Staying Hydrated

The topic of hydration is covered extensively in this newsletter, because staying hydrated is essential to achieving and maintaining peak performance. With the warmer weather approaching, staying well hydrated becomes even more of a challenge.

Losing 2% of your body mass during exercise (about 3 lbs for a 150 lb athlete) can impair performance, especially when exercising in warm environments.

What’s the big deal with hydration?
Staying optimally hydrated helps regulate body temperature – keeping you cooler longer and able to train in warmer weather more efficiently. Drinking fluids in relation to exercise, also helps to ward off muscle cramps and keep you alert. Simply losing 2% of your body mass during exercise (this is only a 3 lbs for a 150 lb athlete) can impair performance, especially when exercising in warm environments.

In this issue, we’ll cover important hydration topics including the energy drinks, fluid replacement beverages, as well as, what can happen if you drink too much fluid.

Healthy, Effective, Training,
Energy Drinks – Are They All They’re Cracked Up to Be?

Energy Drinks are beverages that combine fluid and “energy” in a convenient beverage. The term “energy drink” is vague and could apply to any beverage that contains some type of fluid (water) and ingredients that provides energy (carbohydrate, fat, or protein). Drinks currently marketed as “energy drinks” typically contain water, carbohydrate, and caffeine. Different varieties add additional ingredients like herbs, amino acids, electrolytes, protein, medium-chain triglycerides, simple sugars, vitamins and minerals. Energy drinks differ from sports drinks in electrolyte concentration and function. Energy drinks are not promoted or used for fluid replacement.

Why Do Athletes Drink Them?
Energy drinks are heavily marketed towards active people and athletes claiming that consumption of them can:
• Boost energy levels
• Burn fat
• Increase muscle mass
• Supply vitamins and minerals for energy production
• Boost endurance
• Improve brain function

What the research says . . .
Very limited research exists evaluating the effectiveness of the energy drinks for athletic performance. In one study trained athletes, who consumed Red Bull after exercise experienced improved cardiac contractility (attributed to the ingredients taurine and caffeine). Taurine is a sulfur-containing amine thought to be a central nervous system neurotransmitter or neuromodulator. Investigators in this study theorized that the improved cardiac contractility could explain improved maximal performance seen in other studies with taurine-caffeine containing drinks. Further, in endurance trained males, consumption of Red Bull was associated with improve readiness potential and concentration compared to a placebo drink and caffeine control beverage.

Adverse Events
While a lot of the ingredients in energy drinks have safety data, most lack long-term use safety data. Therefore, even the ingredients that appear currently to pose no adverse effects may indeed cause long-term problems. Consequently, these beverages should be consumed in moderation.

The Bottom Line
When it comes to energy drinks and athletic performance, consider these 3 things:
1. High Sugar concentration
   • Too high for optimum fluid replacement during & after exercise
   • May cause gut distress if consumed too close to the start of exercise
2. High Caffeine content
   • Excess for ergogenic benefit, could cause dizziness, jitters, laxative effect
3. Questionable ingredients
   • Herbs, amino acids, Medium Chain Triglycerides (MCTs), lack of scientific support for effectiveness or long-term safety data
   • Adverse interactions with medications may occur

Plain water & sports drinks are formulated with the appropriate concentration of carbohydrate & electrolytes for rapid fluid absorption before, during & after exercise. They offer safe and scientifically proven effective alternatives to the costly and questionably effective “energy drink” in improving sports performance and exercise recovery.
Sports Drink Alternatives?

The sports product and supplement market is a multi-billion dollar business that is constantly looking for the next product to create and promote. In recent months and years, sports drink manufacturers have introduced beverage lines that are targeted at the casual exerciser as well as for athletes to consume when they’re not training. Examples of such products include fitness water, and more recently POWERade Zero™ and G2™.

- **Fitness Water** is a low-calorie (~10 calories/cup), vitamin enhanced (B-vitamins, A, & C), water that is good for promoting fluid intake.

- **POWERade Zero™** is a no-calorie artificially sweetened, sports drink with added electrolytes and vitamins. It’s basically a diet sports drink and while it can help replace fluid and electrolyte loss, it should not be substituted for a regular CHO-electrolyte sports drink that can replace fluid, electrolyte and carbohydrate.

- **G2™** is a low-calorie (25 calories/cup) sports drink with added electrolytes. It is advertised as an “off the field” hydrating beverage and can be used to help stay hydrated and replace electrolytes lost in sweat, but just like POWERade Zero™ it should not be substituted for a regular CHO-electrolyte sports drink.

Of course, off the field, you could always drink plain water with a twist of lemon or lime – it’s a great hydrator and a lot less money!

Are You Drinking Enough Fluid?

Look at the color of your urine to find out!

- **Light Lemonade = HYDRATED**

  An odorless pale yellow urine color, like the color of light lemonade indicates you are well-hydrated.

- **Apple Juice = DRINK UP**

  A darker yellow-orange urine color, like the color of apple juice, with an odor indicates you need to drink more fluids!!

If you are taking a multivitamin supplement, be aware that some vitamins in the supplement can change the color of your urine for a few hours, making it bright yellow or discolored.

Even so, by the end of the day (if you take your supplement in the morning) the color of your urine should look more like light lemonade.
Research Brief:

Does Milk Re-hydrate Better Than A Sports Drink?

There has been a lot of research in recent years looking at the ability of the protein in milk to help stimulate muscle growth (see the Fall 2007 newsletter), and now some research has even started to explore the benefits of milk as a fluid replacement beverage after exercise.

Researchers in the United Kingdom measured the ability of low-fat milk to replace fluid lost during an exercise-induced mild dehydration (~2% body weight loss). Eleven young, healthy, active men and women, exercised in a warm environment on four different occasions. Following each exercise session they were given an hour to consume 1) low-fat milk, 2) low-fat milk plus sodium, 3) a sports drink, or 4) plain water in a volume equivalent to 150% of their sweat lost during exercise. Urine sample were collected to measure fluid balance (both before exercise and for 5 hours after exercise).

Results showed that the low-fat milk was more effective at replacing sweat fluid loss and achieving hydration than the commercially-available sports drink and plain water. There was no difference between the low-fat milk without and the low-fat milk with added sodium in fluid replacement. The authors attributed the better hydration after drinking milk to both the higher sodium and potassium content of milk (more than most commercial sports drinks) and that the additional protein and fat in the milk may have delayed the absorption of fluid from the stomach, helping to reduce fluid loss from stimulation of urination.

Bottom Line

While milk may be an effective fluid to consume after exercise to replace sweat fluid losses, it isn’t for everyone. People with lactose intolerance should avoid drinking milk in close relation to exercise to avoid the consequent gut distress that can accompany consumption. But if lactose intolerance isn’t an issue, then milk, either alone or as part of the post-exercise recovery meal, can be an effective fluid replacement beverage. However, as with all fluid replacement, the volume of intake is essential. At least 3 cups of fluid must be consumed for every pound of fluid weight lost during exercise in order to fully rehydrate. Another key factor to ensure is that the replacement fluid contains some electrolytes, mainly sodium and potassium.

Source:

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Peak Performance Recipe:

Sunshine Refresher

Ingredients:
• 1 cup fat-free/low-fat plain or vanilla yogurt
• ½ cup skim/low-fat milk
• 1 tbs honey, sugar, or sweetener
• ½ cup orange juice
• 8 ice cubes

1. Blend all ingredients together to a smooth and frothy consistency.
2. Pour into a glass and enjoy! Makes 2 (12 ounce) drinks.

Each 12 oz drink contains:
• (with skim milk/yogurt) 150 calories, 28 g CHO, 9g protein, 0g fat
• (with low-fat vanilla milk/yogurt) 190 calories, 35 g CHO, 9g protein, 2g fat

Recipe from Nancy Clark’s Sports Nutrition Guidebook
**Supplement Corner – Glycerol**

Glycerol can be viewed as the hydrating supplement since it is promoted to help athletes hyperhydrate before long duration events and/or events conducted in hot humid environments. It might also be useful as a recovery fluid when the rehydration/recovery period is short.

**What is it?**
Glycerol is the three-carbon backbone of a triglyceride molecule (or stored fat). Taken orally (often as glycine) it is quickly absorbed and evenly distributed throughout fluid compartments, exerting an osmotic pressure. Like a sponge, glycerol can absorb water and promote fluid retention.

**What does it claim to do?**
- Improve hydration (increases fluid retention in the body)
- Enhance endurance performance
- Improve thermoregulation (help better regulate body core temperature)

**How might it work?**
How glycerol supplementation enhances fluid retention is not fully understood. Glycerol may act on fluid retention through effects on increasing antidiuretic hormone concentrations (thereby reducing fluid loss) or by enhancing water reabsorption in the kidneys. Once an athlete’s body has reached its maximal core temperature, performance declines. Fluid loss leading to dehydration can cause core body temperature to increase; therefore, the potential hyperhydration associated with glycerol supplementation may reduce, delay, and even possibly even eliminate the adverse effects associated with dehydration, thereby improving performance.

**What does the research say?**
Research exists to both support and refute any performance enhancing benefits of glycerol supplementation. A lot of the discrepancies in the research are due to different study protocols. In some studies, glycerol is given with very large volumes of fluid, whereas, in others it is given with much smaller fluid volumes. Further, some studies look at the hydrating effects of glycerol before exercise, while still others look at the effects following exercise.

Most supportive studies involve the use of glycerol to promote hyperhydration just prior to an event. For example in a study with six endurance-trained males, they ingested a glycerol containing beverage (1 g glycerol in 20 mL water/kg body weight) or a control beverage of just water prior to a 90 minute steady state cycle ergometer and subsequent 15 minute performance trial test in dry heat (95°F). Subjects also consumed a carbohydrate-electrolyte containing beverage at 15 minute intervals during the trials. Results showed that ingestion of the glycerol containing beverage before exercise significantly decreased urine output when compared to just ingestion of water alone. Additionally, results showed that the glycerol-induced hyperhydration increased performance by 5% and reduced thermoregulatory and cardiovascular strain in the subjects.

Many supportive studies fail to show any benefits to cardiovascular or thermoregulatory parameters with glycerol supplementation, leaving the explanation on how glycerol enhances performance not clearly understood.

**Adverse Effects?**
- Nausea/Vomiting
- Headaches
- Bloating
- Dizziness

Athletes with diabetes, high blood pressure, or kidney disorders should not supplement with glycerol as it can exacerbate existing complications and put the athlete at serious health risk.

**The Bottom Line**
- Effective supplementation protocol is 1-1.5 g/kg glycerol with 25-35 mL/kg fluid
- Hyperhydration may be most beneficial when glycerol is supplemented before exercise, particularly ultraendurance exercises.
- Glycerol’s associated side effects and the limited concrete evidence supporting its benefit to athletic performance warrant careful supervision by a trained medical professional who can monitor and supervise its usage if an athlete chooses to use it as a supplement.
- More research is needed before a final recommendation can be made.
Question & Answer

Q. I have read recently that an athlete can drink too much fluid during exercise and this can cause serious health effects, even death. I am always told to drink enough fluid, but how do I make sure I don’t drink too much?

A. The condition you are referring to is called hyponatremia. It is a serious health condition that can occur when an athlete overconsumes plain fluids (like water) and thereby reduces the concentration of sodium in the plasma. If the concentration of sodium falls too low it can lead to nausea/vomiting, throbbing headache, dizziness, confusion, disorientation, a seizure, and in very serious cases, even death. With this said, it is more likely that an athlete will suffer from dehydration, than hyperhydration and potentially hyponatremia.

Regardless, it is still important to ensure you are drinking enough fluids to meet your needs and not exceed them.

Follow these simple guidelines to ensure adequate fluid replacement.

- Keep weight loss/dehydration to a minimum by:
  - Drinking fluids before, during, and after exercise
- Drink enough fluids to replace fluid lost during exercise
  - 3 cups of fluid per pound of fluid weight loss
- You should not gain weight during exercise
  - This could be an indicator that you are over consuming fluids
- Replace sodium lost in sweat
  - Everyone loses sodium in their sweat (some people lose much more than others). Replace this loss with a drink that contains sodium (like a sports drink or milk) or with a food containing sodium in combination with your post-exercise recovery drink.
    - Beverages with 20 mEq Na/L fluid (ex. commercial sports drink) or water + 1g table salt added

What is the Combined Events Athlete Development Project (CEAD)?

The Combined Events Athlete Development Project (CEAD Project) provides education and research for elite combined events athletes to help promote optimal health and sport performance. Funded by the High Performance Division of USA Track & Field, the Project includes educational support and assessment of dietary practices, body composition, and biochemical markers of nutrition status. Project activities are conducted at Track Meets, Summit Meetings, and through educational manuals, newsletters, handouts, emails, and individual consults with athletes and their coaches.

The CEAD Project was formally known as the Heptathlete Development Project during the years of 1990 -2001, but in the year 2002 the project was funded to provide nutritional support to both male and female combined events athletes.

To learn more about this year's project activities contact Project Coordinator, Jackie Maurer Abbot, Ph.D., R.D., CSSD, (Certified Specialist in Sports Dietetics) at (732) 406-9355 or maurerj@email.arizona.edu.

Log onto the CEAD Website for more Performance Nutrition information!

http://cpanarizona.org/cead.phtml