

### RESEARCH SUPPORTS ANTHOCYANIN'S HEALTH BENEFITS

*Anthocyanins are a biologically important subclass of flavonoids (polyphenolic compounds found in plants) that have been linked to numerous health benefits including potentially reducing the risk of cardiovascular disease, obesity, diabetes, certain types of cancer and other chronic disease.* A source of natural food coloring, anthocyanins provide fruits, flowers and plant organs their rich blue, red and purple colorings.

Research suggests flavonoids may decrease glycemia and improve insulin secretion and sensitivity particularly with high intakes of the anthocyanin subclasses<sup>4</sup>. A U.S. study examining the results of the Nurse's Health Studies I & II (NHS I, NHS II) and the Health Professionals Follow-Up Study (HPFS) found that a higher consumption of anthocyanins and anthocyanin-rich fruit was associated with a lower risk of type 2 diabetes<sup>5</sup>.

A 2013 analysis of the NHS II indicated that bioactive compounds, specifically anthocyanins, may be associated with a 32% reduced risk of myocardial infarction (heart attack) in young and middle-age women<sup>1</sup>. This risk reduction was independent of established dietary and non-dietary cardiovascular risk factors and the highest level of benefit occurred when >35mg were consumed per week. For every 15mg increased intake of anthocyanins per week, the relative risk of myocardial infarction decreased by 17%. Researchers noted, with the exception of flavanols and flavonoid polymers, none of the other nutrient subclasses (including saturated fat, dietary fiber and whole grain, among others) had a significant impact on risk reduction.

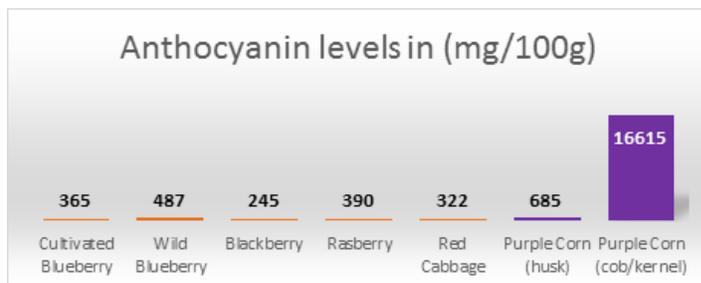
In a 2011 large perspective study of the NHS I, NHS II and HPFS, researchers also found that a higher total anthocyanin intake was significantly associated with a reduced risk of incident

hypertension<sup>3</sup>. The review also found the magnitude of the inverse association between total anthocyanin intake and hypertension was most pronounced in participants under 60, reinforcing the importance of dietary intervention strategies for blood pressure reduction before middle age.

Supporting the idea that dietary intervention of anthocyanins is an important component of healthy aging, a 2014 study concluded that higher intake of flavonoids at midlife, specifically flavones, flavanones, anthocyanins and flavanols, is associated with greater likelihood of health and wellbeing in individuals surviving to older ages<sup>6</sup>.

### SUNTAVA PURPLE CORN CONTAINS EXCEEDINGLY HIGH LEVELS OF ANTHOCYANINS COMPARED TO OTHER FOODS

Despite the well-publicized potential health benefits from increased anthocyanin consumption, researchers have found that the typical American diet only contains 12.5mg of anthocyanins per day<sup>2</sup> despite intakes of >100 mg/day that could easily be achieved with regular intake of selected foods such as blackberries, raspberries, blueberries and concord grapes. Researchers concluded seasonality of these fruits likely impacts the ability to consistently consume them in high levels, but that consumption of food supplements or natural food colorants rich in anthocyanins is another possible way to increase intake.

