Hair analysis for synthetic cannabinoids
a study on the issue of passive contamination by side-stream smoke

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Introduction

As hair analysis is often used for abstinence control it is crucial to consider potential effects of contamination by passive exposure, particularly when drugs are smoked. In this study, the composition of main-stream and side-stream smoke of herbal mixtures containing the synthetic cannabinoids JWH-018, JWH-122 and JWH-210 was investigated and put into the context of head hair concentrations of samples collected from individuals exposed to side-stream smoke of the same mixtures.

Exposure of Hair to Side Stream Smoke

Study Setup

Hair exposed to side-stream smoke

Covered clothes and hands

- Mask
- Air supply (scuba-gear)
- Synthetic cannabinoid cigarette
- 500 mg tobacco
- 500 mg herbal mixture
- Water jet pump

Analytical Method

- Three participants
- Room size 2.5 x 2 x 2.5 m³
- Synthetic cannabinoid amount in side-stream smoke:
  - 10 mg JWH-210, 4 mg JWH-122 and 1 mg JWH-018 per cigarette
- Exposure on five days a week over three consecutive weeks
- Hair sampling over 5-6 weeks, regular washing
- Hair samples were analyzed in 3-5 cm segments

Analytical Method

- 50 mg hair; Washing: water, acetone, petroleum ether; addition of deuterated standards and 1.5 mL ethanol; Ultrasonication for 3 hours; LC-MS/MS: ABSciex Qtrap 4000, column: Luna Phenyl-Hexyl; Calibration range: 0.5 pg/mg to 75 pg/mg (details see Hutter et al.)

Results

- Participant three, week three, segmental hair analysis:
  - Up to 60 pg/mg JWH-210 in the segments from 0 to 20 cm
  - Up to 600 pg/mg JWH-210 in the further distal segments

JWH-210 in all three participants, average of all segments:
Still up to 100 pg/mg two to three weeks after the last exposure

Acetone wash solutions: equal or less analyte in comparison to the corresponding hair segment

Smoke Analysis

Main-stream parameters:
- Puff volume: 35 mL
- Puff duration: 3 s
- Puff interval: 30 s

Side-stream parameters:
- Flow: 1 L/min

Analytical Method

Sample workup: dilution, addition of deuterated standard
- GC-MS parameters: Heating rate: 30 °C /min, Start: 100 °C, End: 310 °C;
- Run time: 20 min; Injection volume: 1 μL, splitless; Liner without glass wool

Results

About the same amount of synthetic cannabinoids in main- and side-stream smoke condensates

500 mg dry tobacco mixed with 166 mg of three herbal mixtures each:
- high variability between the single experiments due to inhomogeneities in the herbal mixture

Reference


Acknowledgement

This publication has been produced with the financial support of the Drug Prevention and Information Programme of the European Union (JUST/2011/DDP/AG/3597), the German Federal Ministry of Health and the City of Frankfurt/Main.

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