
How to Order Biomarkers of Alcohol Use Disorder

Introduction

Biomarkers of alcohol use are sometimes helpful when we are not sure whether our patients are reliable in reporting their level of use. Here are two common situations where we might order a test:

- Screening for ongoing alcohol use in a patient who is requesting controlled substance medications for a psychiatric issue
- Monitoring for relapse in a patient who has been abstinent and who is in a mandated treatment program (such as part of probation or an employer-mandated program)

Screening for Recent Use/Relapse

These tests screen for alcohol directly. They are useful for detecting whether a patient has consumed alcohol within the last few hours.

- *Blood alcohol level (BAL)*: BAL is mainly used in emergency room settings (see “Blood Alcohol Level Fact Sheet” for details). Time window for detection: First appears 15 minutes after use, detectable for six to 10 hours.
- *Urine alcohol content (UAC)*: UAC can be measured in the emergency room, is less invasive to measure, and can be assessed serially. It peaks 45–60 minutes after ingestion and is about 1.3 times the BAL. Time window for detection: Appears one hour after use, detectable for nine to 12 hours.
- *Breathalyzer*: Breath testing results are directly normed to the BAL and similarly give an indication of degree of intoxication. Newer developments include smartphone apps with attached breathalyzers that allow patients or family members to do BAL testing (various devices are available on Amazon.com for around \$100). Time window for detection: Appears one hour after use, detectable for 12–24 hours.
- *Ethyl glucuronide (ETG) and ethyl sulfide (ETS)*: ETG and ETS are metabolites of alcohol that remain in the urine for two to three days after drinking. These tests are more sensitive and have a longer time window than either urine alcohol content or a breathalyzer test. They are considered the gold standard for assessing whether a patient has had a drink over the past few days.

Screening for Chronic Use

The following common blood tests are indirect markers of alcohol use. They are useful in determining that a patient likely has been a heavy drinker, but they aren't as reliable and specific as other tests regarding the time course of drinking.

- *Gamma-glutamyl transferase (GGT)*: GGT is a glycoenzyme on endothelial cell membranes of various organs, especially the liver. Increased levels of GGT generally indicate that a patient has been drinking heavily and continuously for several weeks. Since GGT levels take two to six weeks to normalize, patients will need a decent length of sobriety before producing a normal GGT.
- *Carbohydrate-deficient transferrin (CDT)*: CDT is a more specific blood test than GGT and is good for detecting chronic heavy drinking as opposed to moderate drinking. Transferrin is an iron transport protein that loses some of its carbohydrate side-chains in the presence of alcohol. Thus, the specific “carbohydrate-deficient” transferrin indicates alcohol use. Only prolonged heavy drinking (ie, greater than four or five drinks a day for two to three weeks), however, is likely to produce an elevated CDT level. So, although this test is well suited to identify heavy drinkers, it is not good for detecting relapse or moderate drinking. This test is more specific to alcohol use than the GGT test.
- *Aspartate amino transferase (AST) and alanine amino transferase (ALT)*: Elevations in AST and ALT may reflect liver damage caused by alcohol. An AST:ALT ratio of 2:1 is more indicative of alcohol-induced liver damage compared to other sources of liver injury. However, this measure is not as specific to drinking as GGT.
- *Mean corpuscular volume (MCV)*: Chronic heavy alcohol use can cause MCV elevation both because of alcohol's detrimental effect on erythroblast development and as a secondary effect of vitamin deficiencies sometimes seen in severe alcohol use disorder. This test is not as sensitive to alcohol use as other biomarkers.