

ENDURANCE NEWS #29

OFF SEASON SUPPLEMENT SUGGESTIONS

by Steve Born



As your competitive season winds down, you know it will soon be time to look back and evaluate all the things that went right as well as the things that need improvement. Now is the time to set your goals for the next season. Dr. Misner has suggested that "preseason goals should be realistically set at 1-3% above personal bests at each distance with planned training peaks set to meet those goals methodically." If you're like most athletes, you'll probably be doing some form of aerobic cross training outside your primary sport as well as weight training. But the day to day training, the accumulation of several hours spent running, cycling, swimming, or whatever your training involves, is definitely on the decrease. When I lived in Southern California, the off season simply meant less miles on the bike. But ever since I moved to colder climates, I have used cross-country skiing and weight training as my winter training in preparation for the cycling season. So I try to stay active all year round, even if the duration and intensity is less than during my main season.

But whether or not you choose to be active year round, once your main competitive season ends does that also mean the end of supplement intake? I don't believe so and I'd like to offer some supplement suggestions for the off season. If you plan to remain fairly active, I wouldn't hesitate to remain on pretty much the same program you followed during your main competitive season. There's no reason to stop supplementation if you're still remaining active because you still want to provide your body with the nutrients it needs to get the most out of whatever training you do. Why start from scratch with your supplementation when you start back up on training for your main sport if you're still training on a fairly regular basis during the off season? You may find it desirable to cut back on the dosages if you're not training as heavily, but I would definitely con-

tinue your supplement program. I do not believe there to be any benefit to cycling off things like Race Caps or Enduro Caps. In fact, I believe there are benefits to staying on them year round, as I mention below. However, if you're cutting back severely or completely on your training during the off season, you still might consider the following program for off season health.

1. PREMIUM INSURANCE CAPS-Every athlete I've designed a supplement program for, or given supplement advice to, knows that I consider a multi-vitamin/mineral supplement the foundation of any program, and that I consider Premium Insurance Caps to have no peer in that category. It's especially important during the competitive season for providing substantial nutrients for optimal bodily functions, including the protection and enhancement of the immune system. Especially important is the intake of a variety of antioxidants. Louis Pasteur, recognized as the father of modern medicine, once said, "the key to medicine is host resistance." This is where antioxidants excel. They boost our immunity by increasing our resistance to many types of toxins, bacteria, and viruses. They also neutralize free radicals.

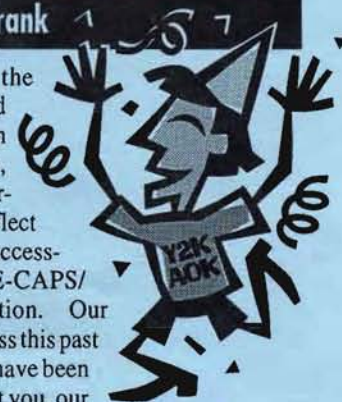
Excess free radical production is caused by oxidation. And even though a primary part of that oxidation can occur during intense and prolonged exercise, it also occurs at ALL times. Whenever our bodies process food to fuel, it is done by oxidation, a vital, life-sustaining process. Unfortunately, that process is not 100% efficient and the metabolism of food, especially foods that are high in fats, can cause high amounts of free radicals to be produced. They are also produced from environmental pollutants and ultra violet radiation. And stress of any kind creates free radicals. So while all free radicals are not bad, excess amounts of them are, and are believed to be the reason for degenerative diseases such as cancer and cardiovascular disease.

As Dr. Misner has written, "Athletes today ingest only 11% of the organic nutrients from their food sources that the athletes of the 1940's enjoyed." The sad fact is that our food supply

(continued on page 9)

Y2K - WHAT A YEAR!

by Brian Frank



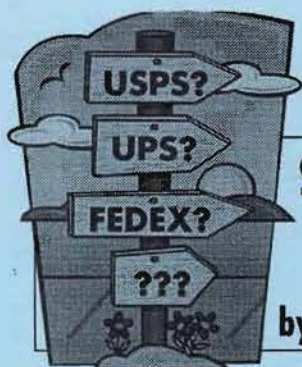
As we begin the New Year and the racing season is all but upon us, this is an opportune time to reflect back on very successful year for E-CAPS/Hammer Nutrition. Our continued success this past year would not have been possible without you, our valued customer. I would like to sincerely thank you for your patronage and continued support. And, with a little bit of luck and a lot of hard work, we will continue to expand our product line and information resources so that we can offer you even more in 2001.

But first I'd like to reflect a bit on the big Y2K. I was able to add several key staff members to my organization which have been much appreciated by our customers and myself especially. Without the services of Dan Taylor, the man behind our trick new e-capsule logo, cycling clothes and all around excellent graphics; Steve Born, the guru for all things diet and supplement related; Colleen Connery, taking charge of our customer service department; and Tim Van Buren heading up our websites, computer network and all things having to do with Information Technology (IT for you techies); I would surely have lost my mind. I'm elated to have them on board as part of the "E-Team" and hope that you are also enjoying the benefits of the additional resources and services that our expanded staff provides.



2000 also saw the realization of one of my biggest dreams for the company; a custom designed, permanent headquarters facility. After hearing me talk about it for so many years, many doubted that this dream would ever come true. But, after years of dream-

(continued on page 9)



SHIPPING SAGA

by Brian Frank

As most of you already know, things are changing quickly in regards to the methods we use to get your products delivered to your door. The good ol' days of being able to use one carrier (UPS for 10 years, FedEx for 3 years) are long gone and may never return. All of the small package carriers are raising their rates and adding residential and rural delivery surcharges. Unfortunately, this is only an update as many rate increases and changes in service are slated for January, February and March of 2001.

In the past few months, we have begun offering "Cheapest Way" as a new method of shipping. This allows us to effectively shop rates and find the least costly carrier to deliver your package. We are using mostly US Postal Service for all packages under 4 pounds and FedEx Ground (a.k.a. RPS) for packages over 4 pounds. The trade off is that there are no delivery guarantees, so this method is not the best choice when you must have your order by a certain date. For guaranteed 3, 2, and 1-day service, we still feel that FedEx is the best bang for the buck.

We are currently evaluating several different options such as flat rates, graduated rates based on dollar value of the order and so on to try to simplify the shipping options for you. We are hopeful that we will be able to make an announcement in issue #30 of *Endurance News*.

In the meantime, I would like to leave you with two thoughts. First, we do not view shipping charges as a profit center the way most mail order businesses do. We are only passing on actual shipping charges to you. Secondly, you can avoid ALL residential and/or rural delivery surcharges (currently \$1.25 to \$2.75 per package) by letting us ship to your work address. However, it must be an actual business, not just a home office. These are the shipper's rules not ours. Also, we must have the name of the business on the package in addition to your name. If you do change your shipping address to your place of work, we can still maintain your home address as your "mailing" address for things like this newsletter and the occasional promotion or new product release notice.

Stay tuned for the next installment of the E-CAPS/Hammer Nutrition Shipping Saga. ■

AVOID SIMPLE SUGARS

Where have you heard this before? by Dr. Bill Misner, Ph.D.

