Secondary Hyperparathyroidism

- Occurs as a response to declining kidney function in order to maintain calcium/phosphorus homeostasis and bone health.
- Stimulation of PTH from the diseased kidney may have a negative impact on bone turnover and mineralization, and in its severe forms, may lead to bone abnormality called osteitis fibrosa cystica.
- May also lead to parathyroid hyperplasia.

Prevalence of abnormal serum calcium, phosphorus, and intact PTH by BFR

- In large observational studies, it is important to consider the effects of biomarkers of CKD–MBD and various therapies used to lower PTH on patient outcomes.

Definition of CKD-MBD
- Systemic disorder of mineral and bone metabolism due to CKD manifested by either one or a combination of the following:
  - Abnormalities in bone turnover, mineralization, volume, linear growth, or strength
  - Vascular or in other tissue distributions

Definition of renal osteodystrophy
- Renal osteodystrophy is an alteration of bone morphology in patients with CKD.
- It is a measure of the osteoanabolic component of systemic bone disease that is quantifiable by histomorphometry of bone biopsy.

References:

Managing PTH in CKD-MBD

AS KIDNEY FUNCTION DECLINES, there is a progressive disruption in the metabolism of vitamin D, calcium, phosphorus, and parathyroid hormone (PTH).

Patients with secondary hyperparathyroidism may develop abnormalities of all components of Osteomodulin (Osteoimmunochemical Markers for Diagnosis of Osteomalacia) (See page 722). An overview of the Biochemical and Hormonal Abnormalities of CKD-MBD

- An overview of the Biochemical and Hormonal Abnormalities of CKD-MBD

Equivalents of pTH concentrations with the assay used for the measured Allograft

- Establishing a narrow target range for serum intact PTH in ESRD because assays vary in their measurement of intact PTH.
- Expert Panels have debated ways to help clinicians reduce some of the interassay and biologic variability.

Variability in PTH-MBD Biochemical Measurements

- In the graph below, mortality risks are associated with combinations of calcium and phosphorus categories and two PTH categories (≥300 pg/mL, >7.0 μg/dl, >7.0 μg/dl).
- In patients with PTH levels ≥300 pg/mL, patients with calcium levels ≥10.0 mg/dL appeared to be at greatest risk at all phosphorus levels. In patients with PTH levels <300 pg/mL, patients with calcium levels ≥10.0 mg/dL appeared to be at greatest risk.
- A prospective cohort study which included 25,588 patients on hemodialysis therapy (CKD Stage 5) in 12 countries during the course of 10 years. Patients were eligible for mortality in analyses for mortality risk at all phosphorus levels. In patients with PTH levels ≥300 pg/mL, patients with calcium and phosphorus ≥10.0 mg/dL appeared to be at greatest risk. In patients with PTH levels <300 pg/mL, patients with calcium levels ≥10.0 mg/dL appeared to be at greatest risk.

Managing PTH in CKD-MBD Insights for Dialysis

An overview of the Biochemical and Hormonal Abnormalities of CKD-MBD

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Management is generally focused on: • Lowering high serum phosphorus • Maintaining calcium • Treating abnormal PTH level

**Lowering High Serum Phosphorus and Maintaining Calcium**

**Suggested approaches**

- **Serum Phosphorus**
  - Suggest reducing dietary intake of phosphorus in conjunction with other treatments. (0.4 1.7 D)
  - Once a diet calcium concentration between 1.05 and 1.50 mmol/L (0.4 and 0.6 mg/dL) or a phosphate-binding agent is taken into account. (0.4 1.7 D)
  - The phosphate-binding agents, (0.4 1.7 D) suggest the phosphate should intake at least 1.50 g/day (0.4 mmol/L) 1.7 D
  - The phosphate-binding agent should intake at least 1.50 g/day (0.4 mmol/L) 1.7 D
  - **Calcium**
  - Evidence of the choice of components of CKD-MBD 3.1.4 (2C)
  - **Calcimimetics**
  - **Biochemical and/or clinical calcium and phosphorus levels**
  - Suggest treating with: Calcitriol, or Calcimimetics, or a combination of these options. 3.2.4 (2B)

**Reasonable Monitoring Intervals for CKD Stage 5D**

- **Serum Calcium and Phosphorus** Every 1–3 months (0.3 1.2 D, grade 2)
- **Phosphate** Every 2–3 months (0.3 1.2 D, grade 2)

In patients who have high phosphorus levels (0.3 1.2 D) and/or if PTH is elevated (0.3 1.2 D, grade 2)

**Suggested approach**

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  - Suggest reducing dietary intake of phosphorus in conjunction with other treatments. (0.4 1.7 D)
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