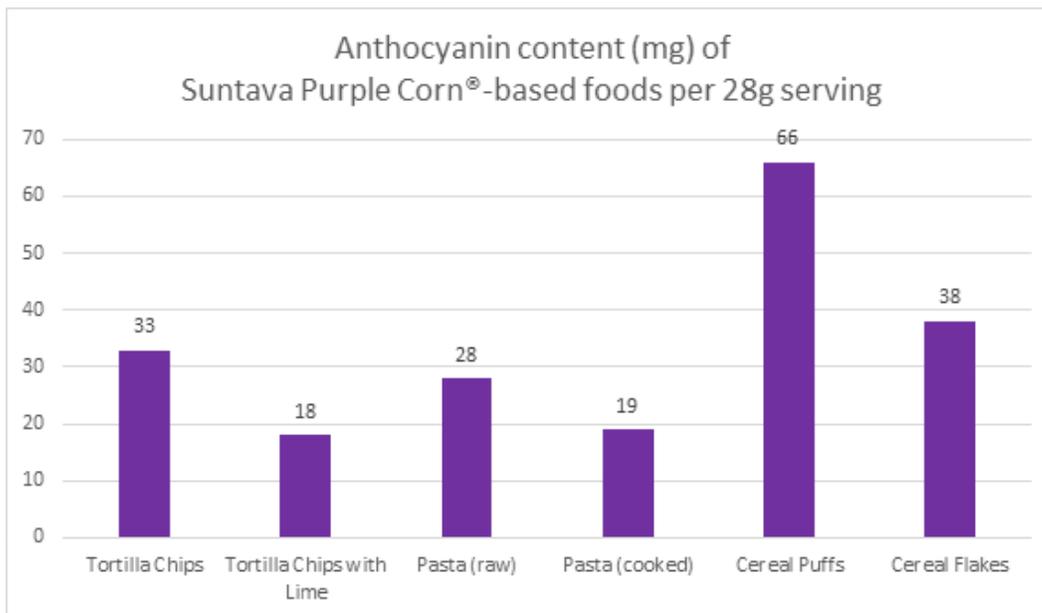


Sources: Wu and others 2006<sup>2</sup>; HFI.

**Purple corn is a non-seasonal source of high levels of anthocyanins.** Unlike fresh fruits that must be frozen to maintain integrity, purple corn can be stored at room temperature and still maintain potent levels of anthocyanins. Purple corn contains on average 6.8mg to 82.3 mg/g gallic acid equivalents fresh weight (FW) of anthocyanins depending on the part of the plant that was tested in comparison to blueberries which contain 1.3 to 3.8 mg/g FW<sup>7</sup>.

**FOODS MADE WITH SUNTAVA PURPLE CORN RETAIN SIGNIFICANT LEVELS OF ANTHOCYANINS**

**Even after processing into foods, significant levels of anthocyanins remain in purple corn-based products.** When examining results of purple corn based nixtamal, tortillas and chips, on average between 25-53% of anthocyanins remained in the product, even after cooking<sup>8</sup>. Testing of processed foods by HFI confirmed that cereals, pastas and snack foods made with Suntava Purple Corn can still provide a significant level of anthocyanins per 28g serving for consumers, providing manufacturers an opportunity to utilize Suntava Purple Corn as a functional, healthy ingredient.



References:

1. Cassidy C, Mukamal 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;127:188-196.
2. Wu X, Beecher GR, Holden JM, Haytowitz DB, Gebhardt SE, Prior RL. Concentrations of Anthocyanins in Common Foods in the United States and Estimation of Normal Consumption. *J. Agric. Food Chem*. 2006, 54, 4069-4075.
3. Cassidy A, O'Reilly EJ, Kay C, Sampson L, Franz M, Forman JP, Curhan G, Rimm EB. Habitual intakes of flavonoid subclasses and incident hypertension in adults. *Am J Clin Nutr*. 2011;93:338-47.
4. Hanhineva K, Torronen R, Bondia-Pons I, Pekkinen J, Kolehmainen M, Mykkanen H, Poutanen K. Impact of dietary polyphenols on carbohydrate metabolism. *Int J Mol Sci*. 2010;11:1365-402.
5. Wedick NM, Pan A, Cassidy A, Rimm EB, Sampson L, Rosner B, Willett W, Hu FB, Sun Q, van Dam RM. Dietary flavonoid intakes and risk of type 2 diabetes in US men and women. *Am J Clin Nutr*. 2012;95:925-33.
6. Samieri C, Sun Q, Townsend MK, Rimm EB, Grodstein F. Dietary flavonoid intake at midlife and healthy aging in women. *Am J Clin Nutr* doi: 10.3945/ajcn.114.085605.
7. Cevallos-Casals BA, Cisneros-Zevallos L. Stoichiometric and kinetic studies of phenolic antioxidants from Andean purple corn and red-fleshed sweet potato. *J Agric Food Chem*. 2003; 51:3313-9.
8. Lopez-Martinez LX, Parkin KL, Garcia HS. Phse II-inducing, polyphenols content and antioxidant opacity of corn (*Zea mays* L.) from phenotypes of white, blue, red and purple colors processed into masa and tortillas. 2011. *Plant Foods Hum Nutr*66:41-7.