The Hammer Nutrition

**FUELS & SUPPLEMENTS**

*EVERYTHING YOU NEED TO KNOW!*

How to use the Hammer Nutrition fuels

Supplements: Why you should be taking them

How to get through your epic sessions

Brought to you by **HAMMER NUTRITION**
Getting your fuel and supplement program dialed in just got easier!

The Hammer Nutrition Fuels and Supplements - Everything You Need To Know contains three articles that will “arm” you with all of the information you need on each and every Hammer Nutrition fuel and supplement. Within the pages of the first article, “The Hammer Nutrition Fuels – What they are and how to use them”, you’ll find the details on each of our fuels, when to use them, and how much to use for optimum benefits.

“Supplements – A necessity for athletes” provides the rationale for our strong conviction that a well-thought-out, consistently used supplement program is of vital importance. This article also discusses each of the supplements we produce and categorizes them—a hierarchy system, if you will—which will be helpful to you in designing your personalized supplement program.

“Epic Sessions – Supplement suggestions for workouts and races” effectively answers the question, “If I’m doing a long, arduous workout or race, what would the ultimate supplement program look like and how much of each product should I take?” We have no doubt that The Hammer Nutrition Fuels and Supplements – Everything You Need To Know will be invaluable in helping you enjoy more productive workouts and better race results, so you’ll want to refer to it often!
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Hammer Nutrition products fuel 20-year-old Stephen Bucken to his first ultra finish at the 2011 Iron Horse 50 Mile. Photo: Chris Rodatz
THE HAMMER NUTRITION FUELS

What they are and how to use them

Dustin Phillips stays ahead of the pack in Whitefish, Montana. Photo: Angela Miller
1. We at Hammer Nutrition are exceptionally pleased to market to endurance athletes around the globe a complete line of the finest fuels available. Our fuels contain only ingredients that promote healthy, steady energy production. None of our products contain any added simple sugars, artificial flavors or colorings, or any questionable, fad, or unproven ingredients.

2. Hammer Gel currently is available in nine flavors and is the gold standard of pure carbohydrate energy. The maltodextrins (complex carbs) in Hammer Gel provide smooth, clean energy.

3. HEED is our all-purpose sports drink mix that provides complex carbs and some electrolytes, too. It is ideal for shorter-duration exercise, or for activities where a sports drink is preferred.

4. Sustained Energy, Perpetuem, and Perpetuem Solids contain soy protein and other necessary metabolites in addition to complex carbs. Either of these are your choice for training/races that last beyond two hours or so.

5. Endurolytes (capsules, powder, or effervescent tablets) are a full-spectrum, easily assimilated electrolyte supplement. If the above-listed fuels can be thought of as the body’s gasoline, Endurolytes are the body’s motor oil, helping to maintain the optimal performance of many important bodily functions, thus vitally fulfilling a crucial aspect of athletic fueling.

6. Hammer Bars are a super healthy food in the convenience of an energy bar, ideal for use as a pre-exercise meal, post workout/race recovery food, or healthy snack any time.

7. Hammer Soy is a superb all-purpose, GMO-free, all-vegetable protein that has many health benefits and helps athletes to fulfill their daily protein requirements.

8. Hammer Whey is 100% whey protein isolate, the highest quality, most bioavailable form of protein, not the more commonly found, lower quality whey protein concentrate. For recovery purposes, whey protein isolate has no peer. Each scoop of Hammer Whey also contains six grams of glutamine, an amino acid that provides a plethora of benefits.

9. Recoverite is a delicious all-in-one recovery drink. Each two-scoop serving provides 31 grams of carbohydrates, 10 grams of whey protein isolate, and three grams of glutamine.

10. All Hammer Nutrition products are flexible, easy-to-use, and complement each other perfectly. They offer a great variety of flavor and concentration mixes. You can alternate fuels during very long events, make ultra-concentrated pastes, or toss a scoopful in a water bottle. Hammer Nutrition fuels will satisfy anyone’s energy needs, regardless of the length or type of athletic event or personal taste.

Start reading the full article on page 6
INTRODUCTION

Hammer Nutrition fuels are the building blocks for your personal fitness and athletic success. We offer a full line of endurance fuels, from gels and energy drinks, to recovery and protein powders, and everything in between. However, with so many choices and possible combinations, how do you know which ones to choose and when?

This article describes our fuels in detail and tells you how to best use them. For ease of comparison and for systematically sorting out your needs, we divide our fuels into four categories: Calorie/Energy Sources, Electrolytes, Protein Powders, and Recovery Drink.

FULL ARTICLE

Calorie/Energy Sources

We have five products in this category. The first two listed, Hammer Gel and HEED, have only carbohydrates as their energy source. Choose them for events lasting up to two hours, perhaps up to three hours on occasion (see the section “The Gray Area of Fueling” in the article “CALORIC INTAKE–Proper amounts during endurance exercise” in The Endurance Athlete’s GUIDE to SUCCESS for more details), especially when the pace is fast and intense (75-85%+ MHR). The other three on the list, Sustained Energy, Perpetuem, and Perpetuem Solids, contain protein also and other components for fueling longer exercise sessions.

All-carb fuels

Hammer Gel and HEED

> Hammer Gel is a rapidly absorbed and assimilated source of complex carbohydrates in an easy to consume gel form (actually, a liquid of syrup-like consistency), providing smooth, consistent energy.

You can use Hammer Gel in your water bottle (it mixes completely in solution), in the Hammer Flask, in a one-serving pouch, or to flavor other products and foods. You can keep an extra pouch or flask in your pocket in case your planned fuel outlay in a training session or race comes up a bit short. To coin an oft-used phrase, “Don’t leave home without it!” As with all of the Hammer Nutrition fuels, Hammer Gel is made without added simple sugars or artificial colors, flavors, or sweeteners.

The unique carbohydrate makeup of Hammer Gel

Hammer Gel contains two sources of carbohydrates. The first one is a specific maltodextrin containing a unique saccharide profile that consists of a high percentage of pentasaccharides, (5-sugar chain...
complex carbohydrate). This particular pentasaccharide has unique properties that allow for maximal conversion to energy. In addition, this maltodextrin is relatively low on the Dextrose Equivalent (DE) scale, which is beneficial because the lower the DE, the quicker it will exit the GI tract and cross the stomach lining, allowing it to be more readily available for energy production. The maltodextrin used in Hammer Gel has a DE of 18, whereas sucrose (table sugar), a sweetener found in many sports gels and drinks, has a DE of 100. Hammer Gel is highly absorbable, and readily available for

Use Hammer Gel in the following ways:

- As all or part of a pre-exercise meal
- To allay hunger immediately before a workout or race
- As your sole source of calories in workouts/races lasting up to two hours, sometimes up to three hours under certain circumstances
- As a part-time fuel during longer workouts and races (to supplement Hammer Nutrition’s protein-fortified fuels)
- As part of your post-workout recovery nutrition
- To add to Sustained Energy or Perpetuem for flavor

Article continues here

Chuck Gailey gets a little boost while riding the chair lift on a spring skiing day. Photo: Vanessa Gailey
The demands of both endurance and strength events.

The other carbohydrate source is the patented natural sweetener Energy Smart™, a combination of naturally occurring fruit-based mono- and disaccharides plus specially developed medium and long chain dextrins derived from grain. The process of creating Energy Smart™ maintains the integrity of the fruit, grain dextrin enzymes, and naturally occurring vitamins and minerals. Energy Smart™ is NOT a simple sugar or an artificial sweetener. The unique biochemistry of Energy Smart™ raises blood glucose as fast as sucrose and faster than fructose.

HEED is for athletes who prefer a sports drink over gels. With its pleasantly mild taste (unlike the typical sports drink), it fits the bill perfectly and does so without resorting to refined sugars or artificial colors, flavors, or sweeteners. You won’t find any of these unwanted ingredients in HEED, but you will find a full-spectrum electrolyte profile and key auxiliary nutrients such as l-carnosine for lactic acid buffering and antioxidant support, and chromium polynicotinate for maintaining stable blood glucose levels.

For events up to two hours, perhaps slightly longer on occasion, a bottle or two of HEED can cover all of your calorie and fluid requirements, plus at least a portion of your electrolyte requirements. To add variety to your menu, use HEED as a part-time fuel during long distance events.

HEED’s unique & healthy sweeteners

One of the first things people notice when trying HEED for the first time is that it is noticeably less sweet than the typical sports drink. HEED was intentionally designed that way because the overwhelming majority of the athletes we talked to told us that
What’s the difference?
Hammer Gel vs. HEED

**HAMMER GEL** is a concentrated complex carbohydrate gel with the consistency of syrup.

**HEED** is a powdered sports drink mix.

**HAMMER GEL** contains a small amount of the amino acids l-leucine, l-isoleucine, l-valine (known as branched chained amino acids, or BCAAs), and l-alanine. BCAAs help prevent the cannibalization of lean muscle tissue. L-alanine aids in carbohydrate metabolism.

**HEED** does not contain any BCAAs or l-alanine.

**HAMMER GEL** contains negligible amounts of sodium chloride and potassium for digestive and preservative purposes.

**HEED** contains a full spectrum amino acid-chelated electrolyte profile; each serving (scoop) equal approximately one capsule of Endurolytes.

**HAMMER GEL** does not contain anything for stabilizing blood glucose levels or for lactic acid buffering.

**HEED** contains chromium polynicotinate for stabilizing blood glucose levels, and l-carnosine for lactic acid buffering.

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they were sick and tired of trying to choke down an overly sweet, syrupy tasting drink. The secret to how we’re able to make a drink that’s short on overt sweetness but not deprived of calories is in the sweeteners we use – xylitol and stevia, both undeniably healthier alternatives to the simple sugars and/or artificial sweeteners contained in most sports drinks.

- **Xylitol** – If there’s such a thing as a perfect sweetener, xylitol is at or near the top of the list. Xylitol is a natural substance that can be found in a variety of fibrous fruits and vegetables. It is also known as birch sugar, primarily because it is usually extracted/produced from birch trees (though it can also be extracted/produced from corn cobs). The human body naturally produces over 15 grams of xylitol every day by way of normal metabolic processes. Xylitol is used as a sweetener in HEED; it contributes less than 5% of the calories.

Xylitol also promotes oral health, as it does not ferment and support the acid-producing bacteria that cause tooth decay. That’s why you’ll find this unique sweetener in gum,
• Stevia – Another ideal natural sweetener is the extract (steviosides) from the leaves of *Stevia rebaudiana*, a plant native to subtropical and tropical Central and South America. Stevia’s sweet taste, considered to be up to 300 times sweeter than sugar, means that minimal amounts are necessary to sweeten a product. Stevia is non-caloric and does not affect blood sugar levels, therefore it is safe for diabetics. Stevia may help to lower elevated blood pressure while not affecting people with normal blood pressure. Like xylitol, stevia does not support acid-producing bacteria responsible for tooth decay.

