

ENDURANCE NEWS



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Contents



Artificial Sweeteners

- Page 2

Lessons I Learned From A Legend

- Page 3

Ask Dr. Bill

- Page 5

Fueling : Proper Replacement

- Page 6

Nate's Corner

- Page 7

Catalogs Galore

- Page 7

Endurance News Goes Electronic

- Page 7

Sugar And Cancer

- Page 8

Fructose Is No Answer For A Sweetener

- Page 10

Hammer Gel Now In Germany!

- Page 11

Athlete Spotlight : Kenneth Phillbrick

- Page 12

From The Saddle Of Steve Born

- Page 14

15 Simple Way To Improve Athletic Performance

- Page 15

Artificial Colors : What's The Big Deal?

- Page 16

Fuel Replacement Variation

- Page 17

Hyponatremia : Are You At Risk?

- Page 18

Race Report

- Page 19

Welcome

Welcome to the 47th issue of Endurance News!

Whether you are reading your first issue of EN or your 47th, I hope you will find the information in this issue as riveting as I do. This is the first "theme" issue we have ever done. All of the articles pertain to what I believe to be the three most important and misunderstood nutritional issues today. Our global addiction to sugar and excessive consumption of artificial ingredients are two of those topics. The third issue is the debate of replace what you lose versus replace what you can assimilate when it comes to fueling during exercise.

The sugar and artificial ingredients topics

should be somewhere on your radar screen already. It's not like these are new issues or we are the only ones advocating the minimization of their intake to protect your health and allow your body to perform at it's potential. If you have not yet accepted this reality and are already making every effort possible to keep these toxins out of your mouth, I urge you in the strongest way possible to continue reading and educating yourself. There is an endless amount of resources available on the net, but you must seek them out.

That leaves us with the discussion, or debate as it were, about how to go about

(see WELCOME on page 6)

Carbohydrates : How much is needed for maximal endurance performance?

Bill Misner, Ph.D.

Muscle glycogen, carbohydrates consumed during exercise, body fat, and a small fraction of lean muscle amino acids are converted to glucose to energize endurance exercise. The carbohydrate moiety is the performance-limiting source after 70-90 minutes exercise, and then the body graduates to metabolizing fatty acids as its primary energy fuel. It is my opinion that either too many calories or too much fluid (or both) cause 90% of the gastrointestinal problems athletes experience during endurance events.

Consuming too little carbohydrate fails to support ideal performance duration. However, consuming too much carbohydrate significantly increases risk of gastric shut down generating symptoms incompatible with optimal pace. Because there is a wide variation in individual carbohydrate absorption and oxidation rate, athletes should train with the specific

"What Works" calorie per-hour ratio that is proven compatible with their longest efforts prior to a race. The amount of carbohydrate consumed should be slightly higher than what can be oxidized in distal working muscles during exercise:

Reports from athletes since 1996 show that as calorie intake exceeds 300 calories per hour and/or liquid intake exceeds 30 fluid ounces per hour, gastric stress inhibits performance proportionate to dose. "The most remarkable conclusion is probably that exogenous CHO oxidation rates do not exceed 1.0 to 1.1 grams/minute, 240-264 calories per hour." A little appears to be good for the majority of athletes, but consuming more may produce more problems in the gut. My question is why consume more carbohydrates than can be oxidized by working muscles?

(see CARBS on page 4)

Artificial Sweeteners

Authored by Annie Hope Malka & reprinted with permission of Delicious Organics at www.deliciousorganics.com

Seems the whole world is on artificial sweeteners and we can't exist without saccharine or NutraSweet or Splenda. Poisons. And isn't it ironic that most people who are using these sugar-free substitutes are overweight and don't lose weight. It's not a coincidence. Are artificial sweeteners helping us fight the battle of the bulge?

Some people grab a diet soda each day out of habit. Some do it because they actually think an artificial sweetener is healthier than sugar. It is not. There are no studies which prove that they even help lose weight and because of how they stimulate appetite the very opposite is likely true. A recent study found that people who drank diet soda have a greater likelihood of being obese and overweight, even over people who drink regular soda! Why is that? Diet soda actually triggers our craving for sugar! Diet soda stimulates our appetite. And diet soda even triggers our body to STORE more fat! People who drink diet soda actually end up wanting more sweets and therefore eat more calories in a day and then the body holds on to the fat instead of releasing it.

In addition, diet soda lulls one into a false sense of security that it's okay to eat something else. How many people have you seen drink a diet coke with a dessert loaded with sugar, fat and empty white flour!

Remember that a gram of sugar only contains 4 measly calories (a teaspoon is about 15; a tablespoon is 45). And actually, the sweetness tends to stimulate appetite (especially for more sweets) which causes further weight gain so this is a horrible ugly vicious cycle and we are willing to accept poison and an inferior taste to satisfy our need for the sweet stuff. Silly. Sad. If you're going to indulge, on occasion, make it the real thing.

If you're diabetic, then you have reasons to seek alternate sources here but choose your alternate sweetener wisely.

Aspartame a/k/a NutraSweet a/k/a Equal breaks down to phenylalanine and aspartic acid in our hot bodies when heated. The methanol in Aspartame converts into formaldehyde in our bodies. Formaldehyde is a poison known to damage the immune and nervous system as

well as cause genetic damage. Aspartame breaks down the protective coating surrounding neurons in our brain; this causes a break in the blood-brain barrier which allows toxins to move directly into the bloodstream. Aspartame should never be given to children. People with PKU should never use it either. Almost half of aspartame itself is a toxin, technically an excitotoxin, Aspartate. About 10% of the population has a tendency to MS but never actually have the symptoms, and these people can be pushed into full blown MS with continual usage of products with Aspartame. "Recent studies have also shown that even a single exposure.." can have long-term effects. ("Sweet Misery") Since it is in thousands of products, it's easy to consume a lot of this and over a longer period of time, this constant ingestion will lead to holes in your brain, illness and death. CHEC on Aspartame. Consuming products with Aspartame may lead to:

birth defects, brain cancer, brain damage, chronic fatigue, diabetes, dizziness, emotional disorders, Epilepsy, Graves Disease, headaches, inferior short-term memory, Lou Gehrig's Disease, lowered intelligence, lowered sperm count, migraines, MS - Multiple Sclerosis, Parkinson's Disease symptoms, seizures

Sugar Twin or Cyclamates is another artificial sweetener. This chemical has been banned in the U.S. since 1970 based upon the possible link with cancer.

When Saccharin was found to cause cancer in 1977, the U.S. made an exception, as long as Saccharin affixed a warning, and it was not banned because there were no alternative sweeteners for diabetics at the time. Saccharin or Sweet 'n Low has been around the longest of any artificial sweetener and has had the most studies on it's possible effects. It is much sweeter than sugar. Low on the glycemic index, but saccharin may lead to: cancer

Splenda or Sucralose have the least amount of studies surrounding this chemical (under 100!) and what little research has been done shows that it may lead to: Diarrhea, Shrunken Thymus Glands, Enlarged Liver, Enlarged Kidneys, Atrophy of Lymph follicles in the Spleen and Thymus, Increased cecal weight, Reduced growth rate, Decreased red blood

cell count, Hyperplasia of the pelvis, Extension of the pregnancy period , Aborted pregnancy, Decreased fetal body weights, Lower placenta weights, other dangers because it has small amounts of toxins: pesticides, metals, even lead

While no sweetener is not without it's controversy, artificial sweeteners can be quite damaging to our health and may cause serious illness. It's best to avoid them completely. I'd probably go with small amounts of Stevia or Xylitol over any artificial sweetener.

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Our Mission

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 for 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, Endurance News 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 short cuts, and success can only come from hard work.

Back issues of Endurance News are available online at:
www.e-caps.com

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.

The FDA has evaluated none of the statements in this newsletter.

Lessons I Learned From A Legend : Dick Tomlin

Tony Schiller

OK, admit it, it's happened to you too. A complete stranger greets you with a hardy handshake, a big smile and using your first name says, "How've you been...?" and you don't have a clue as to who they are? So you say, "Great. How 'bout yourself?" while flashing one of those unnatural smiles in hopes of fooling them. Most of the time the other person graciously lets you off the hook and you slide away kidding yourself into believing they never noticed.

Dick didn't let me off the hook. Instead, he looked straight into my eyes and said, "You don't remember meeting me, do you?" To which I responded, "Sure, it was at... um, um... give me a second, it'll come to me... um... y'know, um..." He paused just long enough until I was clearly squirming before turning to my wife, and with a big boyish laugh saying, "Hi, I'm Dick Tomlin, you must be with what's his name?"

Sue instantly liked the guy. Then when she gladly accepted one of the local micro-brews he'd just picked up, he instantly liked her.

Until Dick and his traveling mate from Arizona, Jonathan Grinder, joined us, we were the only Americans staying at the Tinakori Lodge in Wellington, New Zealand. We made fast friends while putting away the 12 pack before walking the half block to the corner pub to get started on a second.

It took Dick all of two minutes to begin making friends with the bar patrons who, unimpressed their town was hosting the world triathlon championships in 4 days, seemed very impressed their American bar mates were enjoying libation before the race. By the time I made my way to breakfast the next morning, Dick was already back from his ride and carrying on conversation in some form of broken Scandinavian with several guests.

By the eve of the race, our foursome was resolute about one thing... not carbo-loading on food cooked in a Kiwi restaurant... so we loaded up on groceries to make our own pasta feed. The only problem was that the Tinakori curators, Richard and Julene, strictly forbade guests to enter their kitchen. That is until Dick turned on the charm and gained full reign of the professional kitchen. Within no time he had a nervous Richard and Julene showing us they actually had a fun side over a plate of pasta and a few glasses of red. It wasn't until the evening's end that I learned Dick had won the 45-49 world

duathlon title the previous weekend in Hobarth, Australia. For three days he'd just said, "It went well."

That's when I realized he really had it together. I admired his humility (something I never quite learned from him) and special ability to be 100% focused without getting uptight about a race, not even a world championship held on the other side of the planet. He was a master at taking care of the goal at hand while also satisfying a curiosity to learn all about the local culture and a desire to make new friends. So it was hardly a surprise to see him the next morning loosening



Dick Tomlin, left, and Tony Schiller were all smiles after both earned medals at the 2002 World Triathlon Championship in Cancun, Mexico. With his win, Tony joined Dick as yet another Hammer Nutrition customer to be honored as the USAT Master's Triathlete of the Year.

up the international competitors in his age group just moments before they jumped off the pier into the 53 degree Tasman Sea for the race's start.

Before doing that, he flashed a big smile and a thumbs-up toward Jon and then to me as we lined up for our 35-39 age group wave which was next to start. Watching him race off I felt an amazing level of calm and confidence and knew a big part of it was just hanging out with the guy over those 4 days. He modeled the perfect blend of focused purpose and relaxed energy a competitor wants for a big-time race.

