

MD+ Resolve version V

Pre-Workout Metabolic Primer

Resolve is Part of [Exersol](#), THE EXERCISE SOLUTION, which also includes [Power Drink](#) and [Amino](#).



Resolve version V represents a new paradigm in pre-training supplements. Unlike the other products out there that include macronutrients like protein and carbs, Resolve primes your metabolism and hormones, and increases energy so your body can train more effectively and make the best use of the anabolic, body composition and performance enhancing effects of exercise.

Resolve provides anticatabolic and anabolic effects by increasing levels of testosterone and growth hormone, decreasing protein breakdown, increasing protein synthesis and providing cell volumizing effects that increase muscle growth. They also maximize energy levels, ATP and phosphocreatine (PC) functioning, as well as gluconeogenic, TCA Cycle flux, and other processes, allowing for more strength and stamina.

As well, it provides potent thermogenic and fat loss properties, increasing fat breakdown and utilization and decreasing fat buildup. And finally, it exerts a potent antioxidant, buffering and cytoprotective effects to decrease muscle tissue injury and soreness and improve recovery.

Because of the dramatic changes in the formulation of Resolve version V, it now contains 150 tablets instead of 120 in order to incorporate the changes in some dosages and the addition of several new ingredients.

<https://metabolicdiet.com/product/resolve/>

Updated by Mauro Di Pasquale, B.Sc. (Hons); M.D. October 14, 2021.

Directions: Three to six tablets half an hour before training.

Nutritional Supplement Panel for Resolve

Supplement Facts:		Serving Size: 6 Tablets			
		Servings Per Container: 25			
	Amount Per Serving	% Daily Value			
Vitamin A (as Palmitate)	2,500 IU	50%	L-Taurine	400 mg	*
Vitamin C (as Ascorbic Acid)	250 mg	417%	L-Carnitine Fumarate	350 mg	*
Vitamin D3 (as Cholecalciferol)	1000 IU	250%	L-Histidine	350 mg	*
Vit B3 (as Niacin and Niacinamide)	30 mg	150%	Betaine (Trimethylglycine)	300 mg	*
Vitamin B6 (as Pyridoxal-5-Phosphate)	10 mg	500%	L-Carnosine	300 mg	*
Folic acid (as 5-Methyltetrahydrofolate)	400 mcg	100%	L-Citrulline Malate	300 mg	*
B12 (as Methylcobalamin)	400 mcg	667%	L-Phenylalanine	300 mg	*
Biotin (as d-Biotin)	600 mcg	200%	Panax Ginseng Extract (Root)	250 mg	*
Calcium (as Calcium Citrate)	250 mg	25%	Acetyl-L-Carnitine	200 mg	*
Potassium (as Phosphate and Succinate)	99 mg	1%	Alpha Lipoic Acid	200 mg	*
Magnesium (as Aspartate and Phosphate)	250 mg	62%	DMAE (as Dimethylaminoethanol Bitartrate)	200 mg	*
Sodium (as Chloride and Bicarbonate)	120 mg	5%	Choline Bitartrate	150 mg	*
Chromium (as CHROMEMATE™ Polynicotinate)	100 mcg	83%	N-Acetyl-Cysteine	150 mg	*
Copper (as Citrate)	100 mcg	5%	Mucuna Pruriens Extract (Seed)	100 mg	*
Zinc (as Monomethionine)	15 mg	100%	Resolve™ Proprietary Complex - 4,020 mg*		
Boron (as Amino Acid Chelate)	3 mg	*	Glutamine Peptides (from Casein), Green Tea Extract (Leaf), Epicatechin, Theobroma Cocoa Complex, Yerbra Mate Powder, Guarana Extract (Seed), Cordyceps Sinensis Extract (Mushroom), Kola Nut Powder, L-Alanine, Phosphatidylserine, Grape Seed Extract, Lecithin, Panax Notoginseng, Resveratrol, Inosine, DMG (Di-Methyl-Glycine), 5-Methyl Methoxy Isoflavone, ATP, Co-Enzyme Q10, Inositol Hexanicotinate, Glutathione (Reduced), Astaxanthin, Melatonin.		
Caffeine USP	99 mg	*			
Bioperine	5 mg	*			
Creatine Monohydrate	600 mg	*			
Beta Alanine	500 mg	*			
L-Tyrosine	500 mg	*			
L-Arginine-Aspartate	400 mg	*			
Calcium Pyruvate	400 mg	*			
Other Ingredients: Microcrystalline Cellulose, Hydroxypropyl Cellulose, Cellulose Gum, and Silicon Dioxide					
*Daily Value not established					

Benefits of Resolve:

1. Increases insulin sensitivity
2. Increases GH and IGF-I levels
3. Increases testosterone levels
4. Decreases serum cortisol
5. Increases both aerobic and anaerobic energy production
6. Increases neurotransmitter levels in the brain
7. Decreases central and peripheral fatigue
8. Increases nitric Oxide production (NO)
9. Provides buffering of lactic acid production
10. Decreases inflammation and muscle and tendon damage
11. Maximizes macronutrient metabolism
12. Increases protein synthesis
13. Increases the breakdown and oxidation of body fat
14. Decreases markers of heart disease and inflammation
15. And much more as explained below.

The information below on the new Resolve version V is in draft form and will be expanded and revised as needed. For now, this latest information will give you the flavor of just what Resolve will do for you in helping you achieve your health, body composition, performance, and anti-aging goals.

Resolve version V will help you train more effectively and will maximize the anabolic and fat burning effects of exercise like no other product on the market today.

The bottom line is that Resolve is so far above any other pre-workout supplement on the market today that there just is no comparison in the effectiveness of Resolve compared to the rest.

Anabolic Effects

The most potent hormonal mix for maximizing muscle mass and strength is the simultaneous increase in testosterone, insulin, GH and IGF-I and a decrease in cortisol while training. That's because all five can work together synergistically to maximize muscle mass and minimize body fat.

