# Getting to the bottom of

Current PSYCHIATRY

# problem drinking

## The case for routine screening

**John P. Allen, PhD, MPA**
Research scientist
Pacific Institute for Research & Evaluation
Calverton, MD

**Robert M. Anthenelli, MD**
Associate professor of psychiatry
University of Cincinnati College of Medicine
Director, Substance Dependence Program
Veterans Affairs Medical Center
Cincinnati, OH

More-accurate screening tests and biochemical measures make it easier to recognize alcohol problems, motivate change in drinking, and reinforce abstinence.

Do you know which of your patients have alcohol problems? Though alcohol use disorders may be difficult to detect, self-report and biochemical measures followed by a thorough face-to-face assessment improve diagnostic accuracy. New tools—such as the serum carbohydrate-deficient transferrin (CDT) test—are changing how psychiatrists screen for alcohol problems, provide motivational feedback, and monitor patients for relapse.

### FOUR REASONS TO SCREEN

Screening for excessive alcohol consumption is important in psychiatric practice because:

- Alcohol use disorders coexist with many psychiatric problems, most notably affective and anxiety disorders and—not surprisingly—other substance abuse disorders (*Table 1*).[1,2]
- Patients with psychiatric comorbidity who abuse alcohol have poorer prognoses, are less adherent to treatment, and are more likely to drop out of treatment than are psy-

Table 1

**Overlap of alcohol problems with common psychiatric disorders**

| Disorder | Risk of alcohol use disorder (odds ratio) | Source of data (population survey) |
|---|---|---|
| Drug use disorder | 25.1 | NLAES |
| Mania | 5.6 | NCS |
| Major depression | 3.7 | NLAES |
| Obsessive-compulsive disorder | 3.4 | ECA |
| Generalized anxiety disorder | 2.7 | NCS |
| Phobia | 2.3 | NCS |
| Posttraumatic stress disorder | 2.2 | NCS |
| Panic disorder | 1.4 | NCS |

NLAES: National Longitudinal Alcohol Epidemiological Survey
NCS: National Comorbidity Survey
ECA: Epidemiologic Catchment Area

chiatric patients who do not have alcohol problems.[3]

- Alcohol interacts with many psychotropics, and chronic heavy drinking can cause pharmacokinetic changes that affect a patient's response to medications.
- Alcohol-dependent patients are more likely than nondrinkers to become dependent on anxiolytics and sedative-hypnotics.

Because alcohol problems are common in psychiatric patients, routine screening for alcohol abuse and dependence at the onset of any treatment can be very useful. Thereafter, screening can be done periodically—perhaps annually or more often if the patient's functioning declines.

## CHOOSING A SELF-REPORT MEASURE

Many self-report alcohol screening scales are available,[4] the most popular being the CAGE[5] and the Michigan Alcoholism Screening Test (MAST).[6] Though both instruments can help identify alcohol problems, each has shortcomings:

- The CAGE performs less reliably in women and adolescents than in men, and its validity depends on the patient's sensitivity to the emotional impacts of alcohol dependence.
- The MAST is long (25 items), concentrates on late-stage alcoholism symptoms, and uses differential weighting—not validated in subsequent studies—of particular items in deriving the score.

Neither addresses drinking behavior or when symptoms occurred and thus may misclassify recovered alcoholics or former problem drinkers.

**AUDIT.** A more reliable choice is the Alcohol Use Disorders Identification Test (AUDIT).[7] It was designed by the World Health Organization (WHO) to be valid across gender and culture and to identify even early stage problem drinking. The AUDIT's 10 items deal with drinking behavior, dependence on alcohol, and adverse consequences of drinking during the past year (*Box,* page 38). The survey takes less than 5 minutes; can be administered orally, in writing, or online; and it retains its validity when given as part of a comprehensive health risk appraisal.[8]

The WHO offers an excellent manual detailing how to administer and interpret the AUDIT (see *Related resources*). A patient's score is computed by summing the values associated with his or her responses to each item. A score of 8 or greater indicates excessive alcohol consumption, although some researchers have argued that for

continued on page 37

continued from page 28

women a more accurate threshold might be 6 or 7 points.

