

D-Ribose



By David Brady, ND, DC, CCN, DACBN & Suzanne Copp, MS

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What is ribose?

D-ribose is a simple 5-carbon monosaccharide used by all living cells as an essential compound in cellular energy metabolism. Ribose, needed to synthesize adenine nucleotides, is the carbohydrate backbone of genetic material - DNA and RNA, certain vitamins, and other important cellular compounds.

Without ribose, tissues could not produce these life-giving compounds. Adenine nucleotides are required by heart, muscle and other tissue to make adenosine triphosphate (ATP), the primary source of energy used by all cells to maintain normal health and function. When the pool of adenine nucleotides is depressed by disease or strenuous exercise or activity, the level of energy available to the cell is compromised. A reduction in cellular energy level can lead to diminished function and reduced physiological health.

Unfortunately, many tissues, including heart and skeletal muscles, do not have the metabolic machinery to make ribose quickly when it is needed to rebuild energy levels that might be depressed by disease, exercise or strenuous activity. As such, when these tissues come under metabolic stress, they may not be able to adequately maintain energy pools. A reduced capacity for energy maintenance may impact tissue health and normal function.

Who needs supplemental ribose?

Everyone needs ribose. It is an essential ingredient in stimulating natural energy production. Research has shown that ribose promotes cardiovascular health, reduces cardiac stress associated with strenuous activity and helps athletes reach new heights. Ribose helps the heart and muscles to maximize energy recovery. Whether you are a trained athlete, a weekend warrior or are concerned about your cardiovascular health, ribose may help give the energy boost your body needs. Anyone who has lost blood flow to the heart due to heart attack should consider ribose supplementation immediately.

How is ribose made in the body?

All the necessary compounds for life are made in the body through a series of complicated biochemical metabolic pathways. Ribose is no different. In the body, ribose is made from glucose (a simple 6-carbon sugar) through a pathway called the Pentose Phosphate Pathway (PPP) or Hexose Monophosphate Shunt (HMS). This is the same pathway that makes xylitol, a six carbon sugar. Unfortunately, in heart and muscle cells important enzymes that regulate the activity of this pathway are lacking. As such, forming ribose in heart and muscle cells is a slow process. As a result heart and muscle tissues are unable to replace energy pools quickly once they have been depleted by disease or exercise.

How does the body derive cellular energy from ribose?

The physiologically functional form of ribose, called 5-phosphoribosyl-1-pyrophosphate (PRPP), regulates the metabolic pathway that synthesizes energy compounds in all living tissue. If this compound is not available in sufficient quantity, energy synthesis slows.

How does taking supplemental ribose aid in increasing cellular energy?

If the cellular energy pool is depleted by disease or exercise it must be replaced. PRPP is required to turn on the metabolic pathway used by the body to replenish these energy pools. Supplemental ribose bypasses the slow and rate limiting Pentose Phosphate Pathway, forms PRPP, and quickly begins the process of energy synthesis.

Supplement Facts

Serving Size 5 grams (approx. one heaping teaspoon)
Servings per container 30

Amount Per Serving	% Daily Value
D-Ribose	5 g *

* Daily Value not established.

What will ribose do for someone concerned about cardiovascular health?

Numerous medical studies have shown that energy levels in the heart can be dramatically lowered by exercise or decreased blood flow associated with certain cardiac diseases. Depleted cardiac energy pools may be associated with increased cardiac stress, reduced blood flow to the periphery of the body, fatigue and decreased exercise tolerance. Ribose is the key nutrient for quickly restoring cardiac energy stores.

What is the recommended daily dosage of ribose?

For energy enhancement, ½ to 1 teaspoon (about 2 - 5 grams) is generally adequate. Ribose is mildly sweet and completely soluble. It mixes easily with your favorite juice, milk, PaleoMeal®, or other cold foods such as yogurt.

To maximize athletic performance, or to keep energy pools high during strenuous activity, slightly larger doses may be required. Ribose should be taken just before and just after exercise or activity. For extended exercise, an additional 1 - 2 grams per hour of exercise or activity may be helpful. It's great in your water bottle! You'll forget it's there but your body won't.

Are there any side effects associated with taking ribose?

Ribose should be taken in doses up to 5 grams (approximately 1 rounded teaspoon) at a time. Multiple 5-gram doses separated by 30 - 45 minutes can be taken without side effects. There are two known side effects of taking ribose in doses of 10 grams or more on an empty stomach. The first is a transient hypoglycemia (low blood sugar) that can be eliminated by taking larger doses of ribose with other carbohydrates (such as in juice). The second side effect that may occur in some individuals is loose stools. Again, this side effect has only been reported in very large doses, greater than 10 grams. Total daily intake of ribose should be limited to 20 grams, or approximately 4 rounded teaspoonfuls.

References

1. Segal, S. and J. Foley. The metabolism of D-ribose in man. *J. Clinical Invest.* 37: 719 - 735, 1958.
2. Zimmer, H.-G. Restitution of myocardial adenine nucleotides: acceleration by administration of ribose. *J. Physiol., Paris* 76(7): 769 - 775, 1980.
3. Zimmer, H.-G. and J. Schad. Ribose intervention in the cardiac pentose phosphate pathway is not species-specific. *Science* 223: 712 - 713, 1984.
4. Pasque, M. K., T. L. Spray, G. L. Pellom, P. Van Trigt, R. B. Peyton, W. D. Currie, and A. S. Wechsler. Ribose-enhanced myocardial recovery following ischemia in the isolated working rat heart. *J. Thorac. Cardiovasc. Surg.* 83(3): 390-398, 1982.
5. Chatham, J. C., R. A. J. Challiss, G. K. Radda, and A-M. L. Seymour. Studies of the protective effect of ribose in myocardial ischaemia by using 31P-nuclear-magnetic-resonance spectroscopy. *Biochem. Soc. Trans.* 13: 885 - 886, 1985.

What will ribose do for someone who exercises on a regular basis?

Scientific research shows that three or four workouts per week may not allow enough rest time between sessions for heart and muscle energy pools to return to normal levels. Taking ribose shortens the time needed by heart and muscle tissue to replace energy that is lost through vigorous exercise. Keeping energy pools full helps to keep heart and muscles in good physiological condition, increase power and endurance, and reduce fatigue. Recent research has also shown that ribose supplementation during exercise reduces free radical formation and lowers cardiac stress associated with hypoxia.

Does ribose work with carnitine or other supplements?

Ribose can increase the effect of other energy supplements by keeping the energy pool at full capacity. So, combining ribose with carnitine, a nutrient that increases energy production, makes total sense. Carnitine increases the burning of fat as a fuel source (fatty acid metabolism). Only ribose helps to maintain the pool of energy in the cell. Without adequate levels of energy to work with, no other supplement can be fully effective.

Why is the use of ribose on the rise?

Traditionally, ribose has been very expensive to produce making it difficult to offer as a nutritional supplement. New technology has brought production costs down. In addition, ribose is safe and proven effective by many clinical and laboratory studies. Over 70 scientific publications describe the beneficial effects of ribose in heart and muscles. Bottom Line: Ribose is cutting edge.

Research

Research on D-ribose is focused on improving cardiac surgical outcomes, recovery of ischemic tissue (tissue that does not have enough blood flow to provide adequate oxygen levels for normal energy metabolism) and increasing heart function in severely ill patients.