**Carb/Protein Fuels**

**Sustained Energy, Perpetuem, and Perpetuem Solids**

On most occasions, any exercise beyond about two hours requires a protein component in the fuel to satisfy 5-15% of your energy requirements. During these times, if your fuel doesn’t include some protein, your body has only one other source to obtain the amino acids it needs: your lean muscle tissue. You don’t want your body to digest its own muscle just to make fuel—you’d be burning up your own engine! However, if your fuel doesn’t contain some protein, that will happen, leading to negative consequences both during and after your training session or race.

The Hammer line features two carb/protein long-distance fuels, Sustained Energy and Perpetuem/Perpetuem Solids. Though the two have somewhat different formulations,
By design, neither Sustained Energy nor Perpetuem contain any artificial preservatives. Preservatives provide absolutely no benefits for athletic performance or general health—we consider them health hazards, in fact—which is why we do not include them in either of these products, or any of the Hammer Nutrition fuels.

As a result of this, however, once mixed in solution the protein component in both Sustained Energy and Perpetuem is affected in the following ways:

1. At some point in time it will eventually sour and no longer be acceptable for consumption.

2. It tends to separate after awhile and may settle on the bottom of a bottle or hydration pack bladder.

We believe that not having artificial preservatives in the products is far more important that these two inconveniences; however, they are things that you need to remember when using Sustained Energy or Perpetuem. With that in mind, here are some questions we frequently receive, along with the answers to those questions:

**Q:** How soon after I make Sustained Energy or Perpetuem do I have to drink it?  
**A:** Ideally, it should be within 3-5 hours, with up to perhaps 6-8 hours (depending on the temperature) being the longest we recommend. Dr. Bill Misner explains:

Energy drink powders (such as Sustained Energy and Perpetuem) contain no preservatives and are predisposed to change when in solution. Time, temperature, humidity, environmental airborne or endogenous microbes, and/or oxidation factors may cause fatty acids to turn rancid or proteins to “sour” in the presence of long chain or short chain carbohydrates. A prime example is found in pasteurized milk. Milk typically sours in stages as one type of bacteria is replaced by another. Bacilli convert protein into ammonia products, and the pH rises. The odor or taste of spoiled milk is apparent once this has happened. We have observed this phenomenon in our soy-based products, Sustained Energy and Perpetuem, if the product is mixed prior to an event, then not kept cold or consumed within 3-5 hours.

Athletes should be encouraged to keep pre-mixed protein-enhanced or lipid-containing carbohydrate drinks under 59° F (15° C) or ideally at a cooler 40-45° F (approx 4.5-7.25° C) in order to keep fermentation of environmental bacteria from proliferating in the drink mixture. Freezing the drink the night before an event may result in keeping the macronutrient contents intact and inhibit bacterial growth potential. Once the drink is soured to taste or has become noxious to olfactory sensed odor, then it is advised that the drink not be consumed.

**Q:** If I mix Sustained Energy or Perpetuem and keep it in the refrigerator for a day or two, will it break down any of the desired properties due to sitting for awhile and not being used right away?  
**A:** The effectual benefits (“desired properties”) are not lost, but the l-carnitine...
The Fast Lane

When exercise goes beyond about two hours, you can use either Sustained Energy or Perpetuem as your primary or sole fuel, in any combination with each other or any other Hammer Nutrition fuel.

Sustained Energy may be the ideal fuel choice when endurance exercise intensity is at a higher level, whereas Perpetuem may be a more attractive choice for longer distances and when exercise intensity is at a more aerobic pace.

Perpetuem was introduced in early 2003. It takes the concept of long-distance fueling to the max. Though many athletes use Perpetuem for shorter distance events (which is perfectly acceptable), we designed it primarily for extreme endurance events lasting several hours to many days. Perpetuem contains 75% carbohydrates (from maltodextrin—no added simple sugars), 13% fatty acids from a specially made long-chain lyso-lecithin, and nearly 10% soy protein. A small portion of fat seems to cue your body to more liberally release its fatty acids stores, which account for up to two-thirds of one’s energy requirements in long bouts of exercise. A little fat in the fuel also slightly slows the rate of digestion and thus promotes “caloric satisfaction,” another attractive plus during primarily aerobic ultra distance events.

Perpetuem Solids is a chewable tablet version of Perpetuem and contains the same exact, time-
in both products may deteriorate somewhat, forming crystals within the mix since it is very hygroscopic (has an affinity for water). The deterioration, if any, is minimal in 48 hours post-mix, refrigerated. However, for best results we recommend using Sustained Energy or Perpetuem as soon as possible after mixing.

Q: Can I use Sustained Energy or Perpetuem in a hydration pack?

A: You could, but we don’t recommend this practice. First, neither Sustained Energy nor Perpetuem contain any preservatives, and as a result, the protein component tends to separate after awhile and may settle on the bottom if the mixture is not agitated on occasion. Keeping a carbohydrate/protein fuel thoroughly mixed can be difficult to do when using a hydration pack. Also, when you mix the product in a water bottle, you’re better able to see exactly how much you’re consuming. Lastly, cleaning the bladder of any hydration pack is substantially easier when you use it for drinking water only. Our recommendation is to use water bottles to mix Sustained Energy and Perpetuem and hydration packs for water only.

Q: I’m doing a full iron-distance triathlon, and the weather is going to be hot. I want to use Perpetuem for the bike portion. How do you suggest I mix it so that it doesn’t get warm and unpalatable?

A: Let’s say that the bike portion will take you six hours. You can make all six hours of fuel in two bottles. For example, if you have found (through testing in training) that two scoops of Perpetuem will provide an hour’s fuel, put six scoops in and make a 3-hour bottle, fulfilling your hydration requirements with plain water (approx 20-28 fluid ounces/600-830 milliliters per hour) from another bottle or hydration system. Make two 6-scoop bottles and you’ve got your six hours worth of fuel taken care of.

Mix the bottles the night before the race and freeze them. That will keep them cold and palatable as they thaw during the bike portion of the race. If, however, the weather on race day is going to be very hot, or you don’t have a way to keep the bottles cold until the bike leg, then try this method: mix and freeze one bottle as above, but in the other put only the six scoops of Perpetuem, and add no water. When you finish your first 3-hour bottle you will need to stop and take a few moments to add cold water to the second bottle. It just takes a few seconds, but now you have a fresh, cold bottle of fuel for the second half of the bike ride. Using insulated bottles also helps, if you don’t mind the slight extra weight.

One athlete who completed a hot-weather Ironman Australia used this method and wrote to us saying, “I did as you recommended—had the second bottle of dry Perpetuem powder in my bike Special Needs bag, and just added cool water. It only took 30 seconds or so and I was underway with a bidon of cold Perpetuem for the second half of the bike. Great suggestion, it works like a treat!”
proven formula: high-quality calories from complex carbohydrates, GMO-free soy protein, a special soy-derived healthy fat, plus all of the complementary auxiliary nutrients. Like Perpetuem in the powdered form, Perpetuem Solids contains no refined sugar, no artificial colors, no artificial flavors, and no artificial sweeteners. While Perpetuem Solids can be used as a sole source of calories, we believe they are best used as a part-time, solid-food source of calories, augmenting the use of the Hammer Nutrition liquid fuels, and helping you reach your targeted hourly caloric total during exercise/competition, especially when it extends beyond two hours.

**Bottom line:** With Sustained Energy and Perpetuem, you have two great long distance fuel choices. When exercise goes beyond about two hours, you can use either product as your primary or sole fuel, in any combination with each other or any other Hammer Nutrition fuel.

That said, we have noted that Sustained Energy may be the ideal fuel choice when endurance exercise intensity is at a higher level (approximately 70-85% MHR), whereas Perpetuem may be a more attractive choice for longer distances and when exercise intensity is at a more aerobic pace (under 70% MHR). Additionally, over the years we have noted that Sustained Energy may be the ideal choice for very lean athletes (the “high metabolizer/hyper-metabolic” types), while Perpetuem—with its added healthy fat component—may be the ideal choice for athletes with a naturally higher body fat percentage. The rationale for this suggestion is that athletes with a higher body fat percentage have a greater volume of calories available from body fat stores, which the lyso-lecithin component of Perpetuem may effectively assist in accessing for use as energy.
Again though, because the applications for Sustained Energy and Perpetuem are identical, either fuel can be used as the primary-to-sol fuel during prolonged bouts of exercise. Test each product in your long-duration workouts, under a variety of conditions, to find which product works best for you!

**Energy/Meal Replacement Bar**

**Hammer Bar** is ideal as a pre-exercise meal, post workout/race recovery food, or healthy snack any time, and you’d be hard pressed to find a healthier, yet more convenient food. Additionally, when solid food is desired on occasion during extended workouts and races, the Hammer Bar is an ideal choice, one that complements the other Hammer Nutrition fuels perfectly. At 220-230 calories per bar, the suggested use for most athletes is one-half to one bar/hour (as an occasional replacement for your liquid fuel mixes).

Hammer Bars are moist, and easy to chew and digest. More importantly, they’re gluten-free, USDA Certified Organic, and non-dairy Certified Kosher. The almond raisin Hammer Bar is also Certified Vegan.

Hammer Bars are an extraordinarily healthy food, not just a mere energy bar. This is partly because of what the Hammer Bar does not contain: refined sugar, saturated fats, and artificial sweeteners or preservatives, which many other energy bars are loaded with. As for what the Hammer Bar does contain, here are...
A satisfactory electrolyte replenishment product needs to include balanced amounts of sodium, chloride, calcium, magnesium, and potassium.

The Fast Lane

- Alkalizing protein, crucial for reducing the acidity in the body that comes from sustained energy output. This translates into potentially greater endurance and is achieved by using whole food sources, which are naturally healthier.

- Healthy carbohydrates for consistent, reliable, and long-lasting energy. Furthermore, the Hammer Bar is sweetened only with whole-food sweeteners, including organic dates, organic raisins, and low glycemic index organic agave nectar to support stable blood sugar levels.

- Essential Fatty Acids (EFAs). Rich in ultra-healthy EFAs, phytosterols, and sterolins, the Hammer Bar is a deliciously easy way to supply your body with these all-important nutrients.

- Nature’s super foods, including sprouted flax and quinoa, to provide phytonutrients to support overall health, immunity, and resistance to disease.

- Enzymes, which help the body digest the Hammer Bar and utilize its nutrients at a cellular level. In fact, the Hammer Bar is made fresh in small lots and stored at room temperature to preserve the natural qualities and enzyme activity of the ingredients.

When a solid food choice is desired during a prolonged workout or race, Hammer Bar satisfies your hunger in ideal fashion without excess calories. After workouts or races, if solid food is desired, or when the use of Recoverite is not practical, the Hammer Bar is a superb post-workout/
race food, providing high quality carbohydrates and protein in an ideal 3:1 ratio.

