

FACT SHEET

THE HERSHEY CENTER FOR HEALTH AND NUTRITION



Hershey Center for Health & Nutrition

Executive Summary:

- ❑ The use of cocoa dates back to ancient civilizations when it was used as a gift to the Gods.
- ❑ Many studies suggest that cocoa and dark chocolate are associated with numerous health benefits that may reduce risk for cardiovascular disease, including decreases in blood pressure and improvements in endothelial function.
- ❑ Emerging research indicates that the health benefits of cocoa flavanols may extend beyond their action on the cardiovascular system alone and may also elicit improvements in skin health and cognition.



Cocoa and chocolate are natural sources of potassium, which studies have shown to be a key factor in affecting blood-pressure and stroke.

Discover the health benefits of cocoa and dark chocolate

Cocoa: An ancient fruit with contemporary health benefits

While it was once used as a form of currency and an offering to the Gods in ancient civilizations, cocoa and the chocolate products made from it are now a generally recognized treat by many. Cocoa and chocolate are made from the seeds of the fruit of the *Theobroma cacao* tree. Cocoa was first consumed more than 2,000 years ago by the Olmec, Mayan and Aztec cultures as a bitter drink.

Although ancient people revered cocoa for its life-giving properties, modern research on the health benefits of cocoa and chocolate has been going on for only the past 30 years. Being of plant origin, cocoa and chocolate are rich in many phytonutrients, including flavanols, which are believed to have vascular health

benefits.

Epidemiologic studies have shown an association between cocoa and chocolate and health benefits. Data from the Zutphen Elderly Study which followed 470 elderly men for 15 years showed cocoa intake to be inversely related with blood pressure as measured at baseline and 5 years later.¹ Cocoa intake was also inversely associated with 15-year cardiovascular and all-cause mortality. Another large epidemiological study, the Iowa Women's Health Study, using a large population of postmenopausal women (>30,000), also saw a borderline significant inverse association between chocolate intake and CVD mortality.²

Also, the Kuna Indians who live on islands off the coast of Panama were observed to have lower than expected rates of age-related elevation in blood pressure or hypertension despite a high intake of sodium. Their high intake of cocoa in the traditional Kuna diet is thought to explain the lower blood pressure in this population.^{3,4,5}



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¹Buijsse B, et al. *Arch Intern Med* 2006; ²Mink PJ, et al. *Am J Clin Nutr* 2007; ³Hollenberg NK, et al. *Hypertension* 1997; ⁴Chevaux KA, et al. *J Food Comp Anal* 2001; ⁵McCullough ML, et al. *J Cardiovasc Pharmacol* 2006.

Hypertension? ... Cocoa and dark chocolate deserve mention!

Many of the potential health benefits of cocoa and dark chocolate may be due to their protective effect on the blood vessels of the circulatory system. Cocoa has been shown to improve endothelial function and to reduce blood pressure, i.e. the levels of stress to which the blood vessels may be exposed.

A recent study shows that even a small amount can have a benefit. Long-term consumption of 6.3g of flavanol-rich dark chocolate (30

kcal/d – roughly equivalent to 1.5 Hershey®'s Kisses® Brand Special Dark® Mildly Sweet Chocolates) for 18 weeks reduced blood pressure in a mildly hypertensive population.¹ A meta-analysis found similar reductions in blood pressure with consumption of foods rich in cocoa over a 2-week period.²

The consumption of flavanol-rich dark chocolate also elicited improvements in patients with hypertension (~ 100g/dark choco-

late per day). In addition, decreased daytime and nighttime blood pressure, decreased serum LDL cholesterol, reduced insulin resistance and improved nitric oxide-dependent vasorelaxation were also observed following the intake of flavanol-rich dark chocolate.³

In a similar study, dark chocolate was also shown to decrease blood pressure and improve insulin sensitivity in healthy adults over a 15-day period.⁴

¹Taubert D, et al. *JAMA* 2007; ²Taubert D, et al. *Arch Intern Med*. 2007; ³Grassi D, et al. *Hypertension* 2005; ⁴Grassi D, et al. *Am J Clin Nutr* 2005.

The Hershey Center for Health and Nutrition sponsors cutting-edge research on the health benefits of cocoa, chocolate and nuts. The Center focuses on studying the chemistry and dietary components of various foods and food components that are key sources of nutrients. The Center directs scientific research to develop products and technologies providing consumers with health benefits in the areas of heart health, weight management, and mental and physical energy. The Hershey Center for Health and Nutrition is designed to be a significant source of new-product innovation as it draws upon clinical studies and scientific analyses of the health benefits of cocoa, nuts and other natural ingredients.



One average dark chocolate bar can deliver nearly 12% of your daily magnesium requirement.

Cocoa and Health: Emerging Frontiers

In addition to the potential cardiovascular health benefits associated with cocoa and/or dark chocolate consumption, recent research indicates that the potential health benefits of cocoa flavanols extend beyond their action on the cardiovascular system alone.

Skin health: Two new human studies suggest that cocoa flavanols may increase blood flow to the skin due to their effect on vessel dilation, potentially offering photoprotection and improved skin appearance. As these are the first studies of their kind, more research is needed to confirm the results as well as understand the potential application to various populations. (Heinrich U, et al. *J Nutr* 2006; Neukam K, et al. *Eur J Nutr* 2007)

Cognition: A few preliminary studies have looked at the potential for flavanols to impact blood flow to the brain. Promising results from these studies suggest that there may be a role for flavanols in affecting risk of dementia and cognitive decline but further research is needed before drawing strong conclusions. (Dinges DF. *J Cardiovasc Pharmacol* 2006; Francis ST, et al. *J Cardiovasc Pharmacol* 2006; Fisher ND, et al. *J Cardiovasc Pharmacol* 2006)

Cocoa and Chocolate Cardiovascular Briefs...

