



## The Caffeine Generation

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There's no telling when caffeine became a contender for the number one most-consumed substance in the world, but it's safe to say it's not a passing fad. And because of its ubiquity in our diets, caffeine is also one of today's most researched compounds.

Certainly it wasn't the taste of caffeine or the coffee bean itself that started caffeine's ascent in becoming the supreme ruler of ingestible substances. Let's face it, pure caffeine in its early delivery systems (e.g. plain coffee, tea, etc.) was not something most people enjoyed the first time they tasted it. So why would the first time lead to a second, third, fourth and finally, a caffeine "addiction"?

Our "taste buds" certainly were NOT designed to desire bitter substances. In fact, bitter taste was a signal to our early ancestors that the substance in question was potentially poisonous, whereas sweet, fat and sodium specific appetites were (and still are) innate to our species (and these savory flavors are generally energy sustaining "foods" necessary for survival). So something about what caffeine actually does to us must alter our perception of flavor.

In the scientific community we say the phenomenon that alters our relationship with (including our taste for) a particular food or drink is related to the post-ingested response. Take alcohol delivered as whiskey or beer for instance. Virtually no one likes either of these two beverages the first time they taste it, but many enjoy the way they feel after they drink enough to alter their mood or relax. At this point, one begins to "acquire a taste" for both the beverage and the settings in which they are often consumed. Combine these and you now have the "experience" of whiskey, beer or wine.

The same is true for caffeine and its delivery systems. The post-ingested response was certainly the first reason for repeating consumption, which then led to adding caffeine to many different delivery systems (75% of it is ingested in the form of coffee). Now add the experience, whether it be social, time of day, or place of ingestion (which also helps to explain the success of decaf) and you're hooked for a lifetime if you maintain no aversion to caffeine's stimulus effect.

### History of caffeine/coffee

Although coffee's earliest mention appears to be around the 10th century, and the first coffee house opened in Istanbul in 1471 (no, it wasn't a Starbucks), it wasn't until the 16th century that it suddenly began to attract worldwide attention. Coffee as a drink started in Arabia,

and by the 13th century Muslims drank it religiously; where Islam went, so did coffee.

Because of caffeine's stimulating effects, coffee was often banned by countries and religious orders. In fact, based on its ability to alter mood/mind and drive away sleep, some people associated the drink with Paganism. However, the popularity of the drink eventually caused all bans to be lifted and coffee began to flow freely throughout the world--not just for its drug-like stimulating effects, but also for its potential medicinal value. In the beginning this was probably just an excuse to keep drinking it.

The rest is history. After 600 years coffee's popularity still hasn't waned, and as alluded to earlier, caffeine is probably the most widely used pharmacologically active compound in the world. Today it's most often delivered as coffee, tea and cola drinks.

### Coffee/caffeine in health, fitness and performance

Caffeine is certainly not necessary to excel in any of these categories, but it's often used and researched in the above areas in order to discover how its use may impact these outcomes.

#### Health

Keep in mind that some health effects of coffee may be related to the many other constituents (e.g. chlorogenic acid, flavones, quinides, lignans) present in the drink and not necessarily the caffeine content itself. The recent link between heavy coffee consumption and lower risk of type II diabetes is an example of this. It appears that both caffeinated and decaffeinated coffee can help protect against the onset of the disease, therefore caffeine is not the sole common denominator. On the other hand, coffee's affect on thermogenesis (speeding the metabolism) and thus weight control is probably solely related to its caffeine content.

Regular long-term caffeine/coffee consumption has been linked to the following effects on health & fitness and weight control:

#### Potential positive effects

**Lower risk of type II diabetes:** Probably due to the synergy of many/all constituents of coffee and caffeine's affect on weight.

**Lower weight:** Possibly driven by caffeine's impact on satiety, thermogenesis (6 cups of coffee or 600 mgs of caffeine leads to an increase in energy expenditure of about 100 cal/day), fat oxidation and by inducing increased physical activity.

**Lower risk of Parkinson's disease:** Caffeine protects dopaminergic neurons (damage to these brain neurons leads to Parkinson's).

**Caffeine is used for therapeutic purposes:** In treating bronchial asthma, as a cardiac stimulant, and as a diuretic

#### Potential adverse effects

**Temporary rise in blood pressure:** this may increase the risk of cardiovascular disease (CVD) events in people with hypertension.

**Contributes to osteoporosis:** due to increased urinary concentrations of calcium thus excretions.

**Adverse effects from high doses:** anxiety, nervousness, sleep disturbance, irritability, agitation, gastrointestinal disturbances and, upon cessation, withdrawal symptoms such as headaches and depression.

