Alcohol Use Biomarkers Testing

Alcohol use biomarkers (e.g., ethyl glucuronide, ethyl sulfate, carbohydrate deficient transferrin) can help determine acute or chronic alcohol use. Screening tests may be useful in ruling out recent alcohol use, for general screening in the assessment of ethanol exposure in the contexts of compliance and/or abuse, and as aid for monitoring alcohol abstinence.

DISEASE OVERVIEW

Clinical Issues

Acute ethanol intoxication beyond the first 6-8 hours is not reliably predicted by serum testing, so other biomarkers are often used to detect alcohol use. Ethyl glucuronide (EIG) and ethyl sulfate (EIS) are direct metabolites of ethanol, detected up to 80 hours in urine after ethanol ingestion. Good biomarkers of recent alcohol ingestion are useful in short-term monitoring for abstinence. Carbohydrate deficient transferrin (CDT) is a negative charged glycoprotein with incomplete glycan chain(s) that is markedly increased by moderate to heavy alcohol use. Most useful for long-term abstinence monitoring (up to 2 weeks).

Phosphatidylethanol (PEth) is a phospholipid formed only in the presence of ethanol. PEth may be a more sensitive marker of chronic use than CDT and identifies chronic heavy ethanol use for up to 28 days.

TEST INTERPRETATION

Analytical Sensitivity

<table>
<thead>
<tr>
<th>Test</th>
<th>Analytical Sensitivity</th>
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<tbody>
<tr>
<td>Ethyl Glucuronide Screen with Reflex to Confirmation, Urine</td>
<td>Cutoff for positive screen is set at 500 ng/mL</td>
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<tr>
<td>Ethyl Glucuronide and Ethyl Sulfate Confirmation, Urine</td>
<td>• Reported as a concentration</td>
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<tr>
<td></td>
<td>• Analytical range is 100-10,000 ng/mL</td>
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<td>• Lower limit of quantification is 100 ng/mL</td>
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<tr>
<td>Carbohydrate Deficient Transferrin</td>
<td>Reported as percent:</td>
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<tr>
<td></td>
<td>• ≥1.7%: supports alcohol use &gt;40g/day</td>
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<td>• &lt;1.4%: does not support alcohol use &gt;40g/day over the prior 2 weeks</td>
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<td>• 1.4-1.6%: reported as inconclusive</td>
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TESTS TO CONSIDER

Ethyl Glucuronide Screen with Reflex to Confirmation, Urine 2007912
Method: Qualitative Enzyme Immunoassay/Quantitative Liquid Chromatography-Tandem Mass Spectrometry
Preferred method for ruling out ethanol exposure
Identify recent ethanol exposure within 1-5 days after ingestion
Results do not accurately correlate with amount or frequency of ethanol use

Ethyl Glucuronide and Ethyl Sulfate, Urine, Quantitative 2007909
Method: Quantitative Liquid Chromatography-Tandem Mass Spectrometry
May be useful in the assessment of ethanol exposure in the contexts of compliance and/or abuse
Identify recent ethanol exposure within 1-5 days after ingestion
Results do not accurately correlate with amount or frequency of ethanol use

Carbohydrate Deficient Transferrin for Alcohol Use 0070412
Method: Quantitative Electrophoresis
Identify alcohol abuse or abuse relapse
Will detect chronic ethanol use (≥40 g/day for 2 weeks)

Tests for Acute Ethanol Use

Ethyl Glucuronide Screen Only, Urine 2012695
Method: Qualitative Enzyme Immunoassay

Ethanol, Serum or Plasma - Medical 0090120
Method: Quantitative Gas Chromatography

Drugs of Abuse Test, Alcohol, Urine - Screen with Reflex to Confirmation/Quantitation 0092280
Method: Semi-Quantitative Alcohol Dehydrogenase/Qualitative Gas Chromatography-Flame Ionization Detection
Limitations (by Test)

Ethyl Glucuronide and Ethyl Sulfate Confirmation, Urine
Incidental exposure from ethanol-containing products may be detected.

Ethyl Glucuronide Screen with Reflex to Confirmation, Urine
- False positive results may be caused by microbial formation or fermentation, ethanol-containing products (e.g., hand sanitizer, mouthwash).
- False negative results may be caused by bacterial degradation, >4 days since ethanol ingestion.

Carbohydrate Deficient Transferrin
- Cannot be used in individuals suspected of having congenital glycosylation disorders.
- Advanced liver damage (including severe chronic viral hepatitis) and antiepileptic drug therapy can increase CDT levels.
- Interference in quantitation may be caused by:
  - Severe icterus
  - Genetic variants of transferrin
  - Excess monoclonal or polyclonal immunoglobulins

Phosphatidylethanol (PEth)
Elevated PEth may result from incidental or unintentional ethanol exposure

REFERENCES


RELATED INFORMATION

Alcohol Use Biomarkers