"Despite considerable controversy over the inclusion of sucrose in the diets of people with diabetes, the acute metabolism of sucrose is not completely understood. Recent research investigated the metabolism of the monomeric constituents of sucrose after a high-sucrose meal. Seven healthy male volunteers consumed three test meals in a randomized, cross over design study. Two of the meals were high in sucrose; one was supplemented with 200 mg uniformly labeled [13C] fructose and one was supplemented with 200 mg [13C] glucose. The other meal was high in starch [complex long chain carbohydrates], supplemented with 200 mg [13C] glucose. Fifty percent of energy was supplied as sucrose in the high-sucrose meals and as starch in the high-starch meal. Breath 13CO₂ enrichment was measured at 15-minute intervals and indirect calorimetry was performed for five 20-minute sessions immediately before and during a 6-hour postprandial period. Carbohydrate oxidation rates rose much faster after the high-sucrose meals than after the high-starch meal. Breath 13CO₂ enrichment rose faster and peaked earlier and at a higher value when [13C] fructose rather than [13C] glucose was given with the high-sucrose test meal. Values for breath 13CO₂ enrichment from [13C] glucose after the high-starch meal were intermediate." [1]

"These results show that fructose is preferentially oxidized compared with glucose after a high-sucrose meal and glucose is oxidized more slowly after a high-sucrose meal than after a high-starch meal." [1]

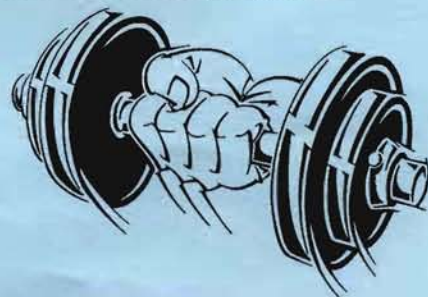
Why not reduce or avoid simple sugars in favor of the better adaptive metabolic response from long-chain carbohydrates? But there again, a warning must be stipulated. Too much long-chain complex carbohydrate foods may also result in elevated blood insulin response like smaller amounts of simple sugar. The preferred carbohydrate is the complex variety in small 50-80 gram portions.

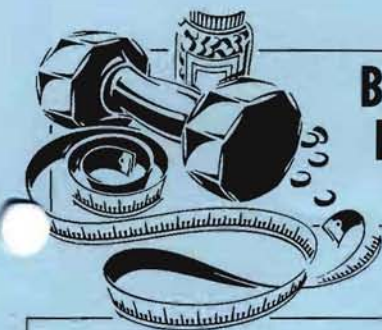
All simple sugars and high volume of carbohydrates may cause typically steep rises and falls in blood sugar levels, impacting mood, lowering long-term energy, leading to diabetes, and plausibly to angina or heart disorders such as a heart attack. Masley reports nearly a 30% reduction in three-month blood sugar averages and total cholesterol/HDL ratio in type 2 diabetes patients using low simple sugar and low high glycemic index food from "Antioxidant Diet Program" which suggests avoiding simple carbohydrate foods known to cause rapid

changes in blood sugar levels, and instead "choose meals made with sustaining carbohydrates, such as beans, colorful vegetables, and most fruit, as well as special grains, such as wild rice, quinoa, and barley." [1]

Eating a meal heavy on the carbohydrates can trigger heart-related chest pains in some people with atherosclerosis, fatty blockages in their coronary arteries, a new study shows. [2] Dr. William Heberden noted that chest pains worsened after meals. British researchers, led by Dr. Mark Kearney, suggest a mechanism caused by carbohydrates raising the body's insulin production. Increased insulin levels increase a release of nitric oxide. Nitric oxide causes the walls of normal coronary arteries to relax. In atherosclerotic patients, nitric oxide causes coronary artery walls to constrict, resulting in chest pain. A new study involved 15 people with a history of angina. After eating meals from 75% carbohydrates, 71% fat, or fasting, subjects took a treadmill cardiovascular capacity for exercise test. It was discovered that 30 and 60 minutes after a carbohydrate meal, the patients' capacity for exercise significantly decreased, showing evidence of poor cardiac blood flow sooner than after either a high-fat meal or fasting. Chest pain occurred 50 to 90 seconds earlier after a carbohydrate meal than after fasting. Time to onset of exercise limiting chest pain did not change compared to fasting. Eating a meal rich in fat did not affect tolerance for exercise compared with eating no meal at all. Both the high-carbohydrate meal and the high-fat meal led to a "significant decline in blood pressure" when the patients exercised after eating. This is the first study to assess the effect of meal composition and timing of exercise in patients with coronary artery disease, though the effects on healthy normal patients may be implicated though not determined. High-carbohydrate meals effect maximal exercise tolerance is present for at least one hour after eating. "A high-fat meal of the same energy content did not compromise performance," they concluded. ■

SEE PAGE 11 FOR REFERENCES





BORON'S MICRO-HORMONE DONATION FOR ENHANCED PERFORMANCE

by Dr. Bill Misner, Ph.D.

Knowledge of human physiology and nutrition has increased greatly, and so has the application of dietary alterations and micro-supplements. Modulation of dietary composition and/or supplementation with specific nutrients with the intent of improving human physical performance is a working definition of nutritional ergogenic aids.

BORON is such a trace element nutrient, and recently it has been shown to increase the concentration of plasma steroid hormones. In a single blind, crossover trial, it resulted in a significant increase in plasma 17-B estradiol (E2) concentration and there was a trend for plasma testosterone (T) levels to be increased! The ratio of estradiol: testosterone increased significantly. However, there was no perturbation in plasma lipids. Furthermore, the effect of boron on steroidogenesis and its mechanism was also investigated in two more studies conducted on adult male rats. The elevation of endogenous steroid hormones as a result of boron supplementation suggests that boron may be used as an ergogenic safe substance for athletes, which should be further investigated. [1]

In general, most sport science nutritionists recommend no more than 3-6 milligrams Boron per day, stating the body has only a micro-appetite for this hormone-enhancing mineral. However, Dr. Michael Colgan, Ph.D., known internationally for his research in sports nutri-

tion and in aging takes 8 mg. Boron daily [2]. Boron is an essential element for plants and is also necessary for humans. Boron is distributed throughout the human body with the highest concentration in the bones and dental enamel. Boron affects the metabolism of steroid hormones (increases male sex hormone levels) and may also play a role in converting vitamin D to its more active form, increasing calcium uptake and deposition into bone. It is essential for healthy bone and joint function, effecting the balance and absorption of calcium, magnesium and phosphorus. It affects cell membranes and how signals are transmitted across membranes.

Boron deficiency may affect calcium and magnesium metabolism, the composition, structure and strength of bone, contributing to osteoporosis. This is due to decreased absorption with increased excretion of calcium and magnesium. Due to these effects on calcium and magnesium metabolism, boron deficiency may also contribute to the formation of kidney stones. Such a deficiency may decrease mental alertness.

There is no RDA for boron. A safe and adequate daily intake is estimated between 1 and 10 mg. Toxic effects appear at intakes of about 100 mg. Premium Insurance Caps are formulated at 5 milligrams boron per each 14 capsule dose. Separate boron supplements typically come in 3-5 mg. units. Plant foods such as fruit, vegetables, soybeans and nuts are rich sources of boron but the level in food depends on the soil in which it is grown. ■

REFERENCES

1. The significance of dietary boron, with particular reference to athletes. Naghii MR, Nutr Health 1999 13:1 31-7.
2. J.O.E. [Journal of Endurance: 2000: # 16].

VOLER CLOTHING UPDATE

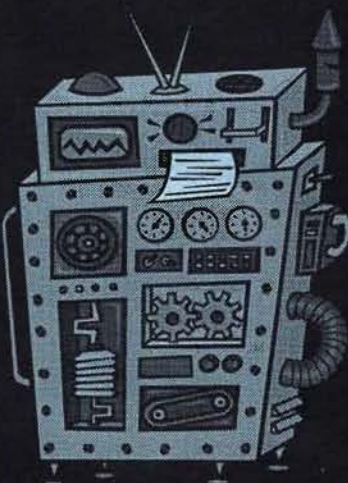
Was it the ultra cool design, the extraordinary fit, or the "buy it at our cost" prices? Or was it all three? Whatever the reason, our line of VOLER cycling clothing was a tremendous success with a nearly total depletion of inventory in record time (some VOLER items are still available in very limited quantities). Our clothing order from VOLER is in and will be available in the early part of April 2001.

