



University of Michigan Health System

University of Michigan Integrative Medicine

Healing Foods Pyramid™



Dark Chocolate is included in the Healing Foods

Pyramid™ as part of a balanced, whole foods, plant-based diet. This Food Pyramid emphasizes foods that nourish the body, sustain energy over time, contain healing qualities and essential nutrients, and support a sustainable environment.



What are the recommended servings per week?

- Up to 7 ounces per week, average 1 ounce per day

Why choose dark chocolate?

- Contains *flavonoids* called *procyanidins* & *epicatechins*; flavonoids are part of a group of antioxidants known as polyphenols and are found in a variety of foods including dark chocolate, tea, red wine, and various fruits and vegetables
- Decreases LDL ("bad") cholesterol oxidation
- Reduces the risk of blood clots
- Increases blood flow in arteries and the heart
- May lower high blood pressure
- Cocoa may have a beneficial effect on cholesterol levels because it consists mainly of stearic acid and oleic acid. Stearic acid is a saturated fat, but unlike most saturated fatty acids, it does not raise blood cholesterol levels. Oleic acid, a monounsaturated fat, does not raise cholesterol and may even reduce it.
- May improve mood and pleasure by boosting serotonin and endorphin levels in the brain
- Regular intake is associated with better cognitive performance in the elderly

- Contains a number of minerals, including calcium, magnesium, and potassium

What is chocolate?

Chocolate is made using beans harvested from the cocoa tree, *Theobroma cacao*. The beans are removed from their pod, fermented, dried, roasted and then ground to produce a cocoa mass or cocoa liquor. Cocoa liquor can be pressed to yield cocoa butter and cocoa cake which is ground up into cocoa powder. Cocoa liquor can also be combined with cocoa butter, sugar, vanilla, (and milk, in milk chocolate) to make chocolate.

What is dark chocolate?

Dark chocolate is also known as "bittersweet" or "semisweet" chocolate. It contains a high percentage ($\geq 60\%$) of cocoa solids, and little or no added sugar. Dark chocolate has a rich, intense flavor, and is found in chocolate bars, candies and baking chocolate.

What qualities should you look for in dark chocolate?

- $\geq 60\%$ cocoa
- Made from cocoa butter instead of fats such as palm and coconut oils. Although cocoa butter does contain significant amounts of saturated fat in the form of stearic acid, it has been shown to have a neutral effect on cholesterol unlike the saturated fat in both palm and coconut oils.
- Made without the use of 'hydrogenated' or 'partially hydrogenated' oils, which are known to negatively impact cholesterol
- Darker is better: phytochemicals, like *flavonoids*, contribute to pigment. More flavonoids means darker chocolate and potentially greater health benefits.
- Chocolate is only as good as its ingredients; look for dark chocolate made from organic or fairly traded cocoa beans (Find a list of fair trade certified chocolate producers at: <http://www.transfairusa.org/>)

Special Considerations: Milk vs. Dark Chocolate:

- Milk binds to antioxidants in chocolate making them unavailable; therefore, milk chocolate is not a good antioxidant source
- To get the benefits of antioxidants, avoid drinking milk with dark chocolate
- White chocolate contains no cocoa solids and therefore is not a good source of antioxidants

Chocolate: Comparisons of Antioxidant Activity and Cocoa Content

<i>Listed from highest level of antioxidant activity to lowest level</i>	<i>Percentage of Cocoa (%)</i>
Cocoa Powder	~ 88-96

Dark Chocolate/ Baking Chocolate	~ 45-80
Milk Chocolate	~ 5-7
White Chocolate	~ 0

What are the health concerns of chocolate?

Caffeine

There are measurable amounts of caffeine in dark chocolate; individuals who are sensitive to caffeine should be aware of this when considering adding dark chocolate to their diet

Kidney Stones

Chocolate contains oxalates which can lead to an increase in urinary oxalate excretion. Increased urinary oxalate increases the risk of kidney stone formation. As a result, those individuals prone to developing kidney stones should reduce their intake of oxalate from food - including chocolate - as a way to reduce urinary oxalate.

Migraine Headaches

Dark chocolate, which contains a natural chemical, tyramine, is thought to trigger migraines although the data is inconclusive. Not all individuals who suffer from migraines are sensitive to tyramine. Individuals who suffer from migraines may consider experimenting to determine if dark chocolate is a trigger for them.

