

Carbohydrate-Deficient Transferrin (CDT) for Alcohol Use

FOR DETECTION OF SUSTAINED ALCOHOL INTAKE

Test Highlights

- The measurement of carbohydrate-deficient transferrin (CDT) in serum is useful for detecting chronic ethanol consumption (greater than 50 g/day for two weeks).
- The major advantage of CDT over other blood tests used to identify excessive drinking (gamma-glutamyltransferase, mean corpuscular volume, aspartate aminotransferase, and alanine aminotransferase) is its higher diagnostic specificity.

Disease Overview

- Alcohol dependency is an underdiagnosed but treatable disorder.
- Alcohol abuse is known to be directly associated with more than 60 different medical conditions, including hepatic, cardiovascular, and neurological disorders.
- It is believed that as much as 4 percent of overall global disease can be attributed to alcohol consumption.
- The prevalence of chronic alcohol dependency in the United States is estimated to range from 2 to 8 percent.

Pathophysiology

- Transferrin is an iron-transport glycoprotein and is produced in hepatocytes. Transferrin exists as a heterogeneous population of isoforms that differ in the number of attached, charged sialic acid chains.
- Chronic alcohol (ethanol) use markedly increases the concentrations of the asialo and disialo transferrin isoforms that together are referred to as CDT.
- Alcohol intake has little or no effect on the concentrations of the trisialo, tetrasialo, and pentasialo transferrin isoforms.

Indications for Ordering

- Evaluation of patients suspected of alcohol abuse or in patients with disorders often associated with alcohol abuse, such as liver disease, pancreatitis, or depression.
- Monitoring of patients who are considered to be at high risk for excessive alcohol use or alcohol-abuse relapse.
- Follow-up testing to investigate abnormalities of other biomarkers suggestive of alcohol abuse, such as gamma-glutamyl transferase, mean corpuscular volume, HDL cholesterol, aspartate aminotransferase, and alanine aminotransferase.

Interpretation

- CDT values of <1.3 percent are considered to be normal, while values ≥ 1.3 percent are elevated and may be associated with heavy alcohol consumption. It is recommended that patients with measured CDT values between 1.2 and 1.4 percent be retested three to four weeks later.

- Consumption of greater than 50 g of ethanol per day (roughly four to five drinks per day) for a period of one to two weeks is required to cause an increase in the serum CDT fraction. The half-life of CDT is approximately two weeks.

Limitations

- This test is not suitable for the evaluation of patients suspected of having congenital disorders of glycosylation. For these patients, Carbohydrate-Deficient Transferrin for Congenital Glycosylation Disorders (ARUP test #2002918) should be utilized. In addition, the presence of rare genetic variants of transferrin (including D, B1, and B2) may interfere with CDT analysis.
- Advanced liver damage (including severe chronic viral hepatitis) can increase observed relative CDT levels, leading to an estimated reduction in specificity from 95 percent to 70–80 percent for heavy alcohol use. Antiepileptic drug therapy may also increase CDT levels.
- CDT has been demonstrated to be most sensitive in males over 40. Sensitivity of the CDT assay may be decreased in females, especially in pregnant females and those taking hormone replacement or hormone contraceptives.
- The presence of significant amounts of monoclonal antibodies may interfere with CDT isoform analysis.
- This test is not recommended for general population screening.

Methodology

- The transferrin isoforms are separated by high-resolution capillary electrophoresis and detected by absorbance at 200 nm, yielding relative concentrations of the different transferrin isoforms. The percentage of CDT isoforms relative to the amount of total transferrin is determined.
- A capillary zone electrophoresis method, similar to the one presented here, exhibited a sensitivity of 73 percent and a specificity of 95 percent in distinguishing 413 subjects who used alcohol heavily (>50 g/day of ethanol) from 201 moderate or light drinkers (<30 g/day of ethanol). A cutoff of 1.2 percent was utilized for the combined asialo and disialo CDT isoforms.³
- As a biomarker for heavy alcohol consumption, the use of CDT compares favorably with gamma-glutamyltransferase and mean corpuscular volume, demonstrating equal or superior sensitivity and specificity in a number of studies.

References

1. Room R, Babor T, Rehm J. Alcohol and public health. *Lancet* 2005;365(9458):519–30.
2. Arndt T. Carbohydrate-deficient transferrin as a marker of chronic alcohol abuse: a critical review of pre-analysis, analysis, and interpretation. *Clin Chem* 2001;47(1):13–27.
3. Legros FJ, et al. Use of capillary zone electrophoresis for differentiating excessive from moderate alcohol consumption. *Clin Chem* 2003;49(3):440–9.
4. Hock B, et al. Validity of carbohydrate-deficient transferrin (%CDT), gamma-glutamyltransferase (gamma-GT) and mean corpuscular erythrocyte volume (MCV) as biomarkers for chronic alcohol abuse: a study in patients with alcohol dependence and liver disorders of non-alcoholic and alcoholic origin. *Addiction* 2005;100(10):1477–86.

Test Information

0070412 Carbohydrate Deficient Transferrin for Alcohol Use

For specific collection, transport, and testing information, refer to the ARUP website at www.aruplab.com.

For information on test selection, ordering, and interpretation, refer to ARUP Consult® at www.arupconsult.com.