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IS26. SIMULTANEOUS DETERMINATION OF 32 NEW SYNTHETIC CANNABINOIDS IN HUMAN URINE AND HAIR BY LC-MS/MS

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The extraction procedure and detection methods of new Synthetic Cannabinoids (ex: BB-22, SDB-005, THJ-018, JZL-195……etc.) for human urine and hair samples are in great need due to these new drugs are abused severely in recent years all over the world. Highly sensitive analytical techniques are therefore required for trace-level identification and quantification of these kinds of drugs. We report a fully validated method here developed by our team which could simultaneously determine 32 new Synthetic Cannabinoids in human urine and hair. We believe this method could be used in our daily analysis for authentic cases in Taiwan, and could also be adopted in other labs universally.

The aim of our research was to develop a new method of simultaneous identification of Synthetic Cannabinoids in urine and hair. And this method must be practical, highly sensitive (down to picogram level), easily applicable, and carefully validated.

Synthetic Cannabinoids from spiked urine or hair specimens were analyzed by LC-MS/MS with different pretreatments as follows:

Urine Specimens

0.2 ml of each urine sample was adjusted to basic condition with 0.1 ml of 1N sodium hydroxide. After addition of deuterated internal standards, the urine sample was extracted by 1 ml ethyl acetate in an ultrasonic bath for 30 mins, and followed by centrifugation at 13,000 rpm for 5 mins. Subsequently, 1 ml of extraction solution was transferred to a glass tube and evaporated to dryness under a gentle stream of nitrogen at 35 °C. The residue was reconstituted in 0.2 ml of mixture of water/ACN, 70/30 (v/v). Gradient elution was performed by an Agilent Zorbax Extend-C18 (5 um, 4.6 x150 mm) analytical column for LC-MS/MS instrumental system consisting of a QTrap 4500 triple-quadrupole linear ion trap mass spectrometer fitted with a TurboIonSpray interface by Applied Biosystems/Sciex (Germany) and a 1260 Infinity Quaternary LC system by Agilent (USA) .

Hair Specimens

A 10 mg portion of washed hair sample was added with 0.2 ng/mg deuterated internal standard and incubated at 40°C for 1 hour with 0.4 ml 1N sodium hydroxide. Subsequently, a liquid-liquid extraction was performed, the incubated hair sample was extracted with 1ml of ethyl acetate. The organic solvent layer was transferred

and gently evaporated to dryness in nitrogen at 35°C. The residue was dissolved in 0.2 ml mixture of water/ACN, 70/30 (v/v) and analyzed by the same condition just mentioned above in urine specimens.

Validation of this new method for simultaneously qualitative and quantitative analysis of Synthetic Cannabinoids from spiked urine and hair samples by LC-MS/MS was fully performed. And over 12 authentic urine specimens were analyzed by this new method.

Urine Specimens

32 Synthetic Cannabinoids (SCs) from spiked urine specimens were analyzed by LC-MS/MS. The limits of detection (LOD) range from 0.05 ng/mL to 1 ng/mL (dependent on different SCs) and the limits of quantification (LOQ) range from 0.20 ng/mL to 5 ng/mL. Linearity is in the range between 0.2 ng/mL and 200 ng/mL for each compound (R2 value above 0.995). Mean relative errors are between ± 10.0%. Precision variances are all below 15.0%.

Hair Specimens

32 SCs from spiked hair specimens were also analyzed by the same method. The limits of detection (LOD) range from 5 pg/mg to 20 pg/mg and the limits of quantification (LOQ) range from 10 pg/mg to 20 pg/mg. Linearity is in the range from 0.01 ng/mg to 2.0 ng/mg for each compound. Mean relative errors are between ± 10.0%. Precision variances are all below 15.0%.

Highly specific qualitative and quantitative analysis of 32 novel Synthetic Cannabinoids in urine and hair by LC-MS/MS has been developed and successfully applied to real samples in Taiwan.

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