D-Ribose + Magnesium

Code: FE2911 – 300 g

D-ribose is a naturally occurring pentose molecule (a 5-carbon sugar) that is involved as an intermediate in the production of adenosine triphosphate (ATP) within the mitochondria of the cell, where ATP is the basic energy unit of cells. Consequently, D-ribose has been evaluated in a number of conditions associated with muscle function, including performance enhancement in athletes, chronic fatigue and fibromyalgia, as well as cardiac function.

Ingredients: D-Ribose, magnesium citrate.

Nutritional information:	**1 teaspoon. (5 500 mg)**
D-Ribose	5 000 mg
Magnesium (from Mg citrate)	80 g (21 %*)

* NRV: Nutrient Reference Value in %

Size and format:

300 g

Indications and uses:

- Physical performance
- Cardiac function
- Fibromyalgia
- Diabetes

Recommended daily dose:

1 teaspoon daily mixed well in a cup of water or juice (250-500 ml). Recommended are 2 teaspoons daily in 1-2 cups of water or juice 45-90 minutes before exercise.
Do not exceed the stated recommended daily dose.

Cautions:

Consult a health-care practitioner prior to use if you are pregnant or breast-feeding.

D-RIBOSE: is a simple carbohydrate molecule found in every cell of the human body. Physical stress can increase the loss of nucleotides (such as ATP, ADP and AMP) from the heart and skeletal muscles. D-Ribose is essential in the continuous production of ATP, the molecule that gives our muscles and hearts the energy they need to function. Ribose supports energy production at the cellular level, improves muscle recovery time and endurance.

Physical performance

Muscle ATP stores are rapidly depleted during exercise. Recovery of ATP levels has been shown to take several days, which can ultimately affect performance and potentially the ability to exercise fully day after day [(1)]. It is thought that D-ribose supplementation may help replenish muscle ATP after exercise [(1)].

In a double-blind, crossover trial, 26 healthy individuals were treated daily with 10 g of D-ribose or dextrose for five days [(1)]. The first two days were reload days, during which the subjects rested and were supplemented with the assigned treatment. Over the next three days, subjects underwent 60 minutes of high-intensity interval exercise in separate daily sessions, including cycling, followed by a two-minute power output (PO) test. The results showed that both mean and peak power production increased in the D-ribose group compared to the dextrose group. Additionally, both the reports of perceived exertion and the blood marker of muscle damage, creatine kinase (CK), were lower in the group treated with D-ribose, indicating better performance and less muscle damage associated with D-ribose supplementation.

Cardiac function

Since the heart is a specialised muscle, D-ribose supplementation may also benefit cardiac function. A prospective, double-blind, randomised, crossover study evaluated the effect of D-ribose or placebo for three weeks in 15 patients with coronary artery disease and congestive heart failure (CHF) [(2)]. The results showed that patients treated with D-ribose exhibited better diastolic function, i.e. heart function while the heart is at rest and not contracting, compared to placebo. Specifically, D-ribose administration resulted in an improved atrial contribution to left ventricular filling, a smaller left atrial dimension and a slowing of the short E-wave detected by echocardiography. D-ribose supplementation also significantly improved patients' quality of life [(2)].

A pilot study involving 11 patients with New York Heart Association stage II-IV heart failure found that D-ribose supplementation improved cardiac parameters in some of the patients over a six-week period. Patients were supplemented with 5 g per day of D-ribose. After six weeks, 64% of patients showed improvements in tissue Doppler velocity, a measure of systolic and diastolic cardiac function [3].

A review article discussed the potential benefits of D-ribose in ischaemic heart disease, a narrowing of the coronary arteries due to atherosclerosis that leads to reduced oxygen supply to the heart; when severe enough, it can precipitate angina or a heart attack [4]. This review suggests that since ischaemia results in reduced energy or ATP production in cardiac muscle, supplementation with D-ribose may alleviate this [4]. In fact, preclinical studies have shown that D-ribose increases cellular energy levels and improves function after ischaemia [4]. In mice with right ventricular hypertrophy due to poor oxygenation and ischaemic heart disease, D-ribose supplementation in combination with creatine almost completely reverses the damaging effects of hypoxia [5].

Fibromyalgia

A pilot study evaluated 41 patients with fibromyalgia (FM) or chronic fatigue syndrome (CFS), administering 5 g of D-ribose three times a day (15 g/d) for approximately 18 days. After this treatment period, approximately 66% of patients had a significant improvement in energy, with an average increase of 45%, as well as an improvement in general well-being with an average of 30% [6].

