

ETG AND ETs: ETHANOL BIOMARKERS

Ethyl Glucuronide (EtG) and Ethyl Sulfate (EtS) are direct biomarkers or metabolites of ethanol. They are termed “direct” because they are analytes of alcohol metabolism. Although most alcohol that is consumed is metabolized by oxidative processes in the liver, a very small amount is broken down nonoxidatively, thereby creating analytes that can be measured for a longer period of time than ethanol itself remains in the body. EtG/EtS concentrations generally represent about 0.02%-0.06% of total ethanol elimination. EtG and EtS are usually measured in urine specimens. Published literature indicates that EtG *may* be detectable for up to 80 hours after alcohol ingestion, while EtS is generally detectable for up to 24 hours after use. The EtG and EtS “windows of detection” are dependent on cut-off levels used, individual metabolism, and alcohol usage patterns.

EtG and EtS testing in urine specimens use a reagent screening process with confirmation using LC/MS/MS methodology. The cutoff level for EtG confirmation is typically 500 ng/mL or higher; the EtS confirmation cut-off level is generally set at 100 ng/mL. Because of the sensitivity of both EtG and EtS testing, it is possible for exposure to alcohol from use of personal hygiene products, foods containing alcohol, and cleaning or sanitizing products to result in a positive EtG and/or EtS test. Neither EtG nor EtS testing can distinguish between alcohol beverage consumption and incidental or unintentional alcohol exposure from foods, personal hygiene products, cleaning or sanitizing agents or other environmental sources. Thus, based on the available published literature, it is recommended that levels of 1500 ng/mL for EtG and 100 ng/mL for EtS be used by monitoring programs when attempting to make determinations of drinking relapse. If substantially lower cut-off levels are used, it is strongly recommended that the results be interpreted with consideration of non-drinking exposure to alcohol.

Recent studies have indicated that EtG can either be formed or degraded in a urine specimen when certain conditions are present. EtG is subject to degradation by some bacteria at room temperature. Also, under certain conditions, in-vitro (outside of the body, in the specimen container) formation of EtG may occur when certain bacteria and ethanol or ethanol-producing bacteria are both present in a urine specimen. Because of these two factors related to EtG degradation and in-vitro production, many laboratories are recommending that EtS testing be conducted in conjunction with testing for EtG. Additionally, it is strongly recommended that urine specimens being testing for EtG/EtS should arrive at the testing laboratory within 5 days of specimen collection. There are no published reports of in-vitro synthesis of EtS or degradation of EtS stability in urine specimens.

While EtG and EtS testing can be effective tools to assist in alcohol abuse relapse prevention and monitoring, use of appropriate cut-off levels and a thorough medical review or clinical correlation of any EtG/EtS positive test results are essential. Use of EtG testing with a cut-off level lower than 500 ng/mL is not recommended and for positive EtG results of 500 ng/mL or more, EtS testing with a cut-off of 50 ng/mL is recommended to rule out in-vitro EtG production.

For programs that choose to use EtG and EtS testing for monitoring alcohol abstinence, the following comments contained in the US SAMHSA's Center for Substance Abuse Treatment (CSAT) Advisory September 2006 should be noted.

“Currently, the use of an EtG test in determining abstinence lacks sufficient proven specificity for use as primary or sole evidence that an individual prohibited from drinking, in a criminal justice or a regulatory compliance context, has truly been drinking. Legal or disciplinary action based solely on a positive EtG, or other test discussed in this Advisory, is inappropriate and scientifically unsupportable at this time. These tests should currently be considered as potential valuable clinical tools, but their use in forensic settings is premature.”

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