# STRAWBERRY SCIENTIFIC SOUNDBITES



## **HEART HEALTH**

Epidemiological studies have demonstrated a link between berry consumption, including strawberries, with reduced risk for heart attack<sup>1</sup> and stroke.<sup>2</sup>

Clinical trials have linked strawberries to improvements in various markers for cardiovascular disease, particularly lipid levels. In several studies, daily consumption of strawberries significantly reduced total cholesterol (TC) and low-density lipoprotein (LDL) cholesterol levels.<sup>34</sup>

Strawberries have also been linked to improved vascular function in populations ranging from adolescent males<sup>5</sup>, post-menopausal women<sup>6</sup> and adult men and women.<sup>7</sup>



### **BRAIN HEALTH**

In long-term population-based studies, greater intakes of anthocyanidins and total flavonoids or at least two servings of strawberries per week have been associated with slower rates of cognitive decline.<sup>8 9</sup>

In the Memory and Aging Project, strawberry intake was associated with a 34 percent reduced risk of Alzheimer's dementia compared to no or rare intake.<sup>10</sup>

In clinical trials, strawberries have been linked to improvements in memory tests, word recognition and spatial memory.<sup>11 12</sup>

# **METABOLIC HEALTH**

Large-scale prospective studies have shown that women who consumed strawberries had a 10 percent lower risk of developing diabetes<sup>13</sup> and were less likely to gain weight.<sup>14</sup>

In randomized trials, strawberries attenuated postprandial changes in insulin, glucose and inflammatory markers in the few hours after a meal<sup>15</sup> and in people with insulin resistance.<sup>16</sup> The effect of strawberries was most pronounced when consumed before a meal.<sup>17</sup> Chronic strawberry consumption also attenuated postprandial increases in pro-inflammatory and pro-thrombotic responses.<sup>18</sup>

Strawberries have been shown to have beneficial effects on insulin resistance, postprandial insulin levels and inflammation in people with metabolic syndrome.<sup>19</sup> <sup>20</sup>



# **GUT HEALTH**

Several studies that were recently published or are underway are looking closely at how strawberry consumption might impact the gut microbiome and, in turn, other aspects of health. In one study, the addition of strawberries increased the number of specific intestinal bacteria associated with lean body mass, health and longevity.<sup>21</sup>









- <sup>1.</sup> Cassidy A, Mukama, KJ, Liu L, Franz M, Eliassen AH, Rimm EB. High anthocyanin intake is associated with a reduced risk of myocardial infarction in young and middle-aged women. Circulation. 2013;127(2). doi:10.1161/circulationaha.112.122408
- <sup>2</sup> Gao Q, Dong JY, Cui R, Muraki I, Yamagishi K, Sawada N, Iso H, Tsugane S; Japan Public Health Center-based Prospective Study Group. Consumption of flavonoid-rich fruits, flavonoids from fruits and stroke risk: a prospective cohort study. Br J Nutr. 2021 Jan 29:1-8. doi:10.1017/S0007114521000404. Epub ahead of print.
- <sup>3</sup> Basu A, Betts NM, Nguyen A, Newman ED, Fu D, Lyons TJ. Freeze-dried strawberries lower serum cholesterol and lipid peroxidation in adults with abdominal adiposity and elevated serum lipids. J Nutr. 2014;144:830-837. doi:10.3945/jn.113.188169
- <sup>4.</sup> Gao Q, Qin LQ, Arafa A, Eshak ES, Dong JY. Effects of strawberry intervention on cardiovascular risk factors: a meta-analysis of randomised controlled trials. Br J Nutr. 2020 Aug 14;124(3):241-246. doi:10.1017/S000711452000121X
- <sup>5.</sup> Djurica D, Holt RR, Ren J, Shindel AW, Hackman RM, Keen CL. Effects of a dietary strawberry powder on parameters of vascular health in adolescent males. Brit J Nutr. 2016;116:639-647. doi:10.1017/S0007114516002348
- <sup>6.</sup> Feresin RG, Figueroa A, Johnson SA, et al. Daily consumption of strawberries improves plasma nitric oxide and adiponectin levels in pre- and stage 1-hypertensive postmenopausal women. J Acad Nutr Diet. 2015;115(9):A-42. doi:10.1016/j.jand.2015.06.142
- <sup>7.</sup> Huang L, Xiao, D, Zhang X, Sandhu AK, Chandra P, Kay C, Edirisinghe I, Burton-Freeman B. (2021). Strawberry consumption, cardiometabolic risk factors, and vascular function: A randomized controlled trial in adults with moderate hypercholesterolemia. J Nutr. 2021 151(6), 1517–1526. <a href="doi:10.1093/jn/nxab034">doi:10.1093/jn/nxab034</a>
- <sup>8.</sup> Devore EE, Kang JH, Breteler MMB, Grodstein F. Dietary intakes of berries and flavonoids in relation to cognitive decline. Ann Neurol. 2012;72(1):135-143. doi:10.1002/ana.2359Prosp
- <sup>9.</sup> Yeh TS, Yuan C, Ascherio A, Rosner BA, Willett WC, Blacker D. Long-term dietary flavonoid intake and subjective cognitive decline in US men and women. Neurology. 2021 Sep 7;97(10):e1041-e1056. <a href="https://doi.org/10.1212/WNL.0000000000012454">doi:10.1212/WNL.00000000000012454</a>. Epub 2021 Jul 28.
- <sup>10.</sup> Agarwal P, Holland TM, Wang Y, Bennett DA, Morris MC. Association of strawberries and anthocyanidin Intake with Alzheimer's dementia risk. Nutrients. 2019; 11(12):3060. <a href="https://doi.org/10.3390/nu11123060">doi:10.3390/nu11123060</a>
- <sup>11.</sup> Miller MG, Thangthaeng N, Rutledge GA, Scott TM, Shukitt-Hale B. Dietary strawberry improves cognition in a randomised, double-blind, placebo-controlled trial in older adults. Br J Nutr. 2021 Jul 28;126(2):253-263. doi:10.1017/S0007114521000222