Electrolytes

Endurolytes, Endurolytes Fizz, and Endurolytes Powder

Endurolytes is a full-spectrum, rapidly assimilated electrolyte supplement, which is as important to your fueling as the water you drink and the calories you eat. While the earlier-listed fuels provide the calories that your body needs to make energy (the body’s “gasoline”), electrolytes can be thought of as the “motor oil” for the body, providing it with the essential minerals it needs to maintain the optimal performance of many important functions, such as muscular contraction.

Far too many athletes forget to replenish electrolytes consistently, or they mistake sodium or salt intake for true electrolyte

Where to start?

- Lighter weight athletes: 1-2 capsules or scoops/hour, or 0.5-1 tablets/hour
- Medium weight athletes: 2-3 capsules or scoops/hour, or 1-1.5 tablets/hour
- Larger athletes: 4-6 capsules or scoops/hour, or 2-3 tablets/hour

Remember, these are only suggested starting doses, and the amount you need may be different and may vary from hour to hour.

Garrett D’Alessandro finishes with enough energy for some high-fives at the EagleMan Ironman 70.3 in Cambridge, Maryland.

Photo: ASI Photos
replenishment. Sodium chloride (salt) is indeed an important component of electrolyte replenishment, but it does not fulfill the entire requirement. A satisfactory electrolyte replenishment product needs to include balanced amounts of sodium, chloride, calcium, magnesium, and potassium, as all these minerals work synergistically in the maintenance of these important body functions. Endurolytes is that product, and you will search in vain to find one like it on the market.

Many variables—body weight, level of fitness, weather conditions, acclimatization level, and biological predisposition—come into play in regards to optimally fulfilling one’s personal electrolyte requirements.

That’s why you want to meet most or all of your electrolyte needs from a source independent of your fuel. These many variables are also why the hourly Endurolytes dose can range from 1-6 capsules an hour, with a handful of athletes requiring up to 7-8 capsules an hour under extreme conditions.

Endurolytes Fizz is essentially the same formula as Endurolytes but in an effervescent tablet. This is an ideal way to replenish electrolytes if you’re unable to swallow capsules and/or prefer to flavor the water you’re drinking. Endurolytes Fizz also works well in HEED; just keep in mind the various flavor options of both products before combining the two. Endurolytes Fizz is not meant to be chewed or dissolved in your mouth. As is the case with Endurolytes Powder, if you are planning to use Endurolytes Fizz in your water/fuel bottles, we recommend that you carry extra Endurolytes Fizz tablets or Endurolytes capsules with you in the event that your pre-mixed dose of Endurolytes Fizz proves to be inadequate.
What’s the difference?
Endurolytes vs. Endurolytes Fizz

1) It was necessary to use bicarbonate forms of sodium and potassium—and more total sodium in Endurolytes Fizz than in Endurolytes capsules/powder—in order to achieve the desired effervescent properties.

2) Because more sodium (via sodium bicarbonate) is necessary in Endurolytes Fizz, the formula required slightly less chloride. However, the net total of both of those mineral components combined is extremely close, with only a 30 mg difference between the two products – one Endurolytes capsule/scoop of powder contains a total of 100 mg of sodium and chloride combined, and one-half of an Endurolytes Fizz tablet contains a total of 130 mg of sodium and chloride combined.

3) Endurolytes Fizz contains magnesium in the oxide form, calcium in the carbonate form (as well as the chloride form), and manganese in the gluconate form, whereas Endurolytes in capsule/powder forms use amino acid chelate forms. These specific forms of minerals were chosen for Endurolytes Fizz because these particular chelating agents do not inhibit the effervescent reaction process, and in some cases aid in the process. Conversely, an amino acid chelate (as is used in Endurolytes capsules and Endurolytes Powder) would severely inhibit and perhaps even halt the process.

4) The amounts of potassium are higher in one-half tablet of Endurolytes Fizz (50 mg) than in one Endurolytes capsule/scoop of powder (25 mg). As mentioned in #1, the formula required more bicarbonates in order to achieve the desired effervescent properties while also helping to maintain a fairly close sodium-to-potassium ratio (62.5% in Endurolytes capsules, and 50% in Endurolytes Fizz).

Article continues here

Endurolytes Powder is the same formula as the encapsulated version of Endurolytes, with the addition of the amino acid glycine, which has a naturally sweet taste to help take the edge off the salty/bitter taste of some of the minerals in the formula. If you are planning to use Endurolytes Powder in your water/fuel bottles, we recommend carrying additional capsules of Endurolytes with you, just in case your pre-mixed dose of Endurolytes Powder is proves to be inadequate.

Note: Refer to the article “ELECTROLYTE REPLENISHMENT—Why it’s so important and how to do it right” in The Endurance Athlete’s GUIDE to SUCCESS for more information regarding this important aspect of fueling.

Protein Powders
Hammer Soy and Hammer Whey

You will not use these two products during your workouts, but as part of your pre-workout meals and post-workout recovery refueling. Hammer Nutrition offers two choices, each with its own set of benefits. Both products come in pure protein form; they are made from the finest quality preparations,
and have no added artificial flavorings or sweeteners.

- **Hammer Soy** is a great all-purpose, all-vegetable protein that has many health benefits. Believe it or not, most endurance athletes have woefully inadequate protein intakes from their daily diet. Soy protein, in addition to the health benefits it provides, is a concentrated protein source, which helps athletes to fulfill their daily protein requirements. Each scoop of Hammer Soy contains 23 grams of soy protein isolate and absolutely no GMO (genetically modified organism) soy protein.

Note: Soy is the preferred protein for use during exercise, partly for its amino acid profile and partly because it minimizes ammonia build-up. Sustained Energy and Perpetuem contain an adequate amount of soy protein for your needs during prolonged exercise. Hammer Soy is formulated for meal supplementation; it is far too concentrated for use during exercise.

- **Hammer Whey** is the standard for promoting rapid recovery. For rebuilding lean muscle tissue and optimal immune system functioning between workouts and races, whey protein has no peer. It is the most bioavailable form of protein with the highest amount of branched chain amino acids (BCAAs) of any protein. One scoop of Hammer Whey provides 17-18 grams of whey protein isolate. Each scoop also contains a huge six grams of glutamine, providing even more muscle rebuilding and immune system enhancing benefits.

**Recovery Drink**

- **Recoverite** is a delicious all-in-one recovery drink with each serving (two scoops) providing 31 grams of carbohydrates, 10
What’s the difference?  
Hammer Whey vs. Hammer Soy

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<thead>
<tr>
<th>HAMMER WHEY</th>
<th>HAMMER SOY</th>
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<tr>
<td>Whey protein is ideal for recovery and immune system boosting.</td>
<td>Soy protein is ideal for cardiovascular/ general health benefits.</td>
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<tr>
<td>Whey protein is arguably the most rapidly absorbed protein source. After exercise, you want the protein to get into your system immediately so that your body can receive the amino acid support it urgently needs. Rapid assimilation is but one area where whey protein shines.</td>
<td>Soy protein is a purely vegan source that has an amino acid profile as complete as any animal protein.</td>
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<tr>
<td>Whey protein has the highest BV (Biological Value, a rating system that ranks bioavailability) of any protein source.</td>
<td>Scientific research has established many connections between soy consumption and lower rates of certain cancers, notably breast, prostate, stomach, lung, and colon.</td>
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<tr>
<td>Whey protein’s amino acid profile is superb for preventing catabolism (lean muscle tissue breakdown) and thus reducing post-workout muscular soreness. The amino acids cysteine, methionine, and glutamine, also found in abundance in whey, increase endogenous levels of glutathione, which provides both immune system and liver support.</td>
<td>Soy has more phenylalanine and tyrosine than whey. This may aid in maintaining alertness during extreme ultra-distance races.</td>
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**Special features of Recoverite**

1. Recoverite contains whey protein isolate, which is 97-98+% protein, whereas whey protein concentrate (which is what many companies use) is only 70-85% protein (and oftentimes less). Whey protein isolate is a purer protein, and the best protein that you can put into your body after a hard workout.

Recoverite contains complex carbohydrates, no simple sugars.

Article continues here
Granted, the one time when your body isn’t going to put up much of a fight about what kind of carbs you consume is right after a workout; it’s so starving for replenishment that it’ll take pretty much anything. That being said, complex carbohydrates are still preferable to simple sugars for two primary reasons:

• While some companies may use monosaccharides and disaccharides (simple sugars) such as glucose or dextrose in their recovery drinks, due to their high glycemic index (GI) (and thus fast elevation of blood sugar), the maltodextrin used in Recoverite has a GI that’s even higher than these simple sugars, so it also elevates blood sugar levels rapidly.

• Complex carbohydrate maltodextrins allow for a greater volume of calories to be absorbed compared to simple sugars. This is vital for preventing stomach distress and also ensuring that your body quickly and efficiently obtains the full amount of calories it needs.

2. Recoverite contains high amounts of glutamine. Taking straight glutamine isn’t recommended during exercise due to the ammonia that is produced during digestion. After exercise, however, it’s a powerfully beneficial nutrient for immune system support and glycogen replenishment. Each serving of Recoverite gives you a superb three-gram (3,000 mg) dose of this vital amino acid.

3. Mild taste. If you’re like most athletes, the last thing that you want after a long workout is a syrupy textured, coat-your-mouth-with-sweetness drink. Recoverite provides the nutrition that your body craves, with the additional benefit of a substantially milder taste.
1. The fuel selection guidelines on page 26 are just that; they’re guidelines only, and what may be ideal for some athletes under specific conditions may not work for others in identical situations. For example, though Perpetuem was designed for more aerobic-paced, longer distance efforts, we receive positive reports daily from athletes who use Perpetuem in much shorter races.

2. All Hammer Nutrition fuels are completely compatible with one another, so you can use them interchangeably as desired. This is especially beneficial in ultra-endurance events as it provides a greater variety of quality fuels to choose from. For example, you can use Perpetuem and/or Sustained Energy from start to finish, or you can occasionally switch to Perpetuem Solids, HEED and/or Hammer Gel to add variety. However, during prolonged workouts or races you should fulfill at least two-thirds of your fueling requirements from Perpetuem or Sustained Energy, with the occasional use of Hammer Gel, HEED, and Perpetuem Solids being perfectly acceptable.

3. All calories from all sources count! Therefore, if you are consuming food (such as a banana) and/or are using more than one fuel (Perpetuem and Hammer Gel for example), be sure to combine all of the calories from all of the food and/or fuels you consume to reach a correct total hourly intake.

4. When you use Hammer Gel and HEED for events longer than two or so hours, you do not need to start with them and then switch to Sustained Energy, Perpetuem, or Perpetuem Solids at the 90-120 minute mark, when protein plays a more predominant role in satisfying fueling requirements. You can use Hammer Gel and/or HEED at any time during your workout. An extra flask of Hammer Gel or tube of Perpetuem Solids in your pocket can save the day if you have already drained your Sustained Energy or Perpetuem mix and you begin to flag with several miles still to go. It will give you a quick pick-up just when you need it, even if it’s many hours into your event.

