

Metabolic Bone Disease and Chronic Kidney Disease



What is Metabolic Bone Disease?

Metabolic Bone Disease, or MBD, is a broad term for a set of diseases that affect the strength of your bones. The most common form of metabolic bone disease is called osteoporosis.

Patients with kidney disease, however, can develop a specific form of metabolic bone disease, called “renal osteodystrophy” or “renal bone disease.”

How does Metabolic Bone Disease Develop?

As kidney function decreases in Chronic Kidney Disease, they do not filter blood as efficiently, causing high levels of phosphorus levels in the blood. The higher levels of phosphorus in your blood binds to calcium causing calcium levels to decrease which triggers your parathyroid glands, which are small glands in your neck next to your thyroid gland, to produce Parathyroid hormone (PTH) to increase your blood calcium levels. This imbalance of calcium and phosphorus will affect your blood vessels, bones and heart.

Additionally, healthy kidneys will change Vitamin D into an active form that can be utilized by your body. However, Chronic Kidney Disease can decrease the available “active” Vitamin D, causing further imbalance between calcium and phosphorus.

What are the types of Metabolic Bone Disease?

High-Turnover Metabolic Bone Disease

- This occurs when phosphorus levels are high and Vitamin D levels are low, causing your body to produce too much parathyroid hormone (PTH). Elevated PTH levels can cause calcium to leave your bones, making them more brittle and as the calcium level continues to increase in the blood, this can lead to increased bone fractures and calcium deposits in heart vessels, potentially causing heart disease.

Low-Turnover Metabolic Bone Disease

- This form of bone disease is less common today as it has been associated with aluminum build up in the body.
- Aluminum-based phosphorus binders were used as a medication option in the past, but are less commonly used today.
- For those who do have this form of bone disease, it is more common in patients who are already on dialysis.

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What are the Signs and Symptoms of Metabolic Bone Disease?

Many patients who have metabolic bone diseases do not know, as the symptoms are often vague or appear later in the progression of CKD. Symptoms may include:

- Weak Bones
- Increase in broken bones
- Stiff joints
- Bone pain
- Heart complications
- Muscle weakness

How do I Know if I have Metabolic Bone Disease?

- Your physician will monitor the calcium, phosphorus, PTH and Vitamin D levels in your blood periodically to determine if there is an imbalance of these minerals/hormones.
- You may have x-rays or an echocardiogram of your heart.
- In rare cases, a bone biopsy may be performed.

What is the Treatment for Metabolic Bone Disease in CKD?

- **Low Phosphorus Diet**
 - Follow the low phosphorus diet plan, as this will assist in keeping the phosphorus levels low in your blood.
 - Refer to our Low Phosphorus Diet handout.
- **Phosphate Binders**
 - Your physician may order medications called Phosphate binders.
 - These medications work to bind with phosphorus in your gut, thus reducing the phosphorus absorption and levels in your blood.
 - Examples include Renvela, Fosrenol and Phoslo.
- You may also be given supplements for calcium, phosphate binders or Vitamin D, regardless of CKD stage.
- The most important treatment practice is to catch the disease early. Work with your physician to find techniques to maintain healthy levels of calcium and phosphorus.

Metabolic Bone Disease is a complex group of diseases. Make sure to consult with your physician and entire healthcare team to fully understand the implications of this disease.

Sources:

https://www.hopkinsmedicine.org/johns_hopkins_bayview/medical_services/specialty_care/metabolic_bone_center/metabolic_bone_disorders.html

<http://jasn.asnjournals.org/content/18/3/875.full>

<https://www.ncbi.nlm.nih.gov/pubmed/1308917>

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