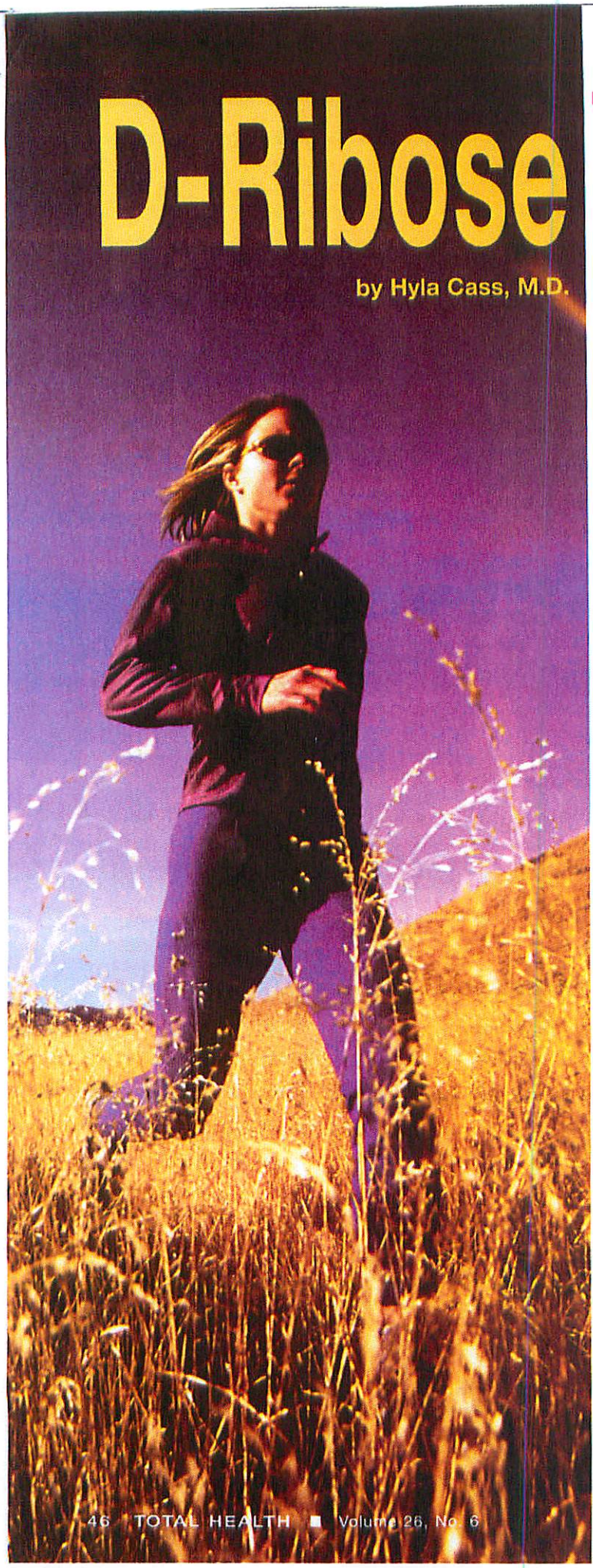

D-Ribose

by Hyla Cass, M.D.

The Energy BOOSTER

Feeling tired and run down? You're not alone. Fatigue is the third greatest health concern among Americans, and more than 33 million cite energy loss as their greatest health challenge. And no matter what their diagnosis, many of my patients arrive at my office complaining of fatigue as a major symptom.

What a contrast to childhood! Remember bounding out of bed in the morning, eager to meet the new day? Somehow, as adults, most of us have outgrown this early exuberance, and we can't always summon the energy we want. We may find ourselves relying on artificial energizers, from caffeine to sugar and over-the-counter and prescription stimulants. However, there's a catch. While they may make us feel good in the short-term, their use, over the long-term, can be harmful. At the same time, we are discovering more natural supplements to aid in restoring our natural energy. One that has captured my imagination lately is D-ribose, or simply "ribose." Found in every cell of the body, particularly in muscle, its job is to make the energy that keeps us going.