5. All of the Hammer Nutrition fuels—especially Hammer Gel, HEED, and Recoverite—are perfectly acceptable and highly beneficial for children. In the following pages you’ll find dosage suggestions for these three particular fuels, based on body weight, for your young athlete/active child.
The Fast Lane

- Complex carbohydrate maltodextrins allow for a greater volume of calories to be absorbed compared to simple sugars, helping to prevent stomach distress while ensuring that your body obtains the full amount of calories it needs.

- The goal in fueling is not to try to replace all the calories your body is burning with equal to near-equal amounts from your fuel.

- All athletes must be willing to alter their calorie intake in deference to the weather, the terrain, their pace, and any pre-race anxieties they’re experiencing.

- For optimal performance, most athletes require far less than the theoretical maximum of 240-280 calories/hour.

Article continues here

See the article “RECOVERY—A crucial component for athletic success” in The Endurance Athlete’s GUIDE to SUCCESS for more details on Recoverite and the importance of proper recovery between workout sessions/races.

Key things to remember regarding fueling

A. The goal in fueling is not to try to replace all the calories your body is burning with equal to near-equal amounts from your fuel. As explained in various articles found in The Endurance Athlete’s GUIDE to SUCCESS, on the Hammer Nutrition website, and in back issues of Endurance News, the human body is not equipped to replace “X” out with “X” or “near-X” in. Fortunately, the body has many built-in mechanisms that effectively bridge the gap between what it’s losing and what it can comfortably accept in return from your fuel donation. That’s why your focus should NOT be “How many calories can I consume before I get sick?” but rather, “What is the least amount of calories I need to consume to keep my body doing what I want it to do hour after hour?”

Fueling this way—the “less is best” approach—makes much more sense, if only because a “not enough calories” problem is significantly easier to fix (you simply consume more calories) than an “uh oh, I overdid it on the calories” problem.

B. During exercise, the average-size athlete’s liver can effectively return 4.0 to slightly over 4.6 calories per minute back to the energy cycle. That’s 240-280 calories per hour MAXIMUM for the average-size athlete under normal conditions. However, we have consistently noted that most athletes do well on even fewer calories, so “average
You can completely and perfectly fulfill your pre-, during-, and post-exercise requirements from our line of fuels.

Whether your workouts or races last an hour or two, or a week or two, Hammer Nutrition has the fuels that your body craves. You can completely and perfectly fulfill your pre-, during-, and post-exercise requirements from our line of fuels.

Check out our Product Application Quick Reference guide on the next page to see what fuels you should consider using and when. After that, start with our dosage recommendations for the products you’ve chosen, keeping in mind that these are estimated doses and that you will need to test the product(s) thoroughly under a variety of conditions in training to determine what amount works best for you. You’ll find our suggested dosages for Endurolytes on page 17 and our suggested dosages for the other Hammer Nutrition fuels on pages 27-30.

C. All athletes must be willing to alter their calorie intake in deference to the weather, the terrain, their pace, and any pre-race anxieties they’re experiencing, as all of these things negatively affect optimal digestive system functioning.

With this in mind, see our suggested dosages for some of the Hammer Nutrition fuels on the following pages. As just mentioned, over the years we have consistently noted that for optimal performance most athletes require far less than the theoretical maximum of 240-280 calories/hour. This is why we recommend starting with the lowest amount suggested, especially if your weight is at the lower end of the scale, and increase the amount of calories you consume if you find it necessary.

Remember, though, that these are just suggestions and that you need to determine, via thorough testing under a variety of conditions, what amounts work best for you.
This table shows Hammer Nutrition product applications. All Hammer Nutrition fuels are completely compatible with one another and can be used in combination as desired.

<table>
<thead>
<tr>
<th>Product Application</th>
<th>Pre-exercise meal: 3 hrs prior to start</th>
<th>10 min. prior to training &amp; competition</th>
<th>10-15 min. into training &amp; competition less than 2 hrs</th>
<th>Use continually during training &amp; competition longer than 2 hrs</th>
<th>Following training &amp; competition</th>
<th>Add to diet for increased daily protein intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAMMER BAR</td>
<td>✓</td>
<td>xec</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>HAMMER GEL</td>
<td>×</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>HEED</td>
<td>×</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>PERPETUEM</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>PERPETUEM SOLIDS</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>SUSTAINED ENERGY</td>
<td>✓</td>
<td>x</td>
<td>x</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>ENDUROLYTES Capsules, Powder, &amp; Fizz</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>RECOVERITE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>HAMMER SOY</td>
<td>×</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>HAMMER WHEY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
# Hammer Gel Usage Suggestions

80-90 calories per serving, depending on flavor

## Suggested Doses by Body Weight*

<table>
<thead>
<tr>
<th>WEIGHT</th>
<th>SERVINGS</th>
<th>CALORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 90 lbs (Up to 41 kg)</td>
<td>0.5-1 serving/hr</td>
<td>40-45 to 80-90 calories</td>
</tr>
<tr>
<td>90-120 lbs (41-54.5 kg)</td>
<td>0.5-1.5 servings/hr</td>
<td>40-45 to 120-135 calories</td>
</tr>
<tr>
<td>120-155 lbs (54.5-70 kg)</td>
<td>1-2 servings/hr</td>
<td>80-90 to 160-180 calories</td>
</tr>
<tr>
<td>155-190 lbs (70-86 kg)</td>
<td>1.5-2 servings/hr</td>
<td>120-160 to 135-180 calories</td>
</tr>
<tr>
<td>190+ lbs (86+ kg)</td>
<td>1.5-2.5 servings/hr</td>
<td>120-135 to 200-225 calories</td>
</tr>
</tbody>
</table>

*These are estimated doses. Each athlete should determine in training, under a variety of conditions, their personal optimum.

If using more than one fuel, be sure to combine all of the calories from all of the products consumed to reach a correct total hourly intake.

## Usage Suggestions & Notes:

- Hammer Gel may be used as your sole energy source during workouts and races up to two hours, perhaps up to three hours under certain circumstances. When training sessions or races go longer than that, select either Perpetuem or Sustained Energy as your primary fuel.

- Hammer Gel is perfectly compatible with all Hammer Nutrition fuels, so during ultra distance events, while Hammer Gel cannot be your sole source of calories, you can use it occasionally to provide a little variety.

- The Hammer Flask holds 5-6 servings.

- Espresso Hammer Gel contains 50 mg caffeine per serving. Tropical Hammer Gel contains 25 mg caffeine per serving.
HEED / Usage Suggestions

100 calories per scoop

Suggested Doses by Body Weight*:

<table>
<thead>
<tr>
<th>WEIGHT</th>
<th>SCOOPS</th>
<th>CALORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 90 lbs (Up to 41 kg)</td>
<td>0.5-1 scoop/hr</td>
<td>50-100 calories</td>
</tr>
<tr>
<td>90-120 lbs (41-54.5 kg)</td>
<td>0.75-1.5 scoops/hr</td>
<td>75-150 calories</td>
</tr>
<tr>
<td>120-155 lbs (54.5-70 kg)</td>
<td>1-2 scoops/hr</td>
<td>100-200 calories</td>
</tr>
<tr>
<td>155-190 lbs (70-86 kg)</td>
<td>1.5-2.25 scoops/hr</td>
<td>150-225 calories</td>
</tr>
<tr>
<td>190+ lbs (86+ kg)</td>
<td>2-2.75 scoops/hr</td>
<td>200-275 calories</td>
</tr>
</tbody>
</table>

*These are estimated doses. Each athlete should determine in training, under a variety of conditions, their personal optimum.

If using more than one fuel, be sure to combine all of the calories from all of the products consumed to reach a correct total hourly intake.

Usage Suggestions & Notes:

- HEED may be used as the sole source of calories during workouts and races up to two hours, perhaps up to three hours under certain circumstances. When training sessions or races go longer than that, select either Perpetuem or Sustained Energy as your primary fuel source.

- HEED is perfectly compatible with all Hammer Nutrition fuels, so during ultra distance events, while it cannot be your sole source of calories, you can use it occasionally to provide a little variety.

- Each scoop of HEED contains the equivalent amount of electrolytes as one Endurolytes capsule/scoop of Endurolytes Powder, or one-half tablet of Endurolytes Fizz. For many athletes, under normal conditions, one or two scoops of HEED will completely fulfill electrolyte requirements. When heat stress increases significantly, you will need to consume additional Endurolytes (capsules or powder) or Endurolytes Fizz tablets.
### Recoverite / Usage Suggestions

85 calories per scoop

**Suggested Doses by Body Weight***:

<table>
<thead>
<tr>
<th>WEIGHT</th>
<th>SCOOPS</th>
<th>CALORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 90 lbs (Up to 41 kg)</td>
<td>1 scoop</td>
<td>85 calories</td>
</tr>
<tr>
<td>90-120 lbs (41-54.5 kg)</td>
<td>1-2 scoops</td>
<td>85-170 calories</td>
</tr>
<tr>
<td>120-155 lbs (54.5-70 kg)</td>
<td>1.5-2 scoops</td>
<td>127.5-170 calories</td>
</tr>
<tr>
<td>155-190 lbs (70-86 kg)</td>
<td>2-3 scoops</td>
<td>170-255 calories</td>
</tr>
<tr>
<td>190+ lbs (86+ kg)</td>
<td>3-4 scoops</td>
<td>255-340 calories</td>
</tr>
</tbody>
</table>

*These are estimated doses. Each athlete should determine in training, under a variety of conditions, their personal optimum. Obviously, a 110 lb/50 kg athlete requires far less after an easy two-hour run than a 190 lb (approx 86 kg) athlete who just crunched an Ironman-length event. How much Recoverite one should use is based on a couple of factors:

1. The body weight of the athlete
2. The duration and/or severity of the workout or race
3. When the next opportunity for a “real food/sit-down” meal will be

### Sustained Energy / Usage Suggestions

107 calories per scoop

**Suggested Doses by Body Weight***:

<table>
<thead>
<tr>
<th>WEIGHT</th>
<th>SCOOPS</th>
<th>CALORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 120 lbs (Up to 54.5 kg)</td>
<td>Up to 1 scoop/hr</td>
<td>107 calories</td>
</tr>
<tr>
<td>120-155 lbs (54.5-70 kg)</td>
<td>1-1.5 scoops/hr</td>
<td>107-160.5 calories</td>
</tr>
<tr>
<td>155-190 lbs (70-86 kg)</td>
<td>2-2.5 scoops/hr</td>
<td>214-267.5 calories</td>
</tr>
<tr>
<td>190+ lbs (86+ kg)</td>
<td>Up to 2.75 scoops/hr</td>
<td>294 calories</td>
</tr>
</tbody>
</table>

*These are estimated doses. Each athlete should determine in training, under a variety of conditions, their personal optimum.*
### Perpetuem / Usage Suggestions

135 calories per scoop

**Suggested Doses by Body Weight**:  

<table>
<thead>
<tr>
<th>WEIGHT</th>
<th>SCOOPS</th>
<th>CALORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 120 lbs (Up to 54.5 kg)</td>
<td>Up to 0.75 scoop/hr</td>
<td>101 calories</td>
</tr>
<tr>
<td>120-155 lbs (54.5-70 kg)</td>
<td>1 scoop/hr</td>
<td>135 calories</td>
</tr>
<tr>
<td>155-190 lbs (70-86 kg)</td>
<td>1.25-1.5 scoops/hr</td>
<td>169-202.5 calories</td>
</tr>
<tr>
<td>190+ lbs (86+ kg)</td>
<td>Up to 2 scoops/hr</td>
<td>270 calories</td>
</tr>
</tbody>
</table>

**Special Note on Perpetuem**: Due to this being a high-concentration calorie source (via its complex carbohydrate, soy protein, and healthy fat components), we have noted that many athletes do well with a substantially lower calorie intake when using Perpetuem as their primary-to-sole fuel. Therefore, with this particular fuel we highly recommend starting with the lowest amount suggested—perhaps even a bit lower—and working your way up to a higher amount, if a higher amount has proved to be necessary via testing in training.

