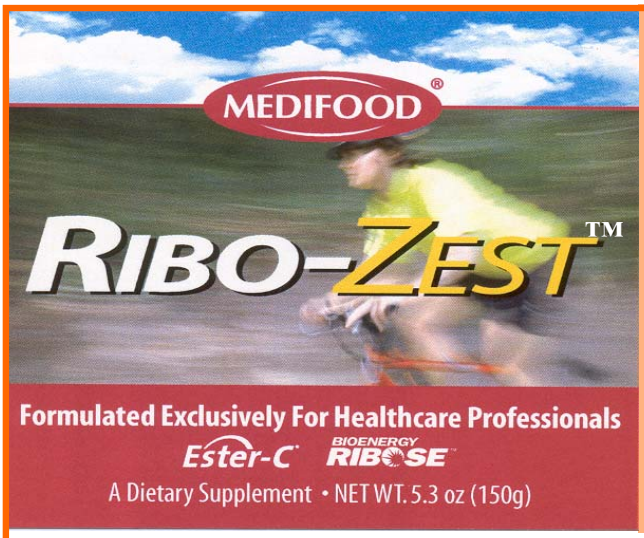


The Ribo-Zest™ Program

Clinically shown to:

- Improve Antioxidant Balance
- Enhance Ability to Exercise
- Reduce Muscle Fatigue
- Improve Heart Function
- Restore Heart Energy

Who will benefit from Ribozest?

- Patients requiring increased cardiac energy and efficiency;
- Individuals requiring high levels of cellular energy to improve their quality of life;
- Athletes wishing to increase athletic performance and improve recovery;
- Individuals who wish to reduce post exercise muscle fatigue;
- Athletes who want to lower oxidative stress during and after exercise;
- Individuals requiring ATP replenishment of cardiac and skeletal muscle.

How long can Ribo-Zest™ be used?

- Ribo-Zest is safe to use as directed on a daily basis by individuals requiring ongoing nutritional support.

When should Ribo-Zest™ be consumed?

- Ribo-Zest may be consumed once or twice daily. Many individuals have reported increased endurance and improved recovery by taking one serving before and one serving just after exercise.

Supplement Facts

Serving Size: 10 gm (Approx. 2 teaspoons)
Servings per Container: 15

	Amount per Serving	% Daily Value*
Calories	36	
Calories From Fat	0	
Sodium	0 mg	0 %
Total Carbohydrates	7 g	2 %
Dietary Fiber	0 g	0 %
Sugars	7 g	
Chromium (From Chromium 454™)	125 mcg	104 %
L-Leucine	800 mg	**
L-valine	700 mg	**
L-Isoleucine	600 mg	**
L-Glutamine	250 mg	**
Vitamin C (from Ester-C®)	50 mg	83%
Citrus Biofavonoids	50 mg	**
Vitamin E (as d-alpha tocopheryl acid succinate)	15 mg	67%

* Percent daily value are based on a 2000 calorie diet

** Daily Value not established for this ingredient

♦ **These statements have not been evaluated by the Food & Drug Administration. This information is not intended to diagnose, treat, cure or prevent any disease.**

Ingredients: RZ-7 Proprietory Energy Mix (Bioenergy Ribose™ and Fructose), Proprietory Antioxidant Fruit and Vegetable blend, Caromix® (Beta-carotene, Alpha-carotene, Lutein, Lycopene, Zeaxanthin, Crytoxanthin), and Natural Berry Flavor.

FUNCTIONAL
INTEGRATED THERAPIES, L.L.C.

MEDIFOOD®

Ribo-Zest™ Key Ingredients

D-Ribose: The Role of D-Ribose in the Body

D-ribose is a naturally occurring 5-carbon monosaccharide. D-ribose is used to synthesize nucleotides (DNA and RNA), nucleic acids, glycogen and other important metabolic products. Ribose is formed naturally in the body from the conversion of glucose via the pentose phosphate pathway or also known as the hexose monophosphate shunt. Supplemental ribose through its intermediate ribose-5-phosphate is the substrate for the formation of 5-phospho-ribose-1-pyrophosphate (PRPP) (1) (Figure 1).

