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File: ■ Cocoa (*Theobroma cacao*)
■ History
■ Cardiovascular Health

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RE: The History and Health Benefits of Chocolate

Gianfagna TJ, Cooper R. Cocoa-food and medicine of the gods. *Altern Complement Ther.* 2012;18(2):84-90.

Chocolate has been known and loved for many centuries as food, medicine, and currency. This article explores the history of chocolate and the evidence for its health benefits.

The cacao tree has the Latin name *Theobroma cacao*, the genus being a term for "food of the gods." It was first introduced to the Europeans in the 1500s when Columbus went to Honduras and grew in popularity when cane sugar was added. The Mayans and Aztecs drank it with chili peppers, corn mash, vanilla, and other spices, and called it *xocoatl*, meaning "bitter water." From here the word "chocolate" was derived. The native people drank cocoa before long expeditions to improve their stamina.

A cocoa drink with milk added began to be sold as medicine in England in 1687 by an English botanist/MD, Sir Hans Sloane. Eating chocolate in its solid, milk chocolate form did not evolve until Victorian times.

Cocoa grows in hot, humid climates along the equator, mainly in Ghana, the Ivory Coast, Brazil, Nigeria, and Malaysia. Harvested beans undergo a fermenting, drying, and roasting process which results in a thick paste called cocoa liquor. The liquor is separated into the fat component (cocoa butter) and the remainder (cocoa solids). Taking the cocoa solids and adding back cocoa butter and sugar produces dark chocolate. The cocoa butter without cocoa solids is used to make white chocolate. Chocolate contains fiber (most of which is lost in processing); minerals, such as magnesium, copper, and iron (providing a significant portion of the recommended dietary allowance); and the monounsaturated fatty acid, oleic acid, and saturated fatty acids, mainly palmitic acid and stearic acid.

The purple color of the raw cocoa beans is due to the polyphenols, such as flavanols, and these are lost in processing with alkali (called "dutching"). The main flavanols are epicatechin and catechin; most chocolate drinks contain < 25 mg of flavanols. The

bioavailability of flavanols has been studied, and it is known that levels in the blood peak 2 hours post-consumption. Cocoa also contains the purine alkaloids theobromine and caffeine. In recent years, athletes have been trying to recapture the Aztec's stamina drink by consuming concentrated flavanols or isolated epicatechin; however, the ancient drink differed in that it contained additional flavanols, and no sugar or milk.

Meta-analyses have shown that, at worst, chocolate has a neutral effect on serum cholesterol, with ambiguous results across studies. The stearic fatty acid component of chocolate does not increase total or low-density lipoprotein (LDL) cholesterol. Epidemiological studies have shown that those eating the highest levels of chocolate had significantly lower rates of all-cause mortality, cardiac death, cardiovascular disease, heart failure, myocardial infarction, stroke, and diabetes. This is thought to be due to down-regulating the inflammatory process and increasing nitric oxide (NO). High-flavanol cocoa has been shown to increase NO and flow-mediated dilation (an indicator of healthy circulation) in human studies.

The Kuna Indians, a free-living island tribe off the coast of Panama, were studied by Norman Hollenberg of Harvard Medical School. The main beverage of the Kuna is made with unprocessed cacao beans. They have a very low incidence of blood pressure, unless they move to the mainland and start drinking commercial cocoa beverages. Then, their incidence of blood pressure matches the rest of the population. Dr. Hollenberg found that the free-living Kuna had higher levels of NO in their blood than mainland Kuna. NO also plays a role in proper platelet function, and in 25 intervention studies, only cocoa has been shown to consistently benefit platelet function. Intervention studies assessing effects on blood pressure have been somewhat ambiguous, though several have shown a lowering effect for both systolic and diastolic blood pressure in normotensive and hypertensive individuals. Though 6.3 g/day of dark chocolate was somewhat effective, the amount of chocolate consumed in other studies (46-105 g/day) would result in weight gain. This would not be the case if cocoa were consumed instead.

The Kuna Indians were also noted to have a low incidence of type 2 diabetes. The link between cocoa's benefits for cardiovascular disease and insulin resistance comes through NO. Several studies have shown a decrease in fasting glucose levels and insulin resistance, but not in diabetic individuals, so conclusions about its therapeutic effects are premature.

Cocoa may have effects on the immune system because of its polyphenol content; however, adequate studies in this area have yet to be undertaken.

The cocoa component phenethylamine (PEA) is structurally and pharmacologically similar to catecholamines and amphetamine, and cocoa may have neurological effects and improve cerebral blood flow, though studies are only of a preliminary nature. Chocolate cravings experienced by women at various parts of their menstrual cycle are possibly the result of cultural rather than neurological factors. Improvements in mood and cognitive ability may be related to the caffeine and theobromine content.

Benefits for skin health and weight loss are two other areas of inquiry, but they have been only preliminarily researched.

Cocoa and chocolate are safe to eat, and studies indicate they do not cause problems with acne or headaches as is commonly thought. There is an issue of high lead levels for

cocoa and chocolate typically used in the West. Weight gain from chocolate consumption must always be taken into account when considering its regular substantial use as a therapy.

—*Risa Schulman, PhD*

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