We will continue to provide the finest VOLER clothing with the sweetest looking E-CAPS/HAMMER GEL graphics at prices NO ONE

can match. We believe that if you choose to wear clothing that has our logos on it, in essence promoting our company, so we shouldn't charge you full price for it. We feel this is one way we can help show our commitment to our customers, our supporters.

The line will once again include short and long sleeve jerseys, shorts, bib shorts, headbands, wind jackets, and arm warmers. We're also adding a sport top for women to our VOLER clothing line up. We'll keep you posted regarding arrival dates for this awesome clothing! ■

DON'T MISS THIS!



Unbelievable Offers Available By Email

In appreciation for our loyal customers, we have finally created the F.A.S.T. (Fantastic Athlete Special Treatment) Program. All E-CAPS and Hammer Nutrition customers are eligible to join the FAST Program to receive unbelievable offers and special discounts via email. Sure, this is a marketing tool for us, but rest assured the offers sent to members of the FAST Program are not meager or chintzy; we're not talking about 10% off this or that overstocked item. We're talking about VERY BIG savings and offers that are good for a very limited time. Because we are able to save thousands of dollars on postage and printing by sending these offers via email, we are able to put together offers that are really worth your time. Sign up and you'll see what we mean.

Sign up for the FAST program by sending an email to subscribe@e-caps.com and we'll sign you up. You can cancel at anytime without hassle by sending an email to unsubscribe@e-caps.com.

Please note that when we send you offers with the FAST Program, they are for you only. These offers are too big to be passed on to friends. Also remember that FAST offers must be acted upon FAST because they usually expire in a week or less!

Don't miss out on signing up with the FAST Program at subscribe@e-caps.com. We won't fill your mailbox full of junk mail, just limited KILLER offers. We will not sell or rent your email address to anyone for any reason, ever. ■

THE NEW & IMPROVED BORON

by Steve Born

OK, so the term "new and improved" is an overused one as it is. But with the updated E-CAPS Boron product it really has been improved. We've moved away from the original tablet form of Boron Proteininate to a much more bioavailable and encapsulated Boron Chelate. But while the formula has improved, the price has remained the same. The new Boron is still \$14.95 for a 90-count bottle.

As Dr. Bill has mentioned, "knowledge of human physiology and nutrition has increased greatly, and so has application of dietary alterations and micro-supplements." As athletes concerned with both performance and health benefits, we continually look to optimize our diet and supplementation with specific nutrients with the intent of improving human physical performance. This is, in my opinion, what defines an ergogenic aid.

We've known about the existence of Boron for a long time. But only fairly recently have some of the health and performance benefits been discovered. As Dr. Bill has written, Boron is a trace element nutrient that has been shown to increase the concentration of plasma steroid hormones. Because of positive results

from recent studies it's been suggested that Boron may have some real ergogenic benefits for athletes. And while excessive amounts won't produce more anabolic hormones, adequate supplemental amounts (up to 10 mg/day) will help replace the amount depleted through the demands of extreme exercise. The result is a normal production of these important hormones for optimal muscular recovery.

Boron is an essential element for humans. Of its many roles in the body that Dr. Bill has detailed, Boron, in addition to affecting the metabolism of steroid hormones, enhances brain function and alertness. As mentioned, Boron is involved in the balance and absorption of calcium, magnesium and phosphorus. This is important in many ways. Studies indicate that Boron has a tremendously beneficial effect on the maintenance of bone health and the prevention of bone loss due to its influence in the balance and absorption of the aforementioned "bone minerals." Boron deficiency may affect calcium and magnesium metabolism, two minerals critical for muscular performance. As we know, calcium is necessary for a normal rhythmic heartbeat and

strong muscle contractions. Magnesium needs to accompany calcium in a 1:2 ratio and works synergistically with calcium for proper muscle function. Without adequate amounts of Boron, the ability of these two minerals to perform their important functions may be compromised.

As mentioned, there is no RDA for boron and a safe and adequate daily intake is estimated between 1 and 10 mg with extreme doses of 100 mg or more being the point at which toxic symptoms may appear. In other words, Boron is very safe. Premium Insurance Caps contain 5 milligrams of boron per two packets. When your training increases, during those times when the workload is heavy, consider augmenting your diet (and your PIC supplement) with a capsule of Boron. We believe it has definite ergogenic potential in addition to tremendous health benefits. ■

Steve Born is a technical advisor for E-CAPS with over a decade of involvement in the health food industry. He is a three-time RAAM finisher, the 1994 Furnace Creek 508 Champion and 1999 runner-up, and is the holder of two Ultra Marathon Cycling records.

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MY 2000 HAWAIIAN IRONMAN by Jeff Cuddeback

energy at each aid station. I also took, at approximately 45 and 85 miles, 4 Enduro Caps, 2 Cardio Caps, and 2 Super AO. In addition to the Sustained Energy for calories, I had a total of two flasks of Hammer Gel. Total calories on the bike: approximately 3800.

On the run, I had 4 flasks of Hammer Gel evenly dispersed from mile 0-20. I had the Hammer Gels every mile only at the aid stations with 2-3 small cups of water. I was very diligent in drinking plenty of water. I had to urinate at mile 13. At 15 miles I also drank 300 calories of Sustained Energy. I also took 4 Enduro Caps, 2 Cardio Caps, and 2 Super AO at approximately 11 and 20 miles. Total calories on the run: approximately 2300.

The bike was the most difficult ride I have ever experienced, either racing or training, due to the incredible cross and side winds on the course that day. Still, I never felt low on calories or like I was running out of energy. My lower back did bother me quite a bit, but this was due (I think) to my saddle nosing

upwards half way through the ride. When I got off the bike my legs felt great and I was running strong. In fact I was feeling so good and running so fast that I was afraid I was going too hard. I did slow down the second half but was never in danger of bonking. I felt great the last mile and terrific running down Alii Drive.

I was thrilled with my performance on a very tough day. I won my age group by nearly 38 minutes, and set a new 40-44 course record. It's been 7 years since I did Hawaii and I had forgotten what a tough race it is. I'm now the only male to hold simultaneous age group records at Hawaii (my 8:49:27 set in 1993 still stands). There are many reasons for my success but there is NO WAY I could have gotten the record or have possibly won without your support. My energy level stayed high throughout the race, and I never felt any bloating or cramping. Like I tell all my athletes, if you use E-CAPS as they are designed, you will have great success with them. In fact, I believe you can't help but go fast with them. ■

Let me give you a synopsis of my nutritional and supplement intake during the Ironman. For breakfast I ate a protein bar, banana, cup of coffee, 2 pieces of toast w/ butter, and 300 calories of sustained energy, plus 36 ounces of water. I figure it was approximately 700-800 calories. I had 100 calories of espresso Hammer Gel 15 minutes before the start and another 8 ounces of water. During the bike, I drank two bottles with 900 calories each of Sustained Energy. I drank one before the turnaround and had the second on the way home. Mixed with the Sustained Energy were a little espresso Hammer Gel for taste, 3 Endurolytes, and 2 ibuprofen tablets. Starting at mile 15, I drank a small bottle of water every 5 miles and would take a sip of the sustained



WIN A FULL MONTHS SUPPLY OF E-CAPS! By: Dan Taylor

Hey everyone, we've just created a partnership with a really neat internet service.

Sign up with them to get your free email and sign up for killer prizes, no strings attached. See the following press release sent to me from the president of the company. I give these guys great marks for a really cool service. Check out their press release for the full scoop!

