed and our cells would be energy deprived.

Attached to Ribose is a compound called adenine. Combined, ribose plus adenine form adenosine, as in adenosine triphosphate. The adenine portion of ATP is not simply added to the Ribose molecule in the cell. Instead, the cell makes adenine by building it, adding one element at a time to Ribose. When this process is completed, adenosine is the result and we have now formed the basis for ATP. To this basic structure we add three phosphate molecules. The energy in the ATP molecule is found in the chemical bonds that hold these phosphate molecules together. When the chemical bond holding the last phosphate molecules in place breaks, it releases chemical energy that is transformed in the cell to mechanical energy to do work.

But that is not the end of the story. Our bodies need to use the basic structure of ATP over and over again to keep the energy supply flowing. To do this, our cells recycle the spent ATP molecule by re-attaching a fresh phosphate group to replace the energy that was used. The cycle works like this. ATP is consumed, leaving a free phosphate group and adenosine diphosphate, or ADP. Remember, adenosine triphosphate (ATP) has three phosphate groups and adenosine diphosphate (ADP) has two. The cell then takes a free phosphate group that is floating around in the cell and reattaches it to ADP, re-forming ATP and replacing the consumed energy. This process of energy consumption and supply must accelerate to accommodate increasing energy needs, such as in exercise.

As long as we stay reasonably physically fit, and our cells get the oxygen they need to fuel metabolism, this cycle of energy utilization and supply can keep turning unimpeded. The problem com

es when our cells are unable to get enough oxygen to keep the process flowing. Many conditions can affect how well oxygen flows to our cells, or how well our cells can use the oxygen that is supplied. Ischemic heart disease, of course, restricts blood flow to the heart muscle itself, and this can impact blood flow and oxygen delivery to the rest of the body. Other heart conditions, such as congestive heart failure or cardiomyopathy, can similarly affect how well the heart functions, and, therefore, how efficiently it can deliver blood and oxygen to our tissues. Many non-disease conditions can also affect blood flow or oxygen delivery. As we age, for example, our tissues lose their ability to use oxygen efficiently. Older tissue, then, has a harder time keeping up the continual demand for energy. Even strenuous exercise can impact the relationship between energy supply and demand. If we exercise beyond the point at which our cells are taking up their maximal amount of oxygen, we overtake the cycle of energy re-supply and begin to use energy more quickly than it can be restored. No matter the cause, when our cells and tissues are unable to get the oxygen they need to maintain the balance of energy supply and demand the results are similar…fatigue, muscle pain, stiffness and soreness, a reduced ability to exercise, and lower quality of life.

Putting Gas in Your Tank

Think of this process of supplying energy to your cells like keeping gasoline in your car. When your car is sitting in the garage with a full tank of gas it is fully fueled and ready for a long drive. When you start the car and head it down the road, you begin to consume the gas in the tank and the supply of energy gets progressively lower until you have to fill the tank with gas or you will run out of fuel and the engine will stop, leaving you stranded by the side of the road. The same thing is true in your body. When you have enough food and oxygen to supply energy your engine will keep running and you will never run out of gas. But if you can’t get enough oxygen to keep the cell’s energy tank fully fueled you will progressively lose energy until you run out of gas. Then, you have to refill your tank before you can start down the road of life once more.

If you are healthy, you can refill your tank simply by resting long enough for new energy fuel to fill your cells. In a normal, healthy person that has been strenuously exercising over a few days in a row, it takes more than three days of rest for cells to be fully recharge. This is a typical situation in young athletes who might exercise every day. Frequently, these athletes do not let their bodies rest long enough to restore lost energy and, in a short time, they become fatigued, sore, stiff, weak, and out of sorts. They simply try to do too much work with too little fuel, and run out of gas.

As we age, or if we suffer with heart or muscle disease, however, the situation can be much more complicated. In contrast to the athlete performing strenuous exercise, if we belong to this group the normal course of daily activities might be enough to fully consume the energy in our cells and tissues. As a result of running out of fuel we might become persistently, or chronically, fatigued, we could have leg soreness and muscle stiffness, we frequently can’t face the prospect of climbing stairs or even walking out to the mailbox, we may be too tired to go

shopping or to play with the grandchildren, and our quality of life suffers as a result. To make matters worse, our bodies might never deliver enough oxygen to let our cells fully recover once the energy in our cells and tissues is fully consumed.

