

Effect of Decaffeinated Coffee on Health

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Caffeine is often the primary focus when the negative health effects of coffee are discussed. But there are a number of significant chemical compounds present in coffee, other than caffeine, which also have strong effects on the body. Some of the more common active constituents include chlorogenic acid, caffeol and diterpenes. Many health conditions that are aggravated by coffee are still affected by decaffeinated coffee, despite the lowered level of caffeine, due to these other phytochemicals that remain in decaf coffee after the decaffeination process. Current studies suggest that, for people who are sensitive to coffee's effects, decaffeinated brews may still exacerbate their health problems. Therefore, the healthiest option may be to eliminate both regular and decaffeinated coffee from the diet.

Implications of Decaffeination Methods

The decaffeination process itself is not always innocuous. There are three common decaffeination methods: the use of one of two organic solvents, either methylene chloride or ethyl acetate; water extraction known as the Swiss water process or European water process; and supercritical carbon dioxide. Eighty percent of decaffeinated coffee is processed with solvents. The health effects of these solvents as found in decaffeinated coffee are not well known, but studies suggest that methylene chloride (dichloromethane) is shown to be carcinogenic,^{1,2} and the National Cancer Institute's list of chemicals labels it as a possible human carcinogen.³ In the decaffeination process, the solvents are removed from the coffee beans, but residues have still been found in decaffeinated coffee and tea.⁴ When water and carbon dioxide are used to decaffeinate coffee, a measurable residue is not left behind in the remaining beans, but high acidity and other phytochemicals found in coffee remain. Additionally, in the process of water extraction, unique flavor characteristics of coffees from different origins are blended and blurred water extraction due to the intermingling of the flavors from various types of beans in the water bath. Among the decaffeination methods, methylene chloride extraction retains the most flavor but leaves a dry taste in the mouth; both water extraction and CO₂ extraction blur the flavor of the beans and ethyl acetate adds a sweet fruit flavor. Additionally, inferior beans that may be old or moldy are often used for decaffeination because the process can remove off flavors and mask the age or condition of the beans.

Amount of Caffeine in Decaffeinated Coffee

According to FDA guidelines, decaffeinated coffee must have 97% of the caffeine removed. In actuality, the caffeine content of coffee beans varies widely; therefore the caffeine content of decaffeinated coffee also fluctuates, and can be 10mg or more per 12 ounce cup.⁵ Other measurements found caffeine levels up to 17.5mg per 16 ounce cup.⁶ Starbucks reports that there is up to 11mg of caffeine in each 8 oz cup of Starbucks decaf coffee, but a Starbucks "tall", their smallest serving size, is 12 ounces and a "grande" is 16 oz, giving their servings 16.5 mg and 22mg respectively. Many coffee drinkers don't limit themselves to 12 or 16 ounces but repeatedly fill oversize mugs or consume larger sizes in coffee shops. The additive effects of several cups of decaffeinated coffee consumed throughout the day can be significant if someone is sensitive to caffeine or suffering from a health condition aggravated by caffeine.

Acidity of Decaffeinated Coffee

It is well-known throughout the coffee industry that decaffeinated coffee is more acidic than regular coffee due to the fact that decaffeinated coffee is made from Robusta beans. Robusta beans are used because they retain more of the coffee flavor after the decaffeination process; Robusta beans have a higher concentration of caffeine and are more acidic than other beans. This is problematic for people with health problems such as acid reflux, GERDS and ulcers making them susceptible to the detrimental effects of high levels of acidity.⁷

All of the food and drink consumed affects the body's pH balance. In a condition of homeostasis, the pH should be naturally alkaline, but consumption of acidic foods including decaffeinated coffee increases metabolic acidity, producing negative systemic effects.⁸ One of the problems associated with metabolic acidity is decreased bone density. This occurs because minerals appear to have a buffering effect on the bloodstream and are subsequently leached from the bone to restore alkalinity to the blood when metabolic levels have shifted too far into acidity.⁹ Both regular and decaf coffee consumption impede the absorption and increase excretion of minerals including calcium, magnesium, zinc and iron, further increasing mineral loss.^{10,11,12,13} Chronic metabolic acidity also stimulates increased cortisol secretion, activating the body's stress response.¹⁴ Elevated cortisol levels aggravate health conditions sensitive to stress including acid reflux, ulcers, irritable bowel syndrome, and cardiovascular disease.