September 15, 2000 iForia, Inc. announced the launch of www.iDoTriathlons.com. iDoTriathlons.com is the first in a network of triathlon, multisport, and endurance websites, by triathletes and for triathletes, focused on making athletes better, faster, and smarter.

iDoTriathlons.com is a free web based email

system for triathletes worldwide. Triathletes can sign up to get a free web based email account such as scott@iDoTriathlons.com and gain access to get his/her email from any computer in the world which has access to the internet. By using the iDoTriathlons.com system, a user can tell their friends, family, contacts, associates, etc. what they do in their spare time, every time they send an email out.

"Heck, people train hard enough for these events, they might as well brag about what they do," said Scott Levitt, President and Founder of iDoTriathlons.com. In addition, the iDoTriathlons.com system allows for an efficient, effective and convenient way for triathletes to be kept abreast of triathlon related events, articles, offers from vendors, and nutrition & educational information - not to mention, communicate with one another in a

100% safe, secure, and private environment.

In an attempt to stay true to its mission of helping endurance athletes get better, faster, and smarter, iDoTriathlons.com has partnered with "best of breed" companies such as E-CAPS to help bring not only the very best products within a market segment to the athletes, but also those with the very best information and research. "After a great deal of research and speaking with athletes all over the world, we determined that E-CAPS not only had the best products for endurance athletes, but also had the history and reputation to back their claims up. It was a natural fit to partner with them," says Levitt. As a grand opening promotion, by registering at the iDoTriathlons.com website, users can be automatically entered into 1 of 12 contests to WIN A FULL MONTH'S SUPPLY OF E-CAPS PRODUCTS!

In the coming months, iForia will be rolling out more of its network, launching over ten unique websites geared for endurance athletes. ■

2000 ULTRAMAN RACE TESTIMONIAL

Dear Steve: I just returned home the other day from Hawaii after doing the 2000 Ultraman Race and I just can't tell you enough how much I enjoyed using the products you had sent me. Your feeding recommendations were excellent, and your recommendations for the E-CAPS by the hour worked out perfectly for me. I just had the best finish ever.

After a brutal 6.2 mile swim against the current we took off on a 90 mile bike ride out to the volcano, and I think because of the products I was using in the water, I was able to get through the water where many were unable.

Day Two was a 171.4 mile bike ride. I finished in the 11th position and finished the 52.4 mile run in the 11th position as well, for an overall 11th place.

I talked to Rick Kent. He happened to have E-CAPS stickers all over his van, I was very low on product, and Rick was nice enough to give me a bottle of Hammer Gel, and when I tried to pay him he wouldn't take the money. He said it was just taking care of those who were in the family. I've got to tell you you've got a great guy in Rick out there.

I have given your name out to several athletes who wanted to know how we did it out there, and how we were feeling. I did the 3:00 AM feeding every day, which was three hours prior to the race. I used Sustained Energy except for the last day as we were completely out of

product, but other than that, I was on a liquid diet until a balanced meal that night. I've never finished a race or an event on a daily basis like this where my mouth wasn't sore, or I didn't have a canker sores on my tongue.

With your product I was able to sit down at night and eat a meal. In fact on Day Two I ate two plates of pasta chicken, which I'd never been able to do and this was the night before the run. I think the best way to describe my feelings was being able to have the confidence and just stick with the product. I was rather concerned the night before the run, in fact I talked with John Hughes, who told me just to have faith and stick with the product, but I did have the de-fizzed Coke and GU and all these things for backup. I just wasn't sure whether we were going to be able to do it on just Hammer Gel.

We were light on the product at that point. We didn't receive Rick's extra bottle of Hammer Gel until about 10 miles into the run, but I have to tell you we didn't ever touch anything with the simple sugars. I think that is the absolute crucial part to making this work. I know I'm not telling you anything new, but from someone who has been trying Fig Newtons, sandwiches and all kinds of food through many endurance events over the years it is so great to have a product that works as well as yours does and it's so easy for my crew to know exactly what to do.

They fed me the E-CAPS on the half-hour, they mixed the Hammer Gel, they mixed the Sustained Energy and that's all we had to do for product. There wasn't any discussion about what we were eating.

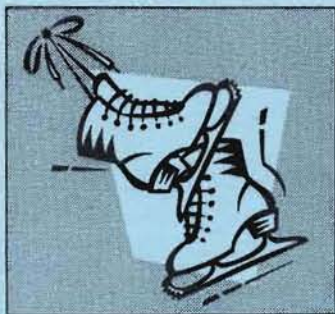
I also need to put an order in at this time, so if you would send me a bottle of the Sustained Energy and the orange Hammer Gel, I would really appreciate it. We should talk about some of the other products you have, so please get a hold of me. I want to continually use your product. I am also forwarding a name on to you and have forwarded your information on to a gentleman in New York who's trying to figure out what to eat.

Steve, thanks for all you've done for me. Have a very Merry Christmas and the happiest of holidays. All my best, Alex Laws

Note from Steve: We are continuing to update and add to our collection of supplement and fueling articles. These are suggested protocols for various sports that we believe will help provide solid suggestions as to which products to consider using, how much, and how often. They are available as Microsoft Word documents that I can email you or can be (or soon will be) found on our website. Currently I have written supplement and fueling suggestions for triathletes, mountain bike racing, and Nordic ski racing with more to come! ■



STAYING HEALTHY DURING THE OFF SEASON by Steve Born



Although I was born in the Midwest (Wisconsin), I had spent most of my life in Southern California, very close to the beach in fact. "The Dead Of Winter" where I lived and trained meant something to the effect of "hmm, I may need a windbreaker today." Staying healthy wasn't quite as much of a challenge as it is now. Why? Because I've lived the past 7-8 years of my life in Idaho and now Montana, where winter takes on a whole new meaning. I'll never forget my first winter in Idaho. It was 15 below zero on Thanksgiving. I thought I was tough enough to train through anything, a little cold weather wasn't going to stop me. Wrong! To make a long story short, I ended up getting sick and was off my feet for a lot longer than I ever dreamed of. While it may be more of a possibility to get sick in areas of the country where it's cold, wet, and snowy, maintaining your immune system and preventing sickness should be a priority no matter where you live.

In my article, "Off Season Supplement Suggestions" (page one) I made the argument for continuing a supplement program that primarily addresses protecting your immune system via antioxidant intake. In addition to that we need to remember the following practical applications to maintaining our health all year round, especially during the winter months. Perhaps some of these suggestions seem obvious but it's that one time that you forget to do one of them that will find you coming down with something.

1. Drink plenty of clean water. I think dehydration is more of a possibility during the dry winter months than during the summer. It's important to remember (though we hear it all the time) that over 3/

4 of our body consists of water. It is the most important nutrient we can put into our body and I believe distilled water is our best choice. We know that our performance suffers when our fluid intake is inadequate, so too does our immunity.

2. Avoid stress and stress-related cortisol. Stress creates excess free radicals, which weaken our immune system. A person's mental state can suppress the immune system, so a positive frame of mind is an important factor in maintaining a healthy, sickness-free body. Excess cortisol from too much daily stress has a negative influence on muscle synthesis, triglyceride levels, blood pressure, and the immune system. It has been suggested that Phosphatidyl Serine and Vitamin C (both in PIC) help decrease excess cortisol levels.

3. Exercise regularly. Even if you don't plan on "training" during the off season, consistent exercise, even occasionally, can yield tremendous anti-stress and immune enhancing benefits. The off season is a good time to do weight training. This type of exercise offers substantial benefits for any sport. In addition, weight-bearing exercise strengthens your heart,



lungs, bones, muscles, organs, and immune system.

4. Eat a healthy diet. Avoiding processed foods, saturated fats, and sugars (kind of a tough thing to do around the holidays) and concentrating on a diet of fresh fruits and vegetables, and other high fiber foods, will help protect your immune system. Science is discovering so many new healthy com-

pounds in foods (there are over 20,000 known flavonoids in plants but only about 4,000 of them have been chemically tested or analyzed!) that it would be beneficial to eat a variety of them. Even though our food supply doesn't contain what it used to, you still have a better chance of obtaining these nutrients by frequently eating a variety of organic fruits and vegetables.