Ingredients for increasing serum testosterone and decreasing serum cortisol include: Beta Ecdysone Deer Antler Velvet Extract, Zinc (monomethionine), Magnesium, B6, vitamin C Boron, 5-Methyl Methoxy Isoflavone, Cordyceps Sinensis.

Ingredients for increasing serum levels of GH and IGF-I: Arginine, Mucuna Pruriens (L-dopa), melatonin. For example taking melatonin prior to training has been shown to increase GH secretion.¹

Ingredients for increasing insulin sensitivity and anabolic effects include: Alpha Lipoic Acid (ALA), Banaba Extract (corosolic acid), Chromium, cinnamon,²³ green tea extract,⁴ Prickly Pear Extract, Caffeine,⁵ Magnesium,⁶ and vitamin A.

Also Resolve contains several amino acids that have a direct anabolic effect and provide elevated serum levels at the beginning of exercise. These include: asparagine, aspartate, alpha-ketoglutarate (glutamine, glutamate substrate), alanine, arginine, phenylalanine and tyrosine. See the description on [Power Drink](#), the second formulation in Exersol, the exercise solution, for information on how the hyperaminoacemia is maintained throughout the training session.

As well, Resolve contains taurine and potassium, both which provide volumizing effects that are felt to lead to an increase in protein synthesis

Increasing Energy and Decreasing Fatigue

There are a number of components in the energy equation. First, a pre-training primer should get you physically and emotionally geared up for working out. Then it should make the workout seem easier to do even though you may be exerting yourself to the max. It should also give you more aerobic and anaerobic energy for working out and decrease both mental (central) and neuroskeletal (peripheral) fatigue. Finally, it should enhance recovery.

Ingredients for increasing energy metabolism include three forms of L-carnitine, L-carnitine itself, acetyl-L-carnitine, and L-carnitine fumarate. These ingredients also have other beneficial effects.

Other ingredients, such as the anaplerotic ones mentioned below, CoQ10, and several others that I'll expound upon as I add them and their effects in this information piece, have significant effects on energy metabolism allowing you to train harder and more effectively and recover faster.

AntiCatabolism - Maximizing The Training Effect

Minimizing physical damage to the neuromusculoskeletal system is crucial to maximizing the training effect. That's because it's not muscle breakdown (catabolism) that provides the adaptation stimulus for increasing muscle size and strength, it's the microscopic damage done to the muscle cell structure and the subsequent adaptation to that damage that determines the muscle and strength building response.

You don't have to break down the muscle at all to get this response in full force. In fact, doing so is counter productive. The more muscle you keep from breaking down, and the more you increase protein synthesis, the better the results from your training.

As well, minimizing trauma to the nervous and musculoskeletal system by protecting them at both the tissue and cellular levels, decreases the chance of injury and increases recovery.

Ingredients having antioxidant, neuroprotective and cytoprotective effects include: Taurine, Melatonin, Arginine, Histidine, NAC (N-Acetyl Cysteine), Glutathione, Vitamin C, Co-Enzyme Q10.

Fat Mobilization and Oxidation

Resolve shifts the fuel you use for training from carbs and muscle protein to fats. Thus the fuel you need to train comes mostly from fatty acids and ketones, which in turn are produced by the breakdown and oxidation of body fat.

Ingredients that increase body fat breakdown and oxidation: L-carnitine, Choline, Phosphatidycholine, Inositol, Caffeine, Guarana extract Green Tea Extract Theobroma Cocoa Complex Panax Ginseng Extract, and Kola Nut Extract.

Getting You in The Mood

There are a number of ingredients in Resolve that act on the cellular level in muscle and on the peripheral and central nervous system to increase physical and mental drive and energy so you're mentally and physically ready to train. These same ingredients stimulate you while you're training to help keep your energy level higher and fatigue lower.

Caffeine, Guarana extract Green Tea Extract Theobroma Cocoa Complex Panax Ginseng Extract, Wheat Germ Extract, and Kola Nut Extract,

Decreasing Mental Fatigue

In addition to focusing on the causes of muscle fatigue, recent research has also centered on mental fatigue during exercise. This is commonly called central fatigue because it results from impaired function of the central nervous system. Although central fatigue does not affect your muscles directly,

it can reduce your capacity to perform. Increasing neurotransmitter levels also decreases perceived exertion. The result is more focused and productive training sessions.

Increasing neurotransmitter levels, increasing CNS energy, increasing well-being, and decreasing central fatigue. L-Phenylalanine, L-Tyrosine, DMAE (dimethylaminoethanol), taurine, and caffeine.⁷

Increasing Anaerobic and Aerobic Energy Levels and Decreasing Muscle Fatigue

There are various ingredients in Resolve that will increase both glycolytic and Tricarboxylic Acid Cycle (TCA cycle, Krebs Cycle) flux and thus increase the availability of ATP both aerobically and anaerobically. These increases result in you having more energy to perform better and longer while you're training and/or competing. The increased energy availability results in an increased muscle cell growth and fat loss and improved recovery.

Ingredients for increasing TCA cycle flux, mitochondrial function, gluconeogenesis and aerobic and anaerobic neuromuscular energy include: Potassium succinate L-Carnitine fumarate, L-Arginine Alpha Ketoglutarate, L-Arginine-aspartate, Asparagine, Calcium Pyruvate, Inosine, Alanine (gluconeogenic substrate, ammonia carrier and anticatabolic amino acid).

For example a study found that aspartate and asparagine supplementation may increase the contribution of oxidative metabolism in energy production and delay fatigue during exercise performed above the anaerobic threshold.⁸

Increasing Nutrient Delivery to Working Muscle by enhancing Nitric Oxide Levels

Increasing nitric oxide levels during training increases oxygen and nutrient delivery to muscle and results in increased training effects and recovery. A special proprietary blend of arginine alpha ketoglutarate and arginine aspartate results in a significant increase in NO production while you train.

