Alcohol Use Biomarkers

Indications for Ordering

- Screening tests to rule out acute alcohol ingestion
- May be useful for general screening in the assessment of ethanol exposure in the contexts of compliance and/or abuse
- Aid in monitoring alcohol abstinence

Test Description

Ethyl Glucuronide Screen with Reflex to Confirmation, Urine
- Qualitative enzyme immunoassay/quantitative liquid chromatography-tandem mass spectrometry (LC-MS/MS)
- Positive screen result is confirmed by LC-MS/MS

Ethyl Glucuronide and Ethyl Sulfate Confirmation, Urine
- Quantitative LC-MS/MS

Tests to Consider

Primary Tests

Ethyl Glucuronide Screen with Reflex to Confirmation, Urine 2007912
- Screen with reflex testing is preferred method for ruling out ethanol exposure
- Identifies 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
- May be useful in the assessment of ethanol exposure in the contexts of compliance and/or abuse
- Identifies recent ethanol exposure within 1-5 days after ingestion
- Results do not accurately correlate with amount or frequency of ethanol use

Related Tests

Tests for acute ethanol use
- Ethyl Glucuronide Screen Only, Urine 2012695
- Ethanol, Serum or Plasma – Medical 0090120
- Drugs of Abuse Test, Alcohol, Urine – Screen with Reflex to Confirmation/Quantitation 0092280
- Alcohols 0090131
- Alcohol, Urine, Quantitative 2010136

Tests for chronic ethanol use
- Carbohydrate Deficient Transferrin for Alcohol Use 0070412
  - Identify alcohol abuse or abuse relapse
  - Will detect chronic ethanol use (≥40 g/day for 2 weeks)
- Phosphatidylethanol (PEth) 2012130
  - Identify chronic heavy ethanol use for up to 28 days

Disease Overview

Clinical issues

- Acute ethanol intoxication beyond the first 24 hours is not reliably predicted by serum testing
- Ethyl glucuronide and ethyl sulfate
  - Direct metabolites of ethanol
  - Can be detected up to 80 hours in urine after ethanol ingestion
    - Good biomarker of acute alcohol ingestion
    - May be useful in short-term monitoring for abstinence
- Carbohydrate deficient transferrin (CDT)
  - Transferrin (plasma iron transport protein) contains 2 N-linked glycan chains that differ in their degree of branching, showing bi-, tri-, and tetra-antennary structures
    - Each N-glycan chain branch terminates with a sialic acid molecule
  - The level of disialo-, monosialo-, and asialo-transferrin isoforms is normally low or undetectable
    - Level of these CDTs is markedly increased by alcohol abuse
  - This test is most useful for long-term abstinence monitoring (up to 2 weeks)

Test Interpretation

Analytical sensitivity

Ethyl Glucuronide and Ethyl Sulfate Confirmation, Urine
- Limit of quantification is 100 ng/mL

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Results

Ethyl Glucuronide Screen with Reflex to Confirmation, Urine

- Cutoff for positive screen is set at 500 ng/mL

Ethyl Glucuronide and Ethyl Sulfate Confirmation, Urine

- Reported as a concentration
- Analytical range is 100-10,000 ng/mL

Carbohydrate Deficient Transferrin

- Reported as percent
  - Result ≥1.7% supports alcohol use >40g/day
  - Result <1.4% does not support alcohol use >40g/day over the prior 2 weeks
  - Inconclusive – 1.4-1.6% reported as inconclusive

Limitations

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 (eg, 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

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