The day unfolded perfectly for me as I took my first age group world title with a great race while Jon represented Team USA well, just missing out on a medal. Dick was less fortunate. A dropped chain on a steep descent knocked him out of contention but hardly dimmed his spirit... "Dang - and I was having such a great race too - wasn't that course a blast though!" In classic Dick style, he never let his own disappointment ruin his enthusiasm, and he was the first to toast me for my big day. It was a pattern I grew to

expect over the years to come; so too was the best part of going to dozens of races with Dick - the post race celebration. No one raced as hard and no one had as much fun afterwards. He truly embraced life.

What stands out to me the most about Dick Tomlin is the one characteristic all too rare in most of us... caring enough to actually stay connected from long distance. How many times in life do we meet and click with someone only to have the connection fade into a memory? Not with Dick. A few weeks after we returned to snowy Minnesota, Sue and I were on his Christmas card list. In those days, before each of us had E-mail, he saw to it that we connected at least once a month. Over the years it seemed he knew just when to check in with a joke, an inspiring story or just to say, "How are 'ya?" And always it was he who was among the first - or only - to call in recognition of a good race or to offer a quick pick-up when he figured it mustn't have gone well. Amazingly, he did this for me and many others while running a successful appraisal business, being a great husband to Bonnie, and raising three wonderful kids, Cassie, Nate and Zack.

By now you know Dick Tomlin is no longer with us. He was struck and killed on June 4th by the driver of an RV near his home in Kingman, AZ. The only good that can be drawn from this senseless tragedy is that he went doing something he loved - riding his bike. He was only 58.

When I entered the overflowing church at his funeral and saw how much this man had poured himself into his community and how many hundreds of lives he'd touched, I felt humbled for having been among those he chose to share so much of his time and energy with. He was a great athlete and an even greater friend.

Though I won't get to room with my good buddy "Ricardo" at this October's world championships in Hawaii, I'll honor his legacy by racing in his indelible spirit. As I wrap up this tribute to him, I hope that, even if this is the first you've heard of Dick Tomlin, you'll benefit from his life example. The best way you can do that is to show up at your next race with the excitement of a child opening a present and by seeing with new eyes just how rich our lives are that we discovered and get to play in this game we love called, *Endurance Racing*.

We will remember you Dick.

(CARBS from page 1)

This is a general view of where what fuel energy source enables efficient endurance exercise: (see table 2).

Estimated percent contributions from fat, plasma glucose, and other carbohydrates (CHO) to total aerobic energy expenditure during exercise to fatigue at $68 \pm 2\%$ O₂ peak until fatigue. Subjects ingested 1 liter/hour of an 8% glucose solution throughout the trial.

Calorie Sources During Energy During Exercise

Furthermore, whole body muscle glycogen oxidation (total CHO oxidation minus plasma glucose oxidation) was not reduced by CHO ingestion. Figure 6 below describes the shifts in substrate utilization as a result of glucose ingestion. It should be noted that glucose feedings,

markedly reduced fat oxidation and increased plasma glucose oxidation but did not alter the rate of muscle glycogen (and lactate) oxidation.

Figure 6. The energetic contribution of substrates. Values are means \pm S.E.M. The energetic contribution of substrates during the 60-120 min period of exercise at 50 % VO₂max with water ingestion (fasting), a low dose of glucose (Lo-Glucose) or a high dose of glucose (Hi-Glucose). 9 Several studies¹⁰ show that oral carbohydrate oxidation is limited to about 1 g min⁻¹. Even when large amounts of carbohydrate were ingested oxidation rates did not exceed 1 g min⁻¹. There are slight differences based on exercise types : running versus cycling and water with no carbohydrates versus carbohydrate solutions.

Water Versus Carbohydrate Effect On Fuel Metabolism During Running Or Cycling (see table 4)

Relative contributions of fat, plasma glucose, and whole body muscle glycogen oxidation to total energy expenditure during running and cycling when subjects ingested W and CHO. All values are means of n = 7. Fat oxidation: W significantly different from CHO during cycling, *P < 0.05; running significantly different from cycling with CHO, **P < 0.01. Plasma glucose oxidation: W significantly different from CHO during running and cycling, #P < 0.01.

Conclusion

Athletes who experienced performance-inhibiting gastric stress reported one or

(see CARBS on page 5)

TABLE 1

CARBOHYDRATES CONVERTED TO ENERGY		
CARBOHYDRATE ¹	AMOUNT/HOUR	OXIDIZED/HOUR
Low Glucose Intake ²	0.70 g/min	0.64 g/min
High Glucose Intake ³	0.96 g/min	0.88 g/min
Carbohydrate 10% ⁴	0.83 g/min	0.77 g/min
Glucose, Sucrose, Maltose, Maltodextrin ⁵	1.0-1.5 g/min	1.0-1.1 g/min
Glucose ⁶	1.2 g/min	1.04 g/min
Glucose ⁷	1.7 g/min	0.92-1.12 g/min

TABLE 2

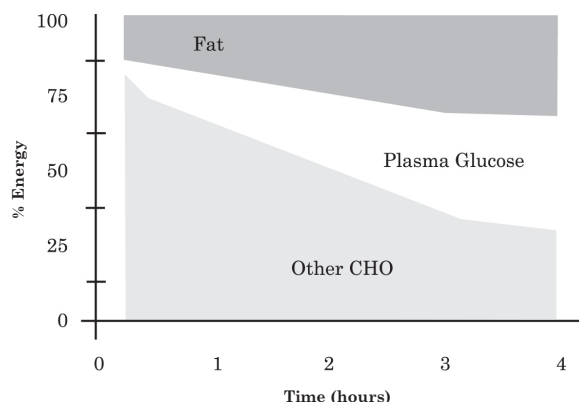


TABLE 3

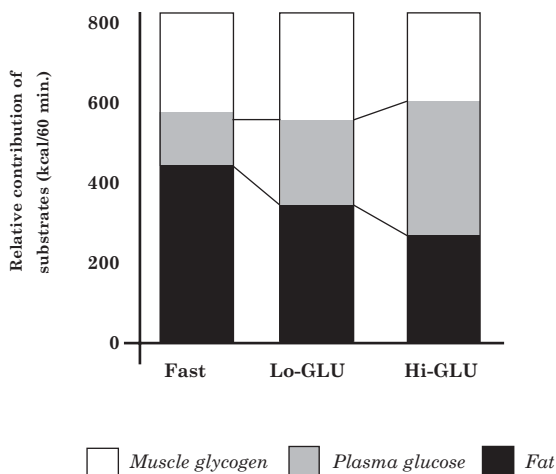
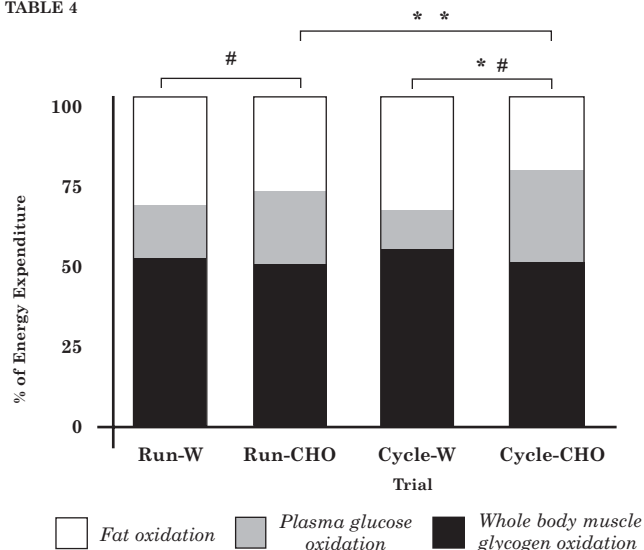


TABLE 4



(CARBS from page 4)

more of the following characteristics:

1. Consumed over 300 calories/hour
2. Consumed simple sugar solutions
3. Consumed over 30 fluid ounces/hour
4. Were unacclimatized with 2-3 weeks heat stress training exposure

Starting dose recommendations for Hammer Gel, Sustained Energy, Perpetuem, or HEED are 240-280 calories mixed in or taken with 24-28 fluid ounces distilled water with 3-6 Endurolytes each hour of endurance exercise. Training with fuel-of-choice will help your body to adapt to the nutrient profile of that fuel more effectually than not training with the fuel-choice intervention. During training, as this adaptive process becomes routine, athletes may test higher doses of energy fuels to determine the maximal caloric compatible volume their body will absorb and replenish exercise-depleted substrates. Most athletes will tolerate between 1.0-1.2 grams long-chain carbohydrate fuels (namely no less than 240 calories to no more than 288 calories) in divided doses each hour of exercise. There are exceptions to every rule and larger athletes or athletes with gifted gastric absorption rate may be able to consume greater amounts of fuel, fluids, and electrolytes without gastric upset or performance-inhibiting negative symptoms. High sugar solutions proportionate to simple sugar content tend to raise osmolar pressure gradients significantly. Once above 6% solution, an increasing risk of gastric shut down, later-stage repeated diarrhea, hyponatremia, muscle cramping, malaise, and premature fatigue may occur. Do not hesitate to experiment within the above suggested ranges as to what dose beneficially supports your pace best, resulting in maximal endurance exercise performance. Beware of certain self-proclaimed "experts" promoting an unsupported "Burn-it-replace-it" doctrine. Replacing carbohydrates from a 2-3 hour exercise bout may take 3 days; it won't happen during a 2-3 hour workout. Because only few can consume large calorie volumes does not mean that the majority can without severe gastrointestinal problems, especially when the heat index increases.

References available upon request.



Ask Dr. Bill

Bill Misner, Ph.D.

QUESTION : The label on Recoverite says it contains 3000mg (3 grams) of Glutamine per serving. Your website says to take 1-3 servings post exercise (3-9grams). Does the amount of Glutamine you need have any relation to bodyweight? Do you take more if you are overtrained or have had recent infections?

I've seen articles where some people use 10 grams after exercise. Another article recommended 5 grams right after exercise and 5 more grams an hour later. I've also seen where it should be taken by weight (30mg per 2.2 pounds of body weight). For me that would be less than 2 grams.

ANSWER : Glutamine accounts for approximately 60% of the body's total intramuscular pool of free amino acids and 20% of the body's total circulating amino acids. The average human diet provides 3,500 - 7,000mg glutamine per day. A dosage of 2,000 mg of supplemental glutamine per day increases plasma glutamine levels by 19% in people who undertake intensive exercise, thereby restoring glutamine levels to normal ranges. The therapeutic dosage of supplemental glutamine for the treatment of depression is 250-1,000 mg per day. Orally administered glutamine effectively increases serum glutamine levels (when a dose of 5 grams of glutamine is ingested, serum glutamine levels increase by approximately 50% within 30 minutes). A dosage of 5,000-10,000 mg of supplemental glutamine per day prevents the suppression of the immune system in people who participate in endurance exercise. Some studies have demonstrated that a dosage of 2,000 mg of supplemental glutamine per day increases human growth hormone (hGH) levels by up to 400%.