Electrolytes, minerals and buffering effects

Increasing potassium, phosphate, copper and magnesium levels, and providing a buffering agent gets your workout off on the right foot by taking care of any possible marginal deficiencies and decreasing your tendency to cramping.

Resolve contains: Calcium phosphate, dibasic, Potassium phosphate, potassium succinate, magnesium phosphate, Carnosine, Histidine and Copper.

Carnosine, along with histidine and beta-alanine, precursors of carnosine, all of which also have antioxidant and muscle buffering effects on their own, as well as being important for protein synthesis, are integral parts of Resolve. Carnosine has antioxidant and buffering properties that make it useful for increasing exercise performance under anaerobic conditions and thus as a pre-training supplement.⁹ As well, carnosine has been implicated as an anti-aging supplement, as well as having significant anti-fatigue and immune boosting properties.^{10,11,12,13,14,15,16}

Boosting Recovery - Adaptogens

There are a number of compounds and adaptogens that help you deal with the stress of exercise by enhancing recovery.

Ingredients boosting recovery and having adaptogenic effects include: Cordyceps Sinensis, ginseng, prickly pear extract, and silicon.

Increasing Health and Energy, and Boosting the Immune System

Resolve contains B12 (methylcobalamin – the biologically active form of B12), folic acid, B6 and DMG. These ingredients optimize macronutrient metabolism and help maximize muscle mass and decrease body fat. As well, they decrease serum levels of homocysteine, cholesterol and C-Reactive proteins, markers of heart disease and inflammation in the body.

A More Detailed Look at Some of the Ingredients in Resolve

I'll cover some of the ingredients in Resolve in more detail for now but will add more specific information on others later. I'll also be covering specific individual and groups of ingredients in future articles and blogs on my new Master Site – May 2017.

Taurine

Taurine ((2-aminoethane-sulfonic acid), a sulfur-containing amino acid is the second most abundant amino acid in the body, the most abundant free amino acid found in skeletal muscle tissue, the heart and brain. It's also one of the most abundant amino acids in most organs in the body.

Taurine has a myriad of beneficial functions in the body, including the musculoskeletal and central nervous system, from development to cytoprotection in all age groups.¹⁷¹⁸¹⁹ As such, it is beneficial for improving body composition and physical and mental performance. Although it's one of the few amino acids not directly used for protein synthesis, it can indirectly increase protein synthesis.

Taurine is often considered a non-essential or hesitantly a conditionally essential amino acid for humans since it can be synthesized by the body from methionine and cysteine. However, the limiting enzyme required for biosynthesis of taurine is very low in humans and biosynthesis may not be adequate for times when the need for taurine are increased.

Because of these limits, and to make sure there's enough taurine available when needed, taurine has been added to infant formulas as well as to intravenous solutions used for various medical conditions.

Because of its many functions and suboptimal levels in most people, I consider taurine an essential amino acids for anyone looking to improve body composition (add muscle and reduce body fat) and/or increase exercise/sports performance.²⁰²¹

Taurine is highest in meat and seafood and the average person, non-vegan, takes in around 60 mg per day. However, over twenty times that amount can be beneficial for improving body composition and performance, increasing health and wellbeing, and as complimentary treatment for prevention and treatment of various diseases, including sarcopenia and musculoskeletal disorders.²²²³

Vegan intake of taurine is usually much lower than non-vegans and I always recommend taurine supplementation for vegans, especially vegan athletes. As an aside I always recommend other forms of supplementation for vegans, depending on how carefully a vegan structures their diets, including vitamins D, B2, B12, B6, and niacin, zinc, iron, selenium, calcium, L-carnitine, carnosine and/or beta-alanine, omega-3 fatty acids, and creatine.²⁴²⁵²⁶

Effects on Performance

Taurine is a nutrient that enhances the training effect by its many roles in improving skeletal muscle function including increasing growth hormone and IGF-1, and decreasing inflammation, muscle soreness, and injury.²⁷²⁸²⁹³⁰³¹³²³³³⁴³⁵³⁶³⁷³⁸³⁹

As well, taurine has immune system benefits, insulin like effects as far as increasing protein synthesis and decreasing muscle breakdown and cell volumizing effects. The volumizing effect on certain nutrients on muscle cells is also felt to lead to an increase in protein synthesis.

Over the years, oral taurine administration has been shown to help muscle cramping in patients with liver cirrhosis and myotonic dystrophy. Several studies have suggested that it may also help to alleviate muscle soreness and cramps occurring during and after exercise.⁴⁰

Studies on mice and rats show that taurine is useful for reducing physical fatigue, muscle damage, and exercise induced muscle injury during exercise training, presumably due to its antioxidant effects and the beneficial effects that taurine has on metabolism and on muscle and cardiac functions.⁴¹⁴² It's also been shown to improve the electrical and contractile properties of skeletal muscle fibers.⁴³

Another study on rats has shown that oral taurine supplementation may increase muscle performance and reduce muscle injury caused by exercise.⁴⁴ The aim of the study was to determine if increasing muscle levels of taurine would decrease free radical damage after exercise-induced injury. The authors found that first taurine levels rose in muscle after supplementation, and secondly that running performance was improved by the taurine supplementation. Thus, it appears taurine supplementation may facilitate exercise performance and reduce some of the counterproductive muscle injury caused by exercise.

