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LC-QTOF-MS BASED TARGETED AND UNTARGETED METABOLOMIC APPROACHES FOR THE IDENTIFICATION OF POTENTIAL BIOMARKERS IN PLASMA FROM PEDIATRICS WITH CHRONIC KIDNEY DISEASE

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Chronic kidney disease (CKD) is a major worldwide public health problem which causes several disturbances due to an irreversible kidney damage which can progress to renal hypofunction. However, information available for CKD in both pediatric and adult population is limited. As a result, CKD is difficult to diagnose, to follow in progression and to evaluate the response to therapy [1]. In clinical practice, creatinine is considered the classic biomarker for the assessment of renal function. However, creatinine is still far from being the ideal biomarker, as it lacks sensitivity and reveals kidney damage when an important nephronic loss has already taken place [2]. The advent of omics technologies is enabling the discovery of new biomarkers in the form of DNA, RNA, proteins, transcriptomes and metabolites. Moreover, metabolomics corresponds to the study of small molecules, typically below 1500 Da in a biological system [3]. Targeted metabolomics focuses on the determination and quantification of known metabolites, suspicious to be altered in a disease, whereas untargeted metabolomics makes possible to measure and compare as many unknown metabolites as possible without any bias. Therefore, with the aim of finding new potential biomarkers, both targeted and untargeted metabolomics approaches have been performed. Regarding targeted metabolomics, an ion-pairing LC-QTOF-MS methodology has been developed, optimized and used for the quantification of 16 metabolites from the arginine-creatinine metabolic pathway, arginine methylation and urea cycle in plasma [4]. On the other hand, untargeted metabolomics has been applied in order to find unknown metabolites whose levels are statistically different in plasma from CKD pediatrics and a control population. [1] V.Fanos, C.Fanni, G.Ottonello, A.Noto, A.Dessì, M.Mussap. Molecules. 18,4644 (2013). [2] R.H.Weiss, K.Kim. Nature Reviews Nephrology. 8, 22 (2012). [3] D.S.Wishart et al. Nucleic Acids Research. 35:D521-D526 (2007). [4] S.Benito, A.Sanchez, N.Unceta, F.Andrade, L.Aldamiz-Echevarria, M.A.Goicolea, R.J.Barrio. Analytical and Bioanalytical Chemistry. 408 (2016).