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## ORIGINAL RESEARCH COMMUNICATION

# Short-term administration of dark chocolate is followed by a significant increase in insulin sensitivity and a decrease in blood pressure in healthy persons<sup>1,2,3</sup>

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**Background:** Numerous studies indicate that flavanols may exert significant vascular protection because of their antioxidant properties and increased nitric oxide bioavailability. In turn, nitric oxide bioavailability deeply influences insulin-stimulated glucose uptake and vascular tone. Thus, flavanols may also exert positive metabolic and pressor effects.

**Objective:** The objective was to compare the effects of either dark or white chocolate bars on blood pressure and glucose and insulin responses to an oral-glucose-tolerance test in healthy subjects.

**Design:** After a 7-d cocoa-free run-in phase, 15 healthy subjects were randomly assigned to receive for 15 d either 100 g dark chocolate bars, which contained  $\approx 500$  mg polyphenols, or 90 g white chocolate bars, which presumably contained no polyphenols. Successively, subjects entered a further cocoa-free washout phase of 7 d and then were crossed over to the other condition. Oral-glucose-tolerance tests were performed at the end of each period to calculate the homeostasis model assessment of insulin resistance (HOMA-IR) and the quantitative insulin sensitivity check index (QUICKI); blood pressure was measured daily.

**Results:** HOMA-IR was significantly lower after dark than after white chocolate ingestion ( $0.94 \pm 0.42$  compared with  $1.72 \pm 0.62$ ;  $P < 0.001$ ), and QUICKI was significantly higher after dark than after white chocolate ingestion ( $0.398 \pm 0.039$  compared with  $0.356 \pm 0.023$ ;  $P = 0.001$ ). Although within normal values, systolic blood pressure was lower after dark than after white chocolate ingestion ( $107.5 \pm 8.6$  compared with  $113.9 \pm 8.4$  mm Hg;  $P < 0.05$ ).

**Conclusion:** Dark, but not white, chocolate decreases blood pressure and improves insulin sensitivity in healthy persons.

**Key Words:** Insulin • insulin resistance • blood pressure • cocoa • dark chocolate

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