In humans, taurine supplementation in patients with heart failure increases their exercise capacity.⁴⁵ It's been shown that taurine decreases oxidative stress in skeletal muscle after eccentric exercise⁴⁶ and that taurine may attenuate exercise-induced DNA damage and enhance the capacity of exercise due to its cellular protective properties.⁴⁷⁴⁸

There is some evidence to show that taurine may enhance training further by decreasing training induced fatigue. One study found that Na⁺-K⁺-ATPase activity is depressed with fatigue, regardless of training state, suggesting that this may be an important determinant of fatigue.⁴⁹ Another paper associated fatigue and training with reduced Ca²⁺-ATPase activity.⁵⁰ Previous studies have shown that taurine stimulates Na⁺-K⁺-ATPase activity and also the pumping rate of the Ca²⁺-activated ATPase pump. One study found that taurine increased fat oxidation in endurance trained athletes.⁵¹

Two recent studies in humans found that human endurance performance can be improved by orally ingesting as little as one gram of a single dose of taurine.⁵²⁵³ Another recent study found that taurine supplementation increases lipolysis and contributes to energy systems, exerting its effects on increasing endurance.⁵⁴

One study found that taurine administration increased taurine concentrations in skeletal muscles, reduced the decrease in taurine in skeletal muscles that is seen with exercise, increased physical endurance by increasing the duration of running time in rats, and was considered to reduce exercise-induced muscle fatigue.⁵⁵ Also taurine supplementation has been shown to increase skeletal muscle force production, protects muscle function and reduce oxidative stress.⁵⁶

Taurine is one of the most abundant free amino acids in the testes and is instrumental in the production of testosterone and in fertility. A recent study concluded that taurine plays important roles in male reproduction and that a taurine supplement could stimulate the secretion of LH and T, increase the levels of testicular marker enzymes, elevate testicular antioxidation and improve sperm quality.^{5758596061 62636465666768}

Taurine also plays well with the branched chain amino acids (BCAA) as the combination has been shown to decrease delayed onset muscle soreness and muscle damage.⁶⁹ It's also likely that the beneficial effects of both taurine and the BCAA on skeletal muscle function are enhanced by other nutrients such as beta-alanine and carnosine.⁷⁰

Taurine is considered a potent antioxidant and cytoprotective agent that may be useful for combating the adverse effects of physical and psychological stress, and aging.^{71,72,73,74}

Recent papers found that taurine has beneficial effects on periodontal disease, a disease that is wide spread and increases inflammation, which is counterproductive for optimal health and performance.⁷⁵⁷⁶

Taurine, because of its beneficial effects on skeletal muscle functioning may also be used therapeutically for skeletal muscle disorders.⁷⁷⁷⁸

Body Composition Effects

Taurine has a several effects in the body that contribute to weight and fat loss, and body composition, including beneficial effects on lipid metabolism and protein synthesis.⁷⁹

An early study showed that taurine decreases bodyweight in obese mice.⁸⁰ Another study on 30 Japanese college students found that taurine is effective in reducing body weight and fat mass, possibly due to its beneficial effects on lipid metabolism.⁸¹ As well it may have an important role in cardiovascular disease prevention in overweight or obese subjects.

More recent studies have found that taurine supplementation can increase energy metabolism and expenditure in muscle, adipose tissue and liver, and the function of lipolytic enzymes, decrease body fat, especially visceral body fat, and has additive effects with exercise.⁸²⁸³⁸⁴⁸⁵⁸⁶⁸⁷

Other recent studies have found that taurine supplementation can increase energy expenditure and the function of lipolytic enzymes, decrease body fat especially visceral body fat, restore muscle function in overuse of exercised muscle, decrease catabolism of skeletal muscle, improve strength and endurance performance, decrease muscular fatigue, increase enzymatic antioxidants modulate cytokines, improve cognition and physical fitness, and has additive effects with exercise.⁸⁸⁸⁹⁹⁰⁹¹⁹²⁹³⁹⁴⁹⁵

Taurine has also been shown to increase glucose sensitivity and enhance mitochondrial metabolic function.⁹⁶⁹⁷ The data suggest that taurine administration has a marked effect on lipid metabolism and can therefore be beneficial to persons looking to lose body fat. Also, that restoration of plasma taurine

level could be critical in preventing or improving obesity and age related skeletal muscle and cellular dysfunction.⁹⁸

As well, the data suggests that taurine depletion causes inadequate β -oxidation due to decreased pH buffering capacity, which consequently leads to metabolic dysfunction.

Besides the effects on fat metabolism and mitochondrial functioning, taurine also has effects on cellular hydration that increases protein synthesis and thus decreases the loss of muscle with weight loss.⁹⁹

Taurine has been shown to be an important amino acid in several tissues in the body, including muscle.¹⁰⁰ Because of its properties in skeletal muscle it's been suggested as a treatment for various muscle disorders.¹⁰¹

Taurine, because of its effects on increasing insulin sensitivity, growth hormone levels, and protein synthesis (secondary to its effects on osmoregulation and cell volumizing^{102,103,104}), helps to spare muscle when dieting, with the result that weight loss is mostly from the loss of body fat. Taurine is also beneficial because of its effects on osmotic regulation of neuronal activity.¹⁰⁵

Taurine is also useful in regenerative therapies. A recent study looked at the effects of taurine in chondrogenesis when used with stem cells. However, the use of taurine may well aid in chondrogenesis when used along other ingredients present in Resolve and as such may be useful of increasing the repair of cartilage in joints, including the vertebral column facets in degenerative spinal osteoarthritis.¹⁰⁶ The same study also looked at the beneficial effects of Taurine on telomerase and for anti-aging.

The bottom line is that taurine supplementation significantly enhances the body composition and performance benefits of exercise as well as improving health and well-being in all age groups. Because of all these properties, taurine is an integral part of Resolve.

For the most current information on taurine see my recent online article at https://metabolicdiet.com/wp-content/uploads/2017/product_pdf/Taurine.pdf.

Alpha Lipoic Acid

Alpha lipoic acid (ALA) has significant biological activity and therapeutic potential secondary to its potent antioxidant and anti-inflammatory properties including its ability to increase levels of intracellular glutathione, and to recycle other antioxidants such as vitamin C, vitamin E and glutathione.^{107,108,109,110,111,112,113,114,115,116,117}

Alpha lipoic acid also has several useful and diverse properties. In a review¹¹⁸ the author states "LA improves glycemic control, polyneuropathies associated with diabetes mellitus, and effectively mitigates toxicities associated with heavy metal poisoning. As an antioxidant, LA directly terminates free radicals, chelates transition metal ions (e.g. iron and copper), increases cytosolic glutathione and vitamin C levels and prevents toxicities associated with their loss."

