

Positive diagnostic findings of ethyl glucuronide in urine compared to hair samples in the context of a driving ability examination

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1. Introduction

Ethyl glucuronide (EtG) is now part of the guidelines from the DGVP and DGVM to check driving ability. To guarantee abstinence of alcohol over a year's period it is necessary to test a person's urine six times at a short notice. Alternatively, testing of a three cm hair segment for EtG covers a three months period of control. Findings in both matrices are compared.

2. Material and Methods

2.1. Urine

Urine samples which have been sent to the laboratory in the context of driving ability examination, were pretested using DRI ethyl glucuronide- immunoassay (Thermofisher at a 0.1 mg/L cut-off). Positive urine findings were confirmed using a validated LC/MS-MS method (internal standard EtG-D5) following dilution of the samples.

Instrumentation:

Liquid chromatograph:	Agilent binary pump 1100
Pre- Column:	Phenomenex C8 4 x 2.1 mm
Column:	Thermo Scientific Hypercarb 50 x 2.1 mm, 3 μ
Mobile Phase:	0.1 % Formic acid in water 0.01% Formic acid in acetonitrile with gradient elution
Mass Spectrometer:	Ionics
Detection:	ESI- MRM (negative mode)
Transition:	EtG 221 \rightarrow 75.0 (85.0/113.1) EtG-D5 226 \rightarrow 75.0

2.2. Hair

Hair samples were purified using solvents, cut into pieces, followed by extraction of EtG with water. Then, the supernatant was analyzed for EtG with the LC/MS-MS assay (internal standard EtG-D5).

Instrumentation:

Liquid chromatograph:	Agilent binary pump 1200
Pre- Column:	Thermo Scientific Hypercarb 10 x 2.1 mm, 3 μ
Column:	Thermo Scientific Hypercarb 50 x 2.1 mm, 3 μ
Mobile Phase:	0.1 % Formic acid in water 0.01% Formic acid in acetonitrile with gradient elution
Mass Spectrometer:	Agilent Triple Quadrupole 6460A
Detection:	ESI- MRM (negative mode)
Transition:	EtG 221 \rightarrow 75.0 (85.0/113.1) EtG-D5 226 \rightarrow 75.0

3. Results and Discussion

3.1. Urine

Positive immunological results were obtained from 313 out of 6841 (4.6%) urine samples during a year's period. Of these, 231 could be confirmed with the LC/MS-MS assay; hence a total of 3.4% of all urine samples were tested positive. The concentration of EtG exceeded 0.5 mg/L in 92 cases and ranged from 0.1 to 0.5 mg/L in 139 samples.

3.2. Hair

Determination of the concentration of EtG in hair resulted in 289 positive cases out of 4089 (7.1%) samples. The concentration was higher than 30 pg/mg hair (cut-off recommended by SOHT) in 83 cases, and ranged from 7 to 30 pg/mg hair in 206 specimens.

4. Conclusion

The rate of positive samples tested for EtG was smaller when choosing urine as matrix instead of hair. Values in lower concentration range were predominated in both urine and hair, which justifies the low cut-offs in the context of a driving ability examination.