



Bone Metabolism Disorder Panel

MDL Test Number: 645, Tests Included: 15

Specimen Requirements

Specimen	Collection Platform	Stability	Turnaround Time
Serum	2 Serum Separator Tube (SST)	Room Temperature	24 – 72 hrs.
Serum	1 Serum Separator Tube (SST)	Refrigerated	24 – 72 hrs.

Special Handling and Timing

This panel is drawn into serum separator tubes, but several of its tests place requirements on how and when they are collected.

- **One tube is refrigerated immediately.** Calcitonin is not stable at room temperature. The laboratory refrigerates one SST as soon as the specimens are received, which is why this panel should reach the laboratory without delay.
- **A morning draw is preferred.** Cortisol is highest in the early morning and falls throughout the day, testosterone follows the same pattern, and prolactin rises with sleep, stress, and the draw itself. The time of collection should be recorded on the request.

What is the Bone Metabolism Disorder Panel?

Bone is rebuilt continuously throughout life, and bone disease arises when the balance between building and removal is lost. A bone density scan measures the result of that imbalance, but only slowly — it may take two years to show a change. This panel measures the processes themselves, which change within months.

At its center is the bone formation marker, which reflects how actively bone is being laid down and which falls measurably within three to six months of effective treatment. Around it, the panel measures the hormones that regulate bone: parathyroid hormone and vitamin D, which govern calcium; the sex hormones, whose loss at menopause accelerates bone loss; cortisol, whose excess causes bone loss directly; and thyroid function, which does the same when overactive.

The panel also carries homocysteine and the inflammatory marker, both of which are associated with fracture risk, and the growth hormone marker for the less common causes.

Why order the Bone Metabolism Disorder Panel?

It is commonly used to:

- Investigate osteoporosis, low bone density, or a fracture that has occurred with less force than would normally be required.
- Identify a treatable underlying cause of bone loss rather than treating it as age-related, including vitamin D deficiency, overactive parathyroid glands, an overactive thyroid, and cortisol excess.

- Check whether treatment for osteoporosis is working, months before a repeat bone density scan could answer the same question.
- Investigate bone pain, muscle weakness, or repeated fractures, which can indicate long-standing severe vitamin D deficiency, causing softening of the bone.
- Assess bone turnover through the menopausal transition, when the loss of estrogen accelerates it.
- Establish a baseline before treatment for bone loss begins.

Special Instructions

- **Protection from light:** Vitamin B12 and folate break down on exposure to light, so the sample is protected from the moment it is drawn. This is handled by the laboratory and the draw site and needs nothing from the patient.
- **Bone treatments must be listed:** Bisphosphonates, menopausal hormone therapy, raloxifene, and calcitonin all lower the bone formation marker in this panel, and that is a real effect on bone rather than an effect on the test. Current treatment, and when it started, should be on the request.
- **Paricalcitol:** Paricalcitol (Zemlar), a manufactured form of active vitamin D given in kidney disease, is read by the vitamin D test as though it were the patient's own. The manufacturer directs that vitamin D not be tested within 24 hours of a dose.
- **Biotin supplements:** Biotin is sold on its own and is present in many hair, skin, and nail products, often at high doses. Several tests in this panel can be affected, and the most sensitive of them was tested by its manufacturer only up to a level that a high-dose supplement can exceed. Patients should tell the ordering provider what they take and at what dose.
- **Recent supplements and infusions:** Iron tablets, iron infusions, vitamin B12 injections, and high-dose vitamin D taken shortly before the draw can all overstate the corresponding result. When these were last taken should be on the request.
- **Medicines and recent illness:** Steroids, some psychiatric medicines, and any recent significant illness can affect these results. A current medication list should accompany the request.



Which tests are included in this panel?

Each test below is also available individually, and a separate fact sheet for each one gives its reference ranges, limitations, and the conditions it is used to assess.

Free testosterone and the free androgen index, where included, are calculated from the total testosterone and SHBG results already in this panel. They are not separately charged.

Test No.	Analyte	CPT Code	Method
610	Follicle-Stimulating Hormone (FSH)	83001	Immunoassay
611	Estradiol (E2)	82670	Immunoassay
612	Thyroid-Stimulating Hormone (TSH)	84443	Immunoassay
617	Thyroxine, Free (Free T4)	84439	Immunoassay
618	Parathyroid Hormone, Intact (PTH)	83970	Immunoassay
622	Testosterone, Total	84403	Immunoassay
628	Calcitonin	82308	Immunoassay
631	DHEA-Sulfate (DHEA-S)	82627	Immunoassay
641	Cortisol	82533	Immunoassay
655	Vitamin B12	82607	Immunoassay
658	Ostase (Bone-Specific Alkaline Phosphatase)	84080	Immunoassay
659	Vitamin D, 25-OH	82306	Immunoassay
660	Insulin-like Growth Factor 1 (IGF-1)	84305	Immunoassay
662	Homocysteine	83090	Immunoassay
663	C-Reactive Protein, High Sensitivity (hsCRP)	86141	Immunoassay

Limitations:

Every laboratory panel has limits. For this one, the main ones are:

- This panel does not measure bone density and does not replace a bone density scan. The two answer different questions and are used together.
- Bone turnover markers are compared against a previous result from the same laboratory rather than read on their own, and only a fairly large change is a real change.
- A normal panel does not exclude a diagnosis, and a single abnormal result does not establish one. The pattern across the panel is what carries the meaning.
- Results are interpreted against the reference range printed on the report for each individual test. Those ranges differ by age and, for several of these tests, by where the patient is in her cycle.
- These results are one piece of a larger picture. They are meant to be read together with the patient's symptoms, medical history, and examination — never on their own.

What are some references that discuss the medical necessity of this panel?

1. LeBoff, M. S. et al. The clinician's guide to prevention and treatment of osteoporosis. *Osteoporos. Int.* **33**, 2049–2102 (2022).
2. Demay, M. B. et al. Vitamin D for the prevention of disease: an Endocrine Society clinical practice guideline. *J. Clin. Endocrinol. Metab.* **109**, 1907–1947 (2024).
3. Bilezikian, J. P. et al. Evaluation and management of primary hyperparathyroidism: summary statement and guidelines from the Fifth International Workshop. *J. Bone Miner. Res.* **37**, 2293–2314 (2022).
4. Jonklaas, J. et al. Guidelines for the treatment of hypothyroidism. *Thyroid* **24**, 1670–1751 (2014).
5. Harlow, S. D. et al. Executive summary of the Stages of Reproductive Aging Workshop +10: addressing the unfinished agenda of staging reproductive aging. *J. Clin. Endocrinol. Metab.* **97**, 1159–1168 (2012).