Endurance exercise causes severe depletion of the body's glutamine reserves (a single bout of endurance exercise can

cause a 50% reduction in plasma glutamine for up to 6 days compared to pre-exercise plasma glutamine levels). Cells of the immune system are less able to mount a defense against infections after such exercise. Plasma glutamine is decreased in athletes following endurance exercise, which is partly responsible for immunosuppression that occurs in endurance athletes. A group of 151 elite runners and rowers were given two drinks containing either glutamine or placebo immediately after, and two hours post-exercise, and then asked to complete questionnaires regarding the incidence of infection during the seven days post-exercise. The percentage of participants infection-free during the seven days was significantly higher in the glutamine group (81%) than in the placebo group (49%).

I suggest from 2g to 6g may be the lowest effective dose, while more may produce better results. Be sure not to take glutamine right before exercise, as there is about a 3-hour period in which excess nitrogen waste metabolites appear, before the ammonia-scavenging property of glutamine "cleans house" restoring balance.

It has been observed safe even at levels of as high as 40,000-70,000 grams a day.

Reference

Castell, L. M., et al. Does glutamine have a role in reducing infections in athletes? *Eur J Appl Physiol.* 73(5):488-90, 1996.

Calling all athletes....

Our graphic department is always looking for good photos of our athletes to use in advertisements, brochures, catalogs, and other printed materials. If you have any photos of yourself that you'd be willing to share, email them to graphic@e-caps.com or send them snail mail to the address on the back of this newsletter (attn. graphic department). Photos will be returned. Please be sure to include your name, the name and location of where the photo was taken, and to whom photographer credit should be given. One thing we ask is that you not send in any copyrighted photos. *Thanks so much!*

Fueling : Replace What You Can Assimilate, Not What You Lose

Bill Misner, Ph.D.

This is a suggested comparison showing “approximated” upper values for what is lost during prolonged endurance exercise to what can be successfully absorbed, replaced, routed into the energy cycle for the bulk of the fit, acclimatized endurance athletes. This material was extracted from the following literature:

1-Noakes T.D. Lore of Running. Leisure Press. Champaign Illinois. Pages 768-770 29 published and unpublished papers cited on fuels, fluids, electrolyte issues during endurance exercise. (This is cited due to the length that 29 references would take in this reply.)

2-Moodley D. et al., Exogenous carbohydrate oxidation during prolonged exercise. The effect of carbohydrate type and solution concentration. Unpublished manuscript in #1 above.

3-Sweat Composition in Exercise and Heat. Verde T, Shephard RJ, Corey P, Moore R, 1982 J Appl Phys 53(6) 1541-1542.

4-Sweating: Its composition and effects on body fluids. Costill DL, 1977 & 1982., Annals of the New York Academy of Sciences, 301, p.162.

5-American Dietetics Association Position Statement

6-American College of Sports Medicine Position Statement

The approximate values are estimated for fit acclimatized subjects: (see table 1).

Both fluid volume and sodium are controlled to a degree by pathways between the human brain and internal organs precisely monitored and moderated by kidney and hormone signals initiated from the brain causing re-circulation when levels are detected low. This accounts for variation and range differences between individual athletes. Calorie oxidation rate and gastric absorption rate typically allow for no more than 300 calories per hour to be consumed by an athlete with successful energy transfer with positive quality and quantity gastric absorption results. Adding over this amount typically induces indigested calories in the gut, which contribute to no calories crossing intestinal linings without osmolar solute assistance from the gastrointestinal tract or oral dose correction.

The human body has so many survival safeguards by which it regulates living one more minute, that when we try too hard to fulfill all its needs we interfere doing more harm than good. If I replace 100% fuels lost at 700-900 calories per hour, I bloat, vomit, present diarrhea, and finish the event walking or DNF at an aid station. If I replace all the fluids lost all at once, I end up in the emergency tent with an IV for dilutional hyponatremia. If I replace all the sodium my body loses at the rate of 2 g/hour, I end up with swollen

hands, eyes, ankles, feet, and noticeably labored exercise, or hypernatremia-induced bonking.

Based on position papers from ADA and ACSM, sweat composition studies by Shephard, Noakes, Costill, et al., the following replacement values we have observed for the majority of fit acclimatized endurance athletes (+/-5%): (see table 2).

We have been publishing this for a number of years. For many athletes cramping, vomiting, gastric distress, diarrhea, and systemic malaise result when the attempt to replace all the fluids, fuels, and electrolyte (especially sodium) at the rate they were lost. Some who listen to our plea to use less, when they correct intakes to lower absorption property levels, their specific problem ends and performance improves dramatically. However, there are people who can complete events on high intake of fluid, fuel, and electrolyte, but unfortunately the majority cannot or they would do better with less.

It is curious to me that 1 elite athlete whose huge intake of this or that fuel, fluid, or electrolyte should publish or recommend that dose for millions others whose basal state metabolism cannot possibly absorb and return to the energy cycle at an unproven rate. There are few exceptions to these reported reference ranges.

TABLE 1

SUBSTANCE	RATE LOSS	P.O. (Gastric Emptying Rate)
Fluids	(1-3 liters)	17-28 fluid oz.
Sodium	2000 mg/hr	500-700 mg/hr
Fuel (Carb Cal)	700-900 Cal/hr	240-280 Cal/hr

TABLE 2

UNIT	REPLACED %
FUEL	30-40%
FLUID	20-33%
SODIUM	20-35%

(WELCOME from page 1)

fueling for endurance. Most of the experts that write for the various endurance magazines, and most of the other companies selling endurance fuels, focus on how much you are losing and suggest that you should come as close as you can to replacing all that you lose. This is complete rubbish and there is no science whatsoever to support it!

While it may be of passing interest to

know that we can lose 2 liters of fluids, 2 + grams of sodium and burn 700=900 calories per hour, this knowledge is absolutely useless in trying to devise a fueling strategy for your multi hour event. It only serves to confuse and distract you from the real goal which is to replace as much as your body can effectively assimilate without slowing you down or causing unwanted side effects. This issue contains a number of articles that elaborate on this

point, as does our Endurance Athlete’s guide to success and several more articles in the knowledge section of our web site. Follow the “replace what you can assimilate” theory for fueling success and avoid a lot of unnecessary pain and suffering.

Enjoy the rest of the issue, enjoy life,



Nate's Corner : Life's Lessons Learned

We learn lessons all the time as we walk through life. Some of the lessons are quick and easy, and get filed away for future reference. For example, once you touch a red-hot stove top, you're not likely to do it ever again. Other lessons, ones that seem more profound or have the ability to impact the way we live, seem to be the ones we embrace tightly at the time but then the lessons fade over time.

I wonder if the line of demarcation is that lessons learned that directly affect us versus affecting others allow certain lessons to stick better. If I touch the hot stove I will be burning MY hand. Who's going to keep touching the hot stove? But if you see someone else burn his hand on that hot stove, at first you might think, "I'm never doing THAT!" But, over time, maybe curiosity gets the better of you and you touch it. After all, the impact of the initial lesson was not direct - you didn't feel the pain of your friend touching the hot stove.

Life's got a lot of valuable lessons to teach us. About everything. I urge you to not wait until you experience them firsthand in order to derive value from them. Trust that training too hard, too often and without a structured plan leads to overtraining and diminished performance. Trust that you need to tell those close to you that you love them every time you see them. Trust that planning for the future is great and necessary, but live for today and not tomorrow. Trust that not getting enough sleep adverse-

ly affects your performance in both training and racing. And the list goes on and on and on. . .

If you're doing something today that you know is less than advantageous to your wellness, then don't wait for the negative effects to hit you before you plot a new course. Make the change now. "Well, I'm smoking but I don't have terminal cancer yet. . ." OK, that might be a little extreme for this audience, but it illustrates my point.

I thought I pretty much had it all figured out up until about 2 weeks ago. It took that tragedy to force me to realize I really don't have too much figured out. I'm not going to let that "little lesson" slide by the wayside.

Make the most of every day. Prioritize what's really, REALLY important to you and give your time and attention to the top priorities first. Smile. Laugh. Have fun.

Steve's Note: Nate wrote this shortly after the tragic death of his close friend Scott Kornfield. Though this is a bit out of context in regards to this issue's "theme" it is nevertheless appropriate; the message is timeless, actually, and well worth reading and holding on to. After the sudden death of my friend and fellow Race Across America competitor Bob Breedlove in this year's RAAM, I thought even more appropriate to include these heartfelt words of Nate's in this issue.

Catalogs Galore : Sharing Is Caring

Some of you who tend to order often (thanks, we love you) have commented about the over abundance of catalogs that you are accumulating as a result. Some have suggested that we send them only one catalog per year so as not to waste resources. If this were possible, we'd be glad to offer it to those of you who are totally organized and keep a file of our catalogs and literature.

However, our technological limitations do not allow us to selectively drop clients from certain mailings, like catalogs following orders, and not others. We certainly are not suggesting that you reduce your order frequency, like I said, we love that. What we are suggesting is that you couple these extra catalogs with a referral brochure and hand them out to your training buddies, slower competition, friends and even family members. This way the catalogs get "recycled", it will help you to earn more free product and turn more athletes onto our healthy products! That's a win-win-win deal. Ah, it's a beautiful thing.

Endurance News Goes Electronic : Inbox Or Mailbox, It's Your Choice

It only took us 12 years, but I am pleased to announce that we are now offering Endurance News as an HTML e-mail newsletter. Co-produced by our talented graphic artist Angela Nock and web wizard Mandy Hallos, you can be sure that your electronic version will be just as readable as our printed version.

If you are wondering why you should sign up to receive Endurance News electronically, let me give you a couple of compelling reasons. The first is consistency. You may have noticed that even though we publish quarterly, sometimes you get one and sometimes you don't. This is because the size of our client base has become so large that we can only mail to those of you who have ordered within the past four months. We used to go back an entire year, but due to ever escalating printing and postage costs and the aforementioned size of our mailing list, we've had to cut back.

Of course we wouldn't mind if you made a point of ordering every 120 days or so, but we don't expect you to just so you can receive every issue of Endurance News, especially with an increasing number of you buying our Hammer products from your local retailer. So, you can be sure to get all the news in every issue by subscribing to the e-version. If you prefer to read on paper instead of the computer screen, each issue will have a "printer friendly" button that will allow you to print out your copy to read and pass along to friends.

The second reason is our desire to conserve natural resources in all that we do. 15,000 issues at 12 to 16 pages each means a lot of paper, and that means a lot of trees. If even 50% of you sign up to receive EN electronically, we'll be able to save a lot of trees.

Of course, we save money when we send an issue electronically instead of mailing a

paper copy to you, but really, this is not our primary motivation. All savings will go right back into improving the publication and circulation. We can reach clients who are more than four months out from their last order, increase the content of each issue, and possibly increase from four to six issues per year.

Lastly, let me assure you that by subscribing to Endurance News in HTML e-mail form, you are not agreeing to let us spam you daily with junk mail or sell your address to a third party. We take your in-box very seriously and we'll put Endurance News in it only if you subscribe. Go to www.e-caps.com today and enter your email address into the field on the left. You'll be signed up for Endurance News online.

