



COFFEE, TEA, OR ME (CAFFEINE AND SLEEP)

by Frank Roman MD JD

Caffeine consumption goes back at least 1,000 years. Its first reported consumption were by the members of the Galla tribe in Ethiopia. Legend has it that an Ethiopian goat herder discovered coffee's stimulating effects when he noticed his goats' friskiness after munching on the red berries of a local shrub. However, one Harvard professor wrote of the discovery of caffeine rich leaves of *Ilex Yuayusa* in the tomb of a Shaman from highland Bolivia dating from around 500 A.D. The oldest existing text documenting caffeine in medicine is written in *The Canon of Medicine* of the Islamic physician, Avicenna (980-1037).

The first commercial cultivation of coffee occurred in the fourteenth century in Arabia. Noteworthy, Turkish law allowed a wife to divorce her husband for failure to keep the family "ibrik" (pot) filled with coffee. Coffee spread to Europe in the seventeenth century and subsequently to South America and finally North America. Presently Brazil is the world's largest producer of coffee with approximately 33.6 million (one bag is equivalent to 132 pounds) followed by Columbia (11.8 million bags) and Vietnam (10.75 million bags). One commen-

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tator asserted that after oil, coffee is the second most valuable commodity in the world, which begs the question: Would we really go to war for coffee?

According to the Specialty Coffee Association of America, there are over 100 million Americans who consume an average of 3.1 cups of coffee per day. Case in point, Starbucks operates approximately 20,000 stores in the United States and 4,101 overseas which, as the company stated in the print media, they hope to increase to 20,000 in the next few years. Trivia answer, the price of a Venti Mocha at the new Starbucks near Moscow is \$8.98, in contrast the same drink in New York City is \$4.71.

Now for the science, and you may want to refill your coffee mug for this section. Much of what we know about the health effects of coffee is obtained from epidemiological studies. However, this information is fraught with potential pitfalls and confounders that may make it difficult to interpret the data in a meaningful way. For example, some of the potential pitfalls in these studies include but are not limited to cup size, caffeine content of the different coffees used, the possibility that many people

who drink coffee frequently may drink weaker coffee than those who drink only 1-2 cups daily, the use of paper filters in brewing coffee, cigarette smoking, and in general the individual variation in the metabolism of the compounds found in coffee.

Acute caffeine administration has been found to impair glucose tolerance and to decrease insulin sensitivity in several controlled clinical trials. However, large prospective cohort studies in the United States and other countries have found coffee consumption to be associated with significant dose dependent reductions in the risk of developing Type II diabetes mellitus. It is important to specifically mention the two largest prospective cohort studies: The Health Professionals Followup Study with 41,934 men and the Nurses Health Study with 84,276 women in the United States. It was noted that men who drank at least six cups of coffee daily had a 54% lower risk of developing Type II diabetes mellitus than men who did not drink coffee and women who drank at least six cups of coffee daily had a 29% lower risk than women who did not drink coffee. In contrast, tea consumption was not associated with Type II diabetes mellitus risk in the American studies. Despite this information it is premature to recommend coffee consumption as a means of preventing Type II diabetes mellitus.

Caffeine has been found to increase resting metabolic rate in lean as well as obese individuals for up to 24 hours after ingestion. However, several controlled studies have not generally found that caffeine alone is effective in promoting weight loss in over weight adults.

Another area of interest is the prevention of Parkinson's disease as several large prospective cohort studies have found inverse association between coffee and caffeine intake and Parkinson's disease risk in men. For example in the Health Professionals Followup Study, men who regularly consumed at least one cup of coffee daily had a risk of developing Parkinson's disease over the next ten years, that was about 50% that of men who did not drink coffee. Consumption of tea and other caffeinated beverages was also inversely associated with Parkinson's disease. However, this relationship was not found in the Nurses Health Study. The failure of prospective studies to find an inverse relationship between coffee consumption and Parkinson's disease in women may be due to the modifying effect of estrogen replacement therapy. When this was further studied the Nurses Health Study cohort demonstrated that cof-

fee consumption was inversely associated with Parkinson's disease risk in women who had never used post menopausal estrogen but there was a significant increase in Parkinson's disease risk in post menopausal estrogen users who drank at least six cups of coffee daily. One possible explanation is that caffeine is largely metabolized by hepatic CYP1A2 and the use of post menopausal estrogen replacement therapy has been found to inhibit CYP1A2 mediated caffeine metabolism.

With some hesitation I present a 10 year study of over 128,000 patients participating in a California health plan that found that the relative risk of suicide decreased by 13% for every cup of coffee consumed daily. The reasons for this inverse association is unknown and at present there is not enough data to support recommendations for coffee consumption in clinically depressed patients.

Regarding cancer, the consumption of caffeinated coffee or tea was not associated with either colon or rectal cancer risk.

The most interesting or what has attracted the most attention in recent memory is the association of the health risk of coffee consumption and cardiovascular disease. It is well known that acute consumption at dietary levels raises blood pressure in normotensive and hypertensive individuals. Specifically a 200-250 mgs. dose of caffeine which is the equivalent to 2-3 cups of coffee has been found to increase systolic blood pressure by 3-14 mm. of mercury and to increase diastolic pressure by 4-13 mm. of mercury in normal tensive individuals. It seems that the pressure effect of caffeine may be more pronounced in hypertensive individuals.

Regarding cardiac arrhythmias, clinical trials have not found coffee or caffeine intake equivalent to 5-6 cups daily to increase the frequency or severity of cardiac arrhythmias in healthy individuals, patient with established coronary heart disease, or people with pre-existing ventricular ectopy. The few studies regarding stroke risk have not observed a significant association between coffee consumption and the risk of stroke. However there was one exception, a 25 year old study of almost 500 non-smoking, hypertensive men enrolled in the Honolulu Heart Study. In this high risk population the risk of thromboembolic stroke who consumed at least 24 ounces of coffee daily was double that of men who did not drink coffee.

A meta analysis of 14 randomized control trials found that the consumption of boiled coffee dose dependently increased serum total and LDL cholesterol concentrations while the consumption of filtered coffee resulted in very little change in serum cholesterol. The cholesterol raising factors in unfiltered coffee have been identified as cafestol and kahweol. Another important marker of cardiovascular disease, plasma total homocystine has been positively associated with coffee consumption in a dose dependent manner. It is well documented that elevated plasma total homocystine concentration are associated with an increased risk for cardiovascular disease including coronary heart disease, stroke, and peripheral vascular disease. Noteworthy, abstention from

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coffee consumption for at least six weeks resulted in an 11% decrease in fasting homocystine concentrations in those who consumed an average of four cups of filtered daily coffee.

Regarding coronary heart disease, several epidemiological studies have found high coffee intake to be associated significantly increased risk of coronary heart disease or myocardial infarction. One study found that the odds of being diagnosed with an acute coronary syndrome was three times higher in people who drank at least 600 ml. of coffee daily than in those who did not drink coffee but the odds were significantly lower in people who consumed less than 300 ml. daily than in those who did not drink coffee. However prospective cohort studies have not generally found significant associations between coffee consumption and the risk of coronary artery disease. The hypothesis for this difference in findings may be due to the decrease in consumption of boiled coffee with a corresponding increase in the consumption of filtered coffee.

Finally, it is important to mention two special risk groups, specifically newborns breast-feeding and young children. Caffeine is detectable in breast milk within 15 minutes of consumption and peaks

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