



Start Me Up

Caffeine. It's America's buzz word. And with spiked sodas and goosed gums, it's easier than ever to ingest. But is there a price for living a wired life?

By: Jim Thornton Photograph by: Nicholas Eveleigh

I'm an unnervous wreck.

Stuporously groggy on this, the first full day of "[Caffeine Cold Turkey](#)," my head feels like it's been crushed in a vice. It's nearly impossible to think.

I slap myself three times, happy for the jolts of fleeting alertness each cheek sting provides. Alas, this exercise quickly proves too exhausting to continue.

It's now 10:40 a.m., and I've been up since 8:45, nearly 2 full hours. Surely I've earned the right to take my first nap. But no: I shan't succumb to sleep's siren call so swiftly. I will struggle to stay awake till, at the very least, noonish.

Given the headache, lethargy, and sundry other unpleasant symptoms involved so far in my withdrawal, you may be wondering about my reasons for this exercise in abstention. Excellent question.

Let's start with the basic truth that, God help me, I've become a slave to the bean. Our family's commercial-grade coffeemaker brews up to 10 cups at a time. When I first purchased this gizmo in the mid-'90s, I typically limited myself to 2 or 3 cups each morning. Over time, however, my usage incrementally escalated--3 cups gave way to 4, then 5, then 6, then...

Honestly, I'm at a loss to explain how things got so out of whack. But for the past few years, my habit upon awakening has been to pack the basket with prodigious quantities of Colombian Supremo, hit the strongest brew button, then drink the resulting 10 cups of black coffee over the next hour. If the synapses of my brain can be compared to an obstinate mule team, then caffeine has become the lash that drives them.

By lunch, I'm usually ready to follow up my morning dosage with one or two 12-ounce cans of Coke, nothing too serious. But by 5 o'clock, the workday done, I'm ready to resume heavy usage again--not to hone cognitive performance, but rather to boost physical endurance. As a masters swimmer averaging 17,000 yards a week, I've gotten in the habit of stopping off at a local convenience store en route to evening practice. Here I purchase and quickly down a 24-ounce cappuccino to goad my efforts in the pool.

Unfortunately, I've become so habituated to my favorite drug that it no longer works terribly well for me. That's the main reason I decided to decaffeinate my body: I have a key swim meet coming up, and I've been concerned about my chances for some time. So concerned that I sought advice from Lawrence Armstrong, Ph.D., a professor of exercise at the University of Connecticut's human-performance lab and a longtime researcher into caffeine's sports-enhancing effects.

"If you've developed a tolerance to caffeine," he told me, "you should try withdrawal until you become caffeine naive again, then come back to it for your meet, when it's likely you'll get a greater response per dose."

That's the plan, anyway. Right now, I feel like a java junkie, even though, technically, I'm not one. Caffeine isn't a drug like amphetamines or cocaine, in that it doesn't act on the areas of the brain related to reward, motivation, and addiction. So I can't be "hooked" in the heroin sense of the word. On this, my first day of withdrawal, I absolutely crave caffeine, but I don't absolutely need it.

It's now 11:18 a.m.

What I do absolutely need is a nap.

Though my personal usage is undeniably extreme, my affection for caffeine is hardly unique. According to Harriet de Wit, Ph.D., an associate professor of psychiatry at the University of Chicago, caffeine is by far the most widely used psychoactive drug in the world, easily surpassing both alcohol and nicotine. A study of java-drinking trends by the National Coffee Association (NCA) showed that, as of 2000, a record 79 percent of U.S. adults consumed coffee.

As a nation, we down 350 million cups of coffee a day, with men swallowing significantly more than women. Of course, since many of us also imbibe tea, Big Gulps, and "energy" drinks such as Red Bull, these stats don't begin to measure the extent of America's buzz.

Caffeine is ubiquitous. It's in everything from chocolate bars to over-the-counter analgesics, many cold remedies, and weight-loss pills. There's even a new caffeinated gum on the market: Jolt Caffeine Energy Gum--available in Spearmint and Icymint. Two Chiclet-size pieces are capable of leaching, in about 5 minutes, 70 milligrams (mg)--or about a coffee cup's worth--of caffeine into the blood vessels under the tongue. (Coffee, by comparison, takes at least 45 minutes to produce peak caffeine levels in the bloodstream.)

Obviously, mankind has come a long way since Sufi priests made the first caffeinated drink out of coffee-bean husks, then used the liquid to fuel all-night religious ceremonies. Early Europeans witnessing these maniacal events dubbed the participants "whirling dervishes"--and the truth is, there's no shortage of us would-be dervishes around today.