### Perpetuem Solids / Usage Suggestions

33.3 calories per tablet

**Suggested Doses by Body Weight**:  

<table>
<thead>
<tr>
<th>WEIGHT</th>
<th>AMOUNT</th>
<th>CALORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 120 lbs (Up to 54.5 kg)</td>
<td>1-2 tablets/hr</td>
<td>33-67 calories</td>
</tr>
<tr>
<td>120-155 lbs (54.5-70 kg)</td>
<td>2-3 tablets/hr</td>
<td>67-100 calories</td>
</tr>
<tr>
<td>155-190 lbs (70-86 kg)</td>
<td>3-4 tablets/hr</td>
<td>100-133 calories</td>
</tr>
<tr>
<td>190+ lbs (86+ kg)</td>
<td>4-5 tablets/hr</td>
<td>133-167 calories</td>
</tr>
</tbody>
</table>

**Special Note on Perpetuem Solids**: Perpetuem Solids is ideal for all long-duration athletic endeavors, but it is especially beneficial for ultra marathon running or the running portion of half or full iron distance triathlons, where carrying premixed bottles or concentrated flasks of Sustained Energy or Perpetuem may not be practical. Perpetuem Solids tablets are not meant to be dissolved in water. People with dentures or delicate teeth should use caution when consuming Perpetuem Solids.

*These are estimated doses. Each athlete should determine in training, under a variety of conditions, their personal optimum.
Sustained Energy/Perpetuem Mixing Options

You can mix and consume Sustained Energy or Perpetuem three different ways depending on individual preference and logistical concerns. Please experiment with the following options to determine which works best for you.

• **The One-Hour Bottle** - Mix the suggested amount of Sustained Energy or Perpetuem for your body weight (refer to dosage charts) in a 21-26 ounce (approx 620-770 ml) water bottle. Consume one bottle hourly. This method is ideal when training or racing with a support crew and vehicle. If you’re without a support crew but still want to use this option for mixing, keep in mind that it’s obviously less convenient as you’ll have to stop more frequently to mix your fuel drink. Also, because you are trying to fulfill both hydration and caloric requirements from one source, you have limited ability to adjust one without affecting the other; you may need to consume additional water to satisfy hydration requirements.

• **The Multi-Hour Bottle** - This is by far the most convenient method of fueling because it allows you to be self-sufficient for many hours, requiring only additional plain water along the way. The only limitation is how many scoops you can fit into a bottle. Determine your proper hourly intake of scoops by experimenting with the numbers from the dosage charts. Let’s say you’ve determined through testing that two scoops of Sustained Energy or Perpetuem per hour is your ideal caloric intake. For a four-hour workout, you’ll need eight scoops in a bottle, then filled with water and shaken well. You may need to add a few scoops at a time to get it all to mix well. You then “nurse” this bottle, taking small sips every 15-20 minutes.

At this concentration, the water in the mixed bottle does not contribute much at all to your hourly fluid intake needs. To meet your fluid requirements, you can carry a second and possibly even a third bottle of plain water, use a hydration system, or know where you can refill along your route. Drink according to the temperature/humidity and your exertion level so that you consume in the range of 16-28 ounces (approx. 475-830 ml) of plain water per hour.* This way, as long as you can obtain water along the way, you’re set for hours of hard training.

• **Gel or Paste** - If you want to carry the highest volume of calories in the least amount of space, making a thick mix is your best option. Sustained Energy or Perpetuem can be made into a super-concentrated, near paste-like consistency and dispensed from a Hammer Flask. Using a blender or bowl and spoon, mix scoops of powder with a small amount of water, gradually adding water as necessary to create the consistency desired. If you’re using the flavored versions of Perpetuem, remember that the heavier and more concentrated you mix it, the sweeter and stronger the flavor will become. You can also add Hammer Gel or HEED for flavor, if desired. Depending on how many scoops per hour you require, and how concentrated the mix is, each flask of Sustained Energy or Perpetuem can supply you with 2-4 hours of fuel. As with the multi-hour bottle, you must carry additional bottles of plain water or use a hydration system to meet your fluid requirements.

* Note: Please refer to the article “HYDRATION–What you need to know” in The Endurance Athlete’s GUIDE to SUCCESS for more detailed information on hydration requirements.
SUPPLEMENTS

A necessity for athletes

Brian Frank enjoys a winter training ride during the February Hammer Camp in Tucson, Arizona.
Photo: Madeline Frank
1. Despite some medical claims and popular sentiment to the contrary, even a healthy, balanced diet cannot supply anyone, let alone an endurance athlete, with a full complement of all of the nutrients necessary for optimal health.

2. The RDI (Reference Daily Intake) standard is not very useful for an endurance athlete whose nutrient needs are far greater than someone of the same age and sex in the “normal” population. Instead, we recommend thinking in terms of Optimum Daily Intake (ODI). An endurance athlete does not want to merely prevent disease, they want to obtain the highest level of health and fitness.

3. An endurance athlete is a healthy person first, an athlete second, and an endurance athlete third. Your overall health must support your athletic training, and your general training must support your specific training. Your supplement strategy should recognize and parallel this sequence. This means that your first supplement priority is a comprehensive multivitamin that addresses general health needs.

4. Other vital supplements address the need for increased energy production. Because of the complexity of our energy production pathways, we need to take a variety of supplements to address a great number of metabolic processes, such as oxygen utilization, glucose transport, mitochondrial activity, and free radical neutralization.

5. Some supplements should be taken every day, such as Premium Insurance Caps, Hammer Nutrition’s multivitamin/mineral/antioxidant/micronutrient product; Race Caps Supreme, your first choice for energy production; and Mito Caps, for optimizing cellular function and overall health. Other supplements address specific needs, such as soft-tissue damage control or intestinal flora regeneration. These are typically taken as needed.

Start reading the full article on page 34
INTRODUCTION

Do you think that your diet provides the optimum amount of all nutrients, and thus you take no supplements? If you answered, “Yes,” then this is a “must read” article for you, one that I hope will convince you about the importance of a supplement program.

FULL ARTICLE

One of the main reasons I recommend the consistent use of an intelligently designed supplement program is because, quite frankly, the “balanced diet will provide all you need” notion is a myth. You cannot obtain all of the nutrients your body requires from your diet, and here’s why:

• There has never been a single clinical study that documents what comprises a balanced diet, nor one that has demonstrated one’s ability to meet basic nutrient requirements through whole foods alone.

• New studies show that food alone does not supply all of the micronutrients we need to prevent deficiency, let alone achieve optimal health.

• Very few of us have routine access to fresh, locally grown foods. Much of our diet comes from foods grown far away, picked when unripe, and then sent packing; nutritional content is questionable and usually depleted.

• Even if we could obtain all of the nutrients we need from our diet, it’s highly unlikely that any of us eats an ideal diet as consistently as we think we do.

All of this said, please understand that I’m not suggesting that you can neglect your diet, take scads of pills, and have all of your nutrient needs covered. By no means is that the message I’m trying to get across. No supplement program can or should take priority over the consumption of a healthy diet—that’s a no-brainer. Supplementation means just what the word implies, supplementary. The pills we take do not substitute for a healthy diet; I cannot emphasize enough that your primary nutritional goal is to consistently consume a healthy diet.

What does this entail? It means

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If you want to achieve your best performances in your workouts and races—and, even more importantly, enjoy optimal health (not minimal, optimal!)—then daily supplementation is a necessity, not an option.

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Filling in where diets fall short!

... and fall short they will, especially given the high nutrient demands of endurance athletes. So where exactly does regular food consumption fall short?

**Usually not** in calories, except during and right after endurance exercise.

**Never** in salt!

**Often** in protein for hard-training athletes.

**Seldom** in fat, though Omega 3s can be an issue for some.

**Almost always** in micronutrients, and that’s the focus of this article.

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Article continues here

Eating whole grains and locally grown organic foods as much as possible, avoiding packaged, processed foods and junk foods at all times, while consuming a low-sodium diet, a wide variety of foods, and avoiding foods containing artificial sweeteners, colors, flavors, and preservatives, added simple sugars (sucrose, fructose, glucose, etc.) in both your daily diet and in your sports fuels. At Hammer Nutrition, we emphasize both quality nutrition and supplementation. As company founder, Brian Frank, is fond of saying, “The quality of the calories you consume always matters.” That’s a message you need to take to heart!

As mentioned earlier, regular diets simply can’t cover the entire range of vitamins, minerals, phytochemicals, antioxidants, and other micronutrients necessary to maintain optimal health and peak athletic performance. If you want to achieve your best performances in your workouts and races—and, even more importantly, enjoy optimal health (not minimal, optimal!)—then daily supplementation is a necessity, not an option.

**Even the best of diets is not enough**

Eating whole foods is by far the best way to supply your body with the myriad plant-derived, health-benefiting phytochemicals, but today’s food supply can’t provide all of the basic vitamins and minerals. Our food simply won’t even meet the nutrient needs of average people, let alone athletes. Even more sobering is the ever-increasing body of research that suggests that many people’s diets are insufficient
in supplying enough nutrients to prevent a deficiency disease.

Did you get that? Forget about providing enough nutrients to promote optimal health, many people do not eat enough quality food to meet the minimal Reference Daily Intake (RDI) micronutrient requirements for preventing deficiency-related disorders. Misner’s hallmark paper, “Food May Not Provide Sufficient Micronutrients to Avoid Deficiency” (Townsend Letter for Doctors and Patients 261:49-52, April 2005, available at http://www.hammernutrition.com/downloads/diet_deficiencies.pdf) is but one effort to point out this startling problem.

And Dr. Misner is not the only one who suggests that diet alone does not provide adequate disease-preventative micronutrients at the current RDI level. The research of the distinguished nutritional scientist Bruce Ames, professor of biochemistry and molecular biology at the University of California, Berkeley, also presents a hypothesis that implies micronutrient deficiency may eventually deteriorate the quality of whole human cell health. A portion of Professor Ames’ abstract reads as follows:

Taking supplements helps bridge the gap between what you should be obtaining and what you’re actually getting from your diet.