5. Avoid others who are sick. There seems to be so many more opportunities to get sick at the hands of others simply because more people are sick during the fall and winter. Of course it's not necessary to be a hermit during the winter, but keeping your distance from others, a coworker perhaps, who is already sick will help prevent you from the same fate.

6. Wash your hands. It's always a good idea to wash your hands as often as necessary to prevent the spreading of germs. And because this is not always possible, I like to have a small bottle of hand sanitizer (such as Purell) on hand. A quick squirt of that will help keep your hands germ free. By the way, it's a really handy thing to have on hand if you are on a support crew of an ultra endurance athlete.

7. Get plenty of rest. We all know (or should!) that we get stronger NOT by training more, but rather from our adaptations to that training which we get from rest and recovery. Adequate sleep is essential since it is our time to regenerate and rebuild.

8. Avoid antibiotics if at all possible. When absolutely necessary, these medicines can be very effective,

but my personal belief is that they are too often over-prescribed. Unnecessary use of antibiotics severely compromises our immune system. They are nonselective and will destroy all bacteria, even beneficial ones. If however, they are needed, then I suggest a long-term course of DIGEST CAPS to replenish the healthy intestinal bacteria immediately following the completion of a course of antibiotics. The battle for space and food within your intestinal tract is fierce. Regular consumption of DIGEST CAPS is an easy way to keep the balance in favor of the "good guys."

9. Use HAMMER PRO whey protein. Whey contains a much higher level of the amino acid cysteine than any other protein. Cysteine is the precursor for glutathione, perhaps the strongest antioxidant in the body. A study (Bounous G, et al. Clin Invest Med 1989;12:154) has shown that whey improves immunity better than any other protein by rapidly increasing glutathione levels. I'd recommend a serving of HAMMER PRO immediately after any form of exercise and another serving just prior to bedtime. ■

Steve Born is a technical advisor for E-CAPS with over a decade of involvement in the health food industry. He is a three-time RAAM finisher, the 1994 Furnace Creek 508 Champion and 1999 runner-up, and the holder of two Ultra Marathon Cycling records.

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E-CAPS & HAMMER NUTRITION WEBSITES GET MAJOR OVERHAUL

single click! If you've never tried purchasing E-CAPS or Hammer products **online**, now's the time to give it a try.

2. NEW BULLETIN BOARD DELIVERS RED HOT ENDURANCE INFO ALWAYS ON-CALL! The E-CAPS and Hammer Nutrition websites are really becoming fantastic resources for endurance athletes to gain power through knowledge. One of our newest features is the Super Hot Endurance Info link. We are using the Ultimate Bulletin Board for this feature (unfortunately, we are unable to use UBB for the Endurance List discussion group as stated earlier due to limitations with the program). Look for the new "Super HOT Endurance Info" link on the E-CAPS and Hammer Nutrition sites. You'll be taken to the E-CAPS UBB page where we will post the newest and hottest endurance info yet – such as tips on fueling for certain types of events, late breaking usage instruction updates, supplement tips galore and more! This link will get updated frequently, so check back often. Please send us some feedback if you have any comments!

Don't forget to check out our other online resources like "Ask Dr. Bill," a searchable database of over 1000 questions and answers about endurance training and competition! Our technical library is growing too. Both of these features can be found through the "ON-CALL" portion of the E-CAPS website. There you can also find product usage instructions, Journal on Endurance, Frequently Asked Questions, back issues of *Endurance News* and more! Next time you're online, log on to e-caps.com and click on the ON-CALL button.

We have also updated the Endurance List discussion group. Besides new features like weekly training tips and regular endurance supplement comparisons, we have removed all advertisements on the Endurance List. If you haven't joined the Endurance List, just send an email to subscribe@e-caps.com and we'll be happy to sign you on. ■

If you haven't visited the E-CAPS or Hammer Nutrition websites lately, take a few minutes to log on and check out some useful and fun new features including:

1. A BRAND NEW SHOPPING EXPERIENCE. At the forefront of this new feature is a completely new shopping cart and checkout process. We weren't getting the results we wanted for our customers with our previous shopping cart solution (as some of you may experienced with ordering online), so we have had a **completely custom shopping cart program created from the ground up!** Our new cart is faster, more accurate and easier to follow. Aside from providing totally secure shopping, our new sites now provide more useful information than ever before, like athlete feedback on every product (submit your own feedback too), so you can hear what athletes are saying about a product before you try it.

Our new shopping cart is "shared" between the E-CAPS and Hammer Nutrition sites, so **if you are ordering products from both the Hammer Nutrition and E-CAPS sites, the items you choose to buy will all be added to the same shopping cart!** You can navigate the E-CAPS and Hammer Nutrition sites as much as you like and the items you choose from either site will remain in the same cart until you are ready to check out. There is also a "One-Click" order page that has every E-CAPS and Hammer Nutrition product on a single list where you can enter the quantity next to the items you want and order them all with a

Y2K - WHAT A YEAR! (continued from page 1)

ing, 4 months of planning and 5 months of construction, we moved into our new facility on December 29th! Besides providing the much needed room for our continued growth and expansion, this building is tailor made for our unique corporate, warehousing and distribution operation. If you have plans to visit Whitefish, Montana this year, stop by and let me take you on a grand tour.

In 2000 we also launched our brand new websites, complete with secure server e-commerce capabilities. Although the shopping cart was not what we had hoped for, the rest of the websites were exponentially improved from our original versions. But, never being satisfied with mediocrity, we encouraged our web developers to build their own custom shopping cart for us. It will be online by the time you read this and should provide improved functionality as well as being faster and easier to use. You'll find out more about this web stuff in the internet update article.

2000 was purposely a slow year for new product introductions. The three new products introduced were Digest Caps, Omegasource and Race Day Boost. Race Day Boost was extremely successful and helped many of you achieve new PR's, not to mention district, state, national and world championship titles. For 2001, we will be introducing our 8th Hammer Gel flavor – Apple Cinnamon. All I can say is YUM! I think this new flavor might replace Raspberry as our most popular of the bunch. We will also be introducing several new E-CAPS products, the first being "Appestat," a non-stimulant appetite restraint formula. It's perfect for people like me that put on too much weight in the off season and need some help getting rid of it. Look for the complete story on this in your mail box in the next 30 days or less.

Lastly, and just in time, I have elected to hand the reins of this publication over to my able associate, Steve Born. After 7 years of editing and contributing the majority of the content, *Endurance News* needs more attention than I can give it. We will be adding regular columns such as "Ask Dr. Bill," "Training Tips" from one of our growing list of preferred coaches, athlete profiles, product comparisons & evaluations and many more. I will still be contributing to each issue as well. So, if there is a topic that you'd like to see as a regular feature in this publication, please let us know. Most importantly, we will be putting this publication out on a strict quarterly schedule in 2001 and hopefully going to a bimonthly format in 2002 (I know you've heard me say this before, but this time I really mean it and Drill Sergeant Steve will see to it). With Steve's enthusiasm and endless energy and a lot of feedback from you, *Endurance News* can be everything you want it to be.

Again, from all of my staff and myself, we thank you for allowing us to serve your supplement needs.

Cheers! Brian Frank, Co-Founder ■

HAPPY NEW YEAR!

CARBOHYDRATES 101 - THE PERFORMANCE-LIMITING FUEL

Everything you wanted to know about the why's, when's, and what's of carbs, and much more...

By: Dr. Bill Misner, Ph.D.

WHY CARBOHYDRATES AND HOW MUCH, WHEN?

