

caffeinated

You see them everywhere on campus during midterms and finals: students sitting in cubicles in the library or at tables in SUB, exasperated, furiously cramming for exams, surrounded by little styrofoam cups or aluminum cans that keep them going through the day. Apart perhaps from alcohol, there's no other substance or product as ubiquitous and integral to the student experience as caffeine; most students can't even go a day without consuming something with caffeine in it. But most do so without knowing much about the effect that that large double-double has on their bodies.

But where student apathy prevails, so does espresso-sipping investigationalism—so the *Gateway* is here to serve up a refillable mug of everything you never knew about everyone's favourite pick-me-up, from what it actually does to the body to how much money it makes the SU.

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Chemistry is the key to a healthy relationship

When it's 3am the night before your final and you're guzzling down grandes, the physiological effects of caffeine on your brain probably take second place in your thoughts to your ever-expanding knowledge of 18th-century agrarian business practices. But there's a scientific reason why you can stay alert while reading all those supply-and-demand graphs.

According to Jonathan Cena, a PhD candidate in the Department of Pharmacology (and strong advocate of Venti Vanilla Americanos from Starbucks), "Pharmacologically, the main effect of caffeine is to inhibit adenosine receptors."

Adenosine normally works to inhibit the action of neurons in the brain: "if you block that signal, it can increase the activity of the central nervous system," Cena explained. Counterintuitive as it seems, caffeine actually decreases blood flow to the brain by constricting cerebral blood vessels—an effect that can help relieve headaches, which is why caffeine is included in migraine medication.

Chemically, caffeine is part of the methylxanthine family of stimulant compounds, along with theophylline (found in tea), and theobromine (found in chocolate). But while all students understand and exploit the fact that caffeine is a mental stimulant, fewer students understand that caffeine actually has systemic effects within the human body. As well as increasing your heart rate, caffeine will dilate your lungs, and it also has effects on your metabolism and kidneys.

"It releases fatty acids from adipose [fat] tissue," explained Dana Wilkinson, research coordinator of the Human Nutrition Research Unit at the U of A and a registered dietician. "In that sense, it could potentially help with

weight loss, though that is not a good way to lose weight at all. It also affects the kidneys in that it's linked to dehydration."

If it seems like you need to consume more coffee than your roommate to get a buzz, science has an answer for this as well.

"There's two phenotypes in terms of caffeine metabolism," Cena noted. "One type of person can metabolize caffeine quickly, so they'll get the effects much less, but the people that can't metabolize caffeine that fast will experience heightened effects."

He stated that on average, caffeine's half-life in the body is around six hours, and peaks in the blood around 30–45 minutes after consumption—"so you probably want to take it about a half hour before you want to study or take an exam," he explained.

Coffee before your midterm can have more long-term beneficial effects than just increasing your cognitive alertness and GPA. Wilkinson said it's been demonstrated that the highest coffee drinkers also have the lowest risk of type-II diabetes, while Cena pointed out that there is a decrease in cancer rates amongst frequent coffee consumers. But they both emphasized that this may or may not be due solely to caffeine.

"Coffee has thousands of compounds and a lot of antioxidants that are generally very beneficial, whereas caffeine is just caffeine," she said.

With all these positive health benefits, you may be inclined to start downing the cups of joe at a frantic pace. But everyone knows what it's like to get the coffee jitters. People tend to forget that caffeine is a drug and has side effects just like other substances if you overindulge.

"You'll start feeling adverse effects above 500–600mg of caffeine," Cena said. "Two

to three Starbucks Grandes results in caffeinism, as you start getting jitters and feeling nauseous.

"There is a lethal dose of caffeine; that is around 10g, or about 28 Starbucks Grandes. At these high concentrations, it inhibits another receptor, and people die because they go into convulsions. Typically, this wouldn't be from coffee, though, but that can happen in pill form."

Caffeine pills such as NoDoz are readily available today, though they tend to be used for sports performance rather than basic energizers. As a source of highly concentrated caffeine, overuse of such pills can more easily result in caffeinism and further detrimental effects.

Despite the potential for overconsumption, many students will admit to the need for a cup of coffee to start functioning for the day. According to both researchers, if you *think* you're addicted to caffeine, you're probably right.

"It's not as addictive as street drugs, but like drug addicts, people can be both psychologically and physically dependent," Cena said, adding that if you're having withdrawal symptoms like headaches, you're probably physically dependent.

Luckily, according to Wilkinson, it isn't difficult to kick the habit, explaining that it only takes "about 24–48 hours for caffeine withdrawal to be fine."

Caffeine has been implicated in other medical problems as well. A new study published this week in the *Journal of Obstetrics and Gynecology* reports that an intake of just 200mg of caffeine per day, or two cups of coffee, resulted in twice the miscarriage rate amongst pregnant women than in expecting women who didn't consume caffeine. This echoes the results of previous studies, though the American College of Obstetricians and Gynecologists has no official guidelines for caffeine use during pregnancy.

Overall, both of the researchers agreed that moderation is the key.

"Studies have shown that long-term use of caffeine is not detrimental," Cena stated.

As for a beneficial threshold, Wilkinson observed that it all depends on where you get your coffee. She recommends two to three cups of home-brewed coffee as a maximum per day, and less if you're drinking more heavily caffeinated brands like Starbucks.

"Each cup has about 100mg [of caffeine], but it does depend on where you get your coffee," she said.

Mixing taurine and caffeine ain't no bull

The increased popularity of energy drinks has led to mixed messages within the media as to their safety, particularly due to the combination of caffeine and taurine, the additive that allows Red Bull to "give you wings." Cena explained that while evidence on taurine was lacking, so far there's nothing to suggest that it's a dangerous chemical, provided that you don't go overboard.



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What's the most caffeine you've ever consumed? Join the discussion in this week's online features section at www.thegatewayonline.ca