The Reference Daily Intake standard (formerly known as the Recommended Daily Allowance, or RDA) doesn’t take into account the higher needs of endurance athletes.

Our diets, no matter how good we think they are, may not provide enough of the micronutrients needed to prevent a deficiency. That’s why taking supplements, especially a multivitamin/mineral supplement, is a wise strategy to employ.
Thoughts on food quality

“Athletes today ingest only 11% of the organic nutrients from their food sources that the athletes of the 1940s enjoyed.”

- William Misner, Ph.D. - Director of Research & Product Development, Emeritus

Inadequate dietary intakes of vitamins and minerals are widespread, most likely due to excessive consumption of energy-rich, micronutrient-poor, refined food. Inadequate intakes may result in chronic metabolic disruption, including mitochondrial decay. Deficiencies in many micronutrients cause DNA damage, such as chromosome breaks, in cultured human cells or in vivo. Some of these deficiencies also cause mitochondrial decay with oxidant leakage and cellular aging and are associated with late onset diseases such as cancer.


The bottom line is that our diets, no matter how good we think they are, may not provide enough of the micronutrients needed to prevent a deficiency. That’s why taking supplements, especially a multivitamin/mineral supplement, is a wise strategy to employ; it helps bridge the gap between what you should be obtaining and what you’re actually getting from your diet. Consuming the best possible diet as consistently as you can, and augmenting that with a multivitamin/mineral supplement plus additional antioxidants and auxiliary/complementary nutrients, is the best way to cover your nutritional bases.

The Recommended Daily Allowance: Recommended for what?

The Recommended Daily Allowance (now known as the Reference Daily Intake, or RDI) doesn’t take into account the higher needs of endurance athletes. Dr. Misner states, “Researchers have established that athletes tend to deplete vitamins, minerals, enzymes, coenzymes, and other substrates more than sedentary people do.” It’s not just more calories that endurance athletes need; it’s the whole nutritional bag.

Moreover, conventional standards are tuned to deficiency avoidance rather than optimal health, so it’s questionable whether anyone
The Fast Lane

In order to attain a state of optimum health and disease prevention, we must take into our bodies optimum—not minimum—amounts of vitamins and minerals.

The need for ODIs (Optimum Daily Intakes) is based on six factors:

- RDIs are based on amounts that simply prevent overt deficiency diseases.

- RDIs do not take into account preventative or therapeutic levels of nutrients.

- We cannot meet the RDIs even with a “perfect” diet.

- Foods available to us do not contain the amounts of vitamins and minerals they should.

- We require higher levels of vitamins than originally thought.

- We do not absorb 100% of the vitamins and minerals in foods and supplements.

Just like the RDAs, the RDIs have three basic problems: (1) you cannot get all of the nutrients you need from today’s food; (2) the RDIs reflect amounts that are adequate to prevent nutrient-deficiency diseases, and are not tailored for individual needs; and (3) the RDIs do not address or consider optimum health or the prevention of degenerative diseases such as cancer and heart disease.”

In another chapter, “The Optimum Daily Intakes (ODIs),” they write:

In order to attain a state of optimum health and disease prevention, we must take into our bodies optimum—not minimum—amounts of vitamins and minerals. To distinguish them from the lesser amounts characteristic of the RDIs, I have called these amounts the Optimum Daily Intakes, or ODIs. The need for ODIs is based on six factors:

1. The RDIs are generally based on an amount that simply prevents overt deficiency diseases.

2. The RDIs do not take into account preventative or therapeutic levels of nutrients.

3. We cannot meet the RDIs even if we eat the “perfect” diet.
4. Because of many factors, including the loss of nutrients through shipping, storage, and processing, the foods available to us do not contain the amounts of vitamins and minerals they should contain.

5. Owing to the constant bombardment of stress factors, from pollution to emotional stress, we require higher levels of vitamins and minerals than originally thought.

6. We do not absorb 100% of the vitamins and minerals in foods and supplements.

Are you convinced yet that you need to supplement? Remember, Dr. Lieberman has basic human welfare in mind, and not the even higher demands of endurance athletes.

**Supplements are dangerous? Antioxidants shorten life span? Be careful what you read!**

Every once in awhile you’ll come across a media article lambasting, or at least questioning, the use of supplements. It’s usually not bad science, but misapplied research in the hands of story-seeking media. Studies that apply only to very limited conditions, or that have only mildly suggestive findings don’t stop circulation-hungry editors from printing these results with sensational headlines that make sweeping generalizations. Sometimes the studies themselves seem to be questionable, and this makes what the public finally reads even more suspect.

Perhaps you remember the vitamin E “studies” from not too long ago, the ones that suggested that high doses of vitamin E were not only unsafe, but they also contributed to potentially shortened life span. As it turns out, this wasn’t new research at all, but rather a meta-analysis, a mathematical study that combines data from different trials in an attempt to draw statistically valid conclusions from the larger, combined set of data. Bottom line was that the findings of the meta-analysis were inappropriately applied to the general population.

Not too long after that, another attack on supplements hit the front pages. Australia’s *Sydney Morning Herald* announced “Vitamins Raise Death Risk.” If that title isn’t enough to get you at least a little concerned about taking vitamins, you’re not easily frightened! Now, the studies weren’t necessarily targeting vitamins per se, but antioxidants in general. Well, guess why the subjects in these studies died: over two-thirds of the people involved in them were already sick with heart disease, cancer, or other...
ailments. Taking antioxidants didn’t prevent these already very sick people from dying! Of course, that really shouldn’t come as a surprise because antioxidants are intended to help prevent disease, not cure already existing conditions. Research has already established that antioxidants don’t work in disease treatment. Taking vitamin E (or whatever) didn’t prevent a person already afflicted with cancer from dying of cancer.

Now, when the playing field isn’t anywhere near being level—in this case meaning that when over two-thirds of the people involved in the studies were already very sick—how can you not have negative results? This is really an inappropriate application of limited research. Call it sensationalism or flawed science or both, but the fact remains that we already have an enormous amount of research (including one listed on the facing page) that has shown the overwhelming benefits of antioxidant supplementation for reducing free radicals and improving health. The bottom line is that the sensible use of antioxidant supplements yields numerous and overwhelmingly positive results.

The Fast Lane

The sensible use of antioxidant supplements yields numerous and overwhelmingly positive results.

To optimize athletic performance and overall health, you need to consistently consume the best possible diet and augment that diet with a high-quality, comprehensive supplement regimen.

Article continues on page 42
Improved health
A recent study on antioxidant supplementation

While “scare tactic studies,” as I like to refer to them, often make the headlines, seldom are positive study results promoted. As an example, the safety and efficacy of beta-carotene has come into question quite a bit in recent years. However, because it’s a study/article that shows positive benefits (and yes, I’m being cynical here), I’m betting you haven’t heard of one of the most recent beta-carotene studies. Check this out:

Beta-carotene supplementation associated with reduced cognitive decline

The November 12, 2007 issue of the AMA journal, Archives of Internal Medicine, reported on a study that found that taking beta-carotene supplements for 15 years or more might confer a protective effect against cognitive decline in older men. The research involved 5,956 men over the age of 65 who participated in the Physicians’ Health Study II, a randomized trial of beta-carotene and other nutritional supplements for the prevention of chronic disease. The Physicians’ Health Study II is a continuation of the Physicians’ Health Study, which tested the effect of 50 milligrams of beta-carotene every other day and low-dose aspirin on male participants. For the current study, Francine Grodstein, ScD, of Brigham and Women’s Hospital and Harvard Medical School and her associates administered cognitive function tests to 4,052 men who participated in the original study since 1982, and 1,904 newer recruits enrolled between 1998 and 2001.

The team found that those who received beta-carotene for an average of 18 years had significantly higher scores on several tests of cognitive function compared with those who received a placebo. Among men who had received short-term treatment with beta-carotene, there was no improvement observed.

“The results support the hypothesis that long-term supplementation may be necessary to achieve cognitive benefits.”

“‘The results support the hypothesis that long-term supplementation may be necessary to achieve cognitive benefits,’” the authors remark. They note that the Nurses’ Health Study found that a decade or more of vitamin E supplementation was associated with improved cognition, while failing to find the same result with shorter-term use. Similarly, the Honolulu-Asia Aging Study found improvements in cognitive impairment associated with vitamin C and E supplementation only after 10 years. In animals, brain aging starts early in adult life, and long-term nutrient exposure may be required for neuroprotection.

“In this generally healthy population, the extent of protection conferred by long-term treatment appeared modest; nonetheless, studies have established that very modest differences in cognition, especially verbal memory, predict substantial differences in eventual risk of dementia; thus, the public health impact of long-term beta-carotene use could be large,” the authors write in their commentary. They conclude that, “the public health value of beta-carotene supplementation merits careful evaluation. Moreover, as these data support the possibility of successful interventions at early stages of brain aging in well-functioning subjects, investigations of additional agents that might also provide such neuroprotection should be initiated.”

A comprehensive supplement program—A necessity, not an option!

To optimize athletic performance and overall health, you need to consistently consume the best possible diet and augment that diet with a high-quality, comprehensive supplement regimen. You need to tailor your supplement program to the specifics of your particular training, health, and personal factors. A 64-year-old male Nordic skier has different requirements than a 22-year-old female triathlete. That’s where the Hammer Nutrition supplements come in. As with our fuels, we have designed our supplement line for maximum flexibility and integration. Whatever your personal needs require, we have products available to keep your body in the best possible condition.

To make your supplement selection easy and effective, we’ve divided our line into four categories: Daily Essentials, Very Important, Important, and Specific Support. This classification derives from a basic, but oft forgotten maxim of endurance sports nutrition: You must be a healthy person first, an athlete second, and an endurance athlete third.

Unless you take care of the basics, you can’t succeed with your downstream goals. That’s why our most basic products address overall health issues, not the specifics of endurance exercise. Many athletes think that a daily vitamin is expendable because they’re looking for the “secret formula” that will give them extraordinary endurance. Your body knows better! Our supplement program will keep your body healthy so that it can train at higher levels and thus produce better race results. Don’t look for magic in a bottle. Look for health support so that your hard training will give you the maximum benefit.
I’ve often said that athletic success depends on three key factors:

1. **The use of high-quality equipment** – You don’t need the “limited edition, gold plated” model, but you do need to use good equipment.

2. **The incorporation of an intelligent training and recovery program** – You can’t just ad lib a training regimen and hope that the pieces will fall into place. You need a systematic, incremental, personally adapted training program that places equal emphasis on recovery.

3. **The consistent use of high-quality nutritional supplements and fuels, and a sensible supplement/fueling program** – As an athlete, you place enormous physiological demands on your body. Your nutrient requirements—just to maintain health—are much greater than the average person. But your goal isn’t to just maintain health at a minimally acceptable standard; your goal is to achieve supreme health. In addition, you want it to in your workouts and races, while you have more fun and achieve more success in the process.

