Foods we eat have an enormous impact on our health. Beyond the nutrients that are essential for health, phytochemicals and zoochemicals in foods are physiologically active compounds and provide significant health benefits. Interaction between our genes and food compounds directly affect our health and disease risk. Alpha-tocopherol, the active form of vitamin E in human plasma, has been found to inhibit platelet aggregation (PA) and its inhibitory mechanism suggested being the down-regulation of GPIIb promoter activity which results in a reduction of GPIIb protein expression contributing to PA. Vitamin B-6 exhibits anti-PA through not only down-regulation of GPIIb gene expression but also occupancy of GPIIb/IIa receptor and inhibition of ADP-induced platelet activation via P2T and P2Y1 receptors. Vitamin B-6 also maintains the function and ultrastructure of endothelial cells. Recently, phytochemicals have been shown as molecular modulators in many tissues to promote health and prevent diseases. The anti-diabetic effects of phytochemicals include enhancing insulin secretion and suppressing apoptosis and promoting proliferation of pancreatic β-cells, lowering hyperglycemia through regulation of glucose metabolism in hepatocytes and increasing glucose uptake in skeletal muscle and white adipose tissues, attenuating insulin resistance, inflammation, and oxidative stress in muscle and adipose tissues. Phytochemicals are potential for obesity and/or weight management through reducing viability of adipocytes, inhibiting proliferation of pre-adipocytes, suppressing differentiation of adipocytes, preventing triglyceride accumulation via modulation of signaling involved in lipolysis, fatty acid β-oxidation and inflammation including AMPK, PPARγ, C/EBPα, PGC1α, sirtuin 1, SREBP-1c, UCP 1 and 2, and NF-κB...etc. Dietary polyphenols act as anti-inflammatory and oxidative stress-related modulators for cancer prevention. Ultimately, further randomized clinical trials warrant the preclinical efficacy of these nutrients and/or phytochemicals.