



NUTRITION

WINNING WITH CAFFEINE

It's the last legal performance enhancer, and studies show it really does give jocks an edge. BY HEATHER HANSEN

WHEN THE DOCUMENTARY filmmaker Michael Brown is making his way to the top of Mount Everest, he pares down to the absolute minimum gear needed for success — and that includes a can of fair-trade coffee. For him it's a tool as critical as crampons and oxygen tanks. "I even put instant coffee in my water bottle on summit day," says Brown, 42, who has reached the top of the world four times. "It's the elixir of life. And almost every friend I know who performs at a high level has coffee every day."

Brown and his friends are hardly exceptional. Athletes of all stripes swear by coffee or other caffeinated beverages to fuel top performances. Alberto Tomba, the Italian ski racer who won three Olympic gold medals, famously sipped coffee in the start shack before runs. And long before Tour de France cyclists were giving themselves shots of EPO, they were taking shots of espresso to fuel a long day in the saddle. Not missing any cues, Red Bull, the Austrian energy drink company, brings in nearly \$4 billion annually by mostly marketing its beverage toward athletes in need of a pick-me-up. What's interesting, though, is that for all the anecdotal evidence of caffeine as a performance-enhancing

drug, *why* it helps athletes, and how much it takes to amplify a day of sports, is just now coming into focus.

Caffeine works as a stimulant by blocking a brain chemical called adenosine, which makes us feel tired. It also awakens almost every tissue in the body in ways that still elude scientists. While the compound has been proven to impact the muscular, cardiovascular, and respiratory systems, and speed up metabolism, hormones, and brain activity — masking fatigue and boosting mood, alertness, and concentration — scientists haven't been able to pinpoint the chemical reactions that cause all this to happen. (Most theorize that caffeine encourag-

es the neurotransmitters noradrenalin and epinephrine to increase blood pressure, boosting oxygen flow in the body and the force and rate at which muscles contract.) That said, scientists are now beginning to understand how much caffeine is optimal for fueling top athletic performances.

In a study released this past October from Loughborough University in England, caffeine significantly improved athletes' mental and physical achievements during endurance activities. To test the stimulant's effects, a group of cyclists each ate three carbohydrate-rich bars over a 180-minute ride. Riders who had 100 milligrams of caffeine in each bar experienced greater endurance overall. "Caffeine improved their physical performance, which allowed them to cycle on average 354 seconds longer until they were completely exhausted," says Eef Hogervorst, the head of the study and chair of biological psychology at the university. That was a 27 percent improvement over their competitors who had carb bars without caffeine — and obviously, a huge advantage in races that come down to fractions of a second. The carb-caffeine combo also boosted the athletes' concentration and response times.

Perhaps more astounding is what a group of scientists at Australia's Royal Melbourne Institute of Technology found caffeine did for athletes *after* they finished exercising. A group of cyclists rode lab bikes until they bonked, then were given identical high-carb drinks, except some had added caffeine (about 560 milligrams, or roughly five to six cups of coffee). Chief researcher John Hawley says that after four hours, the caffeinated group had produced upward of 60 percent more glycogen (the energy stored in muscles) than the other group. "Since glycogen in the muscle is stored until you use it," says Hawley, "those athletes are at a distinct advantage when they resume strenuous activity."

Of course most athletes won't consume five cups of coffee before, during, or after a workout — unless they want to feel as if they're slipping into cardiac arrest. Hawley says the magic number for optimal performance is three milligrams of caffeine per 2.2 pounds of body weight before a workout, or about 200 milligrams for a 150-pound person (taken all at once, in powder, gel, or liquid form), which equals a small cup of coffee. In the average adult the effects of that much caffeine start to wear off in three to four hours. Athletes can have a smaller second hit, but can safely consume only about 300 milligrams per day, the equivalent of two to three cups of coffee (too much can cause dehydration, muscle cramping, and gastrointestinal distress). Three hundred milligrams will still boost endurance, says Hawley. "Any more than that and caffeine's adverse effects outweigh its benefits." ■

YOUR DAILY DOSE

THREE MG OF CAFFEINE PER 2.2 POUNDS OF BODY WEIGHT BEFORE A WORKOUT WILL IMPROVE PERFORMANCE. DO THE MATH WHEN REACHING FOR THESE.

Starbucks Grande coffee (16 oz): 330 mg

Espresso (1 oz): 64 mg

Green tea (8 oz, brewed): 32 mg

Black tea (8 oz, brewed): 47 mg

Mountain Dew (12 oz): 54 mg

Red Bull (8.3 oz): 76 mg

Clif Shot Mocha Energy Gel (1.1 oz): 50 mg

Milk chocolate bar (1.55 oz): 9 mg

Dark chocolate bar (1.45 oz): 18 mg