ALA has significant anti-inflammatory properties and has been shown to inhibit IL-1, a proinflammatory cytokine and inhibit the synthesis of PGE2 by inhibiting COX-2 activity. This latter mode of action simulates the anti-inflammatory effects of the present class of NSAIDS such as Celebrex, Advil, Aleve, etc. As well, the anti-inflammatory effects of ALA are increased since it decreases both the pro-inflammatory cytokines^{119,120} and secondary cortisol elevations.

ALA was also added to Resolve because of its actions on decreasing pro-inflammatory cytokines and cortisol levels, its protective effects, and its effects on alleviating pain.¹²¹¹²²¹²³¹²⁴¹²⁵¹²⁶

It has been shown to inhibit cross-linking among proteins, a process that contributes to the aging process in the body and especially in collagen-heavy tissues such as skin. Alpha-lipoic acid activates a collagen-regulating factor known as AP-1 that turns on enzymes that digest glycation-damaged collagen and thus make the skin more supple and youthful looking.¹²⁷

Besides having potent antioxidant and anti-inflammatory effects, ALA also has significant anabolic effects secondary to its beneficial effects on insulin sensitivity, growth hormone and IGF-I secretion, and energy metabolism, all factors involved in maintaining, repairing and regenerating musculoskeletal tissues.^{128,129,130,131,132133}

ALA has also been shown to have significant anti-obesity effects. One study found that ALA decreases hypothalamic AMPK activity and causes profound weight loss in rodents by reducing food intake and enhancing energy expenditure.¹³⁴ More recent studies have also found that ALA significantly affects obesity and body composition in humans.^{135136 137138139} A recent study found that the combination of curcumin and alpha lipoic acid exhibit an additive effect in weight and fat loss.¹⁴⁰

As well, it helps neutralize and remove various toxic metals, including mercury, from the body, both alone and with other compounds such as glutathione (also in Resolve).¹⁴¹¹⁴² A recent study found that ALA reverted the oxidative damage and inflammation in the brain caused by pesticides.¹⁴³

ALA is also useful in reversing mitochondrial dysfunction, especially in the brain and in aging mitochondria.^{144,145146147148} A recent study (2019) stated the following on the combined use of ALA and vitamin D3 (both in Resolve)¹⁴⁹ **“In our study, the combination of LA and vitD showed beneficial effects on viability of astrocytes, since the substances are able to cross the brain barrier. In addition, combined LA and vitD attenuated the H2O2-induced apoptosis through the mitochondrial-mediated pathway. The combination was also able to counteract the adverse conditions caused by iron, preventing its accumulation. All these data support the hypothesis of the synergistic and cooperative activity exerted by LA and vitD in astrocytes indicating a possible new strategy to slow down ageing.**

Astaxanthin

Astaxanthin, a powerful lipid based antioxidant complements and adds to the many beneficial effects of Resolve as it works with other ingredients in Resolve to improve health, enhance exercise performance, increase fat metabolism during exercise, decrease oxidative stress and muscle injury, delay exhaustion, increasing improve body composition, enhance recovery, prevents redox imbalances, improves immune function, and attenuates muscle damage, counterproductive inflammation and fibrosis induced by rigorous physical training as well as immobilization.¹⁵⁰¹⁵¹¹⁵²¹⁵³¹⁵⁴¹⁵⁵¹⁵⁶¹⁵⁷¹⁵⁸¹⁵⁹¹⁶⁰¹⁶¹¹⁶²¹⁶³¹⁶⁴¹⁶⁵¹⁶⁶¹⁶⁷¹⁶⁸

Some of the benefits of Astaxanthin deserve special attention. For example, astaxanthin has a protective effect on mitochondria, the cellular powerhouses that produce the energy we need to live and function optimally. Protecting the mitochondria is especially important during exercise since destructive free radical production increases almost exponentially and can damage not only the mitochondria, thus impairing energy systems, but also skeletal muscle impairing performance and recovery and increasing the chance of injury.¹⁶⁹

But that's not all because astaxanthin, through its effects on decreasing mitochondrial damage in other parts of the body such as the testes, also increases testosterone production and thus increases the anabolic effects of exercise, and has also been shown to have positive effects on sperm parameters and fertility.¹⁷⁰

Unlike some other antioxidants, astaxanthin not only has intrinsic antioxidant and anti-inflammatory properties but it also increases the endogenous production of natural antioxidant defense mechanisms such as SOD and heme oxygenase-1.¹⁷¹ As well it works synergistically with other ingredients in Resolve. For example, in horses it's been shown that continuous dietary administration of astaxanthin and L-carnitine (**both in Resolve**) attenuates exercise-induced muscle damage.¹⁷²

So, with the use of astaxanthin, as with several other antioxidant ingredients and anti-inflammatory ingredients in Resolve, there is not only antioxidant and anti-inflammatory effects of the ingredients, but also an increase in endogenous production of antioxidants and a boost to endogenous anti-inflammatory pathways. The overall effect is a decrease in counterproductive damage and inflammation secondary to strenuous exercise and competition and also quicker recovery from mental and physical exercise induced stress.

For all these reasons astaxanthin plays a prominent part in the beneficial effects that Resolve has on all aspects of health, energy metabolism, nutrition, exercise, and anti-aging.

Resveratrol

Resveratrol is a potent anti-oxidant with significant anti-aromatase activity.¹⁷³¹⁷⁴ Researchers have shown that resveratrol may have significant anti-aging effect and extend lifespan and healthspan.¹⁷⁵

As well, resveratrol has been shown to decrease fatigue, enhance body composition and both physical and mental performance, interact with our microbiome, and improve testicular function.¹⁷⁶¹⁷⁷¹⁷⁸¹⁷⁹¹⁸⁰¹⁸¹¹⁸²¹⁸³¹⁸⁴¹⁸⁵¹⁸⁶¹⁸⁷

Studies have also shown that resveratrol, and the B vitamins in Resolve, can counteract some of the detrimental effects of environmental pollution especially first, second, and third hand cigarette smoke and air pollution.¹⁸⁸¹⁸⁹¹⁹⁰

Both the ingredient resveratrol and grape seed extract that contains resveratrol and many other beneficial ingredients, are in Resolve.

