BONE TURNOVER MARKERS FOR THE EVALUATION OF OSTEOPOROSIS
MED207.116

COVERAGE:

Measurements of bone turnover markers in the diagnosis and management of osteoporosis are not eligible for coverage as they are considered investigational.

DESCRIPTION:

Bone turnover or remodeling is the result of two activities:

1. The formation/production of new bone, which is mediated by osteoblasts, and

2. The resorption/loss of old bone, which is performed by osteoclasts.

The amount of bone mass depends upon the balance between these activities on the bone turnover rate. Remodeling is required for the maintenance and overall health of bone and is tightly coupled. In abnormal states of turnover/remodeling, when resorption exceeds formation, the result is a net loss of bone.

Bone turnover is correlated with the presence of certain biochemical markers in serum and urine that result from net activity in bone throughout the entire skeleton. In contrast, bone mass measurements (Bone Density Studies) and radiographs (X-Rays) provide a static picture of a specific skeletal site. Bone turnover markers, also known as biochemical markers of bone turnover, include those that assess bone resorption and those that assess bone formation.

Most markers of bone resorption can be assayed in urine samples. Some of the markers result from the breakdown of type I collagen, which is a major component of bone matrix, comprising about 90% of the bone's organic content. These types of markers include:

- Urinary hydroxyproline (Hyp),
- Urinary hydroxylysine,
- Urinary total pyridinoline (Pyr),
- Urinary total deoxypyridinoline (dPyr),
- Urinary free pyridinoline (f-Pyr, also known as Pyrilinks),
- Urinary free deoxypyridinoline (f-dPyr, also known as Pyrilinks-D),
- Urinary collagen type I cross-link N-telopeptide (NTx, also referred to as Osteomark),
- Urinary collagen type I cross-link C-telopeptide (CTx, also referred to as CrossLaps),
- Serum carboxyterminal telopeptide of type I collagen (ITCP), and
- Plasma tartrate-resistant acid phosphatase (TRAP).

All of the markers commonly used to measure rates of bone formation are found in serum. These types of markers include:
• Serum osteocalcin (OC),
• Serum total alkaline phosphatase (ALP),
• Serum bone specific alkaline phosphatase (BSAP or B-ALP),
• Serum immunoradiometric bone specific alkaline phosphatase (Tandem-R Ostase),
• Serum microplate bone specific alkaline phosphatase (Tandem-MP Ostase),
• Serum procollagen I carboxyterminal propeptide (procollagen I extension peptide) (PCIP), and
• Serum procollagen type I N-terminal propeptide (PINP).

There has been recent interest in the use of bone turnover markers along with other clinical information to evaluate age-related osteoporosis. This is a disease characterized by slow, prolonged bone loss, resulting in an increased risk of fractures at the hip, spine, or wrist. Bone turnover markers are being investigated as a method to rapidly determine patient compliance with drug therapy for osteoporosis.

Collagen cross-links, part of the bone matrix where bone material is deposited, are biochemical markers that may be considered the best available markers to measure bone resorption. Elevated levels of urinary collagen cross-links indicate elevated bone resorption. Medicare developed a national coverage decision regarding collagen cross-links that indicate this laboratory test may be eligible for coverage under certain circumstances. According to Medicare, collagen cross-links assays are used to:

• identify individuals with elevated bone resorption, who have osteoporosis and whose response to treatment is being monitored;

• predict response (as assessed by bone mass measurements) to FDA approved anti-resorptive therapy in postmenopausal women;

• assess effectiveness of osteoporosis treatment including FDA approved anti-resorptive therapies in postmenopausal women, individuals with osteoporosis, Paget's disease of bone, and anti-estrogen/selective estrogen therapies.

RATIONALE:

The following clinical applications of bone turnover markers have been investigated:

• Bone turnover markers in conjunction with measurements of bone mineral densitometry (BMD) have been investigated as a technique to identify those patients at highest risk of osteoporosis related fractures;

• Bone markers can be used to provide a more immediate assessment of treatment response and can be used to predict change in BMD in response to treatment; and,

• Bone markers have been studied as an alternative to hip and spine (central) measurements of BMD when previously initially being screened for osteoporosis using a peripheral measurement of BMD, such as at the heel or wrist.
Given the complex nature of bone remodeling, it is unrealistic to expect any one test to accurately reflect the balance between bone resorption and formation. Therefore until bone turnover markers have been thoroughly investigated, other more established diagnostic testing should be done to evaluate the bone matrix.

DISCLAIMER:

State and federal law, as well as contract language, including definitions and specific inclusions/exclusions, takes precedence over Medical Policy and must be considered first in determining coverage. The member’s contract benefits in effect on the date that services are rendered must be used. Any benefits are subject to the payment of premiums for the date on which services are rendered. Medical technology is constantly evolving, and we reserve the right to review and update Medical Policy periodically. HMO Blue Texas physicians who are contracted/affiliated with a capitated IPA/medical group must contact the IPA/medical group for information regarding HMO claims/reimbursement information and other general polices and procedures.

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