Decaf Coffee Increases Heart Attack Risk

Numerous studies show that decaffeinated coffee raises the risk for heart attacks similar to regular coffee in spite of the lowered levels of caffeine. Levels of LDL cholesterol, a strong predictor for heart attacks, have been shown to increase after coffee drinkers switch from regular coffee to decaf coffee. The results of these studies suggest that other constituents in coffee, not removed in the decaffeination process, are responsible for increasing the risk factors for heart disease.

Chlorogenic acid is found in both caffeinated and decaffeinated coffee. Significantly, chlorogenic acid has been implicated to be a factor that raises plasma levels of homocysteine,¹⁵ which is associated with increased susceptibility of developing cardiovascular disease. Reducing intake of both caffeinated and decaffeinated coffee may be important in controlling plasma homocysteine levels.¹⁶

Decaf Coffee Produces Adverse Metabolic Effects

Just like regular coffee, decaf coffee produces a variety of adverse metabolic effects that include stimulating the sympathetic or autonomic nervous system, which raises heart rate, blood pressure and causes shaking and tremors commonly thought of as "coffee jitters". Decaf coffee stimulates the lower GI tract and can cause laxative effects like regular coffee in spite of the reduced amount of caffeine. Decaf coffee interferes with the absorption of minerals such as iron, calcium and magnesium and it increases intraocular pressure that can be dangerous for people at risk for glaucoma. Clearly components in coffee other than caffeine strongly affect the body and produce many of the same effects as regular coffee.

The following characteristics of decaffeinated coffee produce adverse health effects:

1) Decaffeinated Coffee Increases Acidity

- **Decaffeinated Coffee Increases gastrin levels.**
 - Regular coffee, decaffeinated coffee and pure caffeine all stimulate the release of gastrin after ingestion. Gastrin is the hormone that stimulates acid release in the stomach. Decaffeinated coffee causes statistically significant increases in serum gastrin levels,¹⁷ and stimulates trypsin secretion.¹⁸
 - Significantly, GI acid secretion is markedly greater after decaffeinated and regular coffee than it is after ingestion of caffeine alone.^{19,20} When decaffeinated coffee was compared to a widely-used protein-based test meal, known to increase gastric acidity, decaffeinated coffee caused more significant stimulation of release of gastrin and secretion of acid.²¹

- **Decaffeinated Coffee Increases Gastroesophageal Pressure Exacerbating Heartburn and Acid Reflux**
 - Both decaffeinated and regular coffee cause similar increases in gastroesophageal sphincter pressure, while pressure changed minimally in response to pure caffeine, tap water, or black (caffeinated) tea.^{22,23} This indicates that compounds in coffee other than caffeine are responsible for increased incidence of acid reflux after coffee consumption.

- **Both Regular and Decaf Coffee Increase Metabolic Acidity**
 - Coffee is highly acidic, with pH values ranging from 4.9-5.8.²⁴ Dietary intake strongly influences metabolic acidity.^{25,26} The natural pH of the body is just above 7.0, and metabolic processes function best at a slightly alkaline pH. In measurements of food effects on acid/alkaline body chemical balance, coffee is identified as a substance that increases metabolic acidity.²⁷

- **Decaffeinated Coffee Interferes With Bone Density**
 - Increased metabolic acidity associated with drinking decaffeinated coffee interferes with healthy bone density. Numerous studies provide evidence for the theory that minerals removed from bone have an alkalizing effect on chronic metabolic acidity.²⁸
 - Excess acidity has been associated with negative calcium balance and increased excretion of calcium.²⁹ Chronically, metabolic acidity alters bone cell function, increasing osteoclastic bone resorption and decreasing osteoblastic bone formation.³⁰
 - Calcium is not only necessary for preventing osteoporosis and maintaining adequate bone density, but adequate calcium is crucial for a healthy heart and nervous system.

2) Decaffeinated Coffee Increases Heart Attack Risk

- Numerous studies show that decaffeinated coffee raises the risk for heart attack similar to regular coffee in spite of the lowered levels of caffeine. A study comparing people who suffered from a myocardial infarction with community-matched controls demonstrated that drinking decaffeinated versus caffeinated coffee did not lower a person's risk of developing a myocardial infarction. Drinking tea, even containing caffeine, was

associated with a lower risk of myocardial infarction.³¹ This suggests that substances in coffee other than caffeine contribute to increased risk of heart attacks and decaffeinated coffee increases heart attack risk.

