



In recent years, chocolate has been recognised as providing health benefits, mostly due to its polyphenol content. The largest group of polyphenols found in the diet is the class of compounds called flavonoids, consisting of more than 4,000 different varieties.

## Pleasure During Consumption

### Focus On: Polyphenols in Chocolate

Flavonoids are found in plant-based foods including many fruits and vegetables, cocoa, tea, coffee and red wine.

Flavonoids can be further divided according to molecular structure - one common class of flavonoids is the group of dietary compounds, the flavanols. Within the flavanol family are the single molecule flavanols, epicatechin and catechin, and the more complex molecules called procyanidins.

Cocoa and chocolate contain both simple and complex flavanols including epicatechins, catechins and procyanidins.

Flavanols can exert antioxidant activity, helping to protect the body against free radical oxidative damage. Recent research suggests that in addition to the antioxidant activity, cocoa flavanols exhibit other health-promoting properties, helping to reduce the risk of development of such chronic and inflammatory

diseases as stroke, Alzheimer’s disease, rheumatoid arthritis, and cataracts.

**Table 1: Comparison of polyphenol content in chocolate to other commonly consumed, antioxidant-rich foods**

Food or Beverage	Serving Size	Polyphenol Content per serving (mg)
Dark chocolate	40 g	340-600
Milk chocolate	40 g	200-480
Cocoa powder	40 g	320-1000
Green tea	180 mL	150-200
Red wine	100 mL	200-800

<sup>a</sup> Manach C, Scalbert A, Morand C et al. Polyphenols : food sources and bioavailability. *Am J Clin Nutr*, 2004; 79:727-47.  
<sup>b</sup> Wollgast J, Anklaam E. Polyphenols in chocolate: is there a contribution to human health? *Food Research International*, 2000;33:449-459.

### NRC Research Initiatives

Nestlé Research has been studying the health benefits of ingredients such as cocoa, long before it was proposed that chocolate, a food consumer purely for pleasure, may also provide tangible health benefits. Nestlé scientists continue to explore the effects of cocoa polyphenols on health, especially cardiovascular health.

#### Cardiovascular Benefits of Chocolate

Nestlé Research evaluated chocolate’s effects on cardiovascular health and has demonstrated benefits with consumption of 40 to 100 grams of chocolate per day, usually of dark chocolate.

##### Effect on cholesterol

- Cocoa polyphenols reduce the tendency of LDL cholesterol, the “bad” cholesterol, to oxidise. When oxidised, there is an increased risk that LDL cholesterol will stick inside blood vessels, forming plaques, and thus restricting the flow of blood through the vessels.
- Cocoa polyphenols appear to increase levels of HDL cholesterol, the “good” cholesterol, which can help reduce the risk of plaque formation.

##### Effect on arteries and blood vessels

The endothelia, namely the walls of

blood vessels and arteries, can be damaged by smoking, infection, bruises, free radicals and oxidised LDL cholesterol, causing the vessel or artery to constrict.

Cocoa polyphenols stimulate the production of nitric oxide in the body, providing a vasodilatory effect which relaxes the arteries and blood vessels for improved blood flow.

##### Effect on blood clots

Platelets are a normal component of the blood, involved in blood clotting at sites of injury in the body. When artery and blood vessel walls are damaged, platelets are more likely to stick together and may cause a blood clot.

Cocoa polyphenols reduce the stickiness of platelets, lowering the risk of blood clots.

#### Nestlé NOIR Dark Chocolate

Scientists have conducted clinical trials using Nestlé dark chocolate. One study found that 40 g of Nestlé NOIR improved individuals’ endothelial function two hours after the chocolate was consumed. And, this effect was still noticeable eight hours later. Platelet function and plasma antioxidant status also improved after eating the chocolate.

A second study with Nestlé NOIR found that after healthy people experienced improved arterial function after they consumed the dark chocolate.

#### References:

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