

# THE CURIOUS CASE OF CAFFEINE

constantly tries to adjust to the increased caffeine intake in order to bring you back to normal. There are different mechanisms that might produce this normalization. Some studies show that in response to increased caffeine intake, your brain creates more adenosine receptors to compensate.

(8) For regular coffee drinkers who have developed a tolerance, the absence of caffeine produces withdrawal symptoms like fatigue, irritability and headaches. The only way to prevent this is to consume caffeine again. Thus the cycle of caffeine addiction can begin. In addition, caffeine's addictive properties may also be related to those of cocaine and heroin.

All three drugs cause dopamine to increase in the brain. Dopamine activates your brain's pleasure centers and makes you feel good which reinforces caffeine use.

(9) Though caffeine is generally considered safe, people can overdose if too much is consumed. One cup of coffee contains 75mg-150mg of caffeine so it would take 60-130 cups of coffee to kill a person as the toxic lethal dose is 10g or greater. Though it is unlikely that a person would kill themselves by drinking coffee, the abuse of powdered caffeine supplements can produce lethal effects with just a tablespoon. There have been cases of death associated with this type of misuse.

## Article Questions

- 1) In the chart below, list the mental and physical effects that caffeine has on the body.

Mental Effects	Physical Effects
<ul style="list-style-type: none"> <li>• mental alertness</li> <li>• increased focus</li> <li>• better thought processing</li> <li>• more energy and wakefulness (2)</li> </ul>	<ul style="list-style-type: none"> <li>• increased heart rate</li> <li>• increased blood pressure</li> <li>• increased short-term endurance and stamina (2)</li> </ul>

- 2) How does caffeine help the brain feel more alert?

Caffeine blocks the adenosine receptors of brain cells. When blocked, adenosine can't bind onto the adenosine receptors. Adenosine, when bound, causes brain cells to slow down in activity. Without the ability to bind onto adenosine, the brain cells are more active and the brain feels more alert. (4)

- 3) What is the "fight or flight" response and how does caffeine trigger this response?

It is the stress response of the body. It helps prepare the body to react and deal with whether it should fight or run away from a stressful situation. (6)

When caffeine stimulates the brain, it causes to pituitary to think that the body is under stress so the pituitary releases ACTH which is a hormone that causes adrenaline to be released from the adrenal glands. Adrenaline initiates the fight or flight response. (5)

- 4) If caffeine is supposed to boost energy, why do regular coffee drinkers seem like they have only normal amounts of energy instead of enormous amounts of energy?

Regular coffee drinkers have developed tolerance towards the effects of caffeine. Their bodies are trying to return them back to normal so that they don't have an overabundance of energy. One way might be to grow more adenosine receptors. (7)

- 5) Explain two reasons why caffeine can become an addictive habit.

1) Once tolerance has developed, not consuming caffeine leads to withdrawal symptoms like fatigue, irritability and headaches. Resuming caffeine intake removes these symptoms. 2) Caffeine increases dopamine in the brain which stimulates its pleasure centers. This reward reinforces more caffeine seeking behavior. (8)