The primary source of muscle energy production is Adenosine Triphosphate (ATP). Each muscle stores its own supply of glycogen, which is a long-chain carbohydrate having a chemical structure similar to the carbs found in a common potato. When we exercise, the body has a remarkably easier time of breaking down muscle glycogen into ATP than either fat or the limited amounts of protein donated from lean muscle mass. In fact, ATP synthesis from muscle glycogen is double (2 times!) that which can be generated from body fat.

THE IMPORTANCE OF PHYSIOLOGICAL MEMORY, TRAINING FOR A FAST FINISH RATE

When doing a workout it is important to realize that your body and brain both remember and record your finish pace rate. When the finish rate slows, the recorded imprint on your inner man is all that is available on race day. Train slow means race slow. When an athlete has depleted carbohydrate stores, the quality of the workout pace is depressed especially at the its conclusion. If an athlete "teaches" his or her body biochemistry to finish strong, that carries over to the next workout, the next, and so on until the race where...you guessed it, a poor or good quality finish training-rate dependant! Training pace each day is closely resolved by adequate muscle glycogen stores. Carryover memory of a strong finish from training for performance in races is sure.

WHERE DOES DIETARY CARBOHYDRATE GO FOR SYSTEMIC ENERGY EXPENSE?

Dietary Carbohydrates are stored, by percent, enzymatically effected, where:

1. Muscle Glycogen [73%] Enzyme-induced stores by glycogen synthase are restored 2-6 hours AFTER exercise.
2. Liver Glycogen [25%] stores are primarily maintain blood sugar levels of glucose for brain cell life. Liver glycogen is rapidly depleted. Stores of glycogen in the liver are considered the main buffer of blood glucose levels. In the liver the action of glucose-6-phosphatase allows glycogenolysis to generate free glucose for maintaining blood glucose levels.
3. Blood Glucose [2%] is enzyme-induced by Hexokinase, which limits body's use of blood sugar directly for exercise metabolism.

SOURCES OF ENERGY FOR ENDURANCE EXERCISE [1, 2]

Energy expense changes during exercise from a number of sources as noted below:

(AT A VO2 MAX=30%-65% EFFORT)			
KEY: FA=Fatty Acids, BG=Blood Glucose, MG=Muscle Glycogen			
Time In Minutes	FA	**BG	MG
0-30'	37%	27%	36%
60'	40%	30%	30%
120'	48%	34%	20%
180'	50%	34%	14%
240'	62%	30%	8%

TYPICAL RATE OF CARBOHYDRATE DEPLETION

Not all activities spend calories at the same rate; an approximate rate of caloric expense follows:

Activity	Per Hour	Cardio	Strength
Running-8 mph	920	5	2
Cycling-fast pace	680	5	3
Swimming-fast pace	680	5	4

WHAT IS THE BEST CARBOHYDRATE FOR REPLENISHING MUSCLE GLYCOGEN?

Glycogen synthesis from carbohydrate intake takes place most rapidly the first 2 hours after exercise, but may occur up to 4-6 hours, but less rapidly from hours 3-6 post. The best glycogen replacement form is complex carbohydrates from GLUCOSE POLYMERS [9], fiber-free glucose molecules hooked together in long chains. Fiber is good for the colon health and braking the rate of carbohydrate absorption, but not for consumption immediately up to 2 hours after exercise.

RATE OF SPECIFIC CARBOHYDRATE ABSORPTION

Intestinal absorption rate has been observed to be most rapid with from glucose polymer [Maltodextrins] than from simple sugar solutions, permitting a higher transit rate of total calories [3]. Body fluids have been observed to cross intestinal linings at a measured osmolality of 280-300 mOsm without delay. In an 8 fluid ounce solution, the following caloric volumes may be generated at body-fluid osmolality levels:

Type Of Carbohydrate	Total Calories	Grams
Glucose	48	12
Fructose	48	12
Sucrose	96	24
Maltodextrins	216-288	54-72

Let us reemphasize after intestinal absorption is completed the above caloric figures DO NOT translate immediately to muscle-energy production but to the calorie volume absorbed across intestinal linings.

Looking further ahead as dietary carbohydrate travels after crossing gastric straits, the blood glucose curve is specifically effected by the carbohydrate selected:

HOW BLOOD GLUCOSE LEVELS RESPOND TO SPECIFIC CARBOHYDRATES OR SUGARS [4]

BLOOD GLUCOSE RESPONSE (AVG. CHANGE ESTIMATED: + or - mg/dl)			
TYPE	30'	60'	90'
Sucrose, Glucose	+35	-10 to -15	-10
Fructose	+5	+1 to +2	-5
Maltodextrins or	+25 or +30	+10 to +15	+1
Other CHO	+25 or +30	+10 to +15	+1

Colgan [5] suggests taking 225 grams glucose polymers for 2-4 hours post-exercise. Much more than that will add consequentially to body fat stores. Other research studies suggest that on average 650 total grams carbohydrate is about all the carb volume that the body can regenerate into

(continued on page 10)

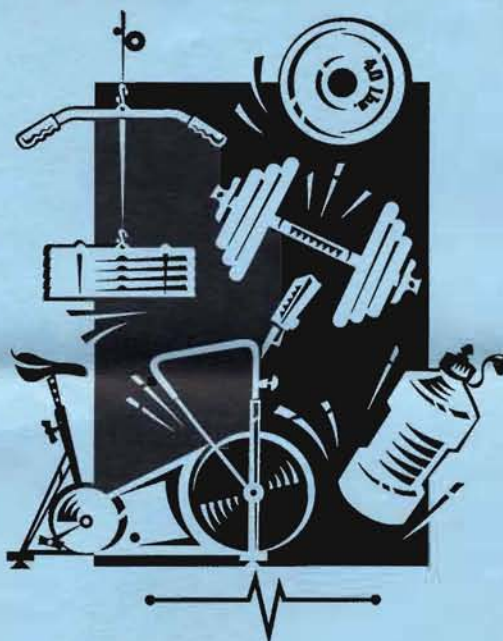
has pathetic amounts of nutrients in it, making supplementation necessary in my opinion. Dr. Misner further writes, "Modern science has concluded that marginal nutritional deficiency and imbalance is directly responsible for 644 diseases or disorders." I believe that for general health purposes, and not just during the competitive season, supplementing with Premium Insurance Caps (along with Phytomax, which I've listed below) makes an awful lot of sense. You may not require the full two-packet dose but the consistent intake of at least one half to one packet (4-7 capsules) a day will help provide the nutrients your body needs that it cannot get in adequate amounts from our food sources.

2. RACE CAPS - There are several types of free radicals. Some are eliminated by a particular antioxidant, some by another. Antioxidants work in synergy with each other and complement each other. Far too often I'll hear someone saying that they take a Vitamin C tablet to fulfill their antioxidant needs. Taking one or two antioxidants cannot offer maximum protection. CoQ10 and Vitamin E in Race Caps work together to help quench free radicals that are caused by fat oxidation that other antioxidants cannot. So even if I do not work out on a particular day I still take one Race Cap for the antioxidant protection they provide. On fairly easy workout days I will take one Race Cap prior to exercise, on medium to long days I will continue to take two Race Caps. If you are still on a regular workout regimen this is a good protocol to follow.

