

Abstract Type : Poster

Abstract Submission No. : PO-1590

DETECTION OF DIURETICS IN HUMAN URINE: KEY REGULATORS OF EXTRACELLULAR FLUID & KIDNEY DISORDERS

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Objectives: Diuretics are agents commonly used in diseases characterized by excess extracellular fluid, including chronic kidney disease, the nephrotic syndrome, cirrhosis and heart failure. Multiple diuretic classes, including thiazide-type diuretics, loop diuretics and K⁺-sparing diuretics, are used to treat patients with these diseases, either individually or as combination therapies¹. Diuretics are often abused by athletes to excrete water for rapid weight loss and to mask the presence of other banned substances. Because of their abuse by athletes, diuretics have been included on The World Anti-Doping Agency's (WADA) list of prohibited substances. Therefore, a sensitive & comprehensive analytical method was developed & validated for the detection of Different diuretic classes like thiazide-type diuretics, loop diuretics and K⁺-sparing diuretics etc. using sophisticated LC-MS/MS technique in human urine.

Methods: An analytical method involving liquid-liquid extraction and detection by Liquid Chromatography Mass spectrometric analysis (LC-MS/MS) in both MRM (multiple reaction monitoring) and product ion scan mode. Diuretics detection method was developed and validated as per ISO17025 & WADA ISL guidelines for LOD (lower detection limit), specificity, robustness, selectivity and linearity.

Results: An analytical method was developed for the detection of 13 diuretics in a run time of 7 minutes. The validation results were found within the acceptable limits. We have achieved LOD in nanogram & picogram levels for few compounds. The method has been successful applied for the confirmatory analysis of diuretics.

Conclusions: A sensitive & selective method was developed for the detection of diuretics. This method could be a useful tool for the detection of these prohibited diuretics in sports doping control and in clinical, nephrological & medical field. This method has facilitated the detection of diuretics at very low levels.