Ideas for Healthy Dark Chocolate Consumption

1. High-quality chocolate contains a high percentage of cocoa solids (³ 60 %). It is brown or dark brown in color, and is glossy. Avoid purchasing chocolate that has a grayish tone, white spots on the surface, or small holes.
2. A small portion of high quality dark chocolate is recommended. Be aware, dark chocolate is high in calories and fat, so consume sparingly.
3. To avoid overindulging in dark chocolate, eat it after you have enjoyed a nice lunch or dinner.
4. Have a piece of fruit prior to dark chocolate to help satisfy your sweet craving.
5. Take your time- dark chocolate is rich and has complex flavors, eat it slowly and mindfully to increase enjoyment.
6. Try dipping fresh fruit in melted dark chocolate for a divine dessert- Mmmmm.
7. Buy Local: see if your town has a Chocolatier. Buying high quality dark chocolate can be a delicious way to support local artisans.

Resources

Caffeine: How does it Affect Blood Pressure?

Mayo Clinic

www.mayoclinic.com

Accessed June 15, 2009

Candies, semisweet chocolate

USDA Agricultural Research Service – Nutrient Data Laboratory

<http://www.nal.usda.gov/fnic/foodcomp/search/>

Accessed June 15, 2009

Chocolate

British Nutrition Foundation

www.nutrition.org.uk

Accessed June 15, 2009

Chocolate's Dark Secret

WebMD Website

<http://my.webmd.com>

Accessed June 15, 2009

Dark Heart Healthy Chocolate

WebMD Website

<http://my.webmd.com>

Accessed June 15, 2009

How much caffeine is in your daily habit?

Mayo Clinic

www.mayoclinic.com

Accessed June 15, 2009

Inventory of the health and nutrition attributes of cocoa and chocolate:

December 2005

International Cocoa Organization

www.icco.org/questions/nutrition.htm

Accessed July 1, 2009

Tips for avoiding migraine headache triggers

WebMD Website

www.webmd.com

Accessed July 1, 2009

Original Research and Review Articles

Boekema PJ, et al. **Coffee and gastrointestinal function: facts and fiction.** *Scandinavian Journal of Gastroenterology*. 1999;34suppl(230):35-39.

Engler MB, et al. **Flavonoid-rich dark chocolate improves endothelial function and increases plasma epicatechin concentrations in healthy adults.** *Journal of the American College of Nutrition*. 2004;23(3):197-204.

Hamed MS, et al. **Dark chocolate effect on platelet activity, C-reactive protein and lipid profile: a pilot study.** *Southern Medical Journal*. 2008; 101 (12): 1203-1208.

Holmes RP, et al. **The impact of dietary oxalate on kidney stone formation.** *Urology Research*. 2004;32:311-316.

Horner NK et al. **Potential mechanisms of diet therapy for fibrocystic breast conditions show inadequate evidence of effectiveness.** *Journal of the American Dietetic Association*. 2000;100(11):1368-1380.

Lippi G, et al. **Dark chocolate: consumption for pleasure or therapy?** *Journal of Thrombolysis*. 2008 doi: 10.1007/s11239-008-0273-3.

Miller KB, et al. **Antioxidant activity and polyphenol and procyanidin contents of selected commercially available cocoa-containing and chocolate products in the United States.** *Journal of Agriculture and Food Chemistry*. 2006; 54: 4026-4068.

Nestel PJ. **How good is chocolate?** *American Journal of Clinical Nutrition*. 2001;74:563-564.

Nurk E, et al. **Intake of flavonoid-rich wine, tea and chocolate by elderly men and women is associated with better cognitive test performance.** *The Journal of Nutrition*. 2009; 139: 120-127.

Richardson T, et al. **Influence of caffeine on frequency of hypoglycemia detected by continuous interstitial glucose monitoring system in patients with long-standing type 1 diabetes.** *Diabetes Care*. 2005;28(6):1316-1320.

Serafini M, et al. **Plasma antioxidants from chocolate.** *Nature*. 2003;424:1013.

Shiina Y, et al. **Acute effect of oral flavonoid-rich dark chocolate intake on coronary circulation, as compared with non-flavonoid white chocolate, by transthoracic Doppler echocardiography in healthy adults.** 2007 Doi: 10.1016/j.ijcard.2007.07.131.

Taubert D, et al. **Chocolate and blood pressure in elderly individuals with isolated systolic hypertension.** *Journal of the American Medical Association*. 2003;290(8):1029-1030.

Wan Y, et al. **Effects of cocoa powder and dark chocolate on LDL oxidative susceptibility and prostaglandin concentrations in humans.** *American Journal of Clinical Nutrition*. 2001;74:596-602.

The *Healing Foods Pyramid*™ was created by the Nutrition Education Team at the University of Michigan Integrative Medicine, Department of Family Medicine in 2005 and updated in 2009

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