P.O. Box 144345 Austin, TX 78714-4345 ▪ 512.926.4900 ▪ Fax: 512.926.2345 ▪ www.herbalgram.org

HerbClip™

FILE: ▪Cocoa (*Theobroma cacao*)
▪Antioxidants

HC 040441-263

Date: August 31, 2003

RE: The Best Antioxidant in the Diet? Forget Red Wine and Tea. Drink Cocoa.

Lee KW, Kim YJ, Lee HJ, Lee CY. Cocoa has more phenolic phytochemicals and a higher antioxidant capacity than teas and red wine. *J Agric Food Chem.* 2003;51:7292-7295.

Black tea, green tea (both *Camillia senensis*), red wine (*Vitis vinifera*), and cocoa (*Theobroma cacao*) are high in naturally occurring phenolic phytochemicals, compounds that have strong antioxidant capacities. Theaflavin and epigallocatechin gallate (EGCG) in tea, resveratrol in wine, and procyanidin in cocoa have been extensively investigated as to their possible roles as chemopreventive agents, based on these antioxidant capabilities. Free radicals are believed to cause degenerative diseases such as cancer, heart disease, and cerebrovascular disease, through a variety of mechanisms, and antioxidants such as these phenolic compounds may delay or prevent their onset.

The present study compared the phenolic and flavonoid contents and total antioxidant capacities of cocoa, black tea, green tea, and red wine. Though many studies have focused on fruits, vegetables, and teas as major sources of dietary antioxidative phenolics, the results of this study also demonstrate the importance of cocoa as a dietary source of these compounds.

The serving size of each beverage was defined as follows: Commercial cocoa powder, manufactured using a nonalkalized process (2 tablespoons dissolved in 200 ml of distilled water), commercial black tea or green tea (2 gram bags) were each extracted with 200 mL of water for 2 minutes, and 140 mL of red wine (Merlot, California). The total phenolic phytochemical concentration was analyzed and expressed in milligrams per serving of gallic acid equivalents (GAE) and the total flavonoid concentration was expressed in milligrams per serving of epicatechin equivalents (ECE). All samples were prepared in 5 replications.

The present study found that cocoa contained much higher levels of total phenolics (611 mg of GAE) and flavonoids (564 mg of ECE) per serving than black tea (124 mg of GAE and 34 mg of ECE, respectively), green tea (165 mg of GAE and 47 mg of ECE), and red wine (340 mg of GAE and 163 mg of ECE). Cocoa exhibited the highest antioxidant activity among the samples. The relative total antioxidant capacities of the samples in both assays were as follows in decreasing order: cocoa > red wine > green tea > black tea.

In addition, previous research has suggested that gallic acid and EGCG, the major antioxidants in tea, can also act as pro-oxidants. However, the amount of pro-oxidant compounds generated by cocoa rich in procyanidins was much lower than that generated by black and green teas. The results indicated that cocoa procyanidins may ultimately possess more beneficial effects than tea phenolics.

Though a bar of chocolate also exhibits strong antioxidant activity, the health benefits are controversial because of the relatively large amounts of saturated fats that are present. A cup of hot cocoa, however, has a much lower level of saturated fat (0.3 g per serving) than a bar of chocolate (8 g per 40 g bar), yet it has a high flavonoid content and an antioxidant capacity that on a per-serving basis is 4 to 5 times stronger than that of black tea, 2 to 3 times stronger than that of green tea, and almost 2 times stronger than red wine.

Investigations into the antioxidant capacity of food should consider the overall concentrations and compositions of diverse antioxidants, because the total antioxidant capacity of food is due to the combined activity of diverse antioxidants, including phenolics, rather than being attributable to any particular compounds.

--Densie Webb, Ph.D.

The American Botanical Council has chosen not to reprint the original article.