



## Q/ Does chocolate have cardiovascular benefits?

### EVIDENCE-BASED ANSWER

**A/ YES, EATING CHOCOLATE REDUCES BLOOD PRESSURE** in the short term (strength of recommendation [SOR]: **B**, a meta-analysis and individual randomized controlled trials [RCTs]). No studies, however, have evaluated the long-term cardiovascular effects of chocolate.

Chocolate contains high levels of flavonol; a diet rich in flavonoids is associated with reduced death rates from coronary heart disease (SOR: **B**, prospective observational studies, which didn't evaluate chocolate intake specifically).

### Evidence summary

A meta-analysis and 3 subsequent single-blinded RCTs showed a short-term decrease in blood pressure with daily consumption of chocolate. The meta-analysis was comprised of 5 randomized controlled parallel-group or crossover studies with a total of 173 adult patients, both normotensive and hypertensive. Patients ate dark chocolate, high-flavonol milk chocolate, white chocolate, or chocolate without flavonol daily for 14 to 15 days. Four studies used 100 to 105 g (approximately 3 oz) of chocolate (480 calories, 500 mg polyphenols, including flavonol), and 1 used 46 g (240 calories, 213 mg flavonol). Investigators didn't report the percent of cocoa in the chocolate used.<sup>1</sup>

Dark chocolate and high-flavonol milk chocolate significantly reduced both systolic blood pressure (−4.7 mm Hg; 95% confidence interval [CI], −7.6 to −1.8 mm Hg; *P*=.002) and diastolic pressure (−2.8 mm Hg; 95% CI, −4.8 to −0.8 mm Hg; *P*=.006). The study using the 46-g dose found no difference in blood pressure. Removing this outlier from the analysis didn't alter the mean blood pressure changes.<sup>1</sup>

### From hypertensive to prehypertensive with help from chocolate

An RCT evaluated 44 adults, 56 to 73 years of age, with untreated upper-range pre-

hypertension or stage 1 hypertension without concomitant risk factors. Subjects consumed either 6.3 g (30 kcal) per day of dark chocolate (50% cocoa) or polyphenol-free (hence flavonol-free) white chocolate for 18 weeks.<sup>2</sup> Dark chocolate significantly reduced systolic and diastolic blood pressures (systolic: −2.9 ± 1.6 mm Hg; *P*<.001; diastolic: −1.9 ± 1.0 mm Hg; *P*<.001) compared with white chocolate.

Four patients who ate dark chocolate (18%) were reclassified from “hypertensive” to “prehypertensive.” None achieved lower-range prehypertension (<130/85) or optimal blood pressure, however. To place this finding in clinical perspective, the authors cite data from the Framingham Heart Study indicating that a 3-mm Hg reduction in systolic blood pressure should reduce the relative risk of stroke mortality by 8%, of mortality from coronary artery disease by 5%, and of all-cause mortality by 4%.<sup>2</sup>

### More evidence of benefit of dark chocolate

A crossover RCT evaluated 19 hypertensive patients with glucose intolerance, but not overt diabetes, who ate either 100 g of flavonol-rich dark chocolate (50% cocoa) or 100 g of flavonol-free white chocolate for 15 days. Dark chocolate significantly reduced both 24-hour ambulatory systolic blood pressure

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**Eating dark chocolate or high-flavonol milk chocolate reduces blood pressure in the short term.**

## CLINICAL INQUIRIES

**>**  
**No studies have specifically evaluated the long-term cardiovascular effects of eating chocolate.**

( $-4.52 \pm 3.94$  mm Hg;  $P < .0001$ ) and diastolic pressure ( $-4.17 \pm 3.29$  mm Hg;  $P < .0001$ ) compared with white chocolate. It also significantly decreased clinical blood pressure readings (systolic:  $-3.82 \pm 2.40$  mm Hg;  $P < .0001$ ; diastolic:  $-3.92 \pm 1.98$  mm Hg;  $P < .0001$ ).<sup>3</sup>

Another RCT evaluated blood pressure in 45 healthy adults given a 74-g dark chocolate bar (30% cocoa) or a 74-g placebo bar. Blood pressure decreased significantly 2 hours afterwards:  $-3.2 \pm 5.8$  mm Hg systolic ( $P < .001$ ) and  $-1.4 \pm 3.9$  mm Hg diastolic ( $P < .001$ ).<sup>4</sup>

### **Sugarless, but not sugared, cocoa shows effects on blood pressure**

One week later, investigators compared 2 cups of cocoa (22 g cocoa powder) with 2 cups of sugarless cocoa and placebo. They found significant blood pressure reduction only with the sugarless drink. This study was the only one that reported sponsorship by a chocolate manufacturer.<sup>4</sup>

### **Long-term high-flavonoid consumption linked to lower heart disease mortality**

A systematic review evaluated the long-term effects of a high-flavonoid diet over a period of 5 to 26 years. The review didn't measure chocolate intake specifically, although the authors report that both milk and dark chocolate

(percent cocoa not specified) are high in flavonoids, containing about 3 to 5 times as much as a comparable amount of black tea or red wine. Eleven prospective observational studies (N=190,000) met the criteria for this review.

Investigators compared occurrence and mortality rates for coronary heart disease and myocardial infarction among participants in the highest and lowest tertiles of flavonoid consumption. Participants in the highest tertile had significantly lower mortality from coronary heart disease than the lowest tertile, with a relative risk of 0.81 (95% CI, 0.71-0.92; no number needed to treat was available).<sup>5</sup>

### **Recommendations**

We couldn't find recommendations from major medical organizations. A Natural Medicines Comprehensive Database monograph states that consuming dark chocolate may modestly reduce blood pressure, but not enough evidence exists to rate chocolate's effectiveness for cardiovascular disease, hypercholesterolemia, or isolated systolic hypertension.<sup>6</sup>

The US Food and Drug Administration warned one candy manufacturer against claiming that its chocolate-containing candy bars were "heart healthy," noting that the candy bars also contained high levels of saturated fats.<sup>7</sup> **JFP**

### **References**

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