As you can see, there are several good reasons to subscribe, and I can't think of any not to. Do it today; you'll be glad you did.

Sugar and Cancer

Dr. Joseph Mercola

It puzzles me why the simple concept "sugar feeds cancer" can be so dramatically overlooked as part of a comprehensive cancer treatment plan. Of the 4 million cancer patients being treated in America today, hardly any are offered any scientifically guided nutrition therapy beyond being told to "just eat good foods." Most patients I work with arrive with a complete lack of nutritional advice. I believe many cancer patients would have a major improvement in their outcome if they controlled the supply of cancer's preferred fuel, glucose.

By slowing the cancer's growth, patients allow their immune systems and medical debulking therapies -- chemotherapy, radiation and surgery to reduce the bulk of the tumor mass -- to catch up to the disease. Controlling one's blood-glucose levels through diet, supplements, exercise, meditation and prescription drugs when necessary can be one of the most crucial components to a cancer recovery program.

The sound bite -- sugar feeds cancer -- is simple. The explanation is a little more complex. The 1931 Nobel laureate in medicine, German Otto Warburg, Ph.D., first discovered that cancer cells have a fundamentally different energy metabolism compared to healthy cells. The crux of his Nobel thesis was that malignant tumors frequently exhibit an increase in anaerobic glycolysis -- a process whereby glucose is used as a fuel by cancer cells with lactic acid as an anaerobic byproduct -- compared to normal tissues. The large amount of lactic acid produced by this fermentation of glucose from cancer cells is then transported to the liver. This conversion of glucose to lactate generates a lower, more acidic pH in cancerous tissues as well as overall physical fatigue from lactic acid buildup. Thus, larger tumors tend to exhibit a more acidic pH. This inefficient pathway for energy metabolism yields only 2 moles of adenosine triphosphate (ATP) energy per mole of glucose, compared to 38 moles of ATP in the complete aerobic oxidation of glucose. By extracting only about 5 percent (2 vs. 38 moles of ATP) of the available energy in the food supply and the body's calorie stores, the cancer is "wasting" energy, and the patient becomes tired and undernourished. This vicious cycle increases body wasting. It is one reason why 40 percent of cancer

patients die from malnutrition, or cachexia. Hence, cancer therapies should encompass regulating blood-glucose levels via diet, supplements, non-oral solutions for cachectic patients who lose their appetite, medication, exercise, gradual weight loss and stress reduction. Professional guidance and patient self-discipline are crucial at this point in the cancer process. The quest is not to eliminate sugars or carbohydrates from the diet but rather to control blood glucose within a narrow range to help starve the cancer and bolster immune function.

The glycemic index is a measure of how a given food affects blood-glucose levels, with each food assigned a numbered rating. The lower the rating, the slower the digestion and absorption process, which provides a healthier, more gradual infusion of sugars into the bloodstream. Conversely, a high rating means blood-glucose levels are increased quickly, which stimulates the pancreas to secrete insulin to drop blood-sugar levels. This rapid fluctuation of blood-sugar levels is unhealthy because of the stress it places on the body.

Sugar in the Body and Diet

Sugar is a generic term used to identify simple carbohydrates, which includes monosaccharides such as FRUCTOSE, GLUCOSE & GALACTOSE; and disaccharides such as maltose and sucrose (white table sugar). Think of these sugars as different-shaped bricks in a wall. When fructose is the primary monosaccharide brick in the wall, the glycemic index registers as healthier, since this simple sugar is slowly absorbed in the gut, then converted to glucose in the liver. This makes for "time-release foods," which offer a more gradual rise and fall in blood-glucose levels.

If glucose is the primary monosaccharide brick in the wall, the glycemic index will be higher and less healthy for the individual. As the brick wall is torn apart in digestion, the glucose is pumped across the intestinal wall directly into the bloodstream, rapidly raising blood-glucose levels. In other words, there is a "window of efficacy" for glucose in the blood: levels too low make one feel lethargic and can create clinical hypoglycemia; levels too high start creating the rippling effect of

diabetic health problems.

The 1997 American Diabetes Association blood-glucose standards consider 126 mg glucose/dL blood or greater to be diabetic; 111 to 125 mg/dL is impaired glucose tolerance and less than 110 mg/dL is considered normal. Meanwhile, the Paleolithic diet of our ancestors, which consisted of lean meats, vegetables and small amounts of whole grains, nuts, seeds and fruits, is estimated to have generated blood glucose levels between 60 and 90 mg/dL. Obviously, today's high-sugar diets are having unhealthy effects as far as blood-sugar is concerned. Excess blood glucose may initiate yeast overgrowth, blood vessel deterioration, heart disease and other health conditions. Understanding and using the glycemic index is an important aspect of diet modification for cancer patients. However, there is also evidence that sugars may feed cancer more efficiently than starches (comprised of long chains of simple sugars), making the index slightly misleading. A study of rats fed diets with equal calories from sugars and starches, for example, found the animals on the high-sugar diet developed more cases of breast cancer.

The glycemic index is a useful tool in guiding the cancer patient toward a healthier diet, but it is not infallible. By using the glycemic index alone, one could be led to thinking a cup of white sugar is healthier than a baked potato. This is because the glycemic index rating of a sugary food may be lower than that of a starchy food. To be safe, I recommend less fruit, more vegetables, and little to no refined sugars in the diet of cancer patients.

What the Literature Says

A mouse model of human breast cancer demonstrated that tumors are sensitive to blood-glucose levels. Sixty-eight mice were injected with an aggressive strain of breast cancer, then fed diets to induce either high blood-sugar (hyperglycemia), normoglycemia or low blood-sugar (hypoglycemia). There was a dose-dependent response in which the lower the blood glucose, the greater the survival rate. After 70 days, 8 of 24 hyperglycemic mice survived compared to 16 of 24 normoglycemic and 19 of 20 hypoglycemic.

This suggests that regulating sugar intake is key to slowing breast tumor growth.

In a human study, 10 healthy people were assessed for fasting blood-glucose levels and the phagocytic index of neutrophils, which measures immune-cell ability to envelop and destroy invaders such as cancer. Eating 100g carbohydrates from glucose, sucrose, honey and orange juice all significantly decreased the capacity of neutrophils to engulf bacteria. Starch did not have this effect. A four-year study at the National Institute of Public Health and Environmental Protection in the Netherlands compared 111 biliary tract cancer patients with 480 controls. Cancer risk associated with the intake of sugars, independent of other energy sources, more than doubled for the cancer patients. Furthermore, an epidemiological study in 21 modern countries that keep track of morbidity and mortality (Europe, North America, Japan and others) revealed that sugar intake is a strong risk factor that contributes to higher breast cancer rates, particularly in older women. Limiting sugar consumption may not be the only line of defense. In fact, an interesting botanical extract from the avocado plant (*Persea americana*) is showing promise as a new cancer adjunct.

When a purified avocado extract called mannoheptulose was added to a number of tumor cell lines tested in vitro by researchers in the Department of Biochemistry at Oxford University in Britain, they found it inhibited tumor cell glucose uptake by 25 to 75 percent, and it inhibited the enzyme glucokinase responsible for glycolysis. It also inhibited the growth rate of the cultured tumor cell lines. The same researchers gave lab animals a 1.7 mg/g body weight dose of mannoheptulose for five days; it reduced tumors by 65 to 79 percent. Based on these studies, there is good reason to believe that avocado extract could help cancer patients by limiting glucose to the tumor cells. Since cancer cells derive most of their energy from anaerobic glycolysis, Joseph Gold, M.D., director of the Syracuse (N.Y.) Cancer Research Institute and former U.S. Air Force research physician, surmised that a chemical called hydrazine sulfate, used in rocket fuel, could inhibit the excessive gluconeogenesis (making sugar from amino acids) that

occurs in cachectic cancer patients.

Gold's work demonstrated hydrazine sulfate's ability to slow and reverse cachexia in advanced cancer patients. A placebo-controlled trial followed 101 cancer patients taking either 6 mg hydrazine sulfate three times/day or placebo. After one month, 83 percent of hydrazine sulfate patients increased their weight, compared to 53 percent on placebo. A similar study by the same principal researchers, partly funded by the National Cancer Institute in Bethesda, Md., followed 65 patients. Those who took hydrazine sulfate and were in good physical condition before the study began lived an average of 17 weeks longer. The medical establishment may be missing the connection between sugar and its role in tumorigenesis. Consider the million-dollar positive emission tomography device, or PET scan, regarded as one of the ultimate cancer-detection tools. PET scans use radioactively labeled glucose to detect sugar-hungry tumor cells. PET scans are used to plot the progress of cancer patients and to assess whether present protocols are effective.

In Europe, the "sugar feeds cancer" concept is so well accepted that oncologists, or cancer doctors, use the Systemic Cancer Multistep Therapy (SCMT) protocol. Conceived by Manfred von Ardenne in Germany in 1965, SCMT entails injecting patients with glucose to increase blood-glucose concentrations. This lowers pH values in cancer tissues via lactic acid formation. In turn, this intensifies the thermal sensitivity of the malignant tumors and also induces rapid growth of the cancer. Patients are then given whole-body hyperthermia (42 C core temperature) to further stress the cancer cells, followed by chemotherapy or radiation. SCMT was tested on 103 patients with metastasized cancer or recurrent primary tumors in a clinical phase-I study at the Von Ardenne Institute of Applied Medical Research in Dresden, Germany. Five-year survival rates in SCMT-treated patients increased by 25 to 50 percent, and the complete rate of tumor regression increased by 30 to 50 percent. The protocol induces rapid growth of the cancer, then treats the tumor with toxic therapies for a dramatic improvement in outcome.

The irrefutable role of glucose in the

growth and metastasis of cancer cells can enhance many therapies. Some of these include diets designed with the glycemic index in mind to regulate increases in blood glucose, hence selectively starving the cancer cells; low-glucose TPN solutions; avocado extract to inhibit glucose uptake in cancer cells; hydrazine sulfate to inhibit gluconeogenesis in cancer cells; and SCMT.

A female patient in her 50s, with lung cancer, came to our clinic, having been given a death sentence by her Florida oncologist. She was cooperative and understood the connection between nutrition and cancer. She changed her diet considerably, leaving out 90 percent of the sugar she used to eat. She found that wheat bread and oat cereal now had their own wild sweetness, even without added sugar. With appropriately restrained medical therapy -- including high-dose radiation targeted to tumor sites and fractionated chemotherapy, a technique that distributes the normal one large weekly chemo dose into a 60-hour infusion lasting days -- a good attitude and an optimal nutrition program which included Sam's formula nine times/day, she beat her terminal lung cancer. I saw her last month, five years later and still disease-free, probably looking better than the doctor who told her there was no hope.