Diabetes

Concerns have been raised regarding the safety of D-ribose in diabetes. One study suggested, based on indirect evidence in animals and humans, that both endogenously produced glucose and ribose can react with haemoglobin in the bloodstream to form glycosylated haemoglobin, also known as haemoglobin A1c (HbA1c) [7]. This study did not actually involve D-ribose supplementation in animals or humans; rather, it was based on positive associations between haemoglobin A1c levels and D-ribose levels in blood or urine. This is suggestive at best, and certainly not conclusive. However, HbA1c is important because it is used as a measure of average blood glucose control in patients with diabetes, and there was some concern about whether D-ribose supplementation might increase this marker and whether this might have a detrimental effect on the course of diabetes.

Another study evaluated the effects of in vivo D-ribose supplementation in animals to assess the effect on HbA1c levels [8]. Two groups of thoroughbred racehorses received 30 and 50 g of D-ribose per day for 17 weeks. During this time, they also exercised. At the end of the study, there was no detectable increase in their HbA1c blood levels and, in fact, the researchers observed that the horses had improved muscle recovery and decreased cramping. This study provides stronger evidence than the previous study that D-ribose is likely to have minimal effects on HbA1c in humans.

MAGNESIUM: Approximately 60% of the magnesium in the body is found in the bones, 26% in the muscles and the rest in soft tissues and bodily fluids.

It is essential for the correct metabolism and absorption of calcium. This mineral plays a very important role at the cellular level, as it regulates the flow of calcium into the cells and together with calcium produces ATP or energy needed by the cells to perform all bodily functions. It is also essential in the transmission of nerve impulses, especially at the intracellular level, and is a co-factor in many enzymatic processes necessary for cellular energy utilisation, which explains the need for high magnesium concentrations in cells [9-11].

Deficiency is reflected in weakness, tiredness, anxiety, apathy, depression, insomnia, irritability, heart problems, predisposition to stress, as well as muscle contraction problems. Possible deficiencies of this mineral are more frequent in older people and in women during the premenstrual period. Magnesium deficiency is associated with premenstrual syndrome. Studies have shown that magnesium intake reduces nervousness, breast tenderness, weight gain, fatigue and headaches during PMS [9,12].

It has a positive effect on stress states and has a calming action. It improves heart muscle activity and regulates blood fats [10,13].

Summary of indications and clinical trials:

Indication	Design	Dose (ribose)	Result	Ref.
Improving performance	Double-blind crossover trial of 26 healthy individuals. Patients were divided according to whether they had a high or low max.VO_2.	10 g per day of D-ribose for 5 days, or dextrose (control)	Average and maximum power output increased in the D-ribose group at low max. VO_2 compared to the dextrose control. In addition, both reports of perceived exertion and creatine kinase (CK; a blood marker of muscle damage) levels were lower in the D-ribose group, indicating better repair and recovery.	1
Coronary artery disease (CAD) and congestive heart failure (CHF)	Randomised, double-blind, crossover design study in 15 patients with CAD and CHF	Dosage not available	D-ribose administration resulted in an increased atrial contribution to left ventricular filling, a smaller left atrial dimension and a slowing of the short E-wave, as measured by echocardiography. D-ribose also showed a significant improvement in the patient's quality of life.	2
Congestive heart failure	Pilot study of 11 patients with stage II-IV heart failure (New York Heart Association)	5 g per day of D-ribose for 6 weeks	Ribose was associated with an improvement in tissue Doppler velocity (E') in 64% of patients, which was maintained at 9 weeks. Five patients showed an improvement in the relationship between early diastolic filling velocity (E) and early annulus relaxation velocity (E'). Four patients also had an improvement in their predicted max. VO_2 values.	3
Fibromyalgia	Pilot study of 41 patients with fibromyalgia (FM) or chronic fatigue syndrome (CFS)	5 g 3 times a day (15 g/d) of D-ribose for 18 days	D-ribose significantly improved all five categories of the visual analogue scale (VAS): energy, sleep, mental clarity, pain intensity and well-being, as well as improving patients' global assessment. Approximately 66% of patients experienced significant improvement while taking D-ribose, with an average increase in VAS energy of 45% and an average improvement in general well-being of 30%.	6

References:

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