Osteoporosis Monitoring

Indications for Ordering
- Monitor response to antiresorptive therapy in postmenopausal women and individuals with osteoporosis
- Does not replace bone mineral density (BMD) screening to diagnose osteoporosis

Test Description
Quantitative electrochemiluminescent immunoassay

Tests to Consider
Primary test
C-Telopeptide, Beta-Cross-Linked, Serum 0070416
  - Preferred test to measure bone resorption and monitor response to antiresorptive therapy
    - Bisphosphonates
    - Hormone replacement therapy

Related tests – see table

Disease Overview

Prevalence
- ~10 million people in U.S. have osteoporosis
  - 80% women
- ~43 million Americans have low bone mass, which can increase risk for osteoporosis
  - Can lead to fractures and other complications

Age of onset – usually >50 years

Symptoms
- Often asymptomatic
- Sentinel fracture
  - Wrist, hip, or vertebral fracture
- Symptomatic individuals
  - Height loss
  - Kyphosis
  - Bone pain
  - History of previous fractures

Physiology
- Osteoporosis is diagnosed by BMD screening
- After effective antiresorptive therapy, concentration of bone markers may return to premenopausal level
  - Long-term treatment of postmenopausal women with bisphosphonates can increase bone density and reduce fractures by ~50%
- Cross-linked C-terminal (CTX) telopeptides
  - Proteolytic fragments of type 1 collagen formed during bone resorption
  - Biochemical marker of bone resorption
    - Can be detected in serum and urine
    - Provides earlier indication of therapeutic response than BMD
    - Changes in bone density can be detected within 3 months by measuring CTX
    - 12-24 months may be required to detect any changes in bone density by radiographic methods

Recommended follow-up testing
- Monitor response 3-6 months after starting antiresorptive therapy
- Initial testing should occur prior to beginning therapy

Test Interpretation

Results
- Decrease in CTX concentration of 35-55% from baseline level after 3-6 months
  - Effective antiresorptive therapy
- No decrease in CTX concentration
  - Ineffective antiresorptive therapy
  - Lack of compliance

Limitations
- Baseline concentration of CTX must be established before treatment begins
- Intraindividual variability of CTX must be considered when interpreting test results
  - Diet, exercise, time of day
- May be significant overlap in CTX between individuals with and without osteoporosis
- Test result cannot be used to predict fractures
- CTX concentration may be higher than expected
  - Individuals with reduced kidney function
    - Reduced excretion of CTX
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