

Ethanol, ethyl glucuronide (EtG) and ethyl sulphate (EtS) in blood and urine after controlled drinking. Chermá M.D.¹, Nilsson J.¹, Kugelberg F.C.^{1,2}, Kronstrand R.^{1,2} and Jakobsson G.¹. ¹Department of Forensic Genetics and Forensic Toxicology, National Board of Forensic Medicine, Linköping, Sweden. ² Division of Clinical Chemistry and Pharmacology, Department of Biomedical and Clinical Sciences, Linköping University, Linköping, Sweden.

Background: Alcohol is consumed regularly by the vast majority of the population. Regular high alcohol consumption is a common risk factor for a range of negative medical consequences. In order to be able to offer adequate healthcare, knowledge of the basic problem is required. Denial of alcohol consumption is very common. Measuring ethanol in breath or blood is used to detect current ethanol use, but it is measurable only for a few hours even after a large intake. Different laboratory tests are used to demonstrate regular over-consumption of alcohol and related harm. Detection of a single/acute alcohol intake can help the healthcare to identify the problem.

Ethyl glucuronide (EtG) and ethyl sulphate (EtS) in urine are used to detect current alcohol consumption. However, the concentration is affected by a number of factors, including dilution of the urine or bacterial hydrolysis in case of urinary tract infection with *E. coli*. Therefore, EtG and EtS measured in blood samples is an alternative primarily in forensic contexts. We present the pharmacokinetics of EtG and EtS in a controlled setting and describe parameters that can indicate a recent intake.

Methods: Five healthy volunteers (80% male, median age 21 and BMI 28) were given a dose of 0.85 g/kg ethanol as wine (13 vol%). Blood and urine samples were taken continuously up to 11h after the dose and only 24h after in urine Ethanol in blood (BAC) and urine (UAC) were analyzed using Headspace Gas Chromatography. EtG and EtS were analyzed by Supercritical Fluid Chromatography Mass Spectrometry.

Results: The median UAC/BAC 1h after dose was ≤ 1.3 and UAC was increasing. BAC/B-EtG was >1 up to 2.5h after dose. The B-EtG was increasing and in the same order of magnitude that B-EtS in the first hour. EtG and EtS were detected in blood 6h after dose and up to 24h in urine, in comparison to ethanol that was detected up to 4h resp. 6h after dose. The creatinine-corrected U-EtG and U-EtS increased during the first 4 hours.

Conclusion: The results suggest that the parameters used are valid to indicate a recent intake of alcohol.