Glutamine peptides

Resolve contains glutamine peptides (from casein rather than from wheat gluten so Resolve can be safely used by those with gluten sensitivity), which have anabolic (increases protein synthesis and muscle mass) and anticatabolic (decrease muscle breakdown) effects, above those normally associated with glutamine, as the peptides themselves have some physiological effects. Also, the peptide form is better absorbed than free glutamine that is not peptide bonded.

As well, the glutamine in the glutamine peptides:

- Regulates protein synthesis and increases body composition and performance
- Increases both aerobic and anaerobic energy systems

- Has beneficial effects on the immune system
- Aids in the prevention and treatment of the overtraining syndrome.
- Increases insulin sensitivity when a protein hydrolysate is combined with creatine.¹⁹¹

Glutamine has significant effects on body composition and performance as it favorably affects growth hormone and cortisol levels, protein synthesis, cell volume, muscle catabolism (inhibits it) and gastrointestinal and immune function.¹⁹²¹⁹³¹⁹⁴¹⁹⁵¹⁹⁶ It's used for energy by most cells in the body but especially by the GI tract, liver, kidney and the immune system. The process for energy production is by successive deamination of glutamine to glutamate, then to alpha-ketoglutarate that enters the TCA/Krebs cycle and through the oxidative phosphorylation forms ATP, the main energy source on which the body functions.

Glutamine is also used as a basis for the synthesis of the ATP molecule itself, nucleic acids (DNA and RNA synthesis and repair), other amino acids and proteins, glucose through gluconeogenic pathways, carbamoylphosphate, and other metabolites. As well glutamine increases glutathione, a powerful endogenous antioxidant that mitigates the counter-productive effects of exercise on excessive muscle damage without affecting the positive effects of exercise.

The interconversions, reactions, pathways and signaling that glutamine is involved in are complex and impacts many metabolic processes that are beyond the means of this information piece. As an example, glutamate can be used (besides conversion to glutamine) in an alanine aminotransferase

reaction to produce alpha-ketoglutarate (AKG) and alanine or by the reverse reaction alpha-ketoglutarate can be aminated by ammonia or via a transamination reaction from other amino acids to

form glutamate and pyruvate. The resulting alanine and pyruvate are involved in complex interactions and so the complexity of how glutamine affects metabolism soon increases exponentially.

A recent paper found that glutamine supplementation improves some parameters of sport and exercise performance, and chronic supplementation appears to be of special importance for increasing tolerance to intermittent exercise, lowering feelings of fatigue, and optimizing recovery from muscle damage.¹⁹⁷ Glutamine may also act as a relevant resource for rehydration during strenuous and prolonged physical activity.

And glutamine plays well with other ingredients in Resolve. For example, a study found that a combination of creatine monohydrate plus glutamine together resulted in significantly increase muscle mass and strength.¹⁹⁸

An advanced cell volumizing formula that results not only in increases in protein synthesis and an anabolic effect, but an increased transport of creatine inside muscle and other cells. This formula includes:

- **Glutamine**
- **Taurine**
- **Potassium**
- **Sodium**
- **Creatine**

Branched Chain Amino Acids

Increased intracellular concentrations of branched chain amino acids (leucine, valine and isoleucine) stimulate formation of acetyl-coenzyme (CoA) and succinyl-CoA, thus increasing both glycolytic and anaerobic flux and aerobic and anaerobic energy production. All three, but especially leucine, have a synergistic effect with creatine on increasing protein synthesis.

Beta-Alanine and Carnosine

Both Beta-alanine and Carnosine (beta-alanyl-L-histidine) were added to Resolve because of their powerful antioxidant, anti-inflammatory, and immune system effects, as well as its beneficial effects on performance, healing and recovery.^{199200201202203204205206207208209210,211,212213,214,215,216} Exercise is a catabolic process and unaided this catabolism isn't reversed right away even after you've finished training. Carnosine has an immediate effect on helping to change the catabolic state to one that's anabolic and aiding recovery in this and other ways. It also has beneficial effects on muscle damage and on increasing blood flow in muscle.²¹⁷

Carnosine has beneficial effects on exercise performance by helping to overcome muscle fatigue, likely due its effectiveness as a buffering agent, and perhaps its antioxidant, chelating, and enzyme regulating effects.²¹⁸

Carnosine levels tend to be higher in athletes such as sprinters^{219,220} and in bodybuilders²²¹ These studies also show that intramuscular carnosine may be an effective physiological H⁺ buffer and that there is a significant relationship between the carnosine concentration in human skeletal muscle and high intensity exercise performance. A recent study found that beta-alanine supplementation increased muscle carnosine levels²²² and resulted in an improvement in exercise performance.²²³

Since dietary carnosine is absorbed across intestinal epithelial cells, using carnosine itself would seem to be more useful than using beta-alanine. However, a recent study found that using carnosine and beta-alanine together results in a greater effect than using either one alone.²²⁴ As such, I've included both in Resolve.

Ditto for the inclusion of Taurine as the combination of taurine and carnosine has been shown to have protective properties towards testicular tissue and consequently for testosterone production.²²⁵

Citrulline Malate

Citrulline Malate (CM), a mixture of citrulline and malate, was added for several reasons. Citrulline has several effects, including increasing ammonia clearance, increasing bicarbonate, ornithine, arginine, and citrulline levels. Malate, a tricarboxylic acid cycle (TCA) intermediate, has beneficial effects on energy metabolism mainly by facilitating aerobic ATP production through anaerobic reactions.