Whether it is an athlete that wants to recover more quickly so they can get back on the field, an aging grandparent who longs for the energy to take the grandchildren to the park, an active professional with too much work, too much stress, and too little sleep, or a heart patient who can't face the prospect of climbing the stairs to bed, the issue is replacing fuel in the tank. Like the fuel pump at the gas station, Ribose is the metabolic fuel the body uses to recharge the energy batteries and put gas back in the tank.

The Recovery Power of Ribose

Replacing the energy that drains from our cellular gas tanks is fundamentally important to recovering cell and tissue function. This process of energy recovery begins with Ribose. Our cells use this simple, five-carbon carbohydrate to initiate ATP synthesis, allowing our bodies to rebuild lost energy and recharge the cellular batteries. If there is not enough ribose present in the cell to begin this vital process, we cannot restore this lost energy.

Every cell in our bodies makes ribose every day

The problem is that our cells lack the metabolic machinery they need to make very much ribose, or to make it quickly when our bodies need it. Our cells make Ribose from a very abundant and highly important carbohydrate called glucose, which is also known as dextrose. In the body, glucose is used as the primary metabolic fuel for many cellular reactions, and because of its importance it is rationed. This rationing prevents too much glucose from moving down the metabolic pathway to make ribose. And so, when our bodies are stressed by strenuous exercise, metabolic dysfunction, or disease our cells cannot recover until enough ribose is made to stimulate ATP synthesis and refill our energy fuel tank. Although this delay can last for several days, if we are healthy, have a good supply of oxygen to our tissues, and take enough time to rest, we can fully recover. If, on the other hand, our cells are aging or not functioning normally, we are not able to supply enough oxygen to our tissues, or we don't allow ourselves sufficient rest, there might never be enough time to make an adequate amount of Ribose for our energy batteries to recharge.

This is exactly what happens in people with ischemic heart disease. When the arteries supplying blood to the heart become clogged they cannot deliver enough oxygen to fully supply the metabolic demand of the heart. The condition by which blood flow to a tissue is restricted is called ischemia. In the case of ischemic heart disease, this lack of blood flow is to the heart itself. Because the heart does not get enough blood flow, it is also deprived of oxygen and this oxygen deprivation slows the normal process of energy recycling. As the heart keeps beating, energy demand outstrips energy supply, resulting in a continual drain on energy reserves. The heart's energy tank is always running low.

Because the heart beats continually, it cannot rest while its energy tank is refilled. Instead, the heart slows down certain energy consuming functions, conserving the energy left in its tank for contraction. The energy-starved heart tries its best to push blood and oxygen to the body, but because it does not have enough energy its efforts are inefficient and inadequate. As time goes on, this inefficient blood flow to the rest of the body begins to take a toll. As heart disease progresses, for example, patients may complain of overwhelming fatigue, shortness of breath, sore legs, or an inability to perform even simple exercise, such as walking up stairs or around the block.

The same is true of people with fibromyalgia or other neuromuscular disease affecting muscle metabolism. In fibromyalgia, for example, research shows that the muscle can become oxygen deprived. Certain studies have concluded that a combination of poor muscle energy metabolism and changes to the capillaries delivering blood to

the muscle affect the level of oxygen available to the tissue and its ability to recycle its energy supply efficiently. As in ischemic heart disease, this metabolic insufficiency drains the energy fuel tank leaving the muscle energy starved.

This chronic and persistent energy drain forces a series of cellular reactions ending in muscle pain, soreness, stiffness, and fatigue. In many cases, the pain and fatigue can be severe and highly debilitating. Patients with fibromyalgia, for example, often face the prospect of major changes in their daily quality of life. They are often too fatigued to maintain normal interaction with their friends or family, and may have too much pain to stay active or even keep their jobs. In many cases, these patients must be treated with anti-depressants because of the psychological stress inflicted by their illness, and in virtually every case doctors treat patients only with pain pills that do not treat the underlying cause of the disease.

In both ischemic heart disease and muscle disease, such as fibromyalgia, a major root cause of concern is energy starvation in the affected tissue. These conditions force the affected hearts and muscles to consume energy more quickly than it can be restored, creating a continual energy imbalance. Unfortunately, the metabolic imbalance caused by these conditions cannot be corrected with rest alone. Neither ischemic hearts nor fibromyalgic muscle have the metabolic capacity to recover. That is where ribose comes in. Supplying affected tissues with Ribose stimulates the process of energy recovery and helps hearts and muscles refill their energy tanks. Supplemental ribose allows cells to bypass the slow process of natural Ribose synthesis and accelerates ATP recovery.

