Metabolomic profiling of Prader-Willi syndrome compared with essential obesity.

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Introduction: Prader-Willi syndrome (PWS) is a rare disease, which shows a peculiar clinical phenotype, including obesity, which is different from essential obesity (EOB). Metabolomics might represent a valuable tool to reveal the biochemical mechanisms/pathways underlying clinical differences between PWS and EOB. The aim of the present (case-control, retrospective) study was to determine the metabolomic profile that characterizes PWS compared to EOB.

Methods: A validated liquid chromatography-tandem mass spectrometry (LCMS/ MS) targeted metabolomic approach was used to measure a total of 188 endogenous metabolites in plasma samples of 32 patients with PWS (F/M = 23/9; age: 31.6 ± 9.2 years; body mass index [BMI]: 42.1 ± 7.0 kg/m^2), compared to a sex-, age- and BMI-matched group of patients with EOB (F/M = 23/9; age: 31.4 ± 6.9 years; BMI: 43.5 ± 3.5 kg/m^2).

Results: Body composition in PWS was different when compared to EOB, with increased fat mass and decreased fat-free mass. Glycemia and HDL cholesterol were higher in patients with PWS than in those with EOB, while insulinemia was lower, as well as heart rate. Resting energy expenditure was lower in the group with PWS than in the one with EOB, a difference that was missed after fat-free mass correction. Carrying out a series of Tobit multivariable linear regressions, adjusted for sex, diastolic blood pressure, and C reactive protein, a total of 28 metabolites was found to be associated with PWS (vs. non-PWS, i.e., EOB), including 9 phosphatidylcholines (PCs) ae, 5 PCs aa, all PCs aa, 7 lysoPCs a, all lysoPCs, 4 acetylcarnitines, and 1 sphingomyelin, all of which were higher in PWS than EOB.

Conclusions: PWS exhibits a specific metabolomic profile when compared to EOB, suggesting a different regulation of some biochemical pathways, fundamentally related to lipid metabolism.