Mechanisms of a long-life health

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Urine metabolomic profiling to identify biomarkers of a flavonoid-rich and flavonoid-poor diets

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The present study aims to investigate the dose dependent effects of consuming diets enriched in flavonoid-rich and flavonoid-poor fruits and vegetables on the urine metabolome of adults who had a ≥1.5 fold increased risk of cardiovascular diseases. A single-blind, dose-dependent, parallel randomized controlled dietary intervention was conducted where volunteers were randomly assigned to one of three diets: high flavonoid diet, low flavonoid diet or habitual diet as a control for 18 weeks. High resolution LC-MS untargeted metabolomics was performed using an Orbitrap mass spectrometer. Putative biomarkers which characterize diets with high and low flavonoid content were selected by state-of-the-art data analysis strategies and identified by HR-MS and HR-MS/MS assays. Discrimination between diets was observed by application of two linear mixed models. Valerolactones, phenolic acids were among sixteen biomarkers related to the high flavonoid dietary exposure. Four biomarkers related to the low flavonoid diet belonged to the family of phenolic acids. For the first time abscisic acid glucuronide was reported as a marker of carotenoid consumption. This metabolomic analysis has identified a number of dose dependent biomarkers, which can be used in future observation and intervention studies to assess flavonoids and/or carotenoids intakes and compliance to fruit and vegetable intervention.