Dr. Mercola's Comment:

Nearly all of us are addicted to sugar. There is not one single food item that is generally more damaging to health. The problem is that most of us are addicted to it. The Hellers in their book, *Carbohydrate Addicts*, discuss the evidence supporting this link. I do not agree with their one hour reward meal, but otherwise the book helps one understand the depth of this problem.

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Fructose (corn syrup) : No Answer For A Sweetener

Nancy Appleton, Ph.D.

The consumption of fructose (corn syrup) has risen considerably in the general population within recent years. In 1980 the average person ate 39 pounds of fructose and 84 pounds of sucrose. In 1994 the average person ate 66 pounds of sucrose and 83 pounds of fructose. This 149 pounds is approximately 19% of the average person's diet.

This increase is due to several factors. There was a decreased use of cane and beet sugar (sucrose) in processed foods and a widespread use of corn syrup due to economics. Corn is much cheaper and twice as sweet as table sugar. It is absorbed only 40% as quickly as glucose and causes only a modest rise in blood sugar.

A few years ago the medical community revealed that there was good news for diabetics. Many people had previously known that table sugar (sucrose) was not a healthy food for diabetics because it raised their blood sugar levels above normal.

Since diabetics have a hard time maintaining healthy blood sugar levels, doctors counseled diabetics not to eat sugar. The new revelation was that diabetics could eat fructose because fructose did not raise their blood sugar level extremely high. So far so good, but there is more.

Many doctors were recommending fructose instead of glucose. Today fructose is not only being used by some diabetics but it is used for a variety of foods, drinks and confectionery around the world. It is used for candies for diabetics, desserts for weight watchers, drinks for the sportsman and jelly for the health conscious.

The medical community recommended it because of a low increase in glucose in the blood. The scientists did not look at other factors in the body when a person eats sugar. Let's look at some of these factors now.

1. Fructose has no enzymes, vitamins, and minerals and robs the body of its micronutrient treasures in order to assimilate itself for physiological use.

Fructose browns food more readily (Maillard reaction) than with glucose. This may seem like a good idea, but it is not.

The Maillard reaction, a browning reaction, happens with any sugar. With fructose it happens seven times faster with than glucose, results in a decrease in protein quality and a toxicity of protein in the body.

This is due to the loss of amino acid residues and decreased protein digestibility. Maillard products can inhibit the uptake and metabolism of free amino acids and other nutrients such as zinc and some advanced Maillard products have mutagenic and/or carcinogenic properties. The Maillard reactions between proteins and fructose, glucose, and other sugars may play a role in aging and in some clinical complications of diabetes.

2. Research showed that in subjects that had healthy glucose tolerance and those that had unhealthy glucose tolerance, fructose caused a general increase in both the total serum cholesterol and in the low density lipoproteins (LDL) in most of the subjects. This puts a person at risk for heart disease.

3. Another study showed that the very low-density lipoproteins (VLDL) increased without an apparent change in high-density lipoproteins (HDL). The VLDL and the LDL should be as low as possible and the HDL should be as high as possible.

4. There is a significant increase in the concentration of uric acid that is dependent on the amount of fructose digested. After glucose no significant change occurs. An increase in uric acid can be an indicator of heart disease.

5. Fructose ingestion in humans results in increases in blood lactic acid, especially in patients with preexisting acidotic conditions such as diabetes, postoperative stress, or uremia. The significance to human health is that extreme elevations cause metabolic acidosis and can result in death.

6. Fructose is absorbed primarily in the jejunum and metabolized in the liver. Fructose is converted to fatty acids by the liver at a greater rate than is glucose. When consumed in excess of dietary glucose, the liver cannot convert all of the excess of fructose in the system and it

may be malabsorbed. What escapes conversion and being absorbed into the cells may be thrown out in the urine. Diarrhea can be a consequence.

7. Fructose interacts with oral contraceptives and elevates insulin levels in women on "the pill."

8. Fructose reduced the affinity of insulin for its receptor. This is the first step for glucose to enter a cell and be metabolized. As a result, the body needs to pump out more insulin, to handle the same amount of glucose.

9. Fructose consistently produced higher kidney calcium concentrations than did glucose in a study with rats. Fructose generally induced greater urinary concentrations of phosphorus and magnesium and lowered urinary pH compared with glucose.

The balance of minerals in the body is very important for the function of vitamins, enzymes and other body function. When the minerals are out of the right relationship, the body chemistry suffers. The presence of diarrhea might be the cause of decreased absorption of minerals.

10. Fructose-fed subjects lose minerals. They had higher fecal excretions of iron and magnesium than did subjects fed sucrose. Apparent iron, magnesium, calcium, and zinc balances tended to be more negative during the fructose feeding period as compared to balances during the sucrose feeding period.

11. A study of 25 patients with functional bowel disease showed that pronounced gastrointestinal distress may be provoked by malabsorption of small amounts of fructose.

12. Many times fructose and sorbitol are substituted for glucose in parenteral nutrition (interavenous feeding, IV). This can have severe consequences with people with hereditary fructose intolerance, a congenital disorder affecting one in 21,000. A European doctor declared: "Fructose and sorbitol containing infusion fluids have no further place in our hospital pharmacies."

13. There is significant evidence that high sucrose diets may alter intracellular

metabolism, which in turn facilitates accelerated aging through oxidative damage. Scientists found that the rats given fructose had more undesirable cross-linking changes in the collagen of their skin than in the other groups.

These changes are also thought to be markers for aging. The scientists say that it is the fructose molecule in the sucrose, not the glucose, which plays the larger problem.

14. Fructose is not metabolized the same as other sugars. Instead of being converted to glucose which the body uses, it is removed by the liver.

Because it is metabolized by the liver, fructose does not cause the pancreas to release insulin the way it normally does. Fructose converts to fat more than any other sugar. This may be one of the reasons Americans continue to get fatter.

15. Fructose raises serum triglycerides significantly. As a left-handed sugar, fructose digestion is very low. For complete internal conversion of fructose into glucose and acetates, it must rob ATP energy stores from the liver.

16. Fructose inhibits copper metabolism. A deficiency in copper leads to bone fragility, anemia, defects of the connective tissue, arteries, and bone, infertility, heart arrhythmias, high cholesterol levels, heart attacks, and an inability to control blood sugar levels.

It seems that the magnitude of the deleterious effects varies depending on such factors as age, sex, baseline glucose, insulin, and triglyceride concentrations, the presence of insulin resistance, and the amount of dietary fructose consumed.

Some people are more sensitive to fructose. They include hypertensive, hyperinsulinemic, hypertriglyceridemic, non-insulin dependent diabetic people, people with functional bowel disease and postmenopausal women.

There is a continuing increase in sugar consumption in the United States. We now eat 153 pounds of sugar per person per year.

This increase is mostly in the form of fruc-

tose. From the research presented, it seems that this increase is going to have a negative influence on our health.

Nancy Appleton, Ph.D. is a clinical nutritionist, researcher, lecturer, and author of *Lick the Sugar Habit*, *Healthy Bones*, *Heal Yourself With Natural Foods* and the *Curse Of Louis Pasteur* and her new book *Lick the Sugar Habit Sugar Counter*. For more information on sugars, see: www.NancyAppleton.com

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Hammer Gel In Germany : And 8 Other Countries

Since this newsletter is only mailed to US residents, it may seem odd to be telling you about product offerings in other countries, but we thought you'd like to know what we are up to.

July 1, 2005 marked the launch of Hammer Gel into the German market. We have partnered with Dr. Reinhard Volker, president of Medi-concepts and the former German Compex distributor, to handle the marketing, sales and distribution in his home market. Initially just pouches and jugs will be offered in the four most popular flavors – Raspberry, Apple-Cinnamon, Vanilla and Espresso. As sales volumes increase the other flavors will be added. Initially, the product will be sold consumer direct through the web site and then begin selling in the retail outlets throughout the country. We plan to add modified versions of HEED, Perpetuem and Recoverite in 2006.

Now clients in Germany, Switzerland and Austria can order from www.hammergel.de and have Hammer Gel delivered right to their doorstep. So, if you know athletes in these countries or any of the others listed below, please forward this info along to them.

The new German web site marks the 3rd independent hammer web site now up and running. Besides the new German site, we also have www.hammergel.com.au serving Australia and www.hammergel.co.nz serving New Zealand. Our Canada site will be up in a few days at www.hammernutrition.ca to serve that growing market. The following countries do not have dedicated web sites, but do have distribution: Puerto Rico (sort of another country, sort of not), Costa Rica, Israel, Society Islands (Tahiti), Malaysia and Singapore.

We'll keep you posted as we advance into more and more foreign countries

COMING SOON!

We are *really* close to offering SINGLE-SERVING PACKETS of Perpetuem, Sustained Energy, Recoverite and HEED. Just a few more tweaks here and there and then they're ready. More details soon...



Kenneth Phillbrick
2005 RAO Champion

Endurance News talked with ultra cyclist Kenneth Phillbrick just after his victory in 2005 Race Across Oregon, where he set a new course record.

Steve: Kenneth, congratulations on your win at this year's Race Across Oregon (RAO), where you finished over three hours ahead of second place and set a new course record of 35:23:23. When you entered the race, did you have any idea that you would do so well?

Kenneth: I had no idea how well I would do at Race Across Oregon. A number of riders, whom I greatly respect, had told me they thought I could do well, but to me just finishing was going to be an enormous accomplishment. I thought if I did snag a win it would be close. I had envisioned a sprint finish on Timberline and definitely not winning by over three hours.

I had trained and planned to race last year, but after a nearly a year of planning and training an 11th hour knee injury sidelined me. At the time I was very depressed, but I picked up the pieces, changed my training, and arrived at RAO this year with a burning desire to just smack the hammer down. Going into RAO, the plan was to race perfect. This included everything from training, recovery, fueling, equipment, and building the perfect crew.

I really can't thank my crew, and especially my crew chief and training partner, Ben Larson enough. They executed the race plan flawlessly keeping my off the bike time, including stop signs and lights, to 25 minutes.

S: What changes did you make in your training between 2004 and 2005?

K: In 2004 I'd really enjoyed attending the three-day RAO race camp. Going into 2005, I decided to up the number of camps I attended. At the end of March I attended a week-long PAC Tour camp and then followed it up with both RAO race camps. The great thing with cycling camps is they make it very fun and easy to engage in intense training and up the mileage significantly.

To attempt to increase the quality of my winter/indoor training this past year, I incorporated CompuTrainer training and Power Crank training into my regular roller repertoire. To improve recovery, and avoid the knee issues I'd faced before, I



Kenneth Phillbrick on his way to setting a new course record at the 2005 Race Across Oregon.

incorporated yoga, regular massage twice a month, and I used a COMPEX unit to further boost recovery. I found the COMPEX unit to be particularly beneficial at the PAC Tour Desert Camp, where day-to-day recovery was critical - I was averaging 100 intense miles per day for eight days.

S: When did you realize that you were on course record pace?