- <sup>12.</sup> Nilsson A, Salo I, Plaza M, Björck I. Effects of a mixed berry beverage on cognitive functions and cardiometabolic risk markers; A randomized cross-over study in healthy older adults. PLoS One. 2017 Nov 15;12(11):e0188173. <a href="doi:10.1371/journal.pone.0188173">doi:10.1371/journal.pone.0188173</a>
- <sup>13.</sup> Sesso HD, Wang L, Buring JE. Strawberry intake, hemoglobinA1c, and risk of developing diabetes in women. Diabetes.2015;64:A423.
- <sup>14.</sup> Bertoia ML, Rimm EB, Mukamal KJ, Hu FB, Willett WC, Cassidy A. Dietary flavonoid intake and weight maintenance: three prospective cohorts of 124086 men and women followed for up to 24 years. BMJ. 2016;352(i17). <a href="doi:10.1136/bmj.i17">doi:10.1136/bmj.i17</a>
- <sup>15.</sup> Edirisinghe I, Banaszewski K, Cappozzo J, Sandhya K. Strawberry anthocyanin and its association with postprandial inflammation and insulin. Brit J Nutr. 2011;106(6):913-922. doi:10.1017/S0007114511001176
- <sup>16.</sup> Park E, Edirisinghe I, Wei H, et al. A dose-response evaluation of freeze-dried strawberries independent of fiber content on metabolic indices in abdominally obese individuals with insulin resistance in a randomized, single-blinded, diet-controlled crossover trial. Mol Nutr Food Res. 2016;60:1099-1109. doi:10.1002/mnfr.201500845
- <sup>17.</sup> Huang Y, Park E, Edirisinghe E, Burton-Freeman BM.
  Maximizing the health effects of strawberry anthocyanins:
  Understanding the influence of the consumption timing variable.
  Food Func. 2016;7:4745-4752. doi:10.1093/jn/nxab034
- <sup>18.</sup> Ellis CL, Edirisinghe I, Kappagoda T, Burton-Freeman B. Attenuation of meal-induced inflammatory and thrombotic responses in overweight men and women after 6-week daily strawberry (fragaria) intake: a randomized placebo-controlled trial. J Atheroscler Thromb. 2011;18(4):318-32. doi: 10.5551/jat.6114
- <sup>19.</sup> Davis DW, Navalta JW, McGinnis GR, Serafica R, Izuora K, Basu A. Effects of acute dietary polyphenols and post-meal physical activity on postprandial metabolism in adults with features of the metabolic syndrome. Nutrients. 2020;12(4):1120. doi:10.3390/nu12041120
- <sup>20.</sup> Basu A. Role of berry bioactive compounds on lipids and lipoproteins in diabetes and metabolic syndrome. Nutrients. 2019; 11(9):1983. doi:10.33390/nu11091983

