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Study on free fatty acids metabolome using 2D nano LC-NSI-Q-TOF/MS, application to polycystic ovarian syndrome in women

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Free fatty acids (FFAs) including omega-3 and omega-6 polyunsaturated fatty acids were major derived from arachidonic acid (AA) and eicosapentaenoic acid (EPA), which plays important roles in many physiological processes, especially inflammation. Assessment of eicosanoids is important for understanding their homeostatic and pathophysiological roles in inflammatory disease. A new analytical approach focus on polyunsaturated fatty acids metabolome was established using isotope dilution, solid phase extraction and 2D nano liquid chromatography-nanospray ionization-time of flight-mass spectrometry (2D nano LC-NSI-Q-TOF/MS). Within 35 min, 58 FFAs, including free fatty acids, prostaglandins, lipoxins, resolvins, leukotrienes, thromboxans, maresins, hydroxyeicosatetraenoic acids as well as epoxyeicosatrienoic acids were quantified along with seven corresponding isotope dilution internal standards. The limits of quantification were between 0.008 and 20 pg per injection for 1 L. The efficiency of separation were perfect, all of the standards were separated well (Figure 1). The method validations for linearity, accuracy, precision, recovery were satisfied. Besides, this approach was performed to analyze both of targeted and non-targeted metabolomics studies in serum samples of women with polycystic ovarian syndrome (PCOS) and health women, the results indicated that the significant differences noted in the levels of heptadecanoic acid, myristic acid, pentadecanoic acid, 9E, 11E-octadecadienoic acid, arachidolic acid, palmitic acid, oleic acid and stearic acid ($p < 0.001$) as well as palmitelaidic acid ($p < 0.01$) (Figure 1). Women with PCOS may have a unique metabolomic finger print and a definitive study is feasible. These findings may indicate that the PCOS were positive correlation between patient and health woman in fatty acids syntheses.

Biography

Guo-An Luo obtained the Master degree from East China University of Science and Technology in China in 1982. He is the professor of Tsinghua University and Macau University of Science and Technology. He has long been engaged in pharmaceutical analysis, the systems biology for traditional Chinese medicine (TCM) and modernization for TCM research. Six research monographs and more than 760 papers were published, of which 310 was indexed by Web of Science, with an H-index of 35. Prof. Luo has been authorized more than twenty-five invention patents and completed six preclinical applications of new drug.

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