K: At Time Station 1, I learned that my pace was right on track with previous records and then promptly forgot about the whole record thing as I settled into my own race. After Prineville, Time Station 4,

my crew told me that I was still on pace. After Prineville, I completely forgot about it again, and just focused on my single goal of getting to the finish ASAP. In the end, I didn't actually realize that I'd just snagged the record, by 1 min 40 seconds, till a few days after the race.

Before, RAO, I'd talked with just about everyone I could think of from the ultra community, trying to get any advice I could go into RAO. All the advice basically boiled down to one thing: Ride your own race. To that end, over the length of the race, I rode the whole course pacing off a Polar heart rate monitor. I only paid slight attention to my actual speed and time splits. It's all very athlete-specific, but in my case, I never wanted to see a heart rate over 150 BPM.

S: Describe what the weather was like throughout the race this year.

K: The morning of the start was fairly typical for the Northwest: cool, overcast, etc, but not raining like in 2004. Then, once on the eastern side of the Cascades, the weather changed dramatically, it was sunny, and hot for Oregon, mid 80's, with little to no wind. Saturday night the

temperature fell quite significantly, dropping down to the mid 30's, and a weather system rolled in bring with it intermittent rain, lightning, and a fairly constant headwind. The closer I got to Mt. Hood on Sunday, the stronger the head wind grew, at one point climbing out of the Warm Springs Indian Reservation between the head wind and the climb the best I could do at max power was a whole 5 mph - the slowest I ever went on the whole course. Climbing Hood, it began to rain intermittently and by the time I reached Timberline Lodge at the finish line it had begun to snow.

S: You were one of only seven solo riders (of 19) to complete the course. What do you think caused so many DNF's this year?

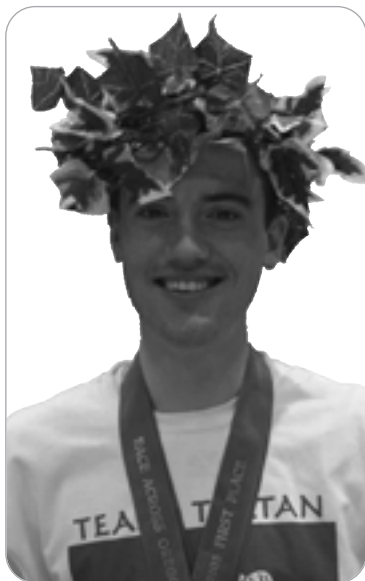
K: The number of DNF's really surprised me too. The final 90 miles of the race were just brutal. Bruce Carroll, fellow solo competitor who has raced the course the last three years, thought this year, by far, had the most challenging weather conditions he had seen. Rain was a factor at night but more decisive were the relentless head and cross winds. Given more favorable conditions, I'm sure the number of DNF's wouldn't have been quite so high.

In general DNF's come down to one of three things: mental willpower, preparation and fitness, and lack of proper nutrition and supplementation. The extreme hot/cold temperature variation made tools like Endurolytes quite critical. At one of the camps, I learned a real trick with the Endurolytes, if you get behind on your supplementation, chew one up. It's quite gross, but it really works fast. I strongly believe to avoid stomach difficulties it's critical to train to fuel, just as one trains to ride.

S: If I remember correctly, you've been using a variety of E-CAPS products in your training and during RAO. What did your supplement program for RAO look like?

K: All winter long I incorporated the same fuels and supplements I planned on using at RAO. For recovery, I've been using Hammer Whey religiously. While training down at PAC Tour Desert Camp I experimented with Recoverite. Leading up to RAO, to maximize the benefit of my training and get every possible edge, I pre-loaded with Race Day Boost for the four days prior to the event. Then at RAO in the morning I started with my morning supplement pack (3 fish oil, 1 packet Premium Insurance Caps, 1 baby aspirin, 3 Race Caps Supreme, 3 Mito-R, 4 Anti-Fatigue, 4 Tissue Rejuvenator). Before the race I'd made up

packets for each hour using the Hammer pill zip lock bags. For even hours I took 1 Race Cap Supreme, 1 Mito-R, 1 Anti-Fatigue, and 1 Tissue Rejuvenator. On odd hours I took everything in the even pill bag and added 1 one Super AO pill. In addition to the nutritional supplementation, I supplemented with Endurolytes, running 3 - 6 an hour, varying with the heat.



Wearing the champions crown.

S: How about your fueling?

K: During the race, I ran almost exclusively on liquid, running ~400 calories an hour. For fuel, I used: P e r p e t u e m , Sustained Energy, Hammer Gel, and some other non-Hammer nutrition shakes. The only caffeine I took for

the entire race was the little caffeine I ingested around 6AM on Sunday via my espresso Hammer Gel. Sustained Energy was a real savior for me. During a few parts of the course I found it very difficult to continue to eat any fat. The no-fat profile in Sustained wasn't something we had planned on using, but it became a critical component in my race nutrition.

S: What were the high points for you during the race? What sections of the race route were your favorites?

K: I really felt quite good over most of the race; an especially high point for me was racing down HWY 97 from Terrebonne to Madras. My crew had just left, to stop for gas and crew related duties, and I had just learned I was a little over an hour up. I had some back pain, and it mysteriously all vanished, even with a fairly strong 90 degree side wind I cooked along at round 30 mph before turning into to the wind and descending down into the Indian reservation. I learned after the race, that on this section, I caused my crew a slight scare, as they thought they had lost me as I was much, much farther down the road

then they had expected me to be.

S: Any low points?

K: Yes, about 40 miles out from the finish, I came down with a respiratory infection. Climbing up Hood, breathing became harder and harder. I got quite severe pains in my side. Through all this, I kept thinking both about how good I would feel at the top, and the ultra cycling motto, don't stop for something that will clear up in a week or two. The respiratory infection was more than just painful. It was very, very frustrating. My legs felt relatively good, but without air, I couldn't quite deliver the power I wanted to the pedals.

S: What advice would you give someone interested in doing an ultra distance event, such as RAO, for the first time?

K: If at all possible pre-ride the course! Race Across Oregon holds three and four day camps one month out from the actual race. In 2004 I rode the three-day, then in 2005 I rode both camps. The importance of previewing the course isn't as much about logging miles which can be done anywhere, but rather about becoming intimately familiar with the climbs, turns etc. If you know where you are on a given climb they don't feel nearly as long and if you know the route you can anticipate every turn and never lose time getting off track.

S: So what's next for you race-wise? Any thoughts of RAAM in 2006?

K: On the 9th of July, in less than a month, my crew chief from RAO, Ben Larson and I are going to be racing the two-person format at the Fireweed 400 in Alaska. The plan for 2006 is to race as a two-person relay at RAAM. Ultra distance racing is evolutionary - races build on each other. Racing the two-person format in 2006 will help me build towards my ultimate goal of racing solo RAAM in 2007 or 2008.



Steve Born : Senior Technical Advisor

Welcome to the mid-summer edition of Endurance News!

I'm writing this column "between events," as I've just returned from the start of this year's Race Across America in San Diego and I've already packed my bags for the Pacific Crest Triathlon/Weekend Sports Festival in Sunriver, Oregon. It's been a busy year for us at Hammer Nutrition events-wise, as well as for me personally, with more traveling than in previous years. It's been great going to all these events and there are still more to come. My upcoming schedule includes:

Muncie Endurathon -

July 15-17 - Muncie, Indiana

Spirit of Racine Triathlon -

July 22-24 - Racine, Wisconsin

USAT National Age Group Championships -

August 12-13 - Kansas City, Missouri

Sometimes the travel gets to me, but the enjoyment of athlete interaction, especially with our clients, always overshadows the frequent unpleasantness of the "flying experience." If you're entered in any of the above events, please come by the Hammer Nutrition booth and say hi.

Less Is More

"The human body has so many survival safeguards by which it regulates living one more minute, that when we try too hard to fulfill all its needs we interfere doing more harm than good."

- Dr. Bill Misner - 4/25/05

Dr. Bill always comes up with these great quotes and this one is my new "mantra" for impressing upon athletes the necessity of replenishing fuel (fluids, calories, and electrolytes) in amounts that support and enhance normal body functions. I based much of my article, "15 Simple Ways to Improve Your Athletic Performance Right Now" (available in the Knowledge section of

From The Saddle Of Steve Born : It's Race Season!

the E-CAPS website) on this quote. Also, check out Dr. Bill's article, "Replacing What You Lose or What You Can Assimilate" in this issue. After seeing how my performances have improved over the years (oh man, you should have seen me in RAAM '88... I have no idea how I made it across after fueling so incorrectly) and after seeing how many athletes have also improved (check out the testimonial at the end from Ironman Tim Britt), I am convinced that fueling under the "replace only what you can assimilate" protocol is the way to go.

Races, Races, and More Races

We are affiliated with a lot of great races and I have the pleasure of working with so many great race directors. Here are just some of the many event organizations we're enthused to be associated with:

American Sports Events

www.americansportsevents.com

Shaun Deane

Set-Up, Inc

www.set-upinc.com

Bill Scott, Jeremy Davis, Greg Hawkins

Fiske Independent Race Management

www.firm-racing.com

Bill Fiske, Wendy Fiske-Truhanovitch

HFP Racing

www.hfpracing.com

Shannon Kurek, Scott Erdman

Racing Underground

www.racingunderground.com

Darrin Eisman

Piranha Sports, LLC

www.piranha-sports.com

Neil Semmel

BBSC Endurance Sports

www.bbscendurancesports.com

Brogg Sterrett

Cutting Edge Events

www.cuttingedgeevents.net

Rebecca Koester

Ultramax Events

www.ultramaxtri.com

Mark and Amy Livesay

3 Disciplines Racing

www.3disciplines.com

Kenneth Krell

Sommer Sports

www.sommersports.com

Fred Sommer

Multirace.com

www.multirace.com

Robert Childers

Team Magic

www.team-magic.com

Faye Yates, Therese Bynum

Ultrarunner.net

www.ultrarunner.net

Robert Mathis

Mountain Man Events

www.mountainmanevents.com

Eddie Carlin

There are, of course, many other events we sponsor and this is but a portion of the ones we're associated with. If you're competing in anything that has "endurance" in the name, there's a pretty good chance that we're sponsoring the event. Still, if you know of an event that we should sponsor but currently aren't, please have the race director email me (born@e-caps.com) with the race information. We are mainly interested in sponsoring the following types of races:

Ultra running - Trail running races in the 25k/m - 100k/m range

Cycling - Road races, double centuries, ultra distance races

Mountain Biking - Cross country, 12-24 hour races

Adventure Racing - All distances

Duathlons/Triathlons - All distances

I hope that you're having a great summer and that your racing season is going well. Thanks for being such an important part of our company!

Sincerely -
Steve Born

I am writing to say thank you for producing "The Endurance Athlete's Guide to Success." I have done triathlon for 2 years progressing from sprint to my first Ironman in Arizona this last weekend. During every event leading to last weekend I experienced every problem you outlined in the book.

