ANTHOCYANIN-RICH MODEL FOODS AND THEIR ROLE IN COMBATING CHRONIC DISEASES


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transcription factors, anthocyanins, Zea mays, Citrus sinensis, health

The role of flavonoids and anthocyanins as the major red, blue, and purple pigments in plants has gained these secondary products a great deal of attention over the years. In plants, they have a well-known physiological function for the recruitment of pollinators and seed dispersers. Besides providing beautiful pigmentation in flowers, fruits, seeds and leaves, they also have key roles in nodulation, in male fertility of some species, in defense as antimicrobial agents, in protection against UV radiation and cold temperatures.

Being commonly found in fruits and vegetables, flavonoids and anthocyanins are widely distributed in the human diet. Epidemiological studies suggested that regular consumption of flavonoid-rich foods or beverages is associated with decreased risk of chronic degenerative diseases. In the frame of the EU-funded project FLORA, we developed maize isogenic lines with high levels of hydroxycinnamic acids, flavonols, phlobaphenes and anthocyanins by generating suitable allelic combinations of the two regulatory gene families (C1/Pl1 and B1/R1) controlling activation of the flavonoid biosynthetic pathway in maize. The aim was to provide dietary supplements to test the impact of specific flavonoids in whole foods on cardiovascular and age-related degenerative diseases using animal model systems. These studies demonstrated that in rats fed anthocyanin-rich blue maize the amount of cardiac tissue that was damaged following ischemic conditions was reduced by approximately 30% compared to rats fed anthocyanin-free maize. Cardioprotection was associated with increased myocardial glutathione levels, suggesting that dietary anthocyanins modulate cardiac antioxidant defences. Furthermore, we investigated the effect of blood and common orange juice on fat accumulation in mice fed standard or high fat diet. Results revealed that providing blood orange juice, but not common orange juice, as a substitute of water, reduced significantly body weight gain and fat accumulation, thus impairing the high-fat induced obesity.