Fibromyalgia: A Case in Point

A good example of disrupted energy production is a mysterious condition call *fibromyalgia*. Difficult both to diagnose and to treat, fibromyalgia is often related to chronic fatigue syndrome (CFS), a relatively common condition affecting 500,000 Americans at any one time, and twice as many women as men. If you are exhausted to the point where it interferes with your life, and paradoxically you cannot sleep, and the fatigue does not go away with a vacation, and exercise makes it worse, you probably have CFS. If you ache all over in addition to these symptoms, you have fibromyalgia as well. Patients with fibromyalgia may also have anxiety, depression, headaches and, frequently, irritable bowel. (In my recent book, *8 Weeks to Vibrant Health*, you will find details on the symptoms and diagnosis, including the need to test for other conditions such as hypothyroidism, adrenal exhaustion, autoimmune conditions such as lupus and rheumatoid arthritis, and infections such as Lyme disease, Epstein-Barr virus and cytomegalovirus.)

Until now, we have had few tools to help these patients. However, recent findings have led to the exciting conclusion that ribose can provide improvement in these patients, as in the following case presented in a well-known medical journal:

Kris was a thirty-seven-year-old veterinary surgeon

and researcher at a major university who became so debilitated with fibromyalgia she had to give up her practice. She not only had severe muscle and joint pain, but mental cloudiness, insomnia, and digestive problems. Kris had tried all the traditional medical interventions for fibromyalgia, which not only were unsuccessful, but had debilitating side effects.

She then joined a clinical study and began taking five grams of ribose two times per day (10 grams per day). Within a week she felt better and, within two weeks, was back in the operating room. Over the balance of the first month, she continued to improve. Wanting to challenge this amazing result, Kris stopped her treatment. Within ten days she was totally debilitated again and could no longer perform surgery. She began ribose treatment for a second time, again with dramatically positive results. As a scientist Kris wanted to be sure, so she stopped treatment after another four weeks, and again her symptoms returned. She then resumed treatment and remained symptom-free as long as she took the supplement regularly.

Energy Metabolism—a Central Element of Fibromyalgia

How did the ribose work to turn Kris's condition around? The exact cause of fibromyalgia is unknown, but there is no question that deficiencies in energy utilization and turnover are involved. One consistent finding is the presence of abnormalities in the capillaries (small blood vessels) that supply blood flow to muscles, causing a decrease in tissue oxygenation. In addition, the part of the cell in which energy (as ATP) is made, called the *mitochondria*, appears to be abnormal. As a result, people with fibromyalgia have lower levels of the energy molecule called ATP and a reduced capacity to make ATP in their muscles.

This combination of poor circulation and diminished ATP production results in pain that keeps these individuals from exercising, which makes muscle tension worse. Sustained muscle tension uses even more energy, and the downward spiral continues. Damage to the cell membrane comes next because the membrane needs a full supply of ATP to control the flow of ions into and out of the cell in order to relax. These ions in the form of minerals (calcium, magnesium, sodium and potassium) carry the electrical charge of the cell. Disruption in ion balance causes a cascade of reactions leading to sustained muscle tension and pain. This compromises the ability of fibromyalgia patients to perform physical work, sustain aerobic exercise, or, in many cases, perform even the most basic of life's everyday functions.

Conventional medical treatment is quite limited in what it can do to alleviate symptoms of CFS and fibromyalgia. In my own practice, I have found Coenzyme Q_{10}, L-carnitine and magnesium to be invaluable, but I now have added the final ingredient, ribose, to help my fibromyalgia and CFS patients.

Ribose—the Energy Booster

There is a large body of research on ribose with some 300 published studies. The official chemical name of D-ribose is D-ribofuranose. It is a simple five-carbon sugar, or pentose, and is found in every cell in the human body. It is the fundamental building block of the energy compound, adenosine triphosphate (ATP). We must maintain healthy levels of ATP in our hearts, muscles and other tissues to fuel basic tissue function and preserve peak physiological performance.

On average the human body contains 1.6 milligrams (mg) of ribose per 100 milliliters (ml) of blood. Ribose can be made naturally in the body, but it is a slow process limited by several enzymes that are lacking in heart and muscle cells. There are no foods containing ribose in any substantial amounts. Under normal circumstances the availability of ribose to tissue is not a problem, but when hearts or muscles are challenged from the stress of exercise or lack of oxygen due to cardiovascular disease, circulatory disorders, chronic fatigue syndrome or fibromyalgia, they need an extra ribose boost to restore ATP levels. If your energy metabolism process is not working correctly, it drains energy reserves and depletes the cellular energy pool. This frequently leads to pain, soreness, stiffness and an overall feeling of fatigue. Supplementing these stressed cells with ribose restores cellular energy. This then promotes ion balance which allows the muscles to relax, stop hurting and function more fully—and eliminates fatigue as well.