All three of these areas are important, and if one is lacking, the others can’t pick up the slack. I hope that you’re now convinced of the importance of an intelligent supplement program and the key role it plays in helping you achieve optimal athletic performance and overall health.

In addition to the information provided in this article, you’ll find more useful articles about supplementation in general, as well as information on all of the Hammer Nutrition supplements, at www.hammernutrition.com. Our Product Usage Manual is an easy-to-read guide that will help you with your supplement purchase decisions, as well as provide suggested doses for each of the Hammer Nutrition supplements. Download your free copy at www.hammernutrition.com/downloads/PUM.pdf. Of course, if you need assistance in putting together a supplement program or help with fine-tuning your current program, our knowledgeable client service staff is ready to assist you. Please don’t hesitate to call or email us!
Daily Essentials

This category includes the three primary products in the Hammer Nutrition line: **Premium Insurance Caps, Race Caps Supreme, and Mito Caps**. These three form the foundation of your supplement program, as they provide the widest range of benefits for enhancing both athletic performance and overall health. You should take these three daily, throughout the year. Because they provide tremendous general health benefits, we also recommend them for daily use by non-athletes.

The Daily Essentials provide:

- Basic vitamins and mineral replenishment to optimize overall health.
- Enhanced immune system and cardiovascular system support by supplying a wide range of antioxidants to neutralize free radicals produced by increased physical activity. Unchecked, free radicals cause cell damage and lead to many disease states.
- Key substrates to enhance and ensure efficient production of energy.
- Support for mitochondrial health. In our view, the longer you can stimulate the number, lifespan, and health of the mitochondria, the longer you will live and the better you will perform in endurance events. The athlete who has the most healthy/efficient active mitochondria is the athlete who performs at their best.
Very Important

These products provide additional support and benefits by adding additional nutrients that complement the Daily Essentials. They address several different physiological functions. You can use these products daily or as needed.

- **AO Booster** – If I hadn’t limited myself to three products only to comprise the Daily Essentials, AO Booster would definitely have a rightful place amongst those three. Its unique fat-soluble antioxidant formula provides powerful protection against fat-soluble-produced free radicals and the damage they cause. Additionally, AO Booster helps reduce post-workout muscle soreness and inflammation. Moreover, some of its components provide eye and skin-specific benefits.

- **Super Antioxidant** – An ultra potent, non-vitamin antioxidant formula. Enhances recovery by reducing soreness and fatigue, improving circulation, and helping to maintain optimal immune system functioning. Provides additional antioxidant coverage to Premium Insurance Caps and AO Booster. Use primarily after lengthy or very strenuous aerobic workouts.

- **Phytomax** – A live, green, “Super Food” supplement containing ample amounts of easily assimilated organic minerals, as well as enzymes and phytochemicals. Makes sense as a dietary supplement, especially in winter when fresh produce is scarce, or when traveling.

- **REM Caps** – A natural sleep formula to help you accrue more quality REM time, and wake up in the morning feeling refreshed. Better sleep = higher HGH levels = better recovery. For anyone with sleep deficits; also has antioxidant properties.
Important

These products provide additional benefits above and beyond the nutrient support of the products in the previous two categories. Mostly, these are taken as needed at various times throughout the year. If you’re seeking the ultimate supplement program, then you should consider products in this category.

• **Tissue Rejuvenator** – Four active ingredients and a multi-nutrient anti-inflammatory pain relieving component make this supplement ideal for protecting and maintaining healthy joints and connective tissue, and aiding in recovery from joint injuries.

• **Xobaline** – Use after workouts to optimize production of red blood cells, reduce fatigue and related symptoms, and enhance muscle repair and regeneration. Additionally, its components—vitamin B12 and folic acid—play a significant role in helping to reduce elevated homocysteine levels, which is implicated in cardiovascular disease.

• **Chromemate** – This multi-beneficial trace mineral helps ensure proper insulin function, maintains healthy cholesterol levels, enhances recovery, and curbs sugar cravings.

• **Digest Caps** – Aids in maintaining proper levels of healthy bacteria in the digestive system. This helps improve intestinal health, immune and digestive system function, and nutrient absorption.

• **Boron** – Safely and naturally restores normal hormone levels, which are depressed as a result of endurance training. Normalizing your hormone levels dramatically enhances recovery, workload tolerance, and libido. Strongly recommended for anyone over 40. Boron also provides support for bone and prostate health, as well as nutritional support for the prevention of kidney stones.
Specific Support

These products are not usually taken regularly; however, they may become essential for certain athletes and/or under specific conditions.

- **Anti-Fatigue Caps** – Helps remove excess, fatigue-causing, performance-robbing ammonia from cell pathways. Especially effective in reducing fatigue in extended endurance events while also providing electrolytic mineral support.

- **Endurance Amino** – Specific amino acids help decrease perception of fatigue and increase cognitive performance when taken prior to and during exercise. Taken after exercise, Endurance Amino helps build, maintain, and repair lean muscle mass, and support a strong immune system.

- **Race Day Boost** – Enhances the functions and performance of your body’s three energy production pathways, and effectively buffers lactic acid. Use for four days prior to a major event and enjoy up to a 10% improvement in performance time.

- **Energy Surge** – Use as needed for a quick energy boost during interval or speed workouts, just prior to increased efforts during training or competition (such as a big climb or an attack), or for a perk during ultra distance events.

- **Appestat** – The sensible, healthy approach to weight loss. Use to control cravings and support your weight loss program. Very helpful in the off-season.

- **PSA Caps** – Effective, non-prescription nutrient support for male prostate health.
EPIC SESSIONS

Supplement suggestions for workouts and races

Campers climb up Mt. Lemmon during Hammer Camp in Tucson, Arizona. Photo: Vince Arnone
1. While fueling (calorie, fluid, and electrolyte) should be the primary focus of all workouts and races, especially “epic” ones, the incorporation of an intelligent supplement program used prior to, during, and afterward will definitely assist in yielding tremendously positive results.

2. The supplements suggested for use prior to an “epic” workout or race can be thought of as a “pre-emptive strike” dose, helping to prepare the body for the arduous task ahead, supporting its nutrient needs for the first hour.

3. The products suggested for use prior to the workout/race and every hour during the workout/race will supply nutrients that, among other things:
   - Support efficient energy production from your calorie and oxygen intake
   - Help neutralize the negative effects of the numerous free radicals that are constantly produced
   - Assist in the removal of excess ammonia and its fatigue-causing effects
   - Aid in the prevention of lean muscle tissue cannibalization

4. The products suggested for use after the workout/race will supply nutrients whose primary purpose is to:
   - Replenish what has been depleted during the course of the workout/race
   - Help with the muscle-tissue reparation process
   - Support enhanced glycogen synthesis
   - Neutralize free radicals and minimize the damage that they can cause

Start reading the full article on page 50
Before I go into the details of my supplement program, let me first mention a couple of things:

1. Most of these supplements are ones that I take on a daily basis for general health benefits, though not always in the same amounts that I take for an “epic” ride such as the 130+ mile, mega-climbing Highline Hammer loop through Glacier Park.

2. I take the higher dose of all the supplements on a significantly long ride, such as the Highline Hammer, and I’ll take the lower dose for less intense, less mountainous, shorter-duration rides (say, 3-5 hours).

3. These products, and the amounts listed, are what I use. I’m a pretty big guy (190+ lbs) so the amounts you should consider may be less than that, depending on your weight and activity level. Refer to the Product Usage Manual (a.k.a. “The Little Red Book”) at www.hammernutrition.com/downloads/PUM.pdf for suggested dosages.

4. The information I’ve provided in this article—in essence, the rationale for why I take these particular products—is but a sliver of what is available on the products and the nutrients they contain. Consider this information the “Reader’s Digest” version and refer to the Hammer Nutrition website for more detailed information about each of these products.

5. Carrying and consuming lots of pills during a long bike ride is, to some extent, an acquired skill and it may take awhile for your body to “learn” how to take a number of pills on an hourly basis. Additionally, it may be more challenging if you’re doing a more “digestively challenging” type of exercise such as running. If this is the case, simply start slow and increase the number of products you take—and the amounts of each product—gradually. Also, depending on your sport, it may be necessary to modify this supplement program in deference to the activity you’re involved in.

6. My hourly intake of each of these supplements, with the exception of Endurolytes, doesn’t change. Therefore, I’ll make “X” number of baggies of these supplements, each baggie containing the identical amounts of each product. I use
the small, plastic bags that are available on the Hammer Nutrition website to carry the pills, and the amount of baggies I make will, of course, be dependent on how many hours I’ll be out there. Every hour I’ll open up a bag and consume the pills.

7. My dose of Endurolytes oftentimes changes hourly (for example, what I need at 2 p.m. may be higher than what I need at 8 a.m., if only because the weather may be hotter). Therefore, I’ll keep my Endurolytes separate from my bags of the other supplements. I use the plastic capsule dispenser that is sold on the Hammer Nutrition website to carry Endurolytes, and I’ll dose them as needed.

- William Misner, Ph.D. - Director of Research & Product Development, Emeritus

Thoughts on Mito Caps

“The longer you can stimulate the lifespan or health of the mitochondria, the longer you will live and the better you will perform in endurance events. Endurance athletes should realize how incredibly important it is to effect mitochondria and that everything formulated in this compound influences mitochondria cell biochemistry function synergistically and remarkably.”

30-120 minutes prior to the workout/race

1-2 Race Caps Supreme – This product contains CoQ10 and idebenone, which are key substrates in the Electron Transport Chain (ETC) process of energy production. Race Caps Supreme also supplies the minerals calcium, magnesium, and potassium. These minerals are chelated to malic acid, citric acid, aspartic acid, lysine, and glycine, most-to-all of which are involved in the Krebs Cycle process of energy production.

CoQ10 and idebenone are also tremendous antioxidants (as is the vitamin E in the product), and I consider taking this product prior to exercise to be an effective head start on free radical neutralization.
1-2 Mito Caps – The “mitochondrial support product” provides, among other nutrients, acetyl l-carnitine (ALC) and R-alpha lipoic acid (R-ALA).

Among its many benefits, acetyl l-carnitine (ALC) helps the body use the calories from fatty acids as fuel more efficiently, while also increasing the volume/amounts/activity of key substances that are involved in the complex process of producing energy from your food and oxygen intake.

R-alpha lipoic acid (R-ALA) plays a major role in specific energy-producing functions within the mitochondria. It is also a superb antioxidant, with the unique ability to neutralize both water- and fat-soluble-based free radicals. Additionally, R-ALA is able to regenerate “used up” antioxidants, thus extending their activity (“shelf life”) in the body. Lastly, R-ALA assists in maintaining proper glucose metabolism.

**Bottom Line:** When you take Mito Caps, you are providing two key nutrients that will help maintain optimal mitochondrial function, which is vital for energy production and overall health.