Studies show reduction in risk of cardiovascular disease with cocoa and dark chocolate

The consumption of cocoa and dark chocolate is associated with improvements in established and emerging risk factors for cardiovascular disease.

Endothelial Health: Impaired flow-mediated dilation and a decreased bioactivity of nitric oxide are related to endothelial dysfunction. Consumption of flavanol-rich cocoa beverages increased flow-mediated dilation and nitric oxide metabolites, thereby potentially improving endothelial function, both acutely and chronically, in healthy and hypercholesterolemic populations. Many of these studies have been short-term, thus studies are needed to better understand the potential health benefits associated with long-term cocoa consumption. (Schroeter H, et al. *PNAS* 2006; Wang-Polagruto JF, et al. *J Cardiovasc Pharmacol* 2006; Ferri C, et al. *J Hypertension* 2006; Vlachopoulos C, et al. *Curr Hypertens Rep* 2006; Schroeter H, et al. *PNAS* 2006; Farouque H, et al. *Clin Sci (Lond)* 2006; Heiss C, et al. *J Cardiovasc Pharmacol* 2007)

Increases in flow-mediated dilation and circulating bioactive

nitric oxide were observed in smokers following the intake of a flavanol-rich cocoa beverage. (Heiss C, et al. *J Am Coll Cardiol* 2005)

Flavanol-rich dark chocolate ingestion improved endothelial function, positively impacting blood flow in healthy volunteers. (Vlachopoulos C, et al. *Am J Hypertens* 2005; Engler MB, et al. *J Am Coll Nutr* 2004)

Further research is needed to confirm whether flavanols intake benefits individuals with established coronary artery disease.

Anti-platelet: Several studies showed flavanol-rich cocoa and chocolate to inhibit several measures of platelet activation and platelet-dependent primary hemostasis. (Pearson, et al. *Clin Dev Immunol* 2005; Heptinstall S, et al. *J Cardiovasc Pharmacol* 2006; Hermann F, et al. *Heart* 2006)

Inflammation: Studies administering cocoa flavanols were shown to beneficially alter the eicosanoid ratio by reducing proinflammatory leukotrienes. (Sies H, et al. *Am J Clin Nutr* 2005; Selmi C, et al. *J Cardiovasc Pharmacol* 2006)

Cholesterol-lowering Effects:

Cocoa flavanols may decrease LDL cholesterol levels and the development of atherosclerosis in animal models and hypercholesterolemic humans. (Kurosawa, et al. *J Atheroscler Thromb* 2005; Vinson JA, et al. *J Agric Food Chem* 2006; Baba S, et al. *J Nutr* 2007)

Antioxidant Effects: Chocolate is a significant source of antioxidants in the U.S. diet and cocoa flavanols may protect LDL cholesterol from oxidation as evidenced by in vivo and ex vivo research. (Wan, et al. *Am J Clin Nutr* 2001; Vinson JA, et al. *J Agric Food Chem* 2006; Baba S, et al. *Am J Clin Nutr* 2007)

Oxygen radical absorbance capacity (ORAC) data showed that cocoa and chocolate have a potent antioxidant capacity, even in comparison to other flavanoid-containing foods. Ingestion of cocoa elicited a rise in plasma antioxidant capacity and a reduction in the susceptibility of cell membranes to oxidation. (Wu, et al. *J Agric Food Chem* 2004; Zhu, et al. *Clin Dev Immunol* 2005)

Chocolate and Cocoa: FAQ

How much chocolate or cocoa should be eaten for heart health benefits?

Although there is no DRI for flavanols (the compound in cocoa beans related to heart healthy benefits) recent research indicates that consuming even small amounts of flavanol-rich dark chocolate or cocoa may improve markers of cardiovascular health. Studies that show cardioprotective effects have used between 6 and 100 grams of flavanol-rich chocolate or cocoa. Eating moderate amounts of dark chocolate as part of a healthy, balanced diet rich in fruits and vegetables may provide vascular health benefits.

Is dark chocolate better than milk chocolate?

Both dark and milk chocolate may contain flavanols because cocoa beans are naturally rich in flavanols. Research shows that in currently available commercial cocoa products, the amount of flavanols is directly related to the non-alkalized, non-fat cocoa solid content. Milk chocolate has less flavanols because it is diluted by the addition of milk—similar to a “latte” in coffee. White chocolate does not contain flavanols. For the flavanol content of various chocolates and other foods visit www.nal.usda.gov/fnic/foodcomp/Data/PA/PA.pdf. Overall, the equation is the more cocoa in a product the more flavanols and other bioactives.

Do the fat and calories in chocolate negate the health benefits?

Much of the saturated fat in chocolate is stearic acid, which has a neutral effect on cholesterol levels. In fact, studies show that consumption of chocolate even at high intakes of 10 ounces a day does not elevate cholesterol levels. As with any food, calorie intake must be taken into consideration with calorie expenditure and balanced to maintain a healthy weight. Health professionals can help patients and the public understand how to develop a heart healthy diet that includes their favorite, great-tasting foods such as chocolate.

For further information see www.allchocolate.com or contact The Hershey Center for Health and Nutrition:

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