



white paper

ALCOHOL TESTING IN THE WORKPLACE

Which method works best for your organization?

INTRODUCTION

The National Survey on Drug Use and Health (NSDUH) conducted a survey in 2015 which showed 86.4 percent of people age 18 and older drank alcohol at some point in their lifetime,¹ and 6.2 percent of this age group had AUD (Alcohol Use Disorder).² According to NIAAA (National Institute on Alcohol Abuse and Alcoholism), nearly 14 million Americans, which is 1 in every 13 adults, abuse alcohol or are alcoholics.

An estimated 88,000 people die from alcohol-related causes annually, making alcohol the third leading preventable cause of death in the United States.³

In the workplace setting, 6.6 percent of Americans employed

in full-time jobs report heavy drinking.⁴ Forty percent of industrial fatalities and 47 percent of industrial injuries can be linked to alcohol consumption and alcoholism.⁵ Sixty percent of alcohol-related work performance problems can be attributed to employees who occasionally drink too much on a work night or drink during a weekday lunch.⁶

Given its widespread availability and high rates of abuse, the risk of alcohol abuse in a workplace setting can lead to severe ramifications for an organization and its employees. Given this risk, many companies perform alcohol testing as a means to reduce risk and potential liability.



¹ SAMHSA (Substance Abuse and Mental Health Services Administration). 2015 National Survey on Drug Use and Health (NSDUH). Table 2.41B- Alcohol use in lifetime, part year, and past month among persons aged 12 or older, by Demographic Characteristics: Percentages, 2014 and 2015

² SAMHSA (Substance Abuse and Mental Health Services Administration). 2015 National Survey on Drug Use and Health (NSDUH). Table 5.6B- Substance use disorder in past year among persons aged 18 or older, by demographic characteristics: Percentages, 2014 and 2015

³ Centers for Disease Control and Prevention (CDC). Alcohol and Public Health: Alcohol Related Disease Impact (ARDI). Average for the United States 2006-2010 Alcohol-attributable deaths due to excessive alcohol use.

⁴ National Institute on Drug Abuse (NIDA), National Household Survey on Drug Abuse (NHSDA): Main findings 1997.4/99,pg111

⁵ M. Bernstein 7 JJ Mahoney, "Management perspectives on alcoholism: the employers stake in alcoholism treatment," Occupational Medicine, Vol.4, No.2, 1989, pg.223-232

⁶ TW Magione, et al, "New Perspective for worksite alcohol strategies: results from a corporate drinking study", JSI research and training institute, Inc., Boston, MA, 12/98, p.1

TESTING FOR ALCOHOL

In general, after consuming one standard drink (12 ounces of beer or its equivalent), the amount of alcohol in the blood (Blood Alcohol Concentration or BAC) peaks within 30 to 45 minutes. Alcohol is absorbed from the stomach and intestines into the blood and metabolized predominantly in the liver by process of oxidation. It is first converted to acetaldehyde, then eventually to carbon dioxide and water. About 94 percent of ingested alcohol is eliminated this way by the liver, with

small amounts excreted unchanged in the breath (0.7 percent), urine (0.3 percent) and sweat (0.1 percent).⁷ It is eliminated at a rate of 0.015-0.018g/dl/hour, which is about one drink per hour.

There are various alcohol testing methods available, which include the use of blood, urine, saliva, hair and breath. These tests vary in terms of detection window, sensitivity and specificity, and correlation with impairment. Certain tests are better suited for point of care testing in post-

accident and reasonable suspicion settings (namely breath and oral fluid or saliva) versus in clinical programs for abstinence monitoring (hair and urine alcohol biomarker tests). Also, to determine impairment based on a certain alcohol level, the test should detect alcohol that correlates to the BAC, which is the most direct measure (short of CSF/Cerebrospinal fluid test) of alcohol concentration and effect on the brain.



Blood:

Alcohol concentration is measured in milligrams or grams of Ethanol per 100ml of blood. To conduct an alcohol blood test, blood is typically collected in a vial containing EDTA or heparin. The most common test used is Gas Chromatography, which detects Ethyl alcohol or Ethanol. Levels of 0.03-0.12

cause the feeling of euphoria, with stupor setting in around 0.40 and coma with levels around 0.50 or more. This method is the most direct measure of impairment; however, it is invasive and cumbersome to perform at odd hours when an emergency collection may be required.

⁷ Holford NH, "Clinical pharmacokinetics of ethanol", Clinical Pharmacokinetics, 1987 Nov; 13(5): 273-92

Urine:

Urine alcohol concentration is related to the average BAC at the time urine was produced, which could be hours before the collection time. Hence, urine alcohol test results do not correlate well with BAC and are not a good measure of impairment. Furthermore, it can yield a positive result if the donor is diabetic or has glucose in the urine and concurrent yeast infection, in which case the glucose is fermented to alcohol.⁸ Thus, even if the donor did not consume alcohol, it can be detected in the urine under these circumstances. Considering these factors, urine alcohol testing is not well suited for use in the workplace setting. Also, routine pre-employment testing for alcohol is not always recommended given that alcohol consumption is legal above the age of 21. Urine alcohol testing is not authorized by the Department of Transportation (DOT).

Saliva:

Alcohol concentration in the saliva correlates with BAC at a steady state, and is well suited for instant testing as a screening test in place of breath. The DOT allows for saliva screening test. Most commonly used is the QED saliva alcohol test device. If the screening is positive, then a confirmatory test is performed using an evidential breath test device (EBT) after a 15 minute wait period.

Breath:

About 0.7 percent of alcohol is eliminated via breath by gaseous exchange between the blood circulating in the lungs and the air in the alveoli.⁷ Various FDA-approved methods like gas chromatography, infrared spectrometry, semiconductor oxide sensor and electrochemical analyzer are used to detect alcohol in the breath using breath analyzers.

The ratio between breath to blood of 2100:1 is commonly used.⁹ Results of breath alcohol (BrAC) are expressed in grams of alcohol per 2100 ml of breath, corresponding to BAC measured in grams/dl. There is a high correlation between BrAC and BAC as shown by several studies.^{10, 11} Hence, it is commonly used by law enforcement as an indirect and non-invasive way to estimate an individual's BAC. BrAC is measured using an EBT (Evidential Breath Test) device that is administered by BAT (Breath Alcohol Technician) for DOT regulated tests, and the results are printed on paper. Each test uses a DOT Breath Alcohol Test Form.

In conclusion, each form of testing has unique characteristics, and when used in the right setting, will offer useful information about the presence of alcohol in the body and correlation with impairment. ■



⁷ Holford NH, "Clinical pharmacokinetics of ethanol", Clinical Pharmacokinetics, 1987 Nov; 13(5): 273-92

⁸ Robert Swotinsky, *The Medical Review Officers Manual*, 5th edition

⁹ Jones AW, "Medicolegal alcohol determinations — Blood- or breath-alcohol concentration?", Forensic Sci Rev 12:23-47; 2000

¹⁰ Harding PM, Laessig RH, Field PH, "Field performance of the Intoxilyzer 5000: a comparison of blood- and breath-alcohol results in Wisconsin drivers." J Forensic Sci. 1990; 35: 1022-1028

¹¹ Jones AW, "Measuring alcohol in blood and breath for forensic purposes-- a historical review." Forensic Sci Rev. 2000; 12:151-182