

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

Commonly Used Bone Turnover Markers	
Bone Formation Markers	ARUP Tests
Serum procollagen type 1 N-terminal propeptide	Procollagen Type I Intact N-Terminal Propeptide 0070236
Serum osteocalcin	Osteocalcin by Electrochemiluminescent Immunoassay 0020728
Serum bone-specific alkaline phosphatase	Bone Specific Alkaline Phosphatase 0070053
Bone Resorption Markers	
Urine or serum N-telopeptide	N-Telopeptide, Cross-Linked, Urine 0070062 N-Telopeptide, Cross-Linked, Serum 0070500
Urine pyridinoline	Pyridinium Crosslinks (Total), Urine 0070213 Pyridinoline and Deoxypyridinoline by HPLC 0080342
Urine deoxypyridinoline	Deoxypyridinoline Crosslinks, Urine 0070212 Pyridinoline and Deoxypyridinoline by HPLC 0080342