K16 Hair Analysis as a Tool to Evaluate the Prevalence of Synthetic Cannabinoids in Different Populations of Drug Consumers

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After attending this presentation, attendees will learn how to investigate the current diffusion of synthetic cannabinoids among the population by means of hair analysis.

This presentation will impact the forensic community by describing which molecules among new synthetic cannabinoids are the most consumed in the Piedmont Region of Northern Italy, and by profiling the typical consumers of these new psychoactive substances.

Forensic laboratories are challenged worldwide with the detection of New Psychoactive Substances (NPSs) in different biological specimens, including hair. Among the new psychoactive products, herbal mixtures containing synthetic cannabimimetics are likely the most abused worldwide. Although the consumption of these drugs has been tolerated, today the majority of them are progressively banned. Still, serious side-effects and acute intoxications are becoming increasingly frequent.

Several analytical methods were developed to determine some cannabimimetics and/or their metabolites in either blood or urine, but no routine urine screening test is generally performed in forensic laboratories globally to detect them on large population sets. Consequently, almost no prevalence studies are available. For the same reason, the potential association between NPS use and traffic or occupational accidents is unknown.

In this study, a specific Ultrahigh Pressure Liquid Chromatography/Tandem Mass Spectrometry (UHPLC/MS/MS) method for the detection of 23 synthetic cannabinoids in hair samples was developed in order to: (1) expand the number of screened compounds, including new substances emerging in the European territory; (2) evaluate their consumption over a long period of examination (year 2011); and, (3) evaluate the prevalence of cannabimimetics among different populations of drug consumers. The method employs alkaline digestion of hair samples followed by extraction with n-hexane/ethyl acetate, and injection into the UHPLC/MS/MS system. After validation, the method was applied to the analysis of 344 hair samples tested in 2011 in the laboratory for the most common drugs. Overall, 15 samples (4.4%) were found positive for at least one synthetic cannabinoid. Consistent with previously published results, the present data show that young males, who are former or still active cannabis consumers, represent the population most often involved in synthetic cannabimimetics consumption. Several cases of poly-abuse were also determined. The drug most frequently detected was JWH-073 (11 samples), generally at low concentration (mean 7.69 ± 14.4pg/mg, median 1.9 pg/mg, range 1.6-50.5pg/mg), followed by JWH-122 (8 samples, mean concentration: 542 ± 962pg/mg, median 28.4pg/mg, range 7.4-2784pg/mg). Other detected drugs included JWH-250, JWH-081, JWH-018, JWH-210, JWH-019, and AM-1220. For several positive samples, the synthetic cannabinoid concentration was lower than 50pg/mg, supporting the need of established cut-off values for discrimination between chronic consumption and occasional use (or external contamination).

Similarly to what has happened in the last two decades for tetrahydrocannabinol (THC), further studies of synthetic cannabinoids are needed to establish: (1) the presence of metabolites to prove consumption; (2) the concentration ratios between parent drugs and metabolites; and, (3) the identification of alternative markers in order to support the interpretation of hair analyses.

Hair, Synthetic Cannabinoids, Spice

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