Drinking in the Dangers of Dehydration

By Jessica Heath and Neal Goulet

More than 30 years later, it’s still painful to watch Gabriela Andersen-Schiess stagger around the track in the Los Angeles Coliseum for nearly six minutes. Decked out in red shorts and tank top and a white ball cap, Andersen-Schiess represented her native Switzerland in the first women’s marathon, held during the 1984 Summer Olympics in Los Angeles.

That August day was hazy, hot and humid, and Andersen-Schiess inexplicably missed the final water station. The temperature was in the 80s when she entered the stadium through a dark tunnel. Leaning uncontrollably to her left, she was reduced to walking with long, spastic strides, unable to stay in a single lane as she made a complete lap.

“My head and everything was still functioning,” she said afterward. “I knew where I had to go. Through dehydration, your body cramps up. I kind of told myself, try to keep running, try to stay upright. My muscles just didn’t respond.”

Three people immediately tended to her as she slumped across the finish line. She was fine within two hours, she said, and she still managed to beat seven other runners.

Today, Andersen-Schiess remains a powerful symbol of courage and determination – and of the dangers of dehydration.

NOT ENOUGH WATER

Of course, most of us will never compete on a grand stage such as the Olympics, but proper hydration is an everyday concern whether we play competitive sports, go for a family bike ride, or simply spend time in the heat. Not only is dehydration a serious heat-related disease, Johns Hopkins Medicine noted, it can be a dangerous side effect of diarrhea, vomiting and fever. Children and adults ages 60 and older are particularly vulnerable to dehydration. Heat stroke is the most severe form of heat illness and can be life-threatening.

At a time when Americans drink ever-bigger and greater quantities of beverages, they aren’t drinking enough of the most important one: water. Studies and stories dating a decade or longer have chronicled our water-consumption deficiency. A Boston College dietician wrote in 2011: “We all have heard for years that we need at least eight cups of water a day but few of us are listening; at least two-thirds of Americans pull up a quart short, according to survey data. In water’s place we guzzle coffee, tea, colas, alcohol and flavored drinks – beverages that don’t help us go the extra mile the way water can.”

Water comprises some 60 percent of our body weight and is necessary for nearly every bodily function, but most of us don’t drink enough of it.

Comprising some 60 percent of our body weight, water is necessary for pretty much every bodily function. Our bodies can’t make or store water, the American Academy of Orthopaedic Surgeons noted, so we have to replace the water lost as sweat or urine.

Dehydration during exercise can have a negative effect on performance and increase the potential for injury and heat illness. Athletes require even more water and should drink it before, during and after sports or exercise.

As it was for women’s marathoner Andersen-Schiess during the 1984 Olympics, muscle cramping is a sure sign of dehydration and the necessities of seeking medical attention and increasing fluid intake.

Thirst is not a reliable indicator of dehydration. You may not feel thirsty until you already have lost approximately 2 percent of your body weight, which is enough to hurt performance. What’s more, if you stop drinking when your thirst is quenched, you only will get half of what you need.

Urine color is a better barometer: a large volume of clear urine suggests that you are well hydrated; smaller amounts or dark yellow urine can indicate dehydration.

In order to keep athletes well hydrated, athletic trainers...
drink 16 to 24 ounces of water. For every pound lost, drinking the same amount of
water. For every pound lost, drinking the same amount of
fluid can cause over-hydration (hyponatremia), which results
in little sodium in the blood and can cause critical illness.

SPORTS DRINKS VS. ENERGy DRINKS

For the most part, water is
sufficient for staving off dehy-
dration. But two categories of
beverages—sports drinks such as
Gatorade and Powerade, and en-
ergy drinks such as Red Bull and
Monster—are increasingly popular.

They also are widely mis-
understood, both in terms of
their purposes and their pitfalls.

Water is a good choice for
activities lasting less than an
hour and occurring at a low-to-
moderate intensity. Sports drinks
are appropriate for activities that
last longer than one hour at
moderate-to-high intensity.

If you notice white residue
on your clothing or skin, it
reflects your body’s loss of salt
(sodium). Sports drinks essen-
tially are flavored salt water:
They replenish electrolytes
(including sodium) and water
after a tough workout.

But it requires a really tough
workout to call for a sports drink.
The Canadian Broadcasting
Corp., Canada’s leading broad-
cast network, recruited a team of
recreational runners for a 2014
story and tested their blood
before and after a 45-minute run.

“None of the runners deplet-
ed either their glucose or elec-
trolyte levels enough to require
a sports drink to replenish them,”
according to the story. “In many
cases, electrolyte and glucose lev-
els increased in the blood. The
test revealed that they could have
benefited from water alone.”

The CBC also noted that
sports drinks can be high in
sugar and sodium. For instance,
the 41 grams of sugar (more
than 10 teaspoons) and 330 mil-
grams of sodium in Gatorade’s
Glacier Cherry Perform drink
are more than a McDonald’s
medium fries or a serving of
Doritos Cool Ranch chips.

Most sports drinks contain
no caffeine, which is a key
difference between them and
energy drinks. Most sports

Q&A

HOW MANY CALORIES SHOULD I CONSUME DAILY?

This depends on your age,
gender, body size, level of physical
activity and whether you want to
lose, gain or maintain weight.
For example, a 250-pound foot-
ball player will need to consume
more calories than a 100-pound
dancer. A sedentary female
between the ages of 31 and 50
with average height and weight
should consume approximately
1,800 calories daily compared
with 2,200 calories for a simi-
larly referenced male. Exercise
may increase calorie needs by
1,000 to 1,500 calories per day.

WHAT DIETARY GUIDELINES
SHOULD AN ATHLETE FOLLOW?

Fifty-five to 60 percent of
the calories should come from
carbohydrates, 30 percent from
fat, and 10 to 15 percent from
protein. These guidelines will
help provide a foundation for
maximizing performance.

HOW MUCH WATER
SHOULD I CONSUME?

This varies based on your
size, your activity level and the
climate where you live. In gener-
al, you should consume at least
half of your body weight in fluid
ounces. For example, if you
weigh 150 pounds, that means
at least 75 ounces of water per
day. This number will be higher
if you are exercising and/or
exposed to a hot climate.

WHICH IS BETTER:
WATER OR SPORTS DRINKS?

For short-duration, low-to-
moderate-intensity activity, water
is a good choice to drink before,
during and after the activity.

Moderate-to-high intensity

WHAT IS CAFFEINE?

More than 80 percent of the world’s population uses caffeine in
some form, but how much do we really know about it?

Caffeine is the most widely used psychoactive substance on
the planet. Make no mistake: It is a drug that can be addictive.

It has positive effects: alertness/wakefulness, pain relief, endurance,
motivation/productivity; it even can help delay or prevent neurological
conditions such as Alzheimer’s and Parkinson’s.

However, it has just as many and perhaps even more dangers:
cardiac arrest, headaches/migraines, insomnia, Type 2 diabetes, drug
interaction, addiction, risky behavior, jitters and nervousness, vomiting,
allergic reactions, increased blood pressure, risk of overdose.

Source: CaffeineInformer.com, “Caffeine: facts, usage and side effects.”
AND EXERCISE

activity lasting longer than 60 minutes should include sports drinks to replenish electrolytes.

WHAT ARE ELECTROLYTES?
Electrolytes are salts, such as sodium and potassium, commonly added to sports drinks. Each electrolyte is important for maintaining the balance of fluids within the body for proper function of nerves and muscles. Extensive exercise or prolonged heat exposure can deplete electrolytes quickly.

WHAT SHOULD I EAT BEFORE EXERCISING?
Intake prior to exercise is important for providing energy and positively affecting performance. Ideally, a meal should be consumed three to four hours before exercising; this will prevent hunger and provide energy and positively affecting performance. A well-balanced diet based on individual tolerance, but it should focus on low amounts of fats and fiber and moderate carbohydrates, proteins and fluids. Avoid eating unfamiliar foods prior to a physical competition. A well-balanced diet during the days and weeks leading up to an event is equally important.

WHAT SHOULD I EAT AFTER EXERCISING?
Muscles use glycogen for energy during exercise, thus making it essential to refuel your glycogen storage. Carbohydrates, such as breads, cereals, pasta and rice, provide the necessary nutrients to build glycogen. Incorporating protein also is significant for repairing muscle tissue and reducing soreness. You should eat within 30 to 60 minutes after completing exercise for optimal refueling and recovery.

CASE STUDY

ATHLETIC TRAINERS PLAY ESSENTIAL ROLE IN MONITORING HYDRATION

By Misty Seidenburg

A 16-year-old football player, well acclimatized to indoor and outdoor conditioning, had been attending pre-season practices for eight weeks. On the first day of practices (each of which was held two times per day, aka two-a-days), the athletes were instructed in the importance of hydration. On the second day, the player told the certified athletic trainer of experiencing severe muscle pain and cramping in the lower leg and hamstrings that progressed to the lower back and abdominal muscles. He reported that he had consumed water during each of the three breaks during practice.

ASSESSMENT AND TREATMENT

Vital signs were normal, including heart rate, blood pressure and respiratory rate. Initial treatment consisted of water and carbohydrate-electrolyte consumption, mild stretching and application of ice to the affected muscles. When the symptoms continued for more than three hours, EMS was summoned.

After an assessment, the patient was transferred to a hospital emergency room. Upon arrival, intravenous fluids were administered and urinalysis, hematology and chemistry reports were ordered.

Creatine kinase levels were found to be elevated, indicating heat stroke and/or renal dysfunction (kidney failure). The athlete was kept on fluid replacement therapy throughout the evening, receiving 8,900 milliliters of fluid with only 700 milliliters of urinary output.

He then was transferred to a children’s hospital, where he was diagnosed with exertional rhabdomyolysis. Associated with dehydration and high-level exercise, exertional rhabdomyolysis can cause muscle damage and lead to renal failure.

RESULTS

He was discharged to his home after 36 hours when creatine kinase levels reduced; after seven days he was cleared to return to practice. At the time of his return, he had a 4.6 percent loss in body mass. As a result, he was educated on consumption of supplemental fluids while at home and more-frequent water breaks during practices. He was able to return to play fully without symptoms.

DISCUSSION

It is essential that athletes replace lost fluids during training and competition. Dehydration as small as 2 percent can affect sports performance. Muscle damage can occur with dehydration, particularly in unaccustomed athletes, with the potential for renal failure and even death.

Athletic trainers play an essential role given that many athletes are unaware of the signs and symptoms of dehydration. In particular, athletic trainers must be aware of symptoms of exertional rhabdomyolysis. During periods of intensive conditioning such as two-a-days, athletes must be educated about and closely monitored for signs and symptoms of dehydration and provided with sufficient opportunities for rehydration.

REFERENCE

By Katherine Myos

INTRODUCTION
Exercise and sports participation in hot and humid climates has gained more attention because of an increase in injury rates and a reportable decline in athletic performance.

Athletes in sports requiring anaerobic power do not always pay attention to thirst and become dehydrated during competition. The purpose of this study was to examine how acute dehydration by exercise in a hot, humid environment affected upper- and lower-body anaerobic muscular power.

METHODS
This study assessed the affect of hydration on upper- and lower-body mean power, peak power and total power output.

Seven healthy men volunteered for the study. All lived active lifestyles with anaerobic and aerobic workout at least two to three sessions per week. Upper- and lower-body Wingate anaerobic testing was performed in a normally hydrated condition before a heat stress trial and again in a dehydrated condition.

The heat stress trial consisted of 45 to 90 minutes of treadmill exercise in a hot, humid environment. Test subjects exercised at 60 percent of their age-predicted heart rate range until achieving a criterion of 3 percent body mass loss.

Vital signs and rating of perceived exertion were measured every 15 minutes during testing as a safety precaution. Hydration level was determined by assessing body mass measurements and urinalysis. The subjects’ motivation level was determined by administering a visual analog scale.

RESULTS
• Subjects became significantly dehydrated during the heat stress trial, according to changes in body mass (reduced 3.1 percent), urine color (increased 24.6 percent), and urine-specific gravity (increased 0.196 percent).
• Motivation ratings were not significantly different.
• Fatigue severity increased 70 percent in the dehydrated state.
• Mean power decreased by 7.17 percent and 19.20 percent for the upper body and lower body, respectively.
• Peak power decreased 14.48 percent and 18.36 percent for the upper body and lower body, respectively.

DISCUSSION
Results from this study suggest that active dehydration of 3.1 percent via exercise in a hot, humid environment has a negative effect on anaerobic muscle power. Water affects athletic performance more than any other nutrient. Consuming adequate amounts of fluids is important for normal cellular function and particularly important for thermal regulation.

This study demonstrated a direct connection between water deficits and an athlete’s ability to produce power. It is important for athletes and anyone physically active to recognize that dehydration can impair muscle performance and make them more susceptible to musculoskeletal injury.

REFERENCE