

A metabolomics-based investigation of the effects of a short-term body weight reduction program in a cohort of adolescents with obesity: a prospective interventional clinical study.

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Metabolomics applied to assess the response to a body weight reduction program (BWRP) may generate valuable information concerning the biochemical mechanisms/pathways underlying the BWRP-induced cardiometabolic benefits. The aim of the present study was to establish the BWRP-induced changes in the metabolomic profile that characterizes the obese condition. In particular, a validated liquid chromatography-tandem mass spectrometry (LC-MS/MS) targeted metabolomic approach was used to determine a total of 188 endogenous metabolites in the plasma samples of a cohort of 42 adolescents with obesity (female/male = 32/10; age = 15.94 ± 1.33 year; body mass index standard deviation score (BMI SDS) = 2.96 ± 0.46) who underwent a 3-week BWRP, including hypocaloric diet, physical exercise, nutritional education, and psychological support. The BWRP was capable of significantly improving body composition (e.g., BMI SDS, $p < 0.0001$), glucometabolic homeostasis (e.g., glucose, $p < 0.0001$), and cardiovascular function (e.g., diastolic blood pressure, $p = 0.016$). A total of 64 metabolites were significantly reduced after the intervention (at least $p < 0.05$), including 53 glycerophospholipids (23 PCs ae, 21 PCs aa, and 9 lysoPCs), 7 amino acids (tyrosine, phenylalanine, arginine, citrulline, tryptophan, glutamic acid, and leucine), the biogenic amine kynurenine, 2 sphingomyelins, and (free) carnitine (C0). On the contrary, three metabolites were significantly increased after the intervention (at least $p < 0.05$)-in particular, glutamine, trans-4-hydroxyproline, and the octadecenoyl-carnitine (C18:1). In conclusion, when administered to adolescents with obesity, a short-term BWRP is capable of changing the metabolomic profile in the plasma.

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