So what exactly has made caffeine the Official Drug of the Human Race? The story of this plant-derived compound clearly begins with its action in the brain. Inside each human noggin, a slew of neurotransmitters and related compounds carry on cascading interactions that somehow result in everything from sleep to wakefulness, thoughts to emotions. Some of these molecules have a generally stimulating effect, while others work to dampen down nervous activity. Until about 20 years ago, scientists thought caffeine fell squarely into the brain-jazzing category. Then, in 1982, researchers discovered an evolutionary fluke: Caffeine's molecular structure is very similar to that of adenosine, an inhibitory brain substance found in many animals, including humans.

"Animal studies have suggested that adenosine could be the 'somnolent,' or sleep-inducing, factor," explains Tom McLellan, Ph.D., a scientist at Defence R&D Canada in Toronto who studies caffeine for the Canadian military. "When people need sleep, their adenosine levels are high, which seems to trigger the brain into wanting to shut down."

The longer you're awake, the more adenosine gradually accumulates in your brain. The growing surfeit, in turn, binds to specialized adenosine receptors, depressing nervous-system activity and making you groggy.

In ways that are not yet understood, getting [enough sleep](#) clears the chemical from your system, allowing you to begin the next day fully restored, your sleep debt paid in full.

There is, however, an alternative to clearing adenosine: You can block it before it has a chance to make you sleepy. Caffeine does this by binding to adenosine receptors before the adenosine gets there. It's like jamming a toothpick into a keyhole so the key can't fit.

To the holistic, health-food-store crowd, such molecular monkey-wrenching probably smacks of fooling Mother Nature in a way similar to pumping heifers full of bovine growth hormone. Surely we caffeine fiends can't keep doing this to ourselves day after day without having to pay some kind of penalty.

Right?

THE HEALTH IMPACT

For decades, studies have attempted to find links between caffeine intake and a host of heavy-duty ailments, from heart disease to cancer. But no luck. The famed Framingham Heart Study, for example, concluded that caffeine consumption showed no influence on the rate of heart disease or stroke. Another investigation of 45,000 men published in the New England Journal of Medicine reached a similar conclusion. As for the cancer connection, a Norwegian study of 15,000 people found no significant correlation between coffee use and cancer, or any other disease, for that matter. The International Agency for the Research of Cancer reaffirmed this finding.

"Caffeine, however, has been condemned by 'clean living' advocates because it has no nutritional value, is not needed for any physiologic function, and is commonly abused by the tired and stressed," concludes nutrition expert Nancy Clark, R.D., in a review paper published in *The Physician and Sportsmedicine*. "As a result, many coffee drinkers worry that their early-morning mugful will contribute to health problems. The truth is, coffee and other caffeinated beverages in moderation are not health demons."

In fact, some health conditions may actually be helped by those judicious jolts of java. Harvard researchers recently connected caffeine intake to a reduced risk of type-2 diabetes, and just last year, scientists in Italy discovered that coffee may decrease a person's chances of developing oral or esophageal cancer.**

THE EMOTIONAL EFFECTS

Even caffeine's greatest boosters have long acknowledged that in a certain subset of users, the drug can trigger unpleasant side effects, including anxiety and even panic attacks. Several years ago, University of Chicago researcher de Wit attended a lecture by German geneticist Jurgen Deckert, who reported his finding that a genetic variation in a type of adenosine receptor was strongly linked to panic disorder. "Since I knew that caffeine works on adenosine receptors," recalls de Wit, "I knew it would be easy to see whether this same gene variation is related to people's different responses to caffeine."

In a study published in the journal *Neuropsychopharmacology*, de Wit and her colleagues gave 94 randomly selected volunteers 150 mg caffeine (the equivalent of 2 cups of coffee) or a placebo, then measured their responses in terms of mood, alertness, heart rate, and blood pressure. The researchers also genotyped each individual. On nearly all measures, from increased vigilance to relief from fatigue, caffeine proved to affect the test subjects identically. The only difference was that those with the specific genetic variation--about 30 percent of the total--reported anxiety, whereas the other 70 percent didn't.

"What our data suggest," says de Wit, "is that if you have an unusual response to caffeine, there's probably a biological basis for why it's happening to you."

Bottom line: If moderate doses of the bean give you the heebie-jeebies, it's best to cut it out entirely.

THE BRAIN BENEFITS

Of all caffeine's purported effects, the one most touted by users themselves is its ability to provide a temporary mental edge. Unfortunately, for those who are hoping to ace a critical exam through a short-lived boost in IQ, the current evidence indicates that caffeine doesn't make you smarter.

"What's been shown with caffeine is that it does have a dramatic effect on alertness," says McLellan, "but as you move to higher-order cognitive functioning, such as decision making, it doesn't really have an impact."