2-4 Anti-Fatigue Caps – Provides three nutrients—potassium/magnesium aspartate, OKG, and l-citrulline—that will help neutralize the negative effects of excess ammonia accumulation, which is arguably the primary culprit in premature fatigue.

2-4 Endurance Amino – Provides the primary amino acids—the three branched chain amino acids (a.k.a. BCAAs – l-leucine, l-isoleucine, l-valine) and l-alanine—that are used in the energy cycle during exercise. Plus, the BCAAs in Endurance Amino assist in replenishing depleted glutamine stores while also aiding in the prevention of muscle tissue breakdown. The latter helps to prevent excess fatigue-causing ammonia from being produced and accumulating. Additionally, research has shown that the intake of BCAAs
prior to and during exercise may delay exercise-induced or central nervous system-induced fatigue. It is also believed that BCAAs may improve mood and cognitive performance.

On top of that, the glutathione component in Endurance Amino provides a number of benefits, primarily powerful antioxidant support.

3 Endurolytes – Provides a balanced supply of necessary electrolytes. Taking this product prior to a lengthy workout or race provides what I call a “pre-emptive strike dose,” meaning that you’re taking care of electrolyte requirements prior to them truly becoming a necessity. This frees you from having to take the product during the first 30-60 minutes of the ride. The dose will be dependent on a variety of factors (weather, fitness levels, acclimatization levels, body weight, etc.), and what you’ve already tested in training.

Every hour during the workout/race, starting at hour #2

1-2 Race Caps Supreme – By taking this product hourly during prolonged exercise, you will be “replacing the spark plugs” in the body, helping to ensure more consistent energy production throughout the workout. In addition, you will also be providing the body with powerful protection (via the CoQ10, idebenone, and vitamin E components) against fat-soluble-based free radicals.

1-2 Mito Caps – By taking this product hourly you will be maintaining optimal mitochondrial function, which translates into more efficient energy production and free radical neutralization (the latter, as is the case with the antioxidants in Race Caps Supreme, being especially important for recovery as well). Plus, the R-ALA component in the product helps maintain proper glucose metabolism, which is undoubtedly beneficial during exercise.
2-4 Anti-Fatigue Caps – By taking this product hourly you supply the body with potassium/magnesium aspartate, l-citrulline, and OKG, all of which help to neutralize the negative effects of fatigue-causing excess ammonia accumulation.

2-4 Endurance Amino – By taking this product hourly you provide the primary “used-in-the-energy-cycle” amino acids (the BCAAs). The BCAAs in Endurance Amino, along with the BCAAs that naturally occur in the soy protein component in Sustained Energy, Perpetuem, and Perpetuem Solids helps prevent the muscle tissue from being broken down to satisfy 5%-15% of the body’s energy requirements. The result is less fatigue-causing ammonia to accumulate and less muscle tissue that will be broken down and needing to be repaired during the recovery process.

You also supply the body with l-alanine. The liver can convert l-alanine into glucose as needed (I like to think of it as an “emergency” energy supply), which the bloodstream transports to the muscles for energy. L-alanine also aids in the synthesis of pantothenic acid (vitamin B-5), which is needed for protein, fat, and carbohydrate metabolism.

Lastly, you provide the body with glutathione, which is one of the most potent antioxidants there is, with an Oxygen Radical Absorbency Capacity (ORAC) rating of 12,000+. Dr. Misner writes, “Decline in endurance performance may parallel decline in glutathione concentrations imposed by the aging process.” That alone makes taking glutathione during exercise sound like a very rational idea to me.

Glutathione also facilitates the transport of amino acids which, hypothetically, will assist in directing the amino acids in Sustained Energy, Perpetuem, and Perpetuem Solids to wherever they’re needed (one athlete...
reported that taking Endurance Amino is like “supercharging” Perpetuem).

3 Endurolytes (higher amount if weather dictates its necessity) – Helps to prevent cramping and keeps the body’s “oil reservoir” topped off, which helps maintain the optimal performance of many important bodily functions.

Special Note: Race Caps Supreme, Mito Caps, and Anti-Fatigue Caps also contain the patented Enzyme Enhancement System™, which helps with the absorption of the nutrients and may also aid in the absorption of the carbohydrate and protein components in the Hammer Nutrition fuels.

During prolonged events, you’re burning a lot of fat which means you’re also producing a massive amount of fat-soluble free radicals.

Premium Insurance Caps – My dose after an “epic” ride is seven capsules with Recoverite, with seven capsules taken later with a meal. My typical suggested dose for lighter weight athletes after an “epic” workout is 4-5 capsules with Recoverite and 3-4 capsules taken later with a meal. Premium Insurance Caps resupplies the body with the vitamins and minerals that have been depleted during exercise, including some key antioxidants such as beta-carotene, vitamins C and E, and the minerals manganese, selenium, and zinc.

1-2 Race Caps Supreme – For the antioxidant support from CoQ10, idebenone, and vitamin E, all three of which are also tremendous “heart health” nutrients.

1-2 Mito Caps – The R-ALA component provides significant antioxidant support while also helping to increase endogenous supplies of the key antioxidant glutathione. For additional antioxidant support, Mito Caps also contains ascorbyl palmitate (the fat-soluble form of vitamin C), and a small amount of vitamin E.

1 AO Booster (plus one additional capsule taken with a later meal) – Provides a wide range of fat-soluble antioxidants: the entire vitamin E “family” (the four tocopherols and four tocotrienols), lutein (which also has eye-specific benefits), and astaxanthin, which is suggested to be up to 50 times more potent in its antioxidant capabilities than vitamin E.

During prolonged events, you’re burning a lot of fat (utilizing the calories to satisfy nearly two-thirds of your energy requirements), which means you’re also producing a massive amount of fat-soluble free radicals. AO Booster is designed to neutralize the negative effects of excess fat-soluble free radicals, similar to how Super Antioxidant (next page) helps to neutralize primarily water-soluble free radicals. Protection against
inflammation is an additional benefit provided from the tocopherol/tocotrienol blend and the astaxanthin.

1-2 Super Antioxidant – Provides a variety of antioxidant nutrients, some of which also have circulation-enhancing benefits that will help accelerate the clearance of metabolic waste by-products accumulated during prolonged exercise.

2-4 Endurance Amino – Even though the body is getting a significant donation of BCAAs via the whey protein isolate component in Recoverite, I firmly believe that additional amounts of these specific “ideal-for-recovery” amino acids is merited and beneficial. Additionally, I believe that providing the body with more glutathione at this critical time is also highly beneficial. (In my opinion, any steps you can take to improve glutathione “status” in the body should be taken, especially after exercise.) With Endurance Amino, the body receives a nice dose of BCAAs and glutathione, complementing the BCAAs and the glutathione precursor amino acids in Recoverite.

1 Chromemate – Research suggests that athletes who consume chromium polynicotinate (Chromemate) along with ample carbohydrates within two hours of completion of exercise will experience a significant increase in the rate of glycogen synthesis compared to no supplementation.

I am a firm believer in the saying, “How well you recover today determines how well you will perform tomorrow.” Taking a capsule
of Chromemate with Recoverite is such a simple and inexpensive way to help maximize glycogen synthesis/storage, which is an undeniably vital component in the recovery process.

1 Xobaline – Space limits me from listing all of the benefits that vitamin B12 and folic acid provide, though they are arguably best known for their role in the production of red blood cells. B12 and folic acid are also intimately involved in protein utilization and RNA and DNA synthesis, both of which have enhanced recovery implications.

Dr. Misner writes, “There are virtually 100s of papers demonstrating the health benefits from folic acid and vitamin B12 in the cells, digestion, vision, hair, skin, immune system, musculoskeletal system, nervous system, oral health, and sexual system. It is a supplement I enthusiastically recommend and take every day.”

1 Boron – Boron is reported to raise testosterone levels in older men to normal physiological values. Supplementation with 10 mg of boron per day for 28 days has been shown to increase testosterone levels in healthy males.

Note that Premium Insurance Caps contains 2.5 mg of boron per seven capsules. Also note that females appear to not require as much boron as do males to attain optimal testosterone levels (3 mg/day is suggested as being adequate).

SUMMARY

There you have it, my “epic workout/race” supplement program. I hope it helps you as you put together your supplement program for your chosen sport.
Priceless knowledge is yours for **FREE!**

**Hammer Nutrition Website**
The Hammer Nutrition website has been designed with your needs in mind. Our website offers a user-friendly look and feel with easy access to our entire line of products. Visit our website today for everything from the latest information on our premier products to our unparalleled wealth of knowledge for improving your performance.

**Athlete Education Series**
The Athlete Education Series is a printed weekly resource that provides the science and rationale behind specific Hammer Nutrition fuels and supplements, along with other helpful tips. Armed with this information, you’ll have a greater knowledge of the various Hammer Nutrition products, what they contain and why, and how best to use them.

**Endurance News**
Our free magazine, published every 60 days, features insightful articles on diet, nutrition, training, and other topics of interest to endurance athletes, including how to optimize the use of Hammer Nutrition fuels and supplements. More than 84 full-color pages of helpful information, published continuously since 1992.

**Virtual Community**
*Like us on Facebook!* Check our Facebook wall frequently for up-to-date happenings, including various events that we’ll be attending with free samples, new product announcements, product knowledge, special offers, and more. Look for us on Flickr, YouTube, and Twitter too!

**Video**
Short, instructional videos are the latest addition to our extensive information offerings. Visit the Hammer Nutrition website where you’ll be able to watch and listen to Steve Born and Dustin Phillips provide information on each of the Hammer Nutrition products, optimal usage, and our fueling strategies.

**Endurance Forum**
Our “clients only” discussion group hosted by Brian Frank, Steve Born, and a panel of professional athletes, coaches, and experts in just about anything even remotely related to endurance training. Have all of your questions answered, share ideas, and learn with our friendly community.

[www.hammernutrition.com/forums/](http://www.hammernutrition.com/forums/)
The book that every endurance athlete should read

*The Endurance Athlete’s GUIDE to SUCCESS*

For years, endurance athletes have been bombarded with—and probably confused by—the plethora of concepts regarding the proper fueling of their bodies prior to, during, and after exercise. To the rescue comes *The Endurance Athlete’s GUIDE to SUCCESS*, which cuts through all of the hoopla and provides a primer regarding these important issues. With over 550,000 copies in circulation, it’s a trusted source of legitimate information.

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**ABOUT THE AUTHOR**

Steve Born’s 20-plus years of involvement in the sports nutrition industry, as well as over 20 years of independent research in nutritional fueling and supplementation, have given him unmatched familiarity with the myriad product choices available to athletes. As a senior staff member at Hammer Nutrition, Steve provides individual consultations to athletes of every level—beginner to professional—and in every discipline of endurance sports, helping them to achieve optimal performance in their training and racing.
The Hammer Nutrition Fuels & Supplements—Everything You Need To Know contains three articles that will “arm” you with all of the information you need for each and every Hammer Nutrition product.

Take the guesswork out of fuels and supplements today!