While the biochemistry of energy metabolism is complex, it is consistent. It doesn't matter whether we are talking about hearts or muscles, if we are healthy or sick, or if we are old or young, certain consistencies remain. Cells need energy, and that energy is supplied by a continual recycling of the cellular energy reserve. If tissues become oxygen deprived, or if the normal metabolic processes of energy recycling are disrupted, energy demand will outstrip supply and the tissue will become energy starved. Ribose is fundamentally required to restore this lost energy and put the energy demand and supply ratio back in balance. In healthy, normal tissue, several days of rest can rebuild these lost energy pools, but in stressed, diseased, or aging tissue, rest is often not enough. Supplemental ribose will accelerate energy recovery, rebuild cellular energy pools, and restore cell and tissue function. For you this can mean less fatigue, less muscle pain, soreness, or stiffness, greater exercise tolerance, and a higher quality of life.

Clinical Implications of Ribose

Although research revealing the clinical implications of Ribose therapy has been going on for decades, it is a fairly new entrant in clinical medicine. The widespread use of ribose in cardiology began in about 2003 following publication of an important clinical study by the noted cardiologist, Dr. Heyder Omran, at the University of Bonn, Germany.

Over the past decade there have been numerous clinical and laboratory studies that prove the beneficial impact of ribose on stressed tissue. In fact, the number of studies published in the scientific and medical literature now exceeds 100. And research continues, with studies now being conducted at major universities in the U.S. and abroad focusing on heart disease, muscle disease, athletic performance, and improving the supply of blood available. But despite this overwhelming scientific evidence, very few doctors have even heard of ribose. All of them studied ribose in their first year medical school biochemistry class, but few have any idea how it works and even fewer recommend it to patients. Most doctors have been taught to rely on pharmaceutical drugs and consider nutritional support products to be "unscientific" or unsafe, and others simply don't understand the science. Others, regrettably, are just disinterested, feeling they are too busy seeing patients to stay current in the considerable body of nutrition research reported monthly in major scientific journals. But the number of doctors

who are seeing for themselves how ribose can improve the lives of their patients is growing daily. These doctors have proven to themselves that ribose supplementation can, and does, give their patients a new lease on life.

How Do I Know I Need Ribose?

At some point in his or her life, everyone needs supplemental Ribose. We all face situations where ribose supplementation could help us overcome the pain and stiffness of muscle overexertion, the fatigue of chronic disease, the weakness after strenuous exercise, or the inability to do the things we want to do. We all want to be as active and healthy as we can, and we need a full supply of energy in all our cells and tissues to reach that goal.

In each of our lives, we will face times when we need ribose to help our bodies make the energy we need. But our cells and tissues cannot store ribose for future use. Instead, our bodies can only make ribose when it is needed, and that is where the trouble comes in. Remember, although ribose is made naturally in all our cells and tissues, it is a slow process. And it is this delay that limits the speed with which our bodies can restore lost energy. Ribose is the limiting factor in ATP synthesis, and our bodies have an absolute and fundamental need for ATP to fuel the multitude of biochemical reactions that keep us alive and vital. ATP is the fuel of life, and ribose is the foundation upon which ATP is built. Therefore, when our bodies need energy it makes sense to supplement our natural metabolism with ribose. Let's look at an example to help make this point.

A very important series of animal studies was conducted at the University of Minnesota beginning in the mid-1980s. In these studies, researchers used elaborate surgical techniques to place balloons around the main artery supplying blood to the heart so they could control the blood flow going to the heart tissue, and used delicate measuring devices to record the result. They found when they blew up the balloons and restricted the blood flow to the heart the energy level in the heart tissue would drop quickly, finally leveling at about 50 percent of normal. As might be expected, this energy drain severely impacted heart function. Primarily, the heart would become stiff and would not fill with blood properly. In turn, this reduced the amount of blood that could be pumped to the rest of the body.

When the air was let out of the balloons normal blood flow would return to the heart. But even after blood flow was restored it took these hearts more than 10 days for the energy level to normalize. Interestingly, the function of the heart closely paralleled energy restoration. As with the energy supply, normalization of heart function took more than 10 days. When the animals were given ribose during and following the test, however, the hearts recovered both their energy level and function in an average of 1.2 days! To further prove the ribose effect, in some studies researchers took away the ribose after 24 hours and found that energy and functional recovery reversed. When ribose supplementation was restored, recovery followed suit.