Still, alertness is essential for most jobs, especially those in the military. In a new U.S. Air Force-funded study, researchers had 16 healthy men alternate 28 hours of consciousness with 14 hours of sleep for 1 month—an eccentric schedule designed to mimic shift work or jet lag. Every hour that the men were awake, they received tablets containing either a placebo substance or roughly 20 mg caffeine, the amount in 1/4 cup of coffee.

The results proved unequivocal, with caffeine users consistently outperforming the placebo group on a host of computerized tests. The findings also showed something else—that it doesn't make sense to wake up and smell the coffee. "Caffeine had a very strong effect when delivered in small, incremental doses over time," says study author James Wyatt, Ph.D. "I hate to say it, but most of us have been using caffeine the wrong way."

Wyatt bases his hypothesis on the fact that soporific adenosine levels are lowest when we first awake, precisely the time most of us reach for our Folgers. By the time adenosine starts to build, the morning caffeine spike is already waning. For those wedded to their caffeine fix, Wyatt recommends waiting till after lunch, when adenosine levels are starting to rise significantly. Thereafter, you'll get a more effective and consistent hit with small, regular doses, such as 1/4 cup per hour. It's important not to overdo it and end up compromising your ability to sleep at night. For most people, this probably means avoiding caffeine within 4 hours of bedtime.

"Remember the big picture here," says Wyatt. "If everyone simply got 8.3 to 8.4 hours of quality sleep on a regular nightly basis, we wouldn't need caffeine in the first place."

THE ENDURANCE ANGLE

Studies have long shown that caffeine has ergogenic (i.e., sports-enhancing) effects in a multitude of activities, from swimming to tennis. The main effect seems to be improving endurance. In a 2002 study published in the *Journal of Applied Physiology*, McLellan and his colleagues found that the time it took for cyclists to exercise to exhaustion was significantly longer in those receiving caffeine than in those given a placebo. Moreover, this benefit was greatest in those who didn't use caffeine regularly.

"More and more," says McLellan, "it's looking like caffeine works on motivation within the brain itself. It affects your perception of effort and makes you feel you're not working as hard as you might otherwise feel."

It doesn't take whopping doses to get this effect. In McClellan's recent study of 9 men, the equivalent of 2 cups of coffee was sufficient to provide a longer exercise duration to exhaustion, with the consumption of more caffeine providing no additional benefit.

If you're planning to try out the caffeine edge the next time you challenge a buddy, say, to five sets of tennis, keep in mind that coffee can sometimes trigger gastrointestinal distress, possibly because of acids and other components in the brew. In his studies for the Canadian military, McLellan found what he believes is an optimum delivery system: caffeinated gum. "I found it great, myself," he says. "It's really quick—the concentration peaks in 5 to 10 minutes. And it doesn't give me any stomach symptoms."

It's exactly 3 weeks since my last cup of coffee, and my system is presumably as caffeine-free now as the day I was born. The headaches and urge to hibernate that plagued me during the first 5 days of abstinence have faded, restoring a baseline normalcy—no less nor, alas, more energetic than I was during the long days of my high-octane dependency.

I stifle a yawn.

In yesterday's mail, my secret weapon for my swim meet finally arrived: a dozen packs of **Jolt Caffeine Energy Gum** (available at convenience stores and joltgum.com). In exactly 1 hour, I'll mount the starting blocks for the 500-yard freestyle at the Pennsylvania State Games. In preparation for this, I finally break my fast, popping a single piece of gum into my mouth. It takes a mere 10 minutes for the wad under my tongue to utterly obliterate any further urge to yawn.

Five minutes before the race, I chew a second piece, providing my system with the total caffeine equivalent of a single cup of coffee. *The effect is nothing short of exhilarating.* I explode off the blocks and find myself swimming with a remarkable degree of verve and indefatigability. When the splashing stops, I've placed first in the event—by 27 seconds—in the process swimming the second-fastest 500 of my life.

Suspecting a possible fluke, I repeat the same two-hit caffeine-gum protocol for each race over the next 2 days. I easily win them all—the 100 backstroke, plus the 50, 100, and 200 freestyles—achieving close to lifetime bests in each race.

True, this success hasn't come cheap. During the nights following both days of competition, I found it nearly impossible to sleep and, in fact, averaged no more than 3 fitful hours. And a day after getting home from the swim meet, I came down with the worst cold I've had in years. I'm sure the caffeine did not directly cause this. But could my immune system have been compromised by sleeplessness and by extraordinary effort made to seem effortless?

In any event, this whole experience has given me a new appreciation—and respect—for a drink I'd come to think of as little more than hot brown water. Gone forever is my old gallon-a-day approach. From now on, I plan to keep my coffee drinking and gum chewing below moderate, saving occasional indulgences only for those times when this dervish truly needs to whirl.

***Please note - These statements have not been evaluated by the Food and Drug Administration. Jolt Gum is not intended to diagnose, treat, cure, or prevent any disease.*