Standardized for adults, the AUDIT also appears to accurately gauge drinking behavior in adolescents[9] and in psychiatric patients, although only three studies have explored its use in the latter population.[10-12] Abbreviated AUDIT versions have been found to be psychometrically sound[8] and may be useful in an emergency room or busy primary care clinic. In comparisons with other screening tools, the AUDIT almost always has been found to be more valid.[9,13]

## USING BIOCHEMICAL MEASURES

Self-report screens for alcohol problems, especially the AUDIT, are highly sensitive and specific, though their accuracy depends on the patient's memory, understanding of the questions, and candor. In chronic heavy drinkers, biochemical measures (*Table 2,* page 41) can augment self-reports.[14]

Self-report and biochemical screens have different strengths and weaknesses (*Table 3,* page 42). It is important to see them as complementary because each contributes to accurate screening.

**CDT.** Most biomarkers screen indirectly for alcohol problems by measuring damage to an end organ—typically the liver—caused by chronic excessive alcohol consumption. False-positive results are common because of nonalcohol-related organ damage, medications, smoking, obesity, and other confounding factors. An exception appears to be the serum test for carbohydrate-deficient transferrin (CDT), a biomarker for heavy drinking approved in kit form 3 years ago by the Food and Drug Administration.

The value of measuring CDT levels is that few conditions other than excessive alcohol consumption elevate them. For unclear reasons,[15] average daily consumption of >60 grams of alcohol (about five standard drinks) during the previous 2 weeks causes a higher percent of transferrin—a glycoenzyme that transports iron in the body—to lack its usual carbohydrate content.

Bio-Rad Laboratories (www.bio-rad.com) offers a reagent kit (%CDT Turbidimetric Immunoassay). It quantifies CDT as a percent of total serum transferrin, rather than total CDT, thus correcting for individual variations in transferrin levels. CDT values are obtained from a 100-microliter serum sample. The blood is clotted and the serum separated. The sample may be stored at 2 to 8 °C if the test is to be run within 1 week. Samples must be tested at a reference lab (Bio-Rad offers a list of labs). Results are available in a few days.

Patients who deny problem drinking may need convincing to submit to a blood draw. It may help to explain that alcohol use can exacerbate emotional problems and that the test can provide information on possible risky alcohol use.

> The AUDIT appears to accurately gauge drinking behavior in psychiatric patients

**GGT.** Using a second biochemical marker may improve the sensitivity of CDT to detect heavy drinking.[16-18] The most-researched choice for a second marker is gamma glutamyltransferase (GGT). Patients are considered to have tested positive for an alcohol problem if either CDT or GGT levels are elevated. Combining these tests may be especially useful in alcohol-dependent women, in whom the reliability of CDT testing alone has been questioned.

**Recommendation.** Start with a self-report screening measure. If the patient scores slightly below the threshold for an alcohol problem, follow up with the more costly CDT and GGT tests.

For example, biomarkers might be useful for follow-up in men with AUDIT screening scores of 6 or 7 or women with scores of 5 to 7. Biomarkers also are recommended when you suspect an alcohol problem for another reason or question whether the patient responded accurately to the self-report measure.

Box

## Screening for problem drinking: the Alcohol Use Disorders Identification Test (AUDIT)

**1. How often do you have a drink containing alcohol?**
(0) Never (1) Monthly or less (2) 2 to 4 times a month (3) 2 to 3 times a week
(4) 4 or more times a week

**2. How many drinks containing alcohol do you have on a typical day when you are drinking?**
(0) 1 or 2 (1) 3 or 4 (2) 5 or 6 (3) 7 or 9 (4) 10 or more

**3. How often do you have 6 or more drinks on one occasion?**
(0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily

**4. How often during the last year have you found that you were not able to stop drinking once you had started?**
(0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily

**5. How often during the last year have you failed to do what was normally expected from you because of drinking?**
(0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily

**6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?**
(0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily

**7. How often during the last year have you had a feeling of guilt or remorse after drinking?**
(0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily

**8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?**
(0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily

**9. Have you or someone else been injured as a result of your drinking?**
(0) No (2) Yes, but not in the last year (4) Yes, during the last year

**10. Has a relative, friend, doctor, or other health worker been concerned about your drinking or suggested that you cut down?**
(0) No (2) Yes, but not in the last year (4) Yes, during the last year

The World Health Organization offers a manual on how to administer and interpret AUDIT (http://www.who.int/substance_abuse/pubs_alcohol.htm).
Source: World Health Organization

continued on page 41

continued from page 38

Table 2

## Biochemical markers of heavy drinking

| Marker | Time needed for return to normal limits | Level of drinking characterized | Comments |
|---|---|---|---|
| **Gamma glutamyl-transferase (GGT)** | 2 to 6 weeks of abstinence | ~70 drinks/wk for several weeks | Most common and reliable of the traditional markers of heavy drinking; many sources of false positives |
| **Aspartate amino-transferase (AST) (formerly SGOT)** | 7 days, but much variability in declines with abstinence | Unknown, but heavy | Present in many organs; many sources of false positives; moderate correlations with GGT |
| **Alanine amino-transferase (ALT) (formerly SGPT)** | Unknown | Unknown, but heavy | Many sources of false positives and less sensitive than AST; ratio of AST to ALT may be more accurate |
| **Macrocytic volume (MCV)** | Unknown; half-life ~40 days | Unknown, but regular and heavy | Poor sensitivity and specificity; even with abstinence, very slow return to normal limits and may increase at first; little, if any, gender effect |
| **Carbohydrate-deficient transferrin (CDT)** | 2 to 4 weeks of abstinence | >60 grams/day for approximately 2 weeks | Few sources of false positives; excellent indicator of relapse |

### MONITORING PATIENTS IN TREATMENT

**MET.** Motivational enhancement therapy (MET) has gained popularity as a means of changing problematic drinking.[19] Project MATCH—a multi-site trial on alcohol abuse treatment—studied MET and two other interventions. MET required fewer sessions but equaled the other interventions in reducing drinking days and average amount of alcohol consumed.[20]

A key component of MET—and other brief interventions—is to provide patients with empathetic, nonjudgmental feedback.[19-21] Responses to the first three AUDIT items can provide such feedback to patients with drinking problems. Amazingly, heavy drinkers and alcoholics often do not realize how much more they drink than other people. To help them develop this insight, show them their self-report responses in contrast with national normative data.

Biomarker results can be used similarly, in this case comparing the patient's score with the test's reference range values. Kristenson et al[22] showed that giving men with elevated scores recurrent biomarker information and advice significantly reduced morbidity and mortality and improved their work performance.

Using visual aids can deepen patients' understanding of motivational feedback. For example, displaying sequential test results on a timeline can reinforce motivation by showing how their drinking behavior has improved with continuing treatment and sustained effort.

Table 3

## Self-report and biochemical measures of drinking: Pros and cons

| Measure | Strengths | Weaknesses |
|---|---|---|
| **Self-report** | Noninvasive<br>Inexpensive<br>High validity<br>Flexible window of assessment<br>Immediate results | Easily feigned<br>Accuracy depends on patient's verbal skills and memory |
| **Biochemical** | Objective<br>Results may be more compelling to patients than self-reports<br>May reflect organ damage<br>Useful in tracking treatment progress | Window of assessment is limited to recent past<br>Results often not immediately available<br>May be more costly than self-report measures |

## DETECTING RELAPSE

Although treatment for alcohol problems is often successful,[23] relapse to some level of drinking is not uncommon, especially during the first 3 or 4 months after patients complete treatment.[20] Recognizing relapse quickly can help you:

- decrease risk of harm from resumed alcohol use
- reduce the potential for drinking to again become habitual
- identify circumstances and cues that may have triggered the drinking episode, for use in tailoring future interventions.