Metabolically what happened was simply this. When the hearts were not given ribose they were forced to make it before they could begin the process of energy restoration. This delayed energy recovery. But giving ribose to these hearts allowed them to bypass the much slower process of making ribose naturally, and the process of energy synthesis was accelerated. Once ribose is present in the cell, either through natural ribose synthesis or supplementation, energy recovery can proceed very quickly. The delay in restoring energy to stressed tissue rests in the rate at which our bodies make ribose naturally.

So, when we consider whether or not we need supplemental Ribose, we should remember some of the simple basics of metabolism. Cells and tissues become stressed when they don't get enough oxygen or if the normal processes of energy recycling are disrupted. In either case, this stress causes the cells to use energy faster than it can be supplied. This energy supply and demand mismatch causes us to lose energy from our cells and tissues, draining cellular energy reserves and depleting energy stores. To maintain normal cell and tissue function this energy must be restored, and ribose is fundamental to this process. If we are young and healthy and our cells

are functioning normally, we can rest and, after several days, we will make enough ribose for our energy levels to be restored. On the other hand, if we are chronically oxygen deprived, or if our cells are not functioning normally, we may never be able to fully recover.

Who Should Take Ribose and When

With these basics in mind it is easy to determine who should take Ribose, and when. Anyone with a highly active lifestyle, for example, can certainly benefit from ribose. High-intensity exercising three or more times per week puts a substantial strain on hearts and muscles. Repeated bouts of strenuous exercise drains energy from hearts and muscles, leaving them weakened for the next exercise session. When athletes take ribose before, during, and after exercise, however, they can better maintain the energy in their muscles and quickly restore any energy that may have been lost. In this way, athletes can keep their hearts and muscles in top physiological condition for their next exercise session.

But what defines an athlete or a strenuous bout of exercise? The answer to that question depends on the individual. For top athletes, high-intensity exercise may be defined as a long distance run or several miles on their bike over hilly terrain. For most, however, strenuous exercise may be much less intense. Some one who is normally sedentary, for example, might face several days of muscle soreness, stiffness, and weakness following a day of hard work in the garden or a weekend softball game. Others who might be a little older or perhaps have problems with their circulation may complain of sore legs after only a short walk or a day of shopping. No matter where you fall along this spectrum, however, what is happening in your muscle is the same. Your muscle is fully consuming the available energy, and that energy drain translates to weak, spongy, and sore muscles. This muscle soreness does not go away until the muscle has recovered its energy balance. Ribose supplementation helps maintain the muscle's energy balance and can be the answer to relieving this post-exertional muscle soreness and stiffness

Age is another factor to consider when deciding if ribose supplementation is right for you. Research has shown as we age our muscles lose energy recycling efficiency. Aging muscle generally has fewer of the energy recycling powerhouses, called mitochondria, than younger muscle. The continual loss of mitochondria as we age makes it more likely our muscles will run out of energy with exertion. This is a primary reason when we become older we become stiff and sore after only mild exercise, and explains why we run out of gas so quickly. Also, as we age our hearts begin to show more and more signs of dysfunction. A recent research report from the Mayo Clinic, showed almost 25 percent of the population, both male and female, showed signs of heart failure, and the percentage increased as people grew older. While this effect was more pronounced in people with high blood pressure or in those with heart valve problems, it was found across the aging population. Taking ribose regularly may help relieve the chronic muscle soreness and stiffness that comes from even mild exercise and, as has been shown in many clinical studies, could help maintain healthy energy levels in the heart.

We also need to include patients with heart disease when considering who should take Ribose. Research has proven, heart disease drains the heart of much needed energy. This is especially true in patients who are taking drugs to make their hearts beat more strongly. These drugs, called inotropes, force the heart to beat, causing it to consume even more energy. As such, over time these hearts can become severely energy starved. It is important that people with heart disease take ribose regularly to offset the effects of energy drain in their hearts. This is particularly true of patients on inotropic drugs. These patients face a continual energy drain that cannot be overcome with rest alone, and they should discuss this issue with their doctors. Research has shown ribose can be taken effectively with drugs, without losing any of the therapeutic benefit of either the drug or the ribose.

When we think about heart and circulatory diseases in the broader sense the benefit of Ribose supplementation on maintaining energy levels cannot be overstated. Hearts and muscles rely heavily on oxygen to fuel the

process of energy recycling. When they are deprived of oxygen our hearts and muscles become energy starved. This energy drain can have a severe impact on heart and muscle function, and this impact becomes progressively more severe as oxygen deprivation and energy loss continues over a prolonged period of time. This effect is well-known in a wide range of cardiovascular diseases including congestive heart failure, coronary artery disease, certain types of cardiomyopathy, certain diseases affecting heart valves, and peripheral vascular disease, a condition that restricts blood flow to the limbs, especially the legs.

