Thiocyanate Drug Monitoring

Indications for Ordering

• Therapeutic monitoring in patients receiving sodium nitroprusside therapy
• Assess exposure to environmental tobacco smoke

Test Description

Quantitative colorimetry

Tests to Consider

Primary test
Thiocyanate, Serum or Plasma 2011575
• Therapeutic monitoring
• Screen for thiocyanate poisoning

Disease Overview

Physiology
• Thiocyanate may be elevated in patients with
  o Environmental tobacco smoke exposure
  o Exposure to sodium nitroprusside
• Sodium nitroprusside is used to
  o Reduce blood pressure in hypertensive crisis
  o Induce controlled hypotension to reduce bleeding during surgery
  o Treat acute congestive heart failure
• Mechanism of action
  o Relaxes vascular smooth muscle
  o Dilates coronary arteries
• Toxicity occurs more frequently with prolonged infusions and renal impairment

Drug profile/clinical issues

• Thiocyanate is the inactive metabolite of sodium nitroprusside
• Thiocyanate can also be used as a biomarker for exposure to environmental tobacco smoke
• Metabolism
  o Ferrous ion in nitroprusside molecule reacts rapidly with sulfhydryl compounds in RBCs
  • Results in cyanide release
  • Metabolized in liver and kidney by rhodanese to thiocyanate
    o Excreted primarily in urine
• Monitoring of thiocyanate levels recommended if
  o Prolonged infusion (>3 days) or
  o Dose ≥4 µg/kg/min or
  o Used in patient with renal impairment
• Drug/drug interactions – numerous

Test Interpretation

Analytical sensitivity – 2 µg/dL

Results

• Therapeutic range (serum/plasma)
  o Nonsmoker – 1-4 µg/mL
  o Smoker – 3-12 µg/mL
• Values seen with nitroprusside therapy – 6-29 µg/mL
• Toxicity – >50 µg/mL