**In clinical practice,** relapse is most often revealed via comments from the family, direct observation by the clinician, or voluntary acknowledgment by the patient. Interestingly, CDT has demonstrated a relapse "heralding effect,"[24] meaning that it tends to rise well before a patient will admit he or she resumed drinking.[24-26] Although other markers may also rise following relapse, their elevation tends to be delayed and less dramatic.

The sensitivity and specificity of CDT alone and with GGT in identifying relapse have been evaluated. Across male-only studies, CDT's median sensitivity (percent of relapsed patients with elevated scores) was 0.73, with a specificity (percent of those not relapsed who had low scores) of 0.91. In the two female-only studies, median sensitivity and specificity for CDT were 0.32 and 0.86, respectively. For women, using CDT and GGT in combination substantially raised median sensitivity to 0.62, although specificity fell slightly to 0.80.[27]

**Recommendation.** When using biomarkers to identify relapse, examine the temporal pattern of test results to date. Assume that an increase of 30% or more above the lowest observed lab value indicates a relapse.[28]

Frequent testing—probably biweekly—is recommended during the first 3 or 4 months after patients complete treatment. If there is no indication of relapse, testing frequency could be tapered down.

**References**

1. Hall W. What have population surveys revealed about substance use disorders and their co-morbidity with other mental disorders? *Drug Alcohol Rev* 1996;15(2):157-70.

continued on page 44



continued from page 42


2. Grant BF, Harford TC. Comorbidity between DSM-IV alcohol use disorders and major depression: Results of a national survey. *Drug Alcohol Depend* 1995;39(3):197-206.
3. Shivani R, Goldsmith RJ, Anthenelli RM. Alcoholism and psychiatric disorders: diagnostic challenges. *Alcohol Res Health* 2002; 26(2):90-8.
4. Allen JP, Columbus M (eds). *Assessing alcohol problems: a guide for clinicians and researchers.* NIAAA Treatment Handbook, Series 4. Washington, DC: U.S. Department of Health and Human Services, 1995 [NIH publication no. 95-3745].
5. Mayfield D, McLeod G, Hall P. CAGE questionnaire: validation of a new alcoholism screening instrument. *Am J Psychiatry* 1974; 131(10):1121-3.
6. Seltzer ML. The Michigan Alcoholism Screening Test: the quest for a new diagnostic instrument. *Am J Psychiatry* 1971;127:1653-8.
7. Saunders JB, Aasland OG, Babor TF, et al. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption—II. *Addiction* 1993;88(6):791-804.
8. Daeppen J, Yersin B, Landry U, et al. Reliability and validity of the Alcohol Use Disorders Identification Test (AUDIT) imbedded within a general health risk screening questionnaire: results of a survey in 332 primary care patients. *Alcohol Clin Exp Res* 2000; 24:659-65.
9. Reinert DF, Allen JP. The Alcohol Use Disorders Identification Test: a review of recent research. *Alcohol Clin Exp Res* 2002; 26(2):272-9.
10. Maisto SA, Carey MP, Carey KB, et al. Use of the AUDIT and the DAST-10 to identify alcohol and drug use disorders among adults with a severe and persistent mental illness. *Psychol Assess* 2002; 12:186-92.
11. Hulse GK, Saunders JB, Roydhouse RM, et al. Screening for hazardous alcohol use and dependence in psychiatric inpatients using the AUDIT questionnaire. *Drug Alcohol Rev* 2000;19;291-8.
12. Dawe S, Seinen A, Kavanagh D. An examination of the utility of the AUDIT in people with schizophrenia. *J Stud Alcohol* 2000; 61:744-75.
13. Allen JP, Litten RZ, Fertig JB, Babor T. A review of research on the Alcohol Use Disorders Identification Test (AUDIT). *Alcohol Clin Exp Res* 1997;21:613-19.
14. Hermansson U, Helander A, Huss A, et al. The Alcohol Use Disorders Identification Test (AUDIT) and carbohydrate-deficient transferrin (CDT) in a routine workplace health examination. *Alcohol Clin Exp Res* 2000;24:180-7.
15. Sillanaukee P, Strid N, Allen JP, Litten RZ. Possible reasons why heavy drinking increases carbohydrate-deficient transferrin. *Alcohol Clin Exp Res* 2001;25(1):34-40.