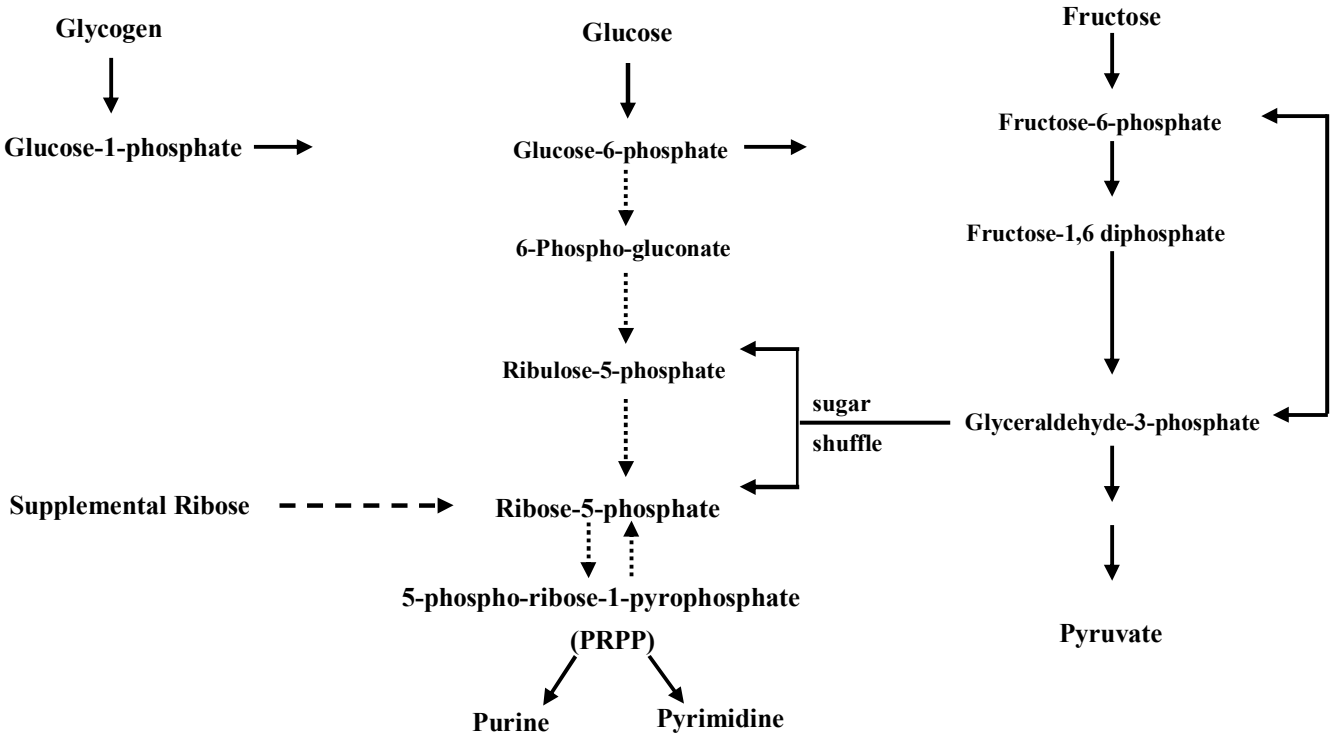


Figure 1

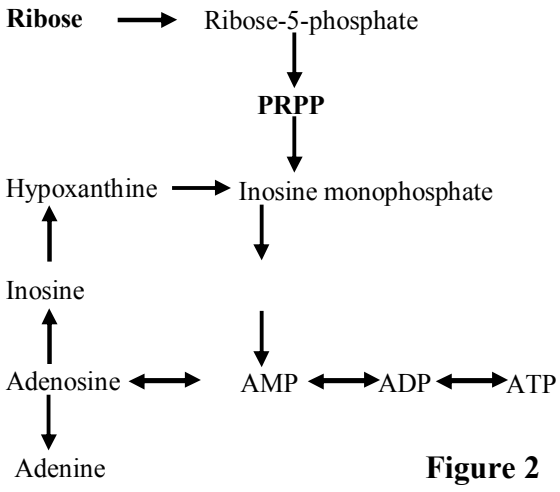


Figure 2

Figure 1.
Carbohydrate metabolism showing the steps of the hexose monophosphate shunt (dotted arrows) verses that of glycolysis (solid arrows) and how the two pathways are connected by the steps of the sugar shuffle. Supplemental ribose (dashed arrow) bypasses the rate-limiting steps of the hexose monophosphate shunt and provides an alternate source of PRPP for nucleotide synthesis.

