

## Evaluation of the IDS ONE-STEP™ Elisa kit for the detection of illicit drugs in hair specimens *versus* GC/MS

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**AIMS:** Validation of the International Diagnostic Systems corp. (IDS) One-Step™ ELISA tests for the screening of illicit drugs (opiates, cocaine, amphetamines and cannabis) in hair specimens *versus* GC/MS.

**METHODS:** Hair strands were washed with methylene chloride, cut into small segments (<1mm) with scissors and 50 mg were incubated in 1 ml of methanol, overnight at 40°C. For the immunological test, the incubation medium was evaporated to dryness, the dry extract was dissolved in 1 ml of the “sample and standard diluent” solution of the kit and 20 µl were added to the wells followed by an enzyme conjugate. After an incubation period of 30 min at room temperature, any unbound material was washed before the final color development process with substrate. The color intensity was inversely proportional to the amount of illicit drug present in the sample and measured with a microplate reader at 450 nm.

For the GC-MS confirmatory procedures, the redissolved incubation medium was extracted after addition of deuterated internal standards (single liquid-liquid extraction using hexane/ethylacetate after complete dissolution in alkaline conditions for amphetamines and cannabis, multiple liquid-liquid extraction at pH 8.4 using methylene chloride/2-propanol/n-heptane for opiates and cocaine). Additional derivatization steps (HFBA, BSTFA) were included for amphetamines, opiates and cocaine. Chromatographic separation was obtained on a 5MS capillary column (30 × 0.25 mm × 0.25µm) and detection was achieved after EI mode of ionization using an Agilent 5973 MSD.

**RESULTS:** In order to test the capacity of the immunoassay to detect cocaine, opiates, amphetamines and cannabis, 71 hair specimens were simultaneously screened by the One-Step™ ELISA tests and analyzed by GC-MS. According to the cut-off values published by the Society of Hair Testing [1], 9 hair specimens (12.7 %) were found positive for cannabis after ELISA screening and confirmed by GC/MS (THC: 0.10 to 1.10 ng/mg), 5 (7.0%) for cocaine (1.1 to 27.6 ng/mg), 6 (8.5%) for opiates (6-MAM: 0.3 to 5.8 ng/mg, morphine: 0.2 to 3.0, codeine: 0.2 to 0.3 ng/mg, pholcodine: 0.6 ng/mg) and 2 (2.8%) for amphetamines (amphetamine: 0.2 ng/mg, MAP: 1.1 ng/mg, MDA: 0.9 ng/mg, MDMA: 0.5 to 5.5 ng/mg). For 18 hair specimens (8.5; 1.4; 8.5 and 7.0 % for cannabis, cocaine, opiates and amphetamines, respectively), the GC/MS did not confirmed the doubtful or positive ELISA results (false positive results). In any way, no false negative results was observed with the immunological test as all negative ELISA results were confirmed as negative by GC/MS (concentrations lower than the cut-off values of the SoHT).

**CONCLUSIONS:** These results support that the One-Step™ ELISA tests of IDS can be considered as a highly sensitive screening procedure to detect cocaine, opiates, amphetamines and cannabis in human hair. In the case of a positive ELISA test, a confirmatory analysis is needed.

**REFERENCE:**

<sup>1</sup> [http://www.soht.org/pdf/Consensus\\_on\\_Hair\\_Analysis.pdf](http://www.soht.org/pdf/Consensus_on_Hair_Analysis.pdf)

**KEYWORDS:** *Hair, Illicit Drugs, ELISA, Screening, GC/MS*

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