Effects of short- and long-term Mediterranean-based dietary treatment on plasma LC-QTOF/MS metabolic profiling of subjects with metabolic syndrome features: The Metabolic Syndrome Reduction in Navarra (RESMENA) randomized controlled trial

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Scope: Adherence to the Mediterranean diet has been associated with a reduced risk of metabolic syndrome (MetS). Metabolomics approach may contribute to identify beneficial associations of metabolic changes affected by Mediterranean diet-based interventions with inflammatory and oxidative-stress markers related to the etiology and development of the MetS. Methods and results: Liquid chromatography coupled to quadrupole-time of flight-MS metabolic profiling was applied to plasma from a 6-month randomized intervention with two sequential periods, a 2-month nutritional-learning intervention period, and a 4-month self-control period, with two energy-restricted diets; the RESMENA diet (based on the Mediterranean dietary pattern) and the Control diet (based on the American Heart Association guidelines), in 72 subjects with a high BMI and at least two features of MetS. The major contributing biomarkers of each sequential period were lipids, mainly phospholipids and lysophospholipids. Dependency network analysis showed a different pattern of associations between metabolic changes and clinical variables after 2 and 6 month of intervention, with a highly interconnected network during the nutritional-learning intervention period of the study. Conclusion: The 2-month RESMENA diet produced significant changes in the plasma metabolic profile of subjects with MetS features. However, at the end of the 6-month study, most of the

associations between metabolic and clinical variables disappeared; suggesting that adherence to healthy dietary habits had declined during the self-control period.

Dependency networks

LC-QTOF/MS

Mediterranean diet

Metabolic syndrome

Metabolomics

biological marker

high density lipoprotein cholesterol

low density lipoprotein cholesterol

triacylglycerol

adult

blood

body mass

body weight

Caucasian

controlled study

diet therapy

human

mass spectrometry

Mediterranean diet

metabolic syndrome X

metabolome

metabolomics

randomized controlled trial

time factor

Adult

Biomarkers

Body Mass Index

Body Weight

Cholesterol, HDL

Cholesterol, LDL

Diet, Mediterranean

European Continental Ancestry Group

Humans

Mass Spectrometry

Metabolic Syndrome X

Metabolome

Metabolomics

Time Factors

Triglycerides