Patients with diseases that impact muscle metabolism should also seriously consider ribose supplementation. Diseases such as fibromyalgia, chronic fatigue syndrome, myoadenylate deaminase disease, and McArdle's disease, for example, drain energy from muscles, and this energy drain shows itself in the form of fatigue, muscle pain, soreness, and stiffness. Patients are also frequently weak and have a great deal of trouble performing the simple tasks of daily living. Ribose has been shown in clinical studies to help offset all these symptoms. By supplementing with ribose, patients give their muscles the chance to overcome the energy drain and refill their energy fuel tanks.

All of us need energy—lots of energy. Whether we are healthy or sick, top-level athletes or couch potatoes, stressed out professionals or grandparents wanting to spend an active day with their grandchildren, our bodies must rely on energy to keep them alive and vital. Most of us don't know we have a problem with the energy in our hearts and muscles until we get sore legs, worn out, or chronically fatigued. But even after these symptoms hit us, it is not too late. Ribose supplementation can quickly help replace energy in stressed hearts and muscles, and help maintain the normal energy balance in our tissue.

How Much Ribose Should I Take?

Studies have shown that virtually any amount of Ribose you can give to stressed hearts and muscles will help. A very important study investigating this question was conducted at the University of Missouri in the laboratory of the noted muscle physiologist, Dr. Ronald Terjung. This study proved even very small amounts of ribose, an amount that approximately equaled 500 milligrams (one-half of one gram) if taken orally, increased the energy recovery in stressed leg muscle by 100 percent. Raising the dose to a level that would approximately equal 2.5 grams if taken orally increased recovery by about 250 percent, and the equivalent of a five-gram dose increased the recovery rate by a whopping 350 percent. At the maximum dose tested, the recovery increased by as much as 650 percent.

The amount of Ribose you should take is really dependent on what you want it to do. For example, if you simply want to give your heart and muscles a little boost so you can be sure they are maintaining a healthy energy pool, you can get by with less. If you want to increase your athletic performance, reduce soreness and stiffness following exercise, or give your muscles a recovery boost after some strenuous work or exercise, you might need a little more. If you need help overcoming the effects of persistent fatigue or chronic muscle pain, still more may be needed. And, if you have heart disease, peripheral vascular disease or other chronic conditions that impact energy metabolism in your heart or muscles, more aggressive supplementation may be required.

To get to the point of how much ribose should be taken, I offer the following suggestions on dosage:

- 2 to 5 grams (about one-half to one slightly rounded teaspoonful of powder) daily to help hearts and muscles maintain a healthy energy pool.
- 5 to 7 grams (about one level to slightly rounded tablespoonful of powder) every day as a preventative in cardiovascular disease, for athletes who want to recover faster from high-intensity exercise, and for healthy people doing strenuous work or activities that are outside their normal level of daily exercise.
- 7 to 10 grams daily for most patients with heart disease or peripheral vascular disease, for patients recovering from heart surgery or heart attack, and for athletes who work out frequently in high-intensity activities.
- 0 to 15 grams daily for patients with more advanced heart disease, patients awaiting heart transplant, and patients with fibromyalgia or neuromuscular disease.

I suggest that patients with heart disease, peripheral vascular disease, fibromyalgia or other muscle diseases begin taking ribose in the upper level of the range. Once they see for themselves that ribose supplementation is helping, they can reduce the daily dose until they find the level that is exactly right for them. It is also recommended that daily doses not be taken all at once. Actually, smaller more frequent doses are better than larger less frequent doses. Therefore, if you want to take daily doses of 10-grams or less, I suggest you take ribose two times per day. For most of us, the best time to take ribose is with morning and evening meals, but if we want to take ribose for exercise it should be taken just before and just after the exercise or activity. If you think you should take 15-grams of ribose per day, I suggest you take it in three equal doses, with breakfast, lunch, and dinner. Although there are no safety concerns with taking ribose (it is, after all, a simple carbohydrate), I do not recommend taking more than 20-grams per day. If you do not feel the benefit of ribose supplementation at that level, you don't need it. Once they have given their hearts and muscles a chance to regain their energy balance, most people stabilize at about 10-grams per day.