**Bottom Line**

**S**elf-report and biochemical measures have improved clinical management of patients with alcohol problems. With these tools, psychiatrists can more effectively assess drinking patterns, motivate change, and monitor for relapse.

## Related resources

- AUDIT. The Alcohol Use Disorders Identification Test. Guidelines for primary care use. Available at: http://www.who.int/substance_abuse/pubs_alcohol.htm
- Allen JP, Litten RZ. Psychometric and laboratory measures to assist in the treatment of alcoholism. *Clin Psychol Rev* 1993;13(3):223-39.
- Salaspuro M. Carbohydrate-deficient transferrin as compared to other markers of alcoholism: a systematic review. *Alcohol* 1999; 19(3):261-71.

DISCLOSURE

Dr. Allen reports that he serves as a consultant to Axis-Shield ASA and Bio-Rad Laboratories, patent holder and U.S. distributor, respectively, of the carbohydrate-deficient transferrin (%CDT) reagent kit.

Dr. Anthenelli reports no financial relationship with any company whose products are mentioned in this article or with manufacturers of competing products.


16. Litten RZ, Allen JP, Fertig JB. Gamma-glutamyltranspeptidase and carbohydrate deficient transferrin: alternative measures of excessive alcohol consumption. *Alcohol Clin Exp Res* 1995;19(6):1541-6.
17. Allen JP, Litten RZ, Fertig JB, Sillanaukee P. Carbohydrate-deficient transferrin, gamma glutamyl transferase and macrocytic volume as biomarkers of alcohol problems in women. *Alcohol Clin Exp Res* 2000;24(4):492-6.
18. Sillanaukee P, Strid N, Allen JP, Litten RZ. Combining biomarkers to screen for alcohol problems (manuscript submitted for publication).
19. Miller WR, Zweben A, DiClemente CC, et al. *Motivational enhancement therapy manual: A clinical research guide for therapists treating individuals with alcohol abuse and dependence.* Rockville, MD: U.S. Department of Health and Human Services, 1995.
20. Project MATCH research group. Matching alcoholism treatments to client heterogeneity: Project MATCH post-treatment drinking outcomes. *J Stud Alcohol* 1997;58(1):7-29.
21. Bien TH, Miller WR, Tonigan S. Brief intervention for alcohol problems: a review. *Addiction* 1993;88:315-36.
22. Kristenson H, Hood B, Peterson B, et al. Prevention of alcohol-related problems in urban middle-aged males. *Alcohol* 1985;2(3):545-9.
23. Miller WR, Walter ST, Bennett ME. How effective is alcoholism treatment in the United States? *J Stud Alcohol* 2001;62:211-20.
24. Mitchell C, Simpson D, Chick J. Carbohydrate-deficient transferrin in detecting relapse in alcohol dependence. *Drug Alcohol Depend* 1997;48:97-103.
25. Borg S, Helander A, Voltaire Carlsson A, Hogstrom Brandt AM. Detection of relapses in alcohol-dependent patients using carbohydrate-deficient transferrin: improvement with individualized reference levels during long-term monitoring. *Alcohol Clin Exp Res* 1995; 19(4):961-3.
26. Schmidt LG, Schmidt K, Dufeu P, et al. Superiority of carbohydrate-deficient transferrin to gamma-glutamyltransferase in detecting relapse in alcoholism. *Am J Psychiatry* 1997;154(1):75-80.
27. Allen JP, Anton R. Biomarkers as aids to identification of relapse in alcoholic patients. In: Galanter M (ed). *Recent developments in alcoholism: research on alcoholism treatment (vol. XVI).* New York: Plenum Press (in press).
28. Anton RF, Lieber C, Tabakoff B, et al. Carbohydrate-deficient transferrin and gamma-glutamyltransferase for the detection and monitoring of alcohol use: results from a multi-site study. *Alcohol Clin Exp Res* 2002;26(8):1215-22.