ACUPUNCTURE today

NATURAL HEALTH

Coffee: The New Superfood

Louis Miller, DC, MS | DIGITAL EXCLUSIVE

Coffee (*Rubaceae coffea*) is arguably one of the most popular beverages in the world, with more than 80 percent of American adults drinking it each day and over 100 different species available for consumption.[1] Does the multitude of bioactive compounds contained in coffee have positive health outcomes when habitually ingested? Let's explore this topic and see how and why drinking coffee may decrease all-cause morbidity.

Coffee: A Science Lesson

Dating back to the 15th century, coffee was consumed for the pleasure and satisfaction it gives the consumer through its flavor, aroma, and desirable physiological and psychological effects.[2] Today, many consume coffee for its stimulatory effects (increase in alertness, reduction in fatigue and elevation in mood), primarily from caffeine (1, 3, 7-trimethylxanthine) – the main psychoactive component.

The primary action of caffeine is to bind to adenosine A1 and A2 receptors in the neural membrane without dampening neural activity.[3] In essence, it exerts the opposite effect as adenosine and produces a stimulant effect. A stimulatory byproduct is enhancing of sympathetic nervous system activity and secretion of catecholamines that increase the oxidation and metabolism of fatty acids.[4]

Caffeine's effects begin within one hour, as it is rapidly absorbed from the GI tract and then metabolized by demethylation and oxidation in the liver (cytochrome P450 1A2 pathway).[5] While coffee is a blend of more than 1,000 volatile and non-volatile compounds, it's the several other bioactive compounds that may be responsible for the many health implications that contribute to lowering the risk of all-cause mortality, various cancers, cardiovascular diseases, gastrointestinal and liver pathology, and neurological and metabolic disorders.

In addition to caffeine, coffee's most studied components include phenolic acids, most notably the bitter-taste-causing chlorogenic acids (CGAs) which are combination ester and acid derived from two acids: caffeic acid and quinic acid.[6] Although CGAs can also be consumed through a variety of plant foods and beverages, coffee ingestion is by far the largest contributor to its intake.

Mechanisms of Action

Promising research demonstrates that CGAs exhibit anti-bacterial, antioxidant and anti-inflammatory activities by modulating a number of important metabolic pathways. CGAs have a multitude of subgroups and isomers that can vary extensively in terms of nutrition content according to specific coffee variety, type of bean (Arabica or Robusta), geographic location of growth and harvest, post- harvest processing, and roasting mechanisms (time and temperature).[7]

Coffee for Metabolic Health and Blood Sugar Regulation

CGAs gained popularity a few years ago when television personality Dr. Mehmet Oz proposed that green coffee bean extract can facilitate weight loss. Although all coffee beans are green when raw, it is the higher concentration of CGAs (in raw beans) that is responsible for weight loss and improved metabolic health. In fact, clinical researchers have postulated that CGAs have hypoglycemic and hypolipidemic functions.

The underlying mechanism lies in the down-regulation of hepatic glucose-6-phosphotase (G6Pase) expression and upregulating the expression of glucose transporter-4 (GLUT4).[8] CGAs inhibit the action of glucose-6-phospatase, the rate-limiting enzyme involved in glycogenolysis and gluconeogenesis in the liver and insulin secretion.[9] As G6Pase activity decreases, the concentration of blood glucose will decline, thus slowing the rate of glucose release in the blood.

In addition, CGAs activate 5' AMP-activated protein kinase (AMPK) – an enzyme that plays a wide role in the regulation of cellular lipid and protein metabolism, and is a mediator of the metabolic effects of hormones such as leptin, ghrelin, adiponectin, glucocorticoids, and insulin.[10] That discovery has led researchers to focus on CGAs as a means to normalizing serum glucose and improving hyperglycemia in type 2 diabetic patients.

Activation of AMPK leads to translocation of GLUT4 from intracellular to plasma membranes, yielding an elevation of glucose transport, meaning an increase of glucose transported into the cell.[11] Furthermore, there is emerging data that AMPK has wider functions with respect to ameliorating metabolic-inflammation, by decreasing the secretion of pro-inflammatory cytokines IL-8, IL-6, and TNF-alpha by down-regulating the NF-kB and JNK/AP-1 pathways.[12]

Coffee for Liver Health

The most promising research appears to be the beneficial associations between coffee / caffeine consumption and liver malignancy outcomes (hepatocellular carcinoma (HCC) and liver disease secondary to alcohol, viral hepatitis, and fatty infiltration).[13] The latest epidemiological and clinical research reveal an inverse relationship with coffee intake and liver enzyme laboratory test improvement: serum levels of aspartate amino transferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP) and gamma-glutamyltransferase (GGT).[14]

Although the underlying mechanism is unclear, a significant contributor to decreasing liver disease is the abundance of bioactive phenolic compounds with antioxidant, anti-fibrotic and anti-angiogenic effects.

A Word of Caution and What to Tell Your Patients

Due to the ever-increasing Westernized lifestyle, there is a greater influence of diet on human health and disease. Unfortunately, a trend supported by several epidemiological studies suggests sugar-sweetened beverages (common in many store-bought coffee drinks) contribute to the pandemic of obesity and many related chronic, low-grade inflammatory diseases.

The large concentration of quickly absorbable, sweet-tasting liquid carbohydrates in the form of high-fructose corn syrup (HFCS) is a major additive responsible for a variety of negative metabolic effects. Make your patients aware of the dangerous consequences of this – and redirect them to enjoy coffee (and its many health benefits) the right way!

References

1. Gruczyska E, et al. Furan in roasted, ground and brewed coffee. *Rocz Panstw Zakl Hig*, 2018;69(2):111-118.
2. Zhang J, Zhou B, Hao C. Coffee consumption and risk of esophageal cancer incidence: a meta-analysis of epidemiologic studies. *Medicine*, 2018 Apr;97(17):e0514.
3. *Ibid*.
4. Yamagata K. Do Coffee polyphenols have a preventive action on metabolic syndrome associated endothelial dysfunctions? An assessment of the current evidence. *Antioxidants*, 2018 Feb 4;7(2).
5. Izadi V, Larijani B, Azadbakht L. Is coffee and green tea consumption related to serum levels of adiponectin and leptin? *Int J Prev Med*, 2018 Dec 5;9:106.
6. Buldak RJ, et al. The impact of coffee and its selected bioactive compounds on the development and progression of colorectal cancer in vivo and in vitro. *Molecules,* 2018 Dec 13;23(12).
7. *Ibid*.
8. Larsson SC, Orsini N. Coffee consumption and risk of dementia and Alzheimer's disease: a dose-response meta-analysis of prospective studies. *Nutrients*, 2018 Oct 14;10(10).
9. *Ibid*.
10. Cornelis MC, Munafo MR. Mendelian randomization studies of coffee and caffeine consumption. *Nutrients*, 2018 Sep 20;10(10).
11. Poole R, et al. Coffee consumption and health: umbrella review of meta-analyses of multiple health outcomes. *BMJ*, 2017;359:j5024.
12. Rothwell JA, et al. Biomarkers of intake for coffee, tea, and sweetened beverages. *Genes Nutr,* 2018 Jul 4;13:15.
13. *Ibid*.
14. Miranda J, et al. Coffee is protective against oral and pharyngeal cancer: a systematic review and meta-analysis. *Med Oral Patol Oral Cir Bucal*, 2017 Sep 1;22(5):e554-e561.

DECEMBER 2019