It generally takes no more than a few days to feel the effect of ribose supplementation. Some people report an improvement in symptoms much more quickly, often in just a day or two. If you don't begin to feel an effect after two or three days, try increasing the dose. Remember, your heart and muscles continually burn energy, and it is possible that the smaller Ribose dose is simply not enough to overcome the persistent energy drain. The sickest patients usually feel the greatest benefit, but almost everyone taking ribose regularly reports a significant benefit. You should also remember that your energy drain is chronic and ribose cannot be stored in your cells and tissues. Therefore, if you stop taking ribose you will lose all the benefit you've gained and your heart or muscles will again become energy starved. As a result, you must take ribose every day, and you must keep on taking it. While this sounds like a commercial for the ribose companies, it is not. Instead, it is hard-learned advice from the reports of hundreds of people who now take ribose religiously.

Where is Ribose Found?

Ribose is found in many product forms, such as powders, beverages, nutrition bars, and tablets. As a practical matter, therapeutic levels are found only in powders. An effective dose of ribose, two or more grams, is simply too much to put in tablets or capsules, so I recommend staying away from those dose forms. Beverages and nutrition bars tend to contain about one-half to one gram of ribose, so in normal healthy people looking to maintain the energy level in their tissue these products may be adequate. For disease patients, however, the amount that is given in beverages and nutrition bars is simply not high enough to give a therapeutic benefit. Hopefully, this will change in the future as food and nutrition companies increase the dose level per serving of their products. For now, though, I suggest powders or chewable tablets (wafers) as the best product forms to supply consistently adequate dose levels.

Although I usually don't recommend one supplier of a product over another, I feel I should do so here. One company, Bioenergy Life Science (Minneapolis, Minnesota) has exhaustively studied both the benefits and possible adverse reactions of ribose supplementation. To the best of my knowledge, they are the only ribose company to have done so. Therefore, all the safety data that has been supplied to regulatory agencies has come from this company. These safety assessments have shown that ribose is 100 percent safe if it is taken as directed and manufactured according to the strict specifications of Bioenergy Life Science.

To confirm the safety of Ribose an expert panel of food and nutrition scientists has concluded that it is Generally Regarded as Safe (GRAS) according to the guidelines established by the U.S. Food and Drug 14 D-Ribose

Administration. This is the highest level of safety affirmation available and with this GRAS affirmation ribose can be safely used in both foods and clinical nutrition products. It is important to note, however, that only ribose manufactured according to the specific process Bioenergy Life Science carries this GRAS affirmation. Like all other nutrition and drug products, the quality of manufacturing is paramount in assuring both safety and effectiveness.

Although there are no known side effects, Bioenergy Life Science recommends that pregnant women ask their doctor before taking ribose. Insulin dependent diabetics should also carefully monitor their blood glucose levels after taking their first several doses. Ribose is a carbohydrate and, as a result, you would expect that it would increase your blood glucose level. In fact, ribose slightly decreases blood glucose level, and that is what should be monitored.

There are very few reports of side effects while taking ribose. Some people have reported being light headed if they take doses greater than 10-grams on an empty stomach. That is why label instructions suggest that ribose be taken with juice or another beverage that contains some additional carbohydrate. Sprinkling ribose on fruit or cereal is also a good way to take it, or, if it is taken with a meal, it can be mixed with water, tea, or coffee. Another reported side effect reported by people taking large doses is loose stools or mild diarrhea. This is common with any carbohydrate that absorbs water, as does ribose. Neither side effect is significant, and neither is found when ribose is taken as directed. Ribose is also safe to take with your usual medicine and with other nutritional therapies. There have not been any reported drug or nutritional interactions with ribose supplementation.

Tens of thousands of people now take Ribose every day. They are feeling for themselves how this energy-giving nutrient can change their lives. Ribose stands alone as a nutrient that can increase the energy level in hearts and muscles, and restore energy that is depleted by over-exertion or disease that robs cells and tissues of the energy they need to survive and thrive. No other compound, whether it is a drug or other nutrient, can do what ribose does in the body. Only ribose can accelerate the complex metabolism that restores energy in our bodies, making it one of the most profound nutrients to ever be introduced.

This article is excerpted from "*The Top 20 Life-Changing Nutrients You Shouldn't Live Without*" by Dr. Ward Bond. Dr. Bond graduated Clayton College of Natural Health, Birmingham, Alabama with a doctor of philosophy degree in holistic nutrition and has a chartered herbalist degree from Dominion Herbal College. He is the author of

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