If the body makes ribose, why do we need to supplement it? Unlike the main energy turnover pathways—glycolysis, the Kreb's cycle and the electron transport chain of oxidative metabolism—the metabolic route to ribose synthesis is slow and sluggish. This pathway can make enough ribose to keep our bodies going at a normal performance level, but it can't keep up when our tissues are stressed by strenuous exercise, disease or metabolic dysfunction. This holds for athletes who have overstressed their energy-production mechanisms, as in sprinting, basketball, hockey, weightlifting, power lifting, volleyball, soccer and tennis. For those of you who run marathons, you may be familiar with the post-marathon seven-day slump in energy, accompanied by muscle pain. The body has to replete the lost ribose stores in order to recover. By taking ribose before and after exertion, athletes have been able to avoid this pain and fatigue cycle. Medical research is very clear on one point—taking ribose both before and after ischemia (impaired blood flow) or strenuous exercise will increase the benefits.

Like other supplements—pyruvate, CoQ_{10}, and L-carnitine for example—a manufacturing process needs to be found before supplements become available. Until now the manufacturing processes for making ribose were so expensive that it was out of reach for the consumer. Now, there is new technology for ribose production.

Ribose is Safe

One of the best parts of the ribose story is that it is a powerful natural chemical health aid, with almost no side effects. The toxicology and safety of ribose has been well studied, and it is 100 percent safe if taken as directed. Thousands of patients have taken ribose in doses up to 60 grams per day with minimal side effects. However, even though there are no known contraindications of ribose therapy, I recommend that pregnant women, nursing mothers, and very young children refrain from taking ribose simply because there is not enough published data on its use in these groups.

How can we be so sure that ribose is safe? First, ribose is made naturally by the body, and works with the body's ▸

own chemistry. Glucose, the main sugar of the body, is converted to ribose in the cells. *The supplemented form of ribose, Bioenergy RIBOSE™, is exactly the same as the ribose made by the body from glucose.* Second, the amount of ribose recommended for supplementation is very modest, only about 5 grams one to three times per day. For athletic recovery ribose is only needed on exercise days, but many people take it every day to keep energy levels at their peak. Third, there is virtually no chance of over supplementation. We safely eliminate any that our body doesn't need. Most of all, ribose has been used by thousands of people for many years with no reports of significant adverse reactions.

How Much Ribose Should You Take?

No matter what end of the health spectrum you are on, ribose may help restore energy levels. To keep cellular ATP levels at their highest, ribose should be taken daily. It can be taken in any form—tablets, bars, drinks, and a slightly sweet-tasting powder. Maintenance doses of five grams per day should be enough to maintain normal ATP levels. Five grams is about 1 teaspoonful. If you are a serious competitor or are concerned about your cardiovascular health, you may want to take more—perhaps five to 10 grams per day. However, you should try the lower dosage first and move up as needed. For fibromyalgia sufferers, I recommend 5 g two to three times daily. Although ribose is a sugar, for those of you watching your carbohydrate intake, including diabetics, ribose does not act like glucose to raise blood sugar. In fact, it causes a brief dip in glucose which then normalizes. It has 20 calories per 5 g serving.

Maintaining normal, physiologically active levels of ATP is vital in controlling energy charge in the heart and muscle cells and in regulating the function of enzymes, electrolyte activity and other important cell functions. The good news is now ribose is available as a safe and effective supplement that can build or restore energy in all the cells of the body. ■

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Hyla Cass, M.D. is an oft-quoted expert in the field of integrative medicine and psychiatry, combining the best of leading-edge natural medicine with the modern science, in her clinical practice, writings, lectures, and nationwide media appearances. She is assistant clinical professor at UCLA School of Medicine and author of several books including *Natural Highs: Supplements, Nutrition and Mind-Body Techniques* (with Patrick Holford) and *8 Weeks to Vibrant Health: A Woman's Take-Charge Program to Correct Imbalances, Reclaim Energy, and Restore Well-Being* (with Kathleen Barnes). She also serves on the board of Vitamin Relief USA which provides daily nutritional supplements to at-risk children across the country. For more information see www.drcass.com.