I was told by a friend to use Perpetuem and Sustained Energy for fuel during the event. I ordered the supplements and received the guide-book. I read the book and followed the plan from cover to cover. The results were staggering. I am not saying I went fast, but I had no physical problems. I mixed the bottles at a 300 plus calorie mixture per hour, along with a Hammer Gel flask which were not computed into the calorie count. I took the Endurolytes every hour, the Hammer Gel every 45 minutes and the mixture every 15 minutes.

I took NOTHING from the aid stations for the whole event, except water. I packed the PB&J in my special needs bag and that is where it stayed. The amazing thing was that I came out of the water 1503, off the bike at 1504 and finished at 1329. I saw all of the pit-falls from the 175 athletes that I passed on the run.

Thank you, Tim Britt.

Read This! : 15 Simple Ways To Improve Your Athletic Performance Right Now

Steve Born

One of the newest pieces you'll find on the Hammer Nutrition website is 15 Simple Ways to Improve Your Athletic Performance Right Now. Along with The Endurance Athlete's Guide To Success, this article will help take the guesswork out of fueling your body prior to, during, and after exercise.

I based many of the suggestions in this article on my new favorite Dr. Bill quote:

"The human body has so many survival safeguards by which it regulates living one more minute, that when we try too hard to fulfill all its needs we interfere, doing more harm than good. If I replace all the fuels I lose at the rate of 700-900 calories per hour, I bloat, vomit, present diarrhea, and finish the event walking or at an aid station. If I replace all the fluids lost all at once, I end up in the emergency tent with an IV for dilutional hyponatremia. If I replace all the sodium my body loses at the rate of 2 g/hour, I end up with swollen hands, eyes, ankles, feet, and noticeably labored exercise, or hypernatremia-induced bonking."

Wow, those are some dire consequences! However, no athlete needs to suffer in

such ways, especially you, our customers. Follow these 15 simple steps and you'll not only avoid the race-ruiners that Dr. Bill mentions, but you'll be on the way to your best training and competition performance. I've listed the 15 tips below; you can read a full-length article for each when you go to the Knowledge section of our website.

1. Keep fluid intake during exercise between 20-28 ounces per hour.
2. Restrict caloric intake to 300 cal/hr during exercise.
3. Avoid simple sugars in your fuels; use complex carbohydrates only.
4. Exercise over two hours requires protein, too.
5. Use soy, not whey, during exercise.
6. Use liquid fuels as your main energy source, even during prolonged training and races.
7. Remember to replenish electrolytes during exercise.

8. Don't rely on salt tablets to fulfill electrolyte requirements.
9. Don't use any new supplement or fuel, or supplement/fueling protocol, in a race without having first tested it in training.
10. Be flexible with your fuel consumption during a race, keeping in mind that what may have worked in training may not be appropriate under race conditions.
11. Replenish your body with carbohydrates and protein as soon as possible after each exercise session.
12. Don't overeat the night before the race in the hopes of "carbo loading."
13. Finish a pre-race meal at least three hours prior to the start of the race.
14. Don't sacrifice sleep to eat a pre-race meal.
15. Consume appropriate amounts of high quality food for your pre-race meal.

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REAL ATHLETES : REAL RESULTS

I started using the Strength program in December 2004. I measured my quads and glutes about 3 weeks after I started the program and then measured them again recently. I have gained 2 inches around my quads and 1 1/2 inches around my glutes! In my late 20's I lifted weights for 2 straight seasons and I never saw muscle development like this. I am 43 now and I would have never expected better development than when I was in my 20's. It is proof to me that the Compex does exactly what it claims to do. I feel I have tremendous strength at the moment and I'm sure my racing will improve this season because of this. - Joe Arnone, Cyclist



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Artificial Colors : What's The Big Deal?

Authored by Annie Hope Malka & reprinted with permission of Delicious Organics at www.deliciousorganics.com

So, the FDA says it's okay, what's the problem?

What's the big deal? Colors Certified by the US Food and Drug Administration are derived from petroleum, acetone or coal tars!

You think it's just a little bit here and there. Artificial colorings can be found in everything as wholesome as yogurt to, of course, candy. Petroleum and Tar do not qualify as something you could label as food at all. And, every little bit adds up. See what colors are in your foods and you decide how much tar and petroleum is okay to ingest.

There are studies that suggest artificial color have an affect on our children's behavior and of course, they can have an affect on our health and how our bodies function. Some people are allergic to some artificial colors. And other studies link tumors to certain colors. How do you keep it all straight and avoid the wrong colors? Best to just skip the artificial colors since data on tumors or carcinogenic side-effects don't come out until it's too late.

Unsafe colors in personal care products add health risks to our lives every day. Some contain impurities like lead acetate, toxic to the nervous system. Some commonly-used

colors and dyes are allergens, irritants, and some are known carcinogens.

At a minimum, avoid the following artificial colors:

Greens

D&C Green 5
FD&C Green 3

Oranges

D&C Orange 17

Blues

FD&C Blue 1

Yellows

FD&C Yellow 5
FD&C Yellow 6

Reds

FD&C Red 3
FD&C Red 9
D&C Red 19
D&C Red 33
FD&C Red 4
FD&C Red 40

You don't want to live in black and white? There are many natural colors that are plant based, like beets, that can bring reds, purples, yellows and greens back into your life. Of course, the color won't stain your child's hands as I've

seen so many birthday cakes do (and can't even imagine what it's doing to their insides!) and you won't find anything neon, but it does offer an aesthetic appeal in a safer format.

Many fruits and vegetables come in a variety of colors! Purple mashed potatoes make for some conversation at the dinner table! So does Purple Cauliflower! Ever had a purple soup with these two mixed together?!? Eat your blues, reds, purples, greens, whites, yellows and oranges naturally!

Resources:

- Red40.org
- Dr. Weil on Artificial Colorings
- CHEC Lists - Limit Your Child's Intake of Food Additives
- U.S. Food and Drug Administration, Center for Food Safety & Applied Nutrition, Color Additives

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REAL ATHLETES : REAL RESULTS

COMPEX is part of my training effort and has been paying huge dividends. I am able to target sore muscles with the Active Recovery mode and the next day I feel great! - Robert Kelly : Triathlete



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Fuel Replacement Variation

Bill Misner, Ph.D.

When athletes come to us complaining about suffering dehydration, muscle cramping, gastric stress, bloating, diarrhea, vomiting, or general malaise while using our products or our products in combination with others, we make every effort to help them adjust fluids, electrolytes, or fuel dose selection so that their results will improve, and that the symptoms suffered are resolved. Over the past 8-9 years, I cannot recall having failed to resolve a problem reported, though we had to adjust the dose advice by trial and error methodology.

A survey of fluids, fuels, and electrolytes protocols vary remarkably among endurance athletes.

Here are some of the variations we have observed:

1. ELECTROLYTES: The female winner of a past Leadville 100 mile ultramarathon run won the event by over an hour (beat most of the men) on 1 Endurolyte per hour). Her electrolyte profile (blood labs) taken before the event were remarkably the same after the event. One triathlete consumes regularly up to 8 Endurolytes per hour in his Ironman events. At 6 Endurolytes per hour, he cramps or presents with gastric upset.

2. FLUIDS: Fluid intake varies considerably between 12-40 fluid ounces per hour.

3. CALORIES: Calorie intake varies considerably from 200-700 calories per hour.

4. DOSE RELATED TO POSITIVE PERFORMANCE: Of the athletes who report success with no performance-inhibiting problems, the following characteristics occur with remarkable consistency:

- Body weight at finish is decreased between 2-3%.
- Fluid intake is under 30 fluid ounces/hour.
- Electrolyte intake is between 3-6 Endurolytes/hour with 4 Endurolytes/hour being the most often reported successful dose.
- Calorie intake is at or under 300 calories/hour, though those using HEED report regular success using less 150-200 cal/hour.

5. DOSE RELATED TO INHIBITED PERFORMANCE: Of the athletes who present performance-inhibiting symptoms, the following characteristics present:

- Fluid intake is nearly always over 30 fluid ounces/hour
- Body weight at finish is hyperhydrated with weight gain from +1-2% dehydrated over -3%. (-2% body weight loss reflects the water loss when glycogen stores are metabolized=over 2% weight loss or weight gain leads to hyponatremia problems)
- Calorie excess using too much simple sugared fuels which raises osmolality in the gut, forcing the body to pull electrolytes out of an already electrolyte depleted system causing stomach shut down.
- The high sodium American diet for example makes those who consume that menu predisposed to taking a higher sodium electrolyte during an event than the low sodium purist. Sodium as you know drives thirst and thirst drives drinking until excess results.
- Sweat composition studies performed by Shephard, Noakes, Costill, Moody, etc., who show in a variety of stress exercise forms, that an acclimatized fit athlete loses 50% of the electrolytes and fluids as an unacclimatized, not fit athlete. Training duration/intensity preparations that are event-specific literally cut in half the athlete's electrolyte and fluids requirements in an endurance event. A common report from ultra marathon runners who suffer cramps, sour stomach, malaise, hyponatremia in the last half of their ultra can be related to not having trained high enough total weekly mileage or not having completed at least 1 training run at 50-60% of the ultradistance using the same fluids-fuels-electrolytes dose. Then, in the event, they either:

A.) Use a different protocol than the one they trained with, or

B.) Demand that their body suddenly adapt to distance and time that their body's systemic enzymes for those fluids-fuels-electrolytes is underdeveloped, which is due to lack of duration training.

SUMMARY

Our point is that less is better than more and that performance optimal fluid-fuel-

electrolytes dose is accurately determined by trial and error. This means that an athlete's weight before and after prolonged training of -2% weight loss after the workout is indicative of positive optimal hydration balance. At the rate of 3% or more post-workout weight loss, dehydration takes a toll in terms of inhibited nutrient delivery, waste removal, overheating issues, malaise, muscle cramps, bloating, gastric upset, and premature fatigue. Nearly the same symptoms reoccur when fluid intake exceeds 1% body weight gain. Here is where some get by with such overhydration issues, while others immediately suffer all of the above or more or at worst scenario are code-4'd to the hospital emergency room with dilutional hyponatremia.

There are persons and organizations telling athletes to consume what you lose because they argue that it needs to be replaced immediately in the event. It cannot be replaced 100% but only around 20-30% of the highest absorbed substance. Think about this statement: At an easy 60-85% volume maximal O2 rate aerobic pace, rate of metabolism increases from a sedentary state between 1200-2000%. The body is then induced to survive. Blood volume is routed to working muscles, fluids are lost to evaporative cooling through capillary beds, oxygen is routed to the brain, heart, and a few of our internal organs. Oddly, it is not so directly focused on fluid, fuel, and electrolyte replacement, as some of the "Experts" so advise. The body sensitizes release of specific hormones in the circulation anticipating losses in favor of life-giving death-preventing survival, neutralizes blood pH, and balances fluid, fuel, and electrolyte, compensating for all but about 20-30% which can be (oral) replaced P.O. Rather than start with attempting to replace hourly loss with hourly dose, we suggest small dose portions at between 20-30% of what is lost. There are many individual variations to consider and they may change with age, dose, fuel selection, and training stress. It is our position that the less you take that supports endurance performance goals is the dose that you should train with and race with... and, if it works for you don't try to fix it by taking more than your body can effectually absorb.

