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A folic acid diet fed to rats during the conception periods modifies the serum and urine metabolic profiles in the adult offspring

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Maternal folic acid (FA) supplementation programs the early development of an offspring. The onset of complex diseases at a later stage of life has been evidently linked with maternal folic acid ingestion. However, little is known regarding the underlying molecule fingerprints of the offspring. The aim of this study is to analyze the influence of maternal FA supplementation on the metabolism of the adult offspring rats based on the metabolomics. Sterile Sprague-Dawley female rats are randomly assigned into two dietary groups and fed the AIN-93G diet containing 2 (control) or 5 (folic acid supplementation, FAS) mg folic acid/kg of diet. Serum and urine metabolite profiles from the offspring in FAS and control groups based on the UPLC-Q-TOF-MS were obtained at 0, 3 and 7 weeks after birth. Here we showed that there was clear separation between the FAS group and the controls. The metabolic change of the offspring for the maternal FA supplementation is characterized by the phospholipids, fatty acid and amino acids. And these results demonstrate neural development related metabolites such as docosahexaenoic acid, glycine, tryptophan, γ -aminobutyric acid were significantly altered. The behavioral test indicate that the maternal FA supplement maybe have an effect on the learning behavior of the offspring. All the above results suggest that active neural conduction occurred in the offspring after maternal FA supplementation. Thus, we conceived that the alterations of metabolites in the offspring are associated with the maternal FA supplementation, which further influenced on the learning behavior of the offspring.

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