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Common Cases Referred to Nephrologists for Calcium Disturbance

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Calcium is the fifth most abundant element in the human body and plays crucial functions in skeletal mineralization, intracellular signaling, muscle contraction, and other biological processes. Calcium homeostasis is regulated by three mechanisms: intestinal absorption, kidney excretion, and bone turnover via parathyroid hormone (PTH) and vitamin D. Hypercalcemia and hypocalcemia indicate significant disruption of calcium homeostasis. The etiology of calcium disturbance may be suggested by duration (acute vs chronic), presentation (symptomatic vs asymptomatic), severity, and patient's history (underlying disease, medication, surgery, and family history). When we encounter patients with calcium disturbances, the first step is to repeat laboratory tests for total calcium, albumin, and ionized calcium concentrations. The second step is to measure serum PTH concentration to determine the cause of calcium imbalances. Additional tests (vitamin D metabolites, phosphate and magnesium, creatinine, tumor marker, direct imaging, serum and urine electrophoresis, or cancer screening) should be determined based on history, physical examination, or other data.

Hypercalcemia is classified into PTH mediated hypercalcemia (primary and tertiary hyperparathyroidism) and non-PTH mediated hypercalcemia (malignancy, vitamin D intoxication, familial hypocalciuric hypercalcemia, or granulomatous diseases). Hypocalcemia is also classified into low PTH (caused by reduced parathyroid function [cinacalcet], parathyroid loss via surgery, autoimmune) and high PTH in response to low serum calcium concentrations (Vitamin D deficiency, chronic kidney disease, tumor lysis, rhabdomyolysis, acute pancreatitis).

Today, I will introduