



# HCHN Newsletter

FALL 2008

## Cocoa: Game On

### The Use of Cocoa for Sports Performance & Recovery

#### ...AND I QUOTE

“Put EAT CHOCOLATE at the top of your list of things to do each day. That way, at least you’ll get one thing done!”

-Unknown

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Sports nutrition is no longer just for competitive athletes. Everyone from soccer moms to the local softball team is interested in performing better and preventing injury and soreness.

The HCHN has investigated the role of cocoa and its numerous nutritive components, such as flavanol antioxidants, on exercise performance and recovery.

#### Getting into the Zone

In one study, researchers at Northern Arizona University investigated brain electrical patterns in college students, after eating a high-flavanol dark chocolate and a low-flavanol chocolate placebo made by Hershey.

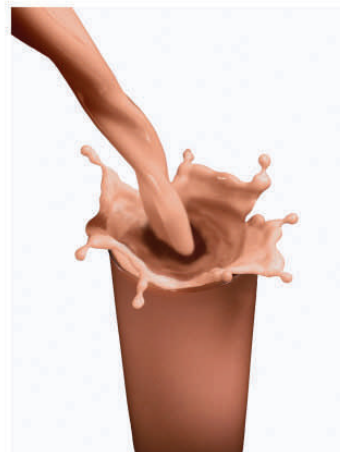
They found that the students’ brain waves reflected a pattern of focused, yet calm attention after eating the dark chocolate. This state of brain activity might be described as being “in the zone” or “having your head in the game.”

#### Mental and Physical Energy

This effect was corroborated in a small HCHN-supported study at Georgia State University. A high-cocoa-flavanol bar or placebo was provided to a group of seven male NCAA Division I golfers over six rounds of golf on three different courses, the test products were provided one hour before teeing off and twice afterwards.

At set intervals across the links, the golfers made ratings on 12 different parameters relating to their alertness, ability to concentrate, fatigue and mental and physical energy levels.

In the ratings over the golf match, the high-cocoa flavanol



bar produced significant improvements in perceived alertness, concentration, consistency of swing, focus and mental and physical energy compared to the non-cocoa placebo bar.

In addition, golfers reported less fatigue, more stamina and feeling less worn out. Measures of accuracy and exhaustion were not significantly affected.

#### Exercise Recovery

According to Joel Stager, PhD, who heads the Department of

Kinesiology at Indiana University, “You don’t get better at your sport or activity while you are engaged in it. You get better when your body heals and strengthens itself afterward. One way to increase that repair is the right nutrition at the right time.” This indicates how important it is for athletes (of all levels) to refuel after practice, a game or activity.

Recovery nutrition is currently a very hot field of study. Some generally accepted tenets are that carbohydrates must be restored to depleted muscle. Eating protein with carbohydrates aids the ability of the muscle to restock glycogen (the storage form of carbohydrate in muscle). Protein also aids the muscle in rebuilding and repairing torn muscle fiber, adding to strength and muscle mass development. A ratio of 3:1 carbs to protein is thought to be optimal.

Finally, the role of antioxidants may aid recovery by reducing the inflammation and free radical damage that occurs naturally with strenuous activity.

This profile of nutrients is very similar to that found in chocolate milk. Dr. Stager’s laboratory tested chocolate milk and found that trained cyclists were able to cycle further in a second exercise bout after consuming chocolate milk com-

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# HCHN & Oral Health: The Xylitol Story

Even with wide availability of fluoride-containing products, tooth decay is still common—by age 39 nearly 87% of people in the U.S. have at least one tooth affected by tooth decay or a “cavity.”



ICE BREAKERS ICE CUBES contains more Xylitol than any other leading U.S. chewing gum.

What provides the **Whoa!** in ICE BREAKERS ICE CUBES chewing gum? That unique, intense cooling effect comes from **Xylitol!**

Found in natural sources such as fruits and vegetables, Xylitol is a great tasting sweetener with 40% less calories than sugar. Beyond its lower calories and unique cooling effect, Xylitol may also offer additional dental benefits.

Xylitol belongs to a group of substances called polyols, which are often called “sugar alcohols,” but technically they are neither sugars nor alcohols. These ingredients are used in many sugar-free and reduced sugar products, as well as in foods intended for people with diabetes. Because oral bacteria do not feed on polyols as they do on sugar, products made with polyols can make a FDA approved health claim, “does not promote tooth decay.”

Numerous studies in the past 30 years have investigated the benefits of Xylitol, many of which used Xylitol-sweetened chewing gum. Results from these studies show that xylitol:

- Is not metabolized (used as fuel) by oral bacteria.
- Inhibits the growth of oral bacteria associated with plaque formation

- Reduces the amount of tooth plaque formation
- Increases the flow of saliva which, in turn, helps to rinse away food and sugar in your mouth
- Aids in the repair or remineralization of damaged teeth
- May reduce the development of cavities

The awareness about Xylitol and

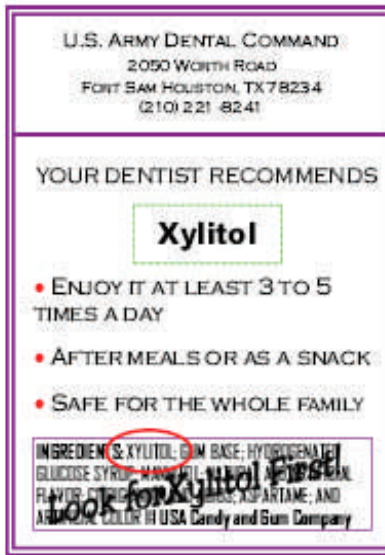
endorsed Xylitol for oral care in 1988, followed by the Swedish and Norwegian Dental Associations.

Using Xylitol products regularly after a meal has become a healthy and common habit in the daily life of many Finns. Over 90 % of Finnish day care centers provide Xylitol products to their children on a daily basis. In the U.S., the American Academy of Pediatric Dentistry supports preventative strategies using sugar substitutes such as Xylitol and recommends further research to identify strategies to reduce cavities.

The U.S. Army is also a supporter of Xylitol’s dental benefits. Due to a 2004 study which indicated a significant increase in tooth decay among deployed soldiers, the military began including Xylitol-containing chewing gum to their MRE rations to aid dental health.

Recognizing the need to improve soldiers oral care, the U.S. Army Dental Command created the “**Look for Xylitol First**” program to increase awareness of the benefits of Xylitol.

With this program, the Army encourages its patients to look for Xylitol as the first ingredient in chewing gums, candies, mints, toothpastes and mouthwashes.



dental benefits is strong in Europe and Asia. Xylitol-containing sugar-free gums are the top sellers in Japan and Korea. In Europe, Xylitol gums and candies are common. In fact, the Finnish Dental Association

## Pregnant? Try a little dark chocolate.

Preeclampsia is a pregnancy complication associated with high blood pressure and significant amounts of protein in the urine, which can have serious consequences for both mother and baby. Chocolate/cocoa intake have been associated with helping to maintain normal blood pressure when consumed regularly.

A recent study investigated the role of chocolate consumption and risk of preeclampsia. The study followed 1681 pregnant women who delivered babies between Fall 1996 and Winter 2000. Chocolate consumption was measured by self report in the first and third trimesters and validated by detecting theobromine, a cocoa marker, in umbilical cord blood. Preeclampsia developed in 3.7% (n = 63) of 1681 women. When risk of preeclampsia was calculated according to chocolate intake, women consuming five or more

servings of chocolate per week had a 40% lower risk of preeclampsia than those eating one or less servings of chocolate per week in the last three months of pregnancy. The researchers concluded that chocolate consumption during pregnancy may lower risk of preeclampsia.

“The fact that as little as a serving of chocolate per day may have a beneficial effect on a major pregnancy complication is encouraging,” says Debra Miller, PhD, The Hershey Company, “The scientists in our Center will continue to monitor this important area of emerging science.”



## HCHN Profile: Ken Miller



Ken Miller, Staff Scientist in the Natural Products Group, joined Hershey in 1982. Ken hails from Reading, PA and has a Bachelor's degree in Chem-

istry (King's College) and a Master's degree in Biochemistry (PSU). Ken's expertise is cocoa bean quality and flavor. In his early years, he was part of a team researching the impact of cocoa fermentation on flavor. He spent weeks at Hershey's cocoa research farm in Belize investigating the science behind traditional cocoa farming practices. Since then, he has traveled extensively to gain expertise in cocoa post-harvest practices.

During his time at Hershey, Ken developed a test for measuring the degree of cocoa fermentation used to track bean quality and holds a patent on chocolate flavor precursors. He presents at numerous in-house and international venues and authored book chapters. One of his hidden talents is preserving cocoa pods for educational presentations in the company and community.

As part of the HCHN, Ken explores the impact of processing on cocoa flavanol antioxidants. He has authored several publications on the flavanol content of cocoa/chocolate products and is a co-inventor on several patent applications.

Ken chairs the Food Safety and Quality Committee of the National Confectioners Association, is active in the World Cocoa Foundation and a member of the American Chemical Society. He serves the local community as a member of the Biosafety Committee for the Milton S. Hershey Medical Center reviewing research protocols and has worked as a Boy's Club leader for over 25 years. Ken is married, has three adult children, and five grandchildren. His favorite hobbies are fishing and boating and, of course, tasting chocolate.

## HERSHEY'S Chocolate & Cocoa: Heart Healthy Study Published

A recent study conducted by the Yale-Griffin Prevention Research Center, and just published in the *American Journal of Clinical Nutrition*, indicates that consuming HERSHEY'S EXTRA DARK chocolate and HERSHEY'S natural cocoa (as a beverage) helps maintain healthy blood pressure and improves blood vessel function.

Evidence continues to accumulate that natural cocoa and dark chocolate, rich in flavonoids, may have the potential to

improve cardiovascular health. This current study was designed to examine the short-term effects of eating dark chocolate and drinking cocoa beverages (with and without sugar) on endothelial function (blood vessel function) and blood pressure.

Forty-five moderately overweight, but otherwise healthy adults were randomly assigned to consume HERSHEY'S EXTRA DARK chocolate or a cocoa-free placebo bar, and again to consume sugar-free hot cocoa, a sugar-sweetened cocoa (both with ~22g HERSHEY'S natural cocoa) and a no-cocoa placebo beverage.

Blood pressure and endothelial function testing (using ultrasound technology) were measured immediately before and two hours after consuming the test foods.

In the test, the ingestion of both solid dark chocolate and the cocoa-containing beverages improved



endothelial function and lowered blood pressure. The results were stronger with the sugar-free beverage preparation; it is believed that the sugar content attenuates these effects, and sugar-free preparations

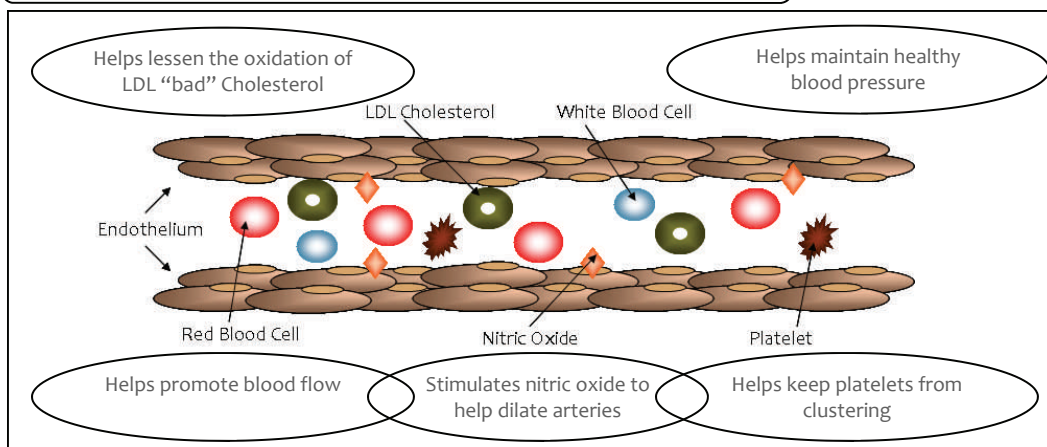
**"This study is exciting because it shows various preparations of dark chocolate and cocoa, foods long associated with pleasure have health promoting properties as well," says Dr. David Katz.**

augment them.

"To our knowledge, this is the first study to compare the short-term effects of regular and sugar-free cocoa on endothelial function and blood pressure, and to examine the effects of solid dark chocolate and liquid cocoa in the same subjects" says David L. Katz, MD, MPH, principal investigator of the study, and director of the Prevention Research Center. "Our study demonstrated impressive enhancement of endothelial function following the acute consumption of dark chocolate and cocoa, which were even better with a sugar-free cocoa. This study is exciting because it shows various preparations of dark chocolate and cocoa, foods long associated with pleasure, have health promoting properties as well."

This study was funded by the Hershey Center for Health & Nutrition.

### How Cocoa Flavonols Aid Cardiovascular Health





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pared to other beverages, but the difference was significantly different compared to a sports drink.

The HCHN and Dr. Stager then investigated how to build the best exercise recovery beverage by testing matched combinations of carbohydrates, protein and cocoa flavanols. The beverage with a 3:1 carb to protein ratio plus natural cocoa powder outperformed all other test products.

In the test, the cyclists exercised to exhaustion and then four hours later were asked to exercise again. After drinking the beverage with the full complement of ingredients, the cyclists were able to do more than 40% more cycling.

“Overall, the connections between cocoa and exercise performance are quite interesting,” says

Amy Griel, PhD, Hershey’s Senior Nutrition Scientist who also has a master’s degree in exercise physiology, “This is definitely an area that HCHN will continue to explore.”

**TIP for YOU:**

For your own sports recovery, it is best to consume a carbohydrate/protein mixture — with some cocoa powder — within one hour after a game or exercise. During this cool down phase after exercise, muscle cells are more insulin sensitive and are better able to refuel.

For more information, read:

[Nutrient Timing: The Future of Sports Nutrition](#) by John Ivy and

Robert Portman

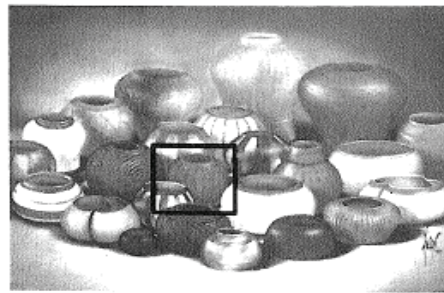
## Hershey Scientist Helps Date the Origins of Chocolate

Many people are now aware that cocoa beans were regularly used in beverages by the Mayan and Aztec cultures. However, new evidence suggests that much earlier civilizations may have been the original cultivators and consumers of cacao.

Much of the original information regarding cacao usage in Mesoamerica was documented at the time of the Spanish conquest in the 1500s AD, which suggested that cacao was cultivated and consumed as early as 900 AD.

In 1989, a group of researchers from the University of Texas led by Terry Powis, PhD, contacted Hershey scientist, Jeffrey Hurst, to determine if his analytical tools could detect whether a vessel (ancient ceramic vase/pitcher) from northeastern Guatemala was used for cacao beverages. Jeff’s analyses led to the discovery that cacao was consumed in this region as far back as 460 AD.

In 2002, Jeff analyzed vessels from modern day Belize. Two of these vessels showed evidence that cacao usage may have pre-dated the Guatemalan vessels by ~800 years — with estimation of use around 600 BC.



Early Mokaya ceramics found to have cacao residue dating between 1900-1500 BC.

A 2007 report indicates that inhabitants of northern Honduras may have consumed chocolate from spouted ceramic bottles and jars around 1200-1100 BC.

Yale University anthropologist David

Coe, PhD provides published evidence that the Olmecs, a civilization which pre-dates the Mayans, used words such as *ka-ka-wa* in reference to cacao as far back as 1500 BC.

Now, Jeff Hurst has again teamed up with Dr. Terry Powis to investigate artifacts from Paso de la Amada, in southern Mexico. This site is thought to have been home to the Mokaya, an ancient Mesoamerican people who pre-date even the Olmecs.

Analyses of ceramic Mokayan vessels indicates that cacao was used by the Mokaya as far back as 1650 BC. “This work is important,” states Jeff Hurst, “Very little is known about the Olmec and Mokaya’s use of cacao. This discovery provides proof that people well before the Mayans were involved in the production and consumption of liquid chocolate.”