Hyponatremia : Are You At Risk?

Bill Misner Ph.D

Hyponatremia (water intoxication or Sodium dilution) is a medical emergency, which may result in fatal consequences if not treated and resolved immediately. Hyponatremia often occurs in endurance athletes when the heat or humidity is high and duration is prolonged. This results from excess loss of sodium through heavy sweating while attempting to resolve the symptoms by drinking more fluid. Intake of carbohydrate-rich energy fuels also reduces sodium levels for transition of calories across gastrointestinal linings into the energy cycle. If sodium is not present with the carbohydrates, the stomach will extract circulating sodium from the bloodstream in order to promulgate carbohydrate entry. This compounds the problem decreasing the availability of circulating sodium. When the exercising athlete drinks more fluid to quench thirst, circulating sodium is further diluted, resulting in severe sodium depletion.

Many endurance athletes consume too much fluid volume during an endurance event. Some mysteriously get away with it while others suffer hyponatremia (water intoxication, serum sodium dilution). The expert in this field is South African Professor Tim D. Noakes M.D., a recognized sports science researcher. Dr. Noakes suggests 400-800 ml (13.53-27.05 fluid ounces) optimal range per hour based on years of evidence collected from research with endurance runners who did or did not develop hyponatremia, a life threatening issue when serum sodium is diluted by consuming too much fluid with too little sodium.

In an earlier study, Noakes suggested for fluid intake: "Humans may have a limited capacity to excrete fluid at rates in excess of approximately 900 ml/h in response to higher rates of oral fluid intake." This implies that 900 milliliters (30.43 fluid ounces) per hour is the average human limit per hour. In my own files of athletes reporting symptomatic and confirmed hyponatremia during hyper thermic events, all commonly reported over hydration rates of between 30-34 fluid ounces per hour, which confirms in my view that dangerous levels of water intoxication or sodium electrolyte dilution commences to occur with repeated doses of 30-34 fluid ounces per hour to most athletes.

Dr. Noakes' concluding statement (2001)

was: *"The rate of intestinal fluid absorption appeared to match the rate of oral fluid ingestion and there was no evidence of fluid accumulation in the intestine with reverse sodium movement from the extracellular space into intestinal fluid. The results of this study are therefore at variance with the Priestley-Haldane hypothesis and suggest that reverse sodium movement did not contribute to the hyponatraemia induced by oral fluid overload in these subjects. Rather it appears that humans may have a limited capacity to excrete fluid at rates in excess of approximately 900 ml/h in response to higher rates of oral fluid intake. When the rate of intestinal fluid absorption matches the rate of fluid ingestion and exceeds the kidneys' maximum capacity for fluid excretion, the excess fluid accumulates in the extra- and intracellular fluid compartments, inducing the dilutional hyponatraemia of water intoxication. These findings may have relevance to other clinical conditions in which hyponatraemia develops in response to high rates of oral or intravenous fluid provision."*

TABLE ONE

FLUIDS INTAKE	SODIUM INTAKE	CARBOHYDRATES
16-24 FL OZ (+/- 4 FL OZ)	300-700 MG/HOUR	240-280 CALORIES/HOUR

Noakes (2003) paper in the British Medical Journal² reported fluid intake values could prevent dilutional hyponatremia:

"To protect all exercisers from this preventable condition, rational and evidence based advice must be provided. In particular, exercisers must be warned that the overconsumption of fluid (either water or sports drinks) before, during, or after exercise is unnecessary and can have a potentially fatal outcome. Perhaps the best advice is that drinking according to the personal dictates of thirst seems to be safe and effective. Such fluid intake typically ranges between 400 ml and 800 ml per hour in most forms of recreational and competitive exercise; less for slower, smaller athletes exercising in mild environmental conditions, more for superior athletes competing at higher intensities in warmer environments."

SODIUM LOSS & WATER EXCESS

Sodium is proportionally lost at a greater rate in sweat than total body fluid. Sodium is required in the stomach for car-

bohydrates to cross gastric linings in order to resupply muscle glycogen and to assist metabolization of body fats into the energy cycle. Carbohydrates going in and sweat going out cause sodium losses to deplete at the rate of 2 grams per hour. To reduce the risk of sodium dilution or depletion two practical applications are (1) control fluid intake and, (2) add 300-700 mg sodium to the energy fuel consumed during exercise. The average American consumes and stores 6000-8000 mg sodium in their bodies each day. That is enough sodium to last through 3-4 hours heavy sweating exercise before symptoms of hyponatremia appear.

PRACTICAL APPLICATION

I conclude that fluid intake should be no less than 12 fluid ounces no more than 28 fluid ounces per hour especially during prolonged distance hyperthermic events. The optimal fluid intake levels that appear to prevent water intoxication are between 16 fluid ounces per hour and 24 fluid ounces per hour (+/- 4 fl oz). When an athlete repeatedly consumes more than 30 fluid ounces per hour, the risk of dilutional hyponatremia increases with dose. If fluid ounces volume tends to dilute sodium, adding more sodium to subsequent fluids is required.

While this is highly individual the following guidelines may prove a starting point for trial testing to resolve hyponatremia issues. See table.

ELECTROLYTES OF CHOICE

Endurolytes taken 3-6 in divided doses with the above protocol appears to resolve hyponatremia in 99% of the subjects we have observed. Persons who regularly consume high sodium diets or who are not acclimatized for conditions in prolonged endurance events may require higher intake of sodium-enhanced electrolytes or Endurolytes above the 6-capsules dose per hour. Trial and error to prove resolution is (1) absence of performance-limiting symptoms, (2) body weight fluid loss of under 3% at the finish, or (3) a CBC electrolyte panel following the event.

References available upon request.

Race Report : Catching Up With A Few Amazing Athletes

24 Hour Solo National Champion

Timari Pruis

Hammer Nutrition sponsored mountain bike rider Timari Pruis continues her outstanding season. Just two weeks after notching her 5th consecutive win at the 24 Hours of Idyllwild (April 30th - May 1st) she entered the 24 Hours of Adrenalin Solo National Championships at Laguna Seca Raceway in Monterey. Timari said, "After my 3rd place finish at this event last year, I REALLY wanted to go out and win this one this year; my hope was that I had fully recovered from Idyllwild." For the most part the race was a two-woman dual between Pruis and teammate teammate Carrie Edwards. After over 23 hours and 14 grueling laps Timari's tenacity paid off with a solid win.

Going The Distance

Connie Gardner

Just wanted to give you an update on my racing. Starting with the win at Olander 100 mile road championship last September, I'm on a winning streak with 8 wins in a row now. After Olander 100, I won the Chicago 50 mile, JFK 50 mile, Texas Trail 50 mile, Silver Comet 100k in Atlanta, Umstead 100 mile, Toledo Marathon, and the Pinkney Trail Marathon in Michigan.

I'm heading to West Virginia to race Capon Valley 50k and I plan on racing the Cleveland Marathon after that.

I've been using these races to gear up for the Mohican 100 Mile and Western States 100 in June.

Rave Reviews From A Race Director

Vince Rucci

Thanks for helping to make Mohican a great event this year! We had a record number of participants, and everyone was very appreciative of all of the items that sponsors were able to donate.

A Big Win at Big Bear

Ernesto Marenchin

Just wanted to inform you of some more results - I just won the 24 Hours of Big Bear this past weekend in West Virginia. Used Heed, Sustained Energy and Hammer Gel along with your Race Caps, Anti Fatigue and Endurolyte caps to get me through the race.

Had some slight issues about 6 hours in as I think I was consuming too much at infrequent times. (I was gulping a lot and drinking a quarter of my bottle at a time). I remembered thinking back to one of Steve's articles about not being afraid to change your game plan when the situation changes, so I switched to 100% Heed until my stomach settled. I then continued on switching between Heed and Sustained energy on every other lap and tried more to take in

mouthfuls as opposed to half the bottle at a time.

The results - I think you guys would be happy. I just beat out the CURRENT NATIONAL 24 Hour Champ Cameron Chambers and also a previous 3rd in the WORLD Solo Champ Mark Hendershot.

I couldn't have done it without your products. Once again, Hammer Nutrition helped me to the finish line over a LAP ahead of second place AND with the fastest solo lap for the 24 hours.

Thanks!
Ernesto Marenchin

Pumped at 24-Hours of Adrenalin

Karl Etzel

Just wanted to let you know I had a very successful race fueled by Hammer Nutrition & E-CAPS. I completed 16 laps in the 24 Hours of Adrenalin National Championship event, bringing home second place. My lap times were steady and my energy levels consistent throughout the 24 hours. Other than a snack or two of comfort food and one gel I had to grab out on the course, all my calories came from Perpetuem, Sustained Energy, & Hammer Gel, with additional support from Race Caps Supreme, Endurolytes, and Race Day Boost leading up to the event. Now it's on to the World 24 Hour Championships in Whistler.

Thanks!
Karl Etzel

your products and company above the rest!

Thanks Again,
Vince Rucci
Co-Owner Vertical Runner

Inside This Issue

- Carbohydrates
How much do you need to perform at your best
- Fructose
Does it make a good sweetener?
- Athlete Spotlight
Get to know Kenneth Phillbrick
- 15 Simple Ways To Improve Your Performance
Get started today!
- Hyponatremia
Are you at risk?
- Artificial Colors
Are they really that bad?
- Artificial Sweeteners
Do you know what you're eating?

...and so much more!!!

The Back Page

Earn FREE Product : The Athlete Referral Program

Tell your friends, neighbors and training partners (just not your competition) about us and you could earn a mess of free products!

Here's how it works...you tell your friend Hank Hammer, who's never ordered from us before, about our products. Hank Hammer places his very first order and mentions either your first and last name or your client number. Hank Hammer gets 15% off his first order and you get 25% of his order credited to your account (i.e. Hank Hammer spends \$100 and you get \$25 credited to your account). You can then use that \$25 just like real cash...purchasing whatever you want from our product and clothing lines.

So, without a lot of work you can earn free product from E-CAPS/Hammer Nutrition. You'd better get going!

For more information and all the details, give us a call at 1.800.336.1977.

The Details :

- Referral credit can be used just like cash for the purchase of any products, accessories and/or apparel.
- We keep track of your referral credit for you. Want an update? Just ask.
- Whenever you place an order, you can apply it to that order or save it for future use.
- If you order online, just put in a note asking that we apply any available credit to that order.
- There is no expiration date for your referral credit.
- And much more!

Get started today! Cut out this card, fill in your name and client number and give it to a friend who's never ordered from us.

Fill in your name and client number and give this card to a friend who's never ordered from us. Remember, you get a 25% credit!

15% Off Your First Order!

Mention the name and/or client number below to receive 15% off your first order! To order, call the phone number shown or cruise our website.

Name

Client Number

1.800.336.1977 • www.e-caps.com