Figure 2.
The role of ribose in *de novo* synthesis of ATP. PRPP is used in *de novo* synthesis of nucleotides such as ATP, adenosine and inosine.

Ribo-Zest™ Key Ingredients

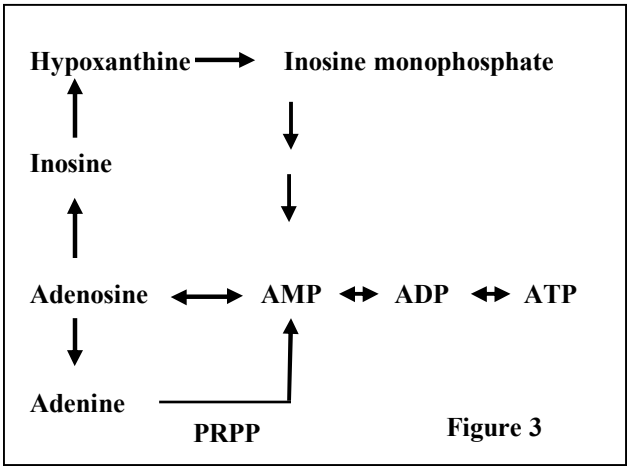


Figure 3.
The role of 5-phospho-ribose-1-pyrophosphate (PRRP) in the ATP salvage pathway.

The importance of Ribose to cardiac and skeletal muscle biochemistry
Supplemental ribose plays a vital role in both myocardial and skeletal muscle metabolism, primarily through its participation in the synthesis of ATP from PRPP, adenine nucleotides and nucleic acid synthesis, cyclic nucleotide metabolism and energy transfer reactions (2). In these tissues, the hexose monophosphate shunt is insufficient due to low availability of glucose-6-phosphate dehydrogenase (3). When ribose is supplemented, the rate-limiting step glucose-6-phosphate dehydrogenase is bypassed, thereby elevating the level of PRPP, which increase adenosine nucleotide biosynthesis and accelerates ATP replenishment of cardiac and skeletal muscle (4).

Mixing ribose and fructose
The proprietary mixture of ribose and fructose supports ATP replenishment from glycolysis, the hexose monophosphate shunt and the sugar shuffle, the interconnection between glycolysis and the hexose monophosphate shunt is shown in (Figure 1). The entry of fructose and ribose into cells is not insulin dependent. In addition, fructose is an extremely poor elicitor of insulin secretion (5).

Antioxidant support
Thirty years ago who would have thought that the term "antioxidant" would have become virtually a household word. Well, it has and today there are so many products touting their "antioxidant capacity" that it is downright confusing. Patients often ask which antioxidant(s) is (are) best for me and how do antioxidants compare with each other? Enter ORAC.

The ORAC (Oxygen Radical Absorbance Capacity) assay was developed in part at the USDA and provides a means by which different antioxidant compounds or groups of compounds can be assessed for their ability to quench free radicals. Moreover, the ORAC measurement yields a single number referred to as the ORAC value based on the degree to which an "antioxidant" can inhibit the action of free radicals as well as the time it takes to do it (6). The measurement is standardized against a water-soluble vitamin E derivative (called Trolox) which has known ORAC value and is reported in terms of Trolox equivalents (µmole TE). The higher the ORAC value the greater the antioxidant capacity. ORAC values have been determined for many different items, including fruits and vegetables. As you might imagine, ORAC values can vary significantly among foods, but on average, a ½ cup serving of fruits or vegetables yields ORAC values in the range of 600 to 800 µmoleTE (6). A healthful diet containing at least 5 servings of fruits and vegetables daily yields on average ORAC values in the range of 3,000 to 4,000 µmoleTE (7).

Ribo-Zest with its proprietary blend of fruits and vegetables, vitamins C and E, citrus bioflavonids and a full spectrum of carotenoids (Beta-carotene, Alpha-carotene, Lutein, Lycopene, Zeaxanthin, Cryptoxanthin) provides a minimum of 3,000 ORAC units per serving, which is equivalent to at least 5 servings of fruits and vegetables daily. No product can replace the benefits of eating a healthy diet, yet Ribo-Zest packs a powerful proprietary mixture of antioxidants with an exceptional ORAC value.

Amino Acids
During physical activity, amino acids derived from skeletal muscle are a potential energy source. The branch-chain amino acids (BCAA), which consist of Leucine, Isoleucine and Valine, constitute approximately 20 % of the skeletal muscle protein mass and are utilized preferentially

Ribo-Zest™ Key Ingredients

by exercising muscle cells to provide carbon skeletons as acetyl CoA and succinyl CoA for fueling muscle fibers, to boost pyruvate levels (an intermediate in energy metabolism) and to provide nitrogen for amino acid transamination reactions (8).

The BCAA transaminase reaction, which removes nitrogen from Leucine, Isoleucine and Valine, is supply driven. RiboZest provides functional levels of these three BCAA, which can spare muscle fiber catabolism to meet the aforementioned needs of the body during exercise.

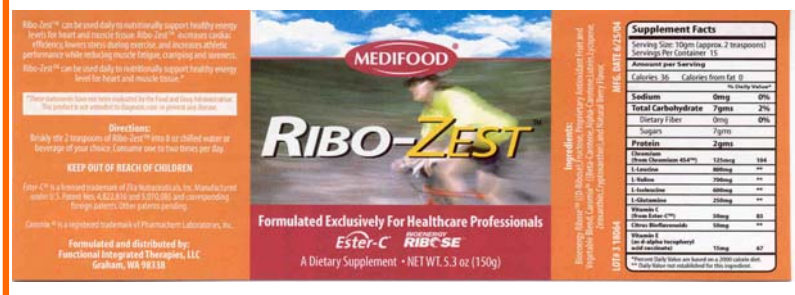
Muscle cells are able to synthesize glutamine and during exercise glutamine is released from the muscle into circulation to provide a substrate for the glycogenic pathway and ATP production (8). RiboZest provides 250 mg of glutamine to conserve glutamine production in exercising muscle cells.

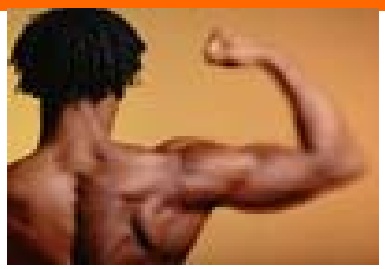
During exercise amino acid pools increase in both muscle fibers and the plasma but are dependent on exercise intensity and duration. Protein turnover, or the balance between protein synthesis and degradation, is less clear during exercise. In some research, a positive protein turnover occurred, whereas others have reported a negative protein turnover (more degradation). Once the exercise is completed, however, there is a significant increase in protein synthesis (8). Consuming RiboZest after exercise with its functional levels of Leucine, Isoleucine, Valine and Glutamine can help to support optimum protein synthesis in muscle cells.

Chromium

An interesting thing happens when you put your muscles to work. When a muscle is repeatedly flexed, the adenosine monophosphate (AMP) kinase (commonly called AMPK) enzyme is activated, increasing fatty acid oxidation and inducing glucose uptake from the blood into skeletal muscle cells.

TASTE TEST APPROVED GRAPE FLAVOR





This metabolic switch moves sugar out of the blood and into these muscle cells where it is burned as fuel. Therefore, regular use of these skeletal muscles can help burn off extra sugars in the blood providing there is adequate adenosine (see Figures 2 and 3) and chromium available.

The trace mineral chromium is critical for proper insulin action and therefore can impact blood sugar control mechanisms (9). Chromium is a key constituent of glucose tolerance factor. By working closely with insulin, chromium helps facilitate the uptake of glucose from the blood into cells (9). Without chromium, the action of insulin is blocked and blood sugar levels are elevated, leading undernourished muscle cells even though the muscle has been repeatedly flexed. Muscle fatigue, the lack of strength and endurance and soreness are the end result. The trivalent form of chromium (Chromium 454™) is one of the most biologically active forms of this mineral (10).

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