

Chocolate

reduces risk of

Cardiovascular disease and
Diabetes Mellitus !

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“The divine drink which builds up resistance and fights fatigue. A cup of this precious drink permits man to walk for a whole day without food.”

- *Hernando Cortés, 1519*



Chocolate

An Overview

- Cocoa and chocolate are food products made from cacao beans.
- Although consumed by the Olmecs, Mayans, and Aztecs long ago, cacao beans were first introduced to the Old World in 1502 by Christopher Columbus when he brought them back to Spain.
- Over the past three decades, chocolate has been viewed more as a confectionary rather than as a medicine. In 2001-2002, the average world cocoa consumption was 1.17 pounds per person.



Chocolate

- Comes from seed (bean) cacao trees
- Scientific name is *Theobroma cacao*
(Which means – “Drink of the Gods”)



What's in the cocoa bean?

54% Fat
(Cocoa Butter)



34% Oleic Acid
33% Stearic Acid
26% Palmitic Acid
6% Other

31% Carbohydrates



~1% Sugar, 16% Fiber

11% Protein



Arginine, Glutamine, Leucine

3% Polyphenols



Flavanols, Proanthocyanins

< 1% Minerals



Fe, Mg, P, K, Cu

Processing of Chocolate



Nibs ground to cocoa paste



Paste Pressed



Cocoa butter

Cocoa powder

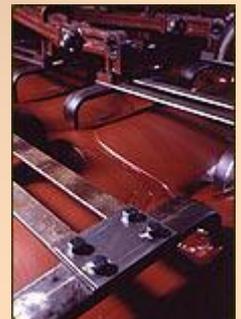
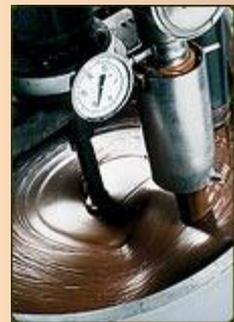


Conching and Tempering



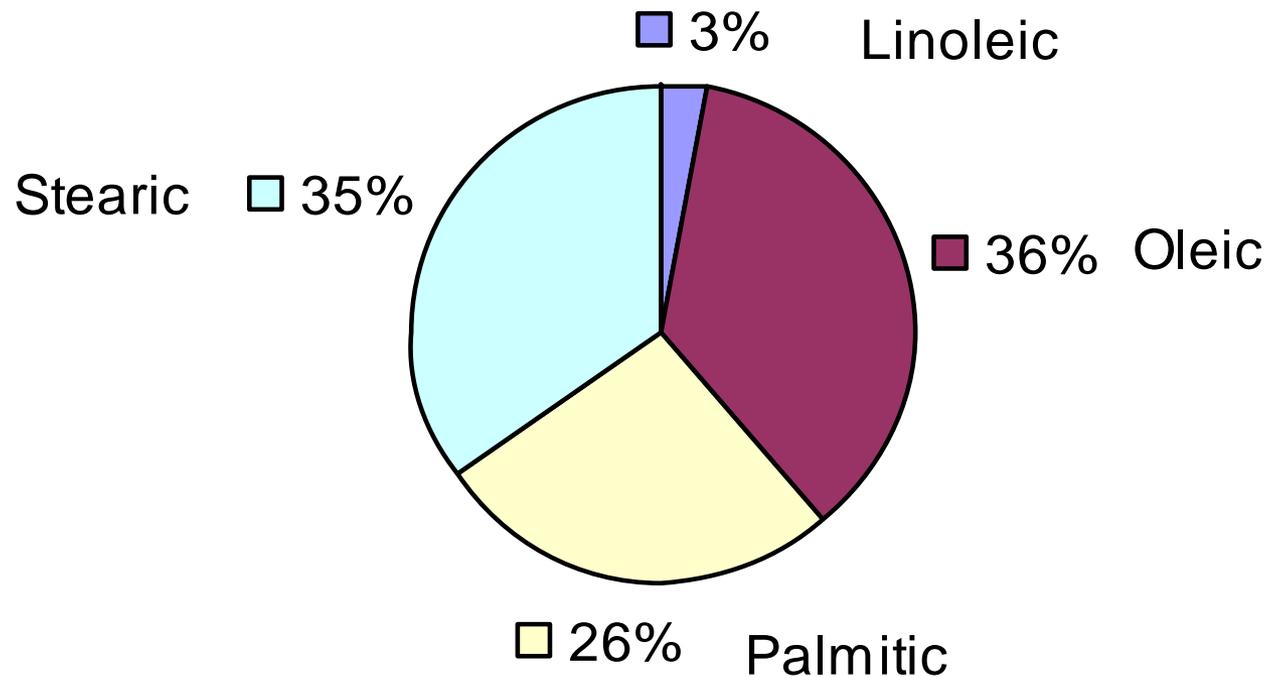
Mixed and ingredients added
(Milk Sugar Flavors Nuts, etc)

Molded, Made into products



Conching

Lipid Composition of Cocoa Butter



Source: Chocolate Manufacturers Association, www.chocolateusa.org

Types of Chocolate

- Unsweetened Chocolate, Bitter Chocolate, Baking Chocolate. (Pure choco, no sugar)
- Dark chocolate (15-35% choco liq, <12% milk solids)
- Bittersweet, Semisweet Chocolate (>35% choco liq)
- Milk Chocolate (>10% choco liq, 12% whole milk)
- “Dutch” Chocolate (Cocoa dutched with alkaline salt)
- White “Chocolate” (no cocoa solid)



Health Benefits before 20th Century

- **Comforted the liver**
- **Aided in digestion**
- **Made one happy and strong**
- **Stimulated the kidney**
- **Treatment of anemia, tuberculosis, fever, gout, heart pain**
- **Strengthening the heart**

**Recent study
on
Chocolate
and Health Benefits**

BMJ 2011:343-d4488

29 August, 2011

“Chocolate consumption and cardiometabolic disease : systematic review and meta-analysis”

A B Lopez, OH Franco, A Wood, et al
University of Cambridge, UK

Objective

To evaluate association of chocolate consumption with the risk of developing cardiometabolic disorder.