At the end of the day, I would probably never use improving health as an excuse to consume caffeine or coffee, but at the same time there are virtually no long-term negative health effects from moderate (2-3 cups or 2-400mgs of caffeine daily) to heavy (4-6 cups or 5-600mgs daily) consumption for the vast majority of the population. Of course with caffeine, like other substances contained in many foods or beverages (e.g. shellfish, nuts, fruit skins, etc.), there are sub-populations of people who cannot tolerate it.

Worldwide coffee is generally considered safe when consumed in moderation. A solid example of responsible guidelines comes from the Canadian government's Guidelines to Healthy Eating (see sidebar for the caffeine content of common beverages):

- Limit caffeine intake to 400-450 mgs/day (three 8 oz cups of caffeinated coffee)
- Pregnant and breast feeding women limit intake to 300 mgs/day (Apex generally suggests none or a maximum of 100 mgs/d during this period)
- Limit children 10-12 years to 85 mgs/day; 7-9 year to 62.5/day; 4-6 years to 45mgs/day

#### **Performance & Exercise**

Because caffeine is classified as a stimulant, it had at one time been banned by the International Olympic Committee (IOC). The ban was eventually lifted in 2004, but a limit still exists for both college and Olympic athletes on the maximum allowed. For the IOC, the amount present in the body is tested through urinalysis and cannot exceed 12 mgs/mL, which would require about 800 mgs of caffeine (about 8 cups of coffee) ingested in a short period.

Numerous studies have demonstrated caffeine's ability to increase exercise performance and particularly in delaying time to exhaustion. Caffeine's most profound

and consistent influence on performance seems to be during exercise lasting 30 to 120 minutes.

Most studies that have demonstrated caffeine's performance enhancement potential (ergogenic effect) have used dosages between 400-600 mgs.

Caffeine's proposed basic mechanisms of actions are:

1) Increase in specific stimulating hormone production (e.g. epinephrine) leading to an increase in fat usage for energy thereby sparing glycogen and thus decreasing time to exhaustion.

2) Mobilization or shift of intracellular calcium into intramuscular space, which may enhance muscle contraction and endurance, improving neuromuscular transmission (message to muscles) and increasing peak force performance.

3) Adenosine receptor blockage, which allows a greater more continuous output of the stimulating hormone epinephrine.

When it comes to exercise in general, caffeine may promote a desire to extend an exercise bout, decrease perceptions of fatigue or improve the willingness to participate in activities because caffeine can increase alertness, concentration and induce a stimulating effect.

#### **An energy boost with a decadent taste – have your Latte or Mocha and eat it too**

Eat your café mocha or latte? Wait until you taste the new Apex Java Delights in two great flavors: Iced Latte and Iced Mocha. You'll definitely be hooked, and not just because of the caffeine. Each cookie contains 100 mgs of caffeine (equivalent to a standard 8 oz cup) with 12 grams of protein and 24 grams of energy yielding carbohydrates. Eat one with a cup of coffee for breakfast and you're good to GO. Or enjoy one after lunch to get you through the next meeting, or as your pre-workout snack (200 calories). Anyway, you get the point. The Java Delight cookies are a two-for-one proposition: extra energy in a delicious new low-calorie, satiating and balanced Fitness Fast Food.

Well, that's it for your first of many New Year's gifts from Apex. Stay tuned and we'll keep you prepared to clear all the "fitness-hurdles" of the 21st century – it's so easy with the right tools. **-NEAL**

P.S. Take a look at some common caffeine counts on the following page.

### Common Coffee and Tea

Coffee	Caffeine Content (mg)
Starbucks Tall Drip	260
Starbucks Grande	330
Starbucks Venti	415
Starbucks Espresso Solo	75
Starbucks Espresso Doppio	150
Regular Coffee, brewed (8 fl oz)	108
Decaf Coffee, brewed (8 fl oz)	5.6
Instant Coffee (8 fl oz)	57
Tea (brewed) 8 fl oz	47
Green Tea (brewed) 8 fl oz	25
Iced Tea 8 fl oz	47
Tea (Instant) 8 fl oz	26

### Common Energy Drinks

Energy Drink	Caffeine Content (mg)
Red Bull 8.3 fl oz	80
Monster 16 fl oz	160
Rock Star 8 fl oz	80
Rock Star 16 fl oz	160
Rock Star 24 fl oz	240
Fixx 20 fl oz	500
SoBe Energy Citrus	80

### Common Soda

Soda	Caffeine Content (mg)
Coca Cola 12 fl oz	34.5
Diet Coke	45
Pepsi	38
Diet Pepsi	36
Dr. Pepper	41
Barq's Root beer	22.5
Mountain Dew	55
RC Cola	45.2
Sprite	0