3. ENDURO CAPS - While oxidation definitely has destructive effects, it's obviously quite necessary for life itself. We need oxygen to create our source of energy, ATP, from the food we eat. This conversion process is about 95% efficient (it's known as the tetravalent reduction of oxygen with Cytochrome C oxidase) and requires ample amounts of Cytochrome C. The other 5% of oxygen is converted by what's known as univalent reduction which is less clean and precise and is where many molecules of oxygen become unstable, becoming free radicals. Without adequate antioxidant protection, these free radicals create uncontrolled oxidation. I feel that if 95% efficiency is the best I can hope for, I want to keep it that way. The sheer volume of our daily oxygen consumption can easily exhaust our body's stores of Cytochrome C. So even though I may not be exercising on a given day, I want to make sure that I am utilizing oxygen at the highest possible percentage I can, thereby providing protection against excess free radical production. One or two Enduro Caps on a daily basis can help by providing additional amounts of Cytochrome

C and it's for this reason, even if no training is planned, that I still take at least 1 Enduro Cap each day. If I've planned an easy workout day I will take two Enduro Caps prior to exercise, on medium to long days I will take four Enduro Caps. During the off season this is a good protocol to follow.

4. SUPER AO - To complete the antioxidant needs we have for daily living, I believe there's a definite place for this product. Our bodies are naturally equipped with three very powerful antioxidants, Superoxide Dismutase (SOD), Catalase, and Glutathione. With Super AO we are able to replenish both SOD and glutathione (catalase supplementation is not practical via oral supplementation). Both protect the immune system, but glutathione is noted for its



ability to help protect the liver from cancer. SOD protects the mitochondria of the cells, which are the site of our energy production. Grapeseed Extract not only provides antioxidant protection, but also strengthens and helps repair connective tissue. It is also known as a pretty good antiinflammatory as well. Ginkgo biloba not only acts as an antioxidant but also enhances circulation, increasing the supply of oxygen to the heart, brain, and other body parts. In colder climates I have found this to be extremely helpful for a condition called Raynaud's Phenomenon, which is the constriction of blood vessels in toes and hands, resulting in numbness (note: the CoEnzyme Q10 in Race Caps is also very good for this). Gotu Kola is also used for circulation as well as for decreasing fatigue and depression. I believe one capsule a day is sufficient and paying \$39.95 for a two-month supply for something that provides such tremendous benefits is a bargain in my book.

5. PHYTOMAX - I wish I could say that my diet is excellent all the times. The truth is that it's not always possible, especially in the winter where I live, to obtain substantial amounts of vegetables. I have found this product to be a real benefit for helping provide additional nutrients not found in other foods. These enzymes and phytochemicals in Phytomax, along with the vitamins and minerals in Premium Insurance Caps, help complete the missing links that even the best diet cannot provide. One of the benefits of Phytomax is its ability to help promote optimum alkalinity in the body, which helps create the best environment for the health of the cells. Two things I've definitely noticed from consistent intake is that my energy and mood levels have increased.

6. OMEGASOURCE - If there was ever a group of nutrients that I would classify as being essential all year round, it would be the Omega 3 and 6 fatty acids. Not all fats are alike and as we all know, the consumption of too much fat, whether from saturated fats or from the conversion of simple sugars to fat, has negative health implications. However, these Omega 3 and 6 fatty acids are particular fats that every human being needs, not just for general health purposes, but to sustain life itself. These fats provide the raw materials that are part of the structure of your brain, eyes, adrenal glands and sex organs. Every cell membrane of every cell in your body is comprised mainly of these special fats. They are responsible for rebuilding and producing new cells. Without sufficient supplies of these essential fats, the easy flow of nutrients into the cell is compromised. They are also responsible for enhanced immune system response (in particular the alpha linolenic acids found in OMEGASOURCE). One thing I've noticed in dry, cold winter climates is that these healthy fats are fantastic for protecting the skin. They work like a skin moisturizer from the inside out.

The recommended optimal daily allowance [ODA] for Linoleic Fatty Acids (Omega-6) is 9-18 grams per day, while recommended optimal daily allowance [ODA] for Alpha-Linolenic Fatty Acids (Omega-3) is 2-9 grams per day according to recognized dietary lipids scientist, Udo Erasmus, in his book, "FAT THAT HEALS, FAT THAT KILLS," Alive Books, 1995. OMEGASOURCE does meet that requirement as far as ratio is concerned but you would need to consume 12 capsules daily to meet the minimum standard for quantity if OMEGASOURCE is your sole source of these fats. If your diet includes North Sea fish, flaxseed, raw almond nuts and sunflower/pumpkin seeds, corn, canola oil, safflower oil, or

(continued on page 11)

muscle glycogen stores each day. Ivy [6] also observed the maximum rate of carbohydrate synthesis to occur after ingesting 225 grams of glucose polymers within a 4-hour window post exercise. Above 225 grams the advantages do not appear for the body may begin to store excess carbs in adipose tissue sites. Colgan [5] rates a 600-900 grams dietary carbohydrate replenishment dose for intense athletic workouts, which figures out to be roughly 2.0-3.0 grams carbohydrate per 2 hours workout per pound of body weight. This table shows a limited relationship between body size and total carbohydrate daily [5] intake:

**RECOMMENDATIONS FOR ENDURANCE EVENTS
(CHO INTAKE) PRE, DURING & AFTER EXERCISE**
(total grams complex-carbohydrates required/day)

Per Bodyweight	Hours Training		
	2	4	6
110 lbs.	300	500	700
132 lbs.	400	600	800
154 lbs.	500	700	900
176 lbs.	600	800	1000
198 lbs.	700	900	1100

However, this amount should not be taken all at once. But how much and when? Glycogen synthesis from carbohydrate intake takes place most rapidly the first 2 hours after exercise, but may occur at lesser rates up to 4-6 hours. After looking at carbohydrate expense calculated by duration and activity in the following table, a review the "Eight Practical Applications Suggested Guidelines" is merited below:

**TOTAL DAILY CARBOHYDRATE INTAKE
VS. EXPENSE BASED ON BODY SIZE [7]**

Daily CHO Intake	Type of Performance
10-12 g/kg/day	5-6 hours exercise/event (Tour de France, RAAM, Ultramarathons, ECO Challenge)
7-10 g/kg/day	3-4 hours exercise/event (marathons, shorter triathlons, longer cycling efforts)
5-7 g/kg/day	2 hours or less exercise/events (Half marathons, 10K runs, shorter cycling efforts)
1 g/kg/2 hours	To enhance recovery after exercise (include this total within above general totals) Optimum absorption occurs within 30 minutes post exercise.
1 g/kg/during workouts	during 1-4 hour exercise/events (take 60-70 grams/hour)

**EIGHT PRACTICAL APPLICATIONS SUGGESTED
GUIDELINES FOR MAXIMIZING FUEL
SELECTION DURING PROLONGED EXERCISE**

1. For EACH hour of exercise, consume 1 gram complex carbohydrates for EACH kilogram of bodyweight during exercise. The recommended ceiling for total carbohydrate intake depends on size and activity level, but most endurance athletes need 600 to 900 grams per day post training.

2. The ideal type of carbohydrate is long-chain Complex Carbohydrates.

3. Intermittent carbohydrate small meal loading of 200-225 grams long-chain glucose polymers or complex carbohydrates within 30-120 minutes after workouts, 60-70 grams per hour during workouts, up to 100 grams no sooner than 3 hours prior to a workout.

4. Avoid the use of niacin-rich supplements or foods prior to a workout session due to its inhibition of fat fuel metabolism.

5. Avoid simple sugars that create an increased insulin response prior to or during a workout.

6. Avoid the energy drinks, bars, and gels that contain simple sugars such as sucrose, fructose, or any type of high fructose corn-syrup solids before or during an exercise session.

7. Use energy drink mixes, bars, or gels that contain a long-chain glucose polymer base and lean muscle mass sparing amino acids from soy, whey, or egg white proteins. When such an energy foods provides a total caloric content 5-12% from amino acids, it may spare lean muscle mass loss, if taken before, during, and after a long or intense workout.