Study design

Systematic review and meta-analysis of

- randomized controlled trials and
- observational studies

Data sources

one

- Medline
- Embase
- Cochrane Library
- PubMed
- CINAHL
- IPA
- Scopus

Two

- Web of science
- Reference lists of relevant studies to October, 2010
- Email contacts with authors
- Pascal

Results

- 4576 references consulted
- 7 studies including 114009 participants met the inclusion criteria .
 - 6 cohort studies
 - 1 cross-sectional study
- 5 of the 7 studies reported a beneficial association.

Results (contd)

Compared to the lowest, the highest levels of chocolate consumption were associated with :

- 37% reduction in cardiovascular disease
- 29% reduction in stroke
- 31% reduction in DM
- No significant association with heart failure

Limitations

- Large variation between the studies for
 - measurement of chocolate consumption
 - methods of study
 - outcome evaluation.
- Types of chocolate consumed were not considered for outcome evaluation.

Physiologically Active Components in Chocolate

- Flavonoids (**Flavanols**)
- Stearic Acid (fatty acid)
- Methylxanthines
 - Caffeine
 - Theobromine
- Magnesium

Flavonoids/Flavanols

Flavonoid compounds - act as antioxidants:

- Reduce free radicals produced by oxidation**
- Lower LDL cholesterol**
- Reduce blood pressure**
- Reduce platelet aggregation**
- Decrease inflammation**

Stearic Acid (fatty acid)

- **Neutral effect on blood cholesterol**
- **Did not adversely affect LDL- cholesterol levels**

Oleic Acid

- **May raise HDL cholesterol**

Dose for Health Benefits

- **Cardiovascular disease**
 - Cocoa, 5 g = 1 Tbsp to 50 g = ~10 Tbsp
 - Dark chocolate = ~7 g to 40 g
- **Weight modification**
 - Dark chocolate = 90 to 100 kcal/d

Food-Based Health Benefits

- Dark chocolate
 - 2 tasting squares (20 g)
 - 90 kcal (45 kcal/square)



- Cocoa
 - 5 g = 1 Tbsp = 10 kcal
 - 50 g = 10 Tbsp = 100 kcal



Source:<http://www.hersheys.com/home.asp>

Antioxidant Effects

- **ORAC** value – Oxygen radical absorbance capacity
- ORAC is a measure of the antioxidant power of a food
- Flavonoid-rich foods are not equal

ORAC Value for Select Foods

	ORAC units/serving
Dark Chocolate	9080
Blueberries	8708
Cocoa (natural)	8260
Raspberries	6895
Pecans	5382
Cranberries	5201
Cherries	4705
Walnuts	4062
Milk chocolate	3200
Grapes	1764
Almonds	1336

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

Chocolate Myths

- **Caffeine**
- **Cholesterol**
- **Cavities**
- **Mood/Aphrodisiac**
- **Migraines**
- **Acne**

Chocolate

Myths

Chocolate is high in caffeine.

Fact: While eating chocolate may perk you up,

A 1.4-ounce chocolate bar or an 8-ounce glass of chocolate milk both contain 6 mg of caffeine. (regular coffee contains about 65-135mg of caffeine.)

Chocolate

Myths

Chocolate is loaded with saturated fat and is bad for your cholesterol.

Fact: Stearic acid, the main saturated fat found in milk chocolate, is unique. It doesn't raise cholesterol levels like other types of saturated fats. In fact, eating a 1.4 ounce chocolate bar instead of a carbohydrate-rich snack has been shown to increase HDL (good) cholesterol levels.

Chocolate

Myths

Chocolate causes cavities.

Fact: Candy alone is not responsible for cavities. Cavities are formed when bacteria in the mouth metabolize sugars and starches from any type of food (soda, candy, juice, bread, rice and pasta) to produce acid. This acid then eats through the enamel of the tooth, causing a cavity.

Chocolate

Myths

Myth: Chocolate causes acne.

Fact: Studies in the past twenty years have eliminated chocolate as a cause of acne. In fact, many dermatologists doubt that diet plays any significant role in the development of acne.

Acne is now believed to be caused by a combination of high bacterial levels and oil on the skin

Chocolate

Myths

Chocolate lacks any nutritional value.

Fact: Chocolate is a good source of magnesium, copper, [iron](#) and zinc. It also contains polyphenols (an antioxidant also found in tea and red wine) that have been associated with a decreased risk of coronary disease.

An average chocolate bar contains about the same amount of [antioxidants](#) as a 5-ounce glass of red wine.

Chocolate

Myths

Chocolate causes weight gain.

Fact: Any food can be part of a healthy diet if consumed in moderation. An average chocolate bar contains 220 calories, and 15 grams of fat.

Enjoying the occasional piece of chocolate may reduce the risk of severe bingeing, which can occur when you feel deprived of your favorite foods.

Recommendations

- Further study to evaluate any potential difference between different types of chocolate.
- Study to evaluate effect of chocolate on primary and secondary prevention separately.
- Initiative to reduce high sugar and fat content of commercially available chocolate.



THANK YOU ALL