- **Decaffeinated Coffee Increases Plasma Homocysteine Levels**

- Increased plasma homocysteine intensifies a person's risk of suffering from a heart attack, particularly in people who have previously suffered a heart attack, or who are already at high risk. Homocysteine negatively affects the vascular endothelium, or lining of the blood vessels.³²
- Coffee drinking significantly increases homocysteine in the bloodstream, even more so than caffeine alone. The negative effect of coffee occurs with both caffeinated and decaffeinated coffee, and is noted within hours of coffee consumption.³³ Filtering the coffee does not affect homocysteine; unfiltered coffee as well as filtered coffee increased homocysteine levels.^{34, 35}
- Chlorogenic acid raises plasma homocysteine levels, and is found to lower blood concentrations of the B vitamin folate. One study observed a lower rise in plasma homocysteine with simple chlorogenic acid compared to the greater increase of homocysteine in studies with coffee; this suggests that chlorogenic acid may not be the only homocysteine-raising factor in coffee.³⁶
- Plasma homocysteine concentrations are higher in coffee drinkers than non-coffee drinkers and have been shown to increase Plasma homocysteine concentrations increased after coffee consumption in people who measured normal homocysteine concentrations before coffee.³⁷

- **Decaffeinated Coffee Raises Cholesterol**

- Upon switching from caffeinated to decaffeinated coffee, levels of serum LDL cholesterol and apolipoprotein B increased, whereas discontinuation of caffeinated coffee revealed no change. This finding suggests that a phytochemical present in coffee other than caffeine is responsible for the subsequent LDL cholesterol, apolipoprotein B, and lipase activity.³⁸
- Cholesterol-raising diterpenes, kahweol and cafestol, are present in unfiltered coffee, which includes coffee made in a French press or cafetière,³⁹ as well as espresso. Coffee oils other than caffeine have also been demonstrated to elevate liver enzyme levels, which are an indicator of injury to or compromise of the cells of the liver, further inhibiting the liver's ability to effectively regulate serum cholesterol.⁴⁰

3) Decaffeinated Coffee Produces Adverse Metabolic Effects Just Like Regular Coffee

- **Decaffeinated Coffee Stimulates the Sympathetic or Autonomic Nervous System**

- Coffee, even decaffeinated, stimulates the sympathetic (fight or flight) portion of the autonomic nervous system irregardless of the amount of caffeine present.⁴¹
- Heart rate, arterial blood pressure and muscle sympathetic nervous activity, including hand shaking, tremors or jitters, are all stimulated by decaffeinated as well as regular

coffee, indicating that it is a substance other than caffeine present in coffee creating these effects.⁴²

- **Decaffeinated Coffee Stimulates the Gastrointestinal (GI) Tract to Overactivity**

- Coffee produces a laxative effect in susceptible people through stimulation of rectosigmoid motor activity, as rapidly as four minutes after drinking. Even modest doses of coffee can have this effect, whether or not the body is ready to dispose of accumulated waste products, resulting in loose stools. Studies show that decaffeinated coffee has a similar stimulant effect on the GI tract proving that the laxative effect of coffee is not due solely to caffeine.^{43,44,45}

- **Decaffeinated Coffee Interferes with Mineral Absorption**

- Iron is an essential component of red blood cells, and iron deficiency is a frequent cause of anemia. Coffee drinking reduces iron absorption.^{46,47} Caffeine is not the only ingredient thought to interfere with iron absorption; chlorogenic acid, also present in decaffeinated coffee, reduces the ability of the body to absorb iron from food sources.⁴⁸
- Coffee consumption, even aside from caffeine, is shown to increase loss of calcium, magnesium and zinc.^{49,50, 51}

- **Decaffeinated Coffee Increases Intraocular Pressure**

- Both decaffeinated and caffeinated coffee increase intraocular pressure. Intraocular pressure increases risk of developing glaucoma and further pressure increases can be dangerous in people who are already suffering from glaucoma. While caffeinated coffee more significantly increased intraocular pressure, decaffeinated coffee also caused a rise in levels of pressure within the eye.⁵²

4) Decaffeinated Coffee Is Associated with Increased Incidence of Rheumatoid Arthritis

- A recent, large-scale epidemiological study has shown that drinking more than four cups of decaffeinated coffee per day has been linked to increased risk of developing rheumatoid arthritis, while caffeine intake was not associated with greater risk, and drinking more than 3 cups of tea per day was actually associated with decreased risk of developing rheumatoid arthritis.⁵³

Recommendation:

People most often switch from caffeinated to decaffeinated coffee due to a desire to improve their health; frequently on their own, but often due to the advice of their physician or other primary health care provider.⁵⁴ But for people with a number of health conditions, drinking decaffeinated coffee may not necessarily create the desired health improvements. There are many healthy beverage choices currently available but coffee drinkers are not usually satisfied by teas, which taste watery and weak to the coffee palate. A satisfying alternative, herbal coffee, allows coffee drinkers to keep their same brewing ritual while enjoying roasted, full body flavor with hearty flavor and aroma. Herbal coffee has a number of nutritional health benefits and its natural alkalinity doesn't provoke the common health

problems associated with coffee’s acidity. Nutrition professionals can support patients at risk for cardiovascular disease, acid reflux, GERDS and IBS or IBD by guiding them through the process of substituting a non-caffeinated, alkaline herbal coffee that brews and tastes just like coffee.

Kicking the Caffeine Habit:

The social prevalence of coffee drinking and the addictive side effects of caffeine can cause problems with patient compliance. Caffeine-free herbal coffee marketed under the brand name of Teeccino® helps coffee drinkers replace their regular or decaf coffee with a satisfying alternative. Coffee drinkers need a dark, full-bodied, robust brew to help satisfy their coffee craving. Teeccino satisfies the 4 needs coffee drinkers require in a coffee alternative:

- 1) Teeccino brews just like coffee, allowing coffee drinkers to keep their same brewing ritual.
- 2) It has a delicious, deep roasted flavor that is very coffee-like.
- 3) It wafts an enticing aroma.
- 4) People experience a natural energy boost from nutritious Teeccino.

Teeccino offers the following health benefits to people weaning themselves off coffee:

<u>Beneficial Features of Teeccino</u>	<u>Teeccino Ingredients:</u> <small>56,57,58,59,60,61,62,63,64,65,66,67</small>
<ul style="list-style-type: none"> ▪ Inulin fiber from chicory <ul style="list-style-type: none"> • Unlike coffee, Teeccino has nutritional value, including soluble inulin fiber, a pre-biotic that helps support a healthy population of beneficial microflora. • Inulin improves mineral absorption ▪ 65 mg of Potassium <ul style="list-style-type: none"> • Teeccino is a source of potassium. In liquid form, potassium is easily absorbed to help relieve muscle fatigue, maintain normal heart rhythm and blood pressure, and help prevent strokes. ▪ Alkaline – helps reduce acidity <ul style="list-style-type: none"> • As opposed to acidic coffee, Teeccino is alkaline, which reduces stomach and metabolic acidity. ▪ Gluten Free <ul style="list-style-type: none"> • Gluten does not extract into boiling water. Tests show Teeccino is gluten free although it contains barley. ▪ Naturally Caffeine-free <ul style="list-style-type: none"> • No chemical processing like decaffeinated coffee. 	<ul style="list-style-type: none"> ▪ Carob <ul style="list-style-type: none"> • Consumption of water-soluble fiber from carob lowers elevated blood cholesterol in healthy people. ▪ Barley <ul style="list-style-type: none"> • Contains niacin, a B vitamin important for healthy heart function. • Shown to have a beneficial effect on lipid metabolism. ▪ Almond <ul style="list-style-type: none"> • Has a beneficial effect on serum lipid levels. ▪ Figs <ul style="list-style-type: none"> • Contain polyphenols, plant compounds that act as antioxidants. • A good source of potassium. ▪ Dates <ul style="list-style-type: none"> • Contains potassium and magnesium, important for maintaining heart rhythm, bone health and metabolic alkalinity. ▪ Chicory root <ul style="list-style-type: none"> • Has been shown to improve mineral absorption, including magnesium.

The Pain-free Way to Wean off of Coffee

Start by mixing normal coffee 3/4 to 1/4 Teeccino Herbal Coffee. Gradually reduce the percentage of coffee over a two to three week period until only 100% Teeccino Herbal Coffee is brewed. Gradual reduction of caffeine is recommended.⁵⁵ Side effects such as headaches, fatigue, and brain foginess can be avoided as the body gradually adjusts to less reliance on stimulants.

Example: Use the following proportions if you make a 10-cup pot of coffee daily:

DAY	Regular Coffee	Teeccino
Day 1-3:	4 tablespoons	1 tablespoon
Day 4-6:	3 tablespoons	2 tablespoons
Day 7-9:	2 tablespoons	3 tablespoons
Day 10:	1 1/2 tablespoons	3 1/2 tablespoons
Day 11:	1 tablespoon	4 tablespoons
Day 12-13:	1/2 tablespoon	4 1/2 tablespoons
Day 14:	0	5 tablespoons

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