Overall, studies suggest that citrulline malate supplementation can boost power and endurance athletic performance, enhance recovery by various pathways including direct effects on skeletal muscle function and contractile force, decreasing post-exercise ratings of perceived exertion and muscle soreness, eliminating the amino acid breakdown products of protein metabolism and augmenting the detoxifying capacity of liver cells in removal of ammonium and lactate from the blood.²²⁶²²⁷²²⁸²²⁹²³⁰²³¹²³²²³³²³⁴²³⁵²³⁶²³⁷²³⁸²³⁹²⁴⁰²⁴¹ These actions decrease fatigue, enhance recovery and facilitate the shift from the catabolic training state to the post exercise anabolic state.

A recent review and meta-analysis found that citrulline malate increased repetition performance, delayed fatigue and enhanced muscle endurance during high-intensity strength training.²⁴²

The bottom line is that CM supplementation has beneficial effects on energy metabolism, body composition, exercise performance, decreasing fatigue, and enhancing recovery short term by facilitating the shift from the catabolic training state to the post exercise anabolic state, and long term.

Many other ingredients that increase the effectiveness of Resolve in maximizing energy metabolism, performance and body composition – see the complete nutrition panel above. Their function in enhancing the effects of Resolve in maximizing energy metabolism, performance and body composition will soon be added to this information piece.

Zinc

Exercise can lead to an increased need for certain nutrients. For example, one study found that there is an increase in selenium requirements with exercise.²⁴³ Problems can arise from exercise induced mineral loss, which is further enhanced by the finding that many of us don't consume adequate amounts of many essential minerals.

Studies have shown that many athletes, and female athletes, in particular, consume diets that have been found to be inadequate for certain key minerals such as zinc, magnesium, copper, and iron. The combination of strenuous exercise and compromised mineral status ultimately leads to low endurance capacity, depressed immune function, and the development of a variety of disease conditions.

One study looked at the effects of zinc deficiency on physical performance and found that low dietary zinc was associated with impaired cardiorespiratory function and impaired metabolic responses during exercise.²⁴⁴

Zinc deficiency in humans is widespread²⁴⁵ and athletes may be particularly prone to lower plasma zinc levels.²⁴⁶ Zinc is a constituent of more than a hundred fundamentally important enzymes, so zinc deficiency has many negative effects on almost every body function.²⁴⁷ As well, zinc deficiency can adversely affect the reproductive hormones and as such impair athletic efforts.²⁴⁸

Zinc deficiency adversely affects protein synthesis. In one study the effects of zinc deficiency in rats, on the levels of free amino acid in urine, plasma and skin extract were investigated.²⁴⁹ Zinc deficiency adversely affected skin protein synthesis. Especially where a deficiency may be present, supplemental zinc has resulted in an increase the secretion of growth hormone and IGF-I,²⁵⁰ and testosterone²⁵¹ and to raise plasma testosterone and sperm count.^{252,253}

A study looking at the effects of zinc supplementation on wrestlers found that the results obtained at the end of the study indicate that zinc supplementation (as well as several other ingredients in Resolve including NAC and ALA) prevents production of free radicals by **activating the endogenous antioxidant system.**²⁵⁴ This activation is important as it coincides with the effects of exercise, which also activates the endogenous antioxidant system and leads to endogenous antioxidants that enhance the beneficial effects of exercise on body composition and performance. The authors concluded that “physiologic doses of zinc supplementation to athletes may beneficially contribute to their health and performance.”

It's been shown that there is an improvement in insulin resistance with **zinc** supplementation and that zinc is involved in controlling some of the aspects of obesity.²⁵⁵ Zinc also improves calcium metabolism and thus the beneficial effects that calcium has on fat metabolism.

Magnesium

Magnesium, besides complementing the effects of calcium on obesity²⁵⁶ and other functions, also has important effects on its own. Magnesium is involved in numerous processes that affect muscle function including oxygen uptake, energy production and electrolyte balance. Low levels of magnesium promote inflammation^{257,258} and impact on the body's ability to handle stress.²⁵⁹ These functions are useful in alleviating the release of pro-inflammatory cytokines, and decreasing both insulin resistance and inappropriate cortisol secretion.

There is evidence that marginal magnesium deficiency impairs exercise performance and increases oxidative stress. As well, strenuous exercise increases urinary and sweat losses that may increase magnesium requirements.²⁶⁰

Recent surveys have shown that a significant number of individuals are magnesium deficient based on their intake. Athletes in sports with weight classes are especially vulnerable to magnesium deficiency due to their weight loss practices. As such, in these athletes, and others who are magnesium deficient or whose levels are marginal, magnesium supplementation would have beneficial effects on exercise performance.

A recent study found that magnesium supplementation improved alactic anaerobic metabolism, even though the athletes were not magnesium-deficient.²⁶¹ Another study found that magnesium supplementation increased strength performance.²⁶² As well, magnesium may prove effective for muscle cramps.²⁶³

Magnesium has been shown to influence testosterone levels as well as the anabolic peptide IGF-1.^{264,265} As well, magnesium has been shown to work along with zinc and B6 (both of which are present in Resolve) to produce a significant anabolic effect.²⁶⁶

Antioxidant Interactions

Many antioxidant compounds act in concert with both other exogenous compounds and with endogenous antioxidants. For example, ubiquinol-10 spares alpha-tocopherol when both antioxidants are present in the same liposomal membranes and that ubiquinol-10, like alpha-tocopherol, does not interact with reduced glutathione²⁶⁷.

Generation of free radicals and subsequent lipid peroxidation have been proposed to contribute to delayed tissue damage. One study has found that ascorbate and ubiquinol levels were decreased after trauma²⁶⁸. In this study, changes in tissue levels of ubiquinol, but not ascorbate reflected the degree of trauma. The authors suggest that ubiquinol levels may provide a useful marker of the oxidative component of the secondary injury response.

In some cases, antioxidants act synergistically. For example, water based antioxidants such as Vit C can act in concert with lipophilic antioxidants such as Vit E. In one study Vit E and Vit C acted synergistically to inhibit the oxidation of human low density lipoprotein (LDL)²⁶⁹. In another study, the combination of vitamins E and C produced a protective effect on parinaric acid peroxidation exceeding the sum of their individual contributions²⁷⁰.