8. HAMMER PRODUCTS CARBOHYDRATE DOSE SUGGESTION GUIDELINES FOR MAXIMAL CARBOHYDRATE-TO-MUSCLE-GLYCOGEN STORES.

WHEN TO TAKE WHAT AND HOW MUCH:

PRIOR TO A WORKOUT: 100 grams carbohydrates 4 scoops Sustained Energy or 4 servings Hammer Gel 3 hours before

DURING A WORKOUT: 60-70 grams carbohydrates per hour Solution of up to 3 scoops Sustained Energy or 3 servings Hammer Gel in 16-24 fluid ounces water. A rough estimate figure specifies the max carbohydrate dose athletes may benefit from based on size per hour:

**SUGGESTED MAXIMUM
CARBOHYDRATE [CHO] GRAMS PER HOUR***
HG=HAMMER GEL, SE=SUSTAINED ENERGY

WEIGHT g/HOUR	MAX CHO	[k/cal] [servings]	HG [scoops]	SE
110	48	[192]	2	2.0
121	53	[212]	2	2.17
132	58	[232]	2.3	2.38
143	62	[248]	2.5	2.54
154	67	[268]	2.75	2.75
165	72	[288]	3.0	3.0
176	77	[308]	3.0	3.16
187	82	[328]	3.25	3.36
198	86	[344]	3.50	3.53

*FOOTNOTE-This is a rough estimate; each athlete should exercise trial in training to determine exact biochemistry optimums. [NOTE: We have often suggested that a maximum of 280 carbohydrate calories an hour is the most the liver can return to the energy cycle and this, for the most part is true. The above figures allow for slightly larger doses for the larger athlete. Still, these are not "one size fits all" dosage recommendations,

(continued on page 11)



they are merely guidelines. Personal experimentation, under a variety of conditions, is necessary to determine what works best for each individual.]

***AFTER A WORKOUT:** 225 grams carbohydrates taken over a 2-6 hour period. If Sustained Energy is chosen, 9 scoops in solution may be ingested at the optimal rate of 3 scoops per 16 ounces fluid each 30 minutes. If Hammer Gel is your preference, 9 servings taken at the rate of 3 servings each 30 minutes will assist your body in reloading glycogen stores in less than the optimal 2-hour window of opportunity. The only time an athlete may benefit from simple sugars is post exercise and then it should be confined to no more than a tablespoon amount to quick start the insulin pump carrier for assisting glycogen restoring.

Does this seem like a lot of carbohydrates? It is because too many athletes wait too long after their workouts failing to use the enzymatic glycogen synthase enzyme synthesis mechanism for replacing glycogen stores. Current thinking is attractive to mix 4 parts carbohydrate to 1 part protein to maximize post-exercise recovery rate. That translates to roughly 4 parts Sustained Energy or Hammer Gel to 1 part Hammer Pro.

HOW DIETARY PROTOCOLS EFFECT GLYCOGEN STORES IN TRAINED SUBJECTS

Noakes suggests approximately 600 ml. fluid per hour [20 fl.oz.] with up to 120 grams from a glucose polymer energy drink will adequately convert 50% of a complex carbohydrate drink [60 grams of a glucose polymer solution] into the energy cycle of oxidized exogenous CHO [foods] processed from the liver to working muscles. There are of course different dietary interventions known and shown to dramatically effect muscle and liver glycogen [carbohydrate] stores [8]:

Subjects	Type & Time Of Diet	In Muscle [g/kg]	In Liver [g/kg]
Trained	Low Carbohydrate Diet	14	30
Trained	High Carbohydrate Diet	21	70
Trained	24-Hour Fast	21	10
Trained	Glycogen Stripping [3 day low Carbohydrates during training]	7	10
Trained	3 day high Carbohydrate Loading	36	90
Trained	After 3-4 hours Intense 70-85% VO2 Max Rate	4+	23
Trained	24 hours post-race [high CHO]	15	90
Trained	48 hours post-race [high CHO]	27	90
Trained	7 days post-race [high CHO]	30	90

Short lived is the "fate" of high carbohydrate intake stores proportionate to exercise intensity and duration. But eating a high percentage of carbohydrate-rich foods [CHO] is a must-do in order to maintain a constant energy flow from the most efficient combustible fuels for a furnace designed to fight off fatigue, feebleness, and failure. Just eat lots of carbs right, is that all there is? Yes and no, certain balances to consider for intake of food, liquid, and electrolytes. These hidden factors exist for each race participant to calculate must for how their body responds to extreme endurance demands.

There you have it, more than you ever wanted to know about CARBOHYDRATES, the performance-limiting fuel, use it or lose it [the race]. ■

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OFF SEASON SUPPLEMENT SUGGESTIONS

(continued from page 9)

even hemp oil, the recommendation of 3-6 capsules per day is accurate. In many discussions with Dr. Misner, he's often told me those Essential Fatty Acids, especially Omega-3's, are the most neglected dietary item in the many dietary analyses he's performed over the past 4 years. So following a diet that includes a variety of the above-listed foods, while minimizing animal fats, simple sugars, and processed foods is highly recommended. Supplementing with OMEGASOURCE will easily and accurately make up for any deficits.

In his book, "OPTIMUM SPORTS NUTRITION," Advanced Research Press, 1993, Dr. Michael Colgan suggests that we should, while we have the opportunity, make our athletic goals a major focus of our lives. In doing so, he urges that we understand that excellence is not possible by doing things halfway or by moderation. Excellence in athletics is a year round proposition and even though the off season is a time for cutting back on heavy training, I believe it still requires a full time commitment to your athletic goals. A year round supplement program is vital for making positive increases in both fitness and health. ■

Steve Born is a technical advisor for E-CAPS with over a decade of involvement in the health food industry. He is a three-time RAAM finisher, the 1994 Furnace Creek 508 Champion and 1999 runner-up, and is the holder of two Ultra Marathon Cycling records.

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AVOID SIMPLE SUGARS (continued from page 2)

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IN THIS ISSUE:

- OFF SEASON SUPPLEMENT SUGGESTIONS Pg 1
- Y2K - WHAT A YEAR! Pg 1
- SHIPPING SAGA Pg 2
- AVOID SIMPLE SUGARS Pg 2
- BORON & ENHANCED PERFORMANCE Pg 3
- VOLER CLOTHING UPDATE Pg 3
- INCREDIBLE E-MAIL OFFERS! Pg 3
- NEW AND IMPROVED BORON Pg 4
- MY 2000 HAWAIIAN IRONMAN, Jeff Cuddeback Pg 4
- WIN A FULL MONTHS SUPPLY OF E-CAPS! Pg 5
- 2000 ULTRAMAN RACE TESTIMONIAL, Alex Laws Pg 5
- STAYING HEALTHY DURING THE OFF SEASON Pg 6
- WEBSITES GET MAJOR OVERHAUL Pg 7
- CARBOHYDRATES 101 Pg 8

ENDURANCE NEWS MISSION STATEMENT

The objective of *Endurance News* is to provide you, the serious endurance athlete, with a valuable resource that you will find to be informative, educational, thought provoking and helpful in your ongoing pursuit of optimum performance and health.

Endurance News features insightful articles on diet, nutrition, training and other topics of interest to endurance athletes - Written by myself as well as professional and elite amateur athletes, and other experts in the area of nutrition and exercise. In addition, EN will include articles highlighting new and existing E-CAPS products and how to get the maximum benefits from them.

In reading this and future issues, please remember that the views expressed in this publication will always be biased in favor of a healthy diet, hard training that emphasizes quality over quantity, and prudent supplementation to improve health and performance. But above all, we at *Endurance News* believe there are no shortcuts, and success can only come from hard work.

Brian Frank
Editor

Legal disclaimer: The contents of *Endurance News* are not intended to provide medical advice to individuals. For medical advice, please consult a licensed health care specialist. ■