Many antioxidants have a vitamin E-sparing action. The water-soluble antioxidant vitamin C can reduce tocopheroxyl radicals directly or indirectly and thus support the antioxidant activity of vitamin E^{271,272}. In one study, vitamin C and other compounds (including ascorbyl palmitate, propyl gallate, butylated hydroxytoluene, hydroquinone and glutathione) blocked the oxidation of platelet tocopherol. In this same study, it was shown that the use of exogenous natural and/or synthetic antioxidants can prevent the oxidation of endogenous antioxidants²⁷³.

Methylcobalamin (Vitamin B12), Vitamin B6, Betaine and Folic Acid, for Increased Health and Energy.

Resolve contains high doses of **Folic acid, Vitamin B6** and **methylcobalamin**. The combination increases energy and health.

There is so much to say about the effects that this trio has on metabolism, macronutrient metabolism, energy systems, and on combating the adverse effects of pollution and mercury toxicity, that it would take a separate book to document it all.

Suffice it to say that the health effects of all three of these B vitamins have been extensively documented. And that several of the medical parameters, such as homocysteine, cholesterol and C - reactive protein, markers of heart disease and inflammation in the body, are decreased by the use of hefty doses of these vitamins, and by some of the other ingredients in Resolve, including **betaine** (trimethylglycine – three methyl groups attached to the amino acid glycine).

Besides acting as a precursor for methionine, choline and carnitine, betaine has other useful properties. Betaine has been shown to protect tissues under stress, regulate fatty acid metabolism, reduce body fat in animals, and be useful in the prevention of chronic diseases.²⁷⁴ Betaine also acts as an important methyl donor.

Methyl donors are important for the methylation reaction, which adds a methyl group (one carbon atom and three hydrogen atoms), on proteins, enzymes, chemicals, DNA, and amino acids like homocysteine. Methylation is important for maintaining many functions in the body including genetic expression, and neurological and musculoskeletal function.

Resolve contains several ingredients involved in methylation, including vitamin B12 (as **methylcobalamin** – the biologically active form of B12 that has an added methyl group – the synthetic B12, cyanocobalamin, a much cheaper form of B12 with a cyanide molecule, must be metabolized to methylcobalamin in the body), **folic acid, B6, betaine**, and **choline**. These ingredients optimize macronutrient metabolism and help maximize muscle mass and decrease body fat, often acting synergistically to achieve their effects.²⁷⁵ As well, they decrease serum levels of homocysteine, cholesterol and C-Reactive proteins, markers and mediators of heart disease and inflammation in the body.^{276,277}

Melatonin

Melatonin, a hormone produced by the pineal gland located at the base of the brain, has many important properties and effects, including regulating the sleep/wake cycles, and increasing growth hormone secretion.

Several studies have shown that melatonin increases growth hormone secretion through complimentary pathways²⁷⁸ for as long as 24 hours.²⁷⁹ Melatonin has also been found to enhance exercise-induced growth hormone secretion.²⁸⁰ As well it's been shown that melatonin induces normal sleep patterns which in turn are conducive to maximizing night time growth hormone secretion.

Melatonin has also been shown to have significant antioxidant effects. In one study it was found to have greater antioxidant effects than vitamins E and C, and reduced glutathione.²⁸¹)

In a recent study the authors concluded that "Evidence shows that intense exercises disturb antioxidant status of competitive athletes, whereas supplementation with melatonin strengthens antioxidant status in trained athletes in various sports as the compound showed high potency in reduction of the oxidative stress and inflammation markers generated during intense and prolonged exercise."²⁸²

It has also been shown to be useful in treating insomnia and sleep disturbances related to conditions like fibromyalgia and depression. As such it is useful for decreasing the stress that often accompanies musculoskeletal injuries and other problems These effects can result in significant effects on injury prevention and healing.

As well, aspirin and other NSAIDs, which are often used to treat injuries, arthritis and other inflammatory conditions, can decrease melatonin levels and thus increase the need for melatonin supplementation.

Bioperine

Resolve contains **piperine** marketed as **Bioperine**, which significantly enhances the bioavailability of supplemented nutrients through increased absorption and decreased metabolic inactivation.²⁸³²⁸⁴²⁸⁵²⁸⁶

The Advantages of Bioperine®

Bioperine® is the only product sourced out of piperine to obtain a patented status for its ability to increase the bioavailability of nutritional compounds. Secondly, it is the only source from piperine to have undergone clinical studies in the U.S. to substantiate its safety and efficacy for nutritional use.

The subtle, yet potent properties of Bioperine® have been measured in several clinical studies with healthy volunteers in the U.S. These studies measured the absorption of various substances with and without Bioperine®. Gastrointestinal absorption of all the studied nutrients, as measured by amounts present in the blood, increased dramatically when administered with Bioperine® as compared to the control group receiving the nutrient alone.

As well, Bioperine has thermogenic and other properties on its own. For current information on the beneficial effects of Bioperine go to <https://www.bioperine.com/index.php/aboutbioperine>.

What Resolve Doesn't Have in It

What Resolve doesn't contain is almost as important as what it does. Resolve doesn't contain any protein (other than specific amino acids) or carbs as both these macronutrients are counter productive for maximizing the body composition and performance effects of exercise.

Using carbs before training has been shown to decrease growth hormone levels, and to decrease the use of body fat as fuel for the training session. Using protein before training, especially whey protein, is also counter productive and like carbs can lead to a cascade prior to training that is counter productive as it results in a decrease in the anabolic and fat burning hormones, and a decrease in the use of fat as a primary fuel at the beginning and into exercise.

The ingredients in Resolve, on the other hand, set the training stage for maximal use of body fat and a decrease in muscle catabolism while training. It also sets the stage for the optimal use of [Power Drink](#) as the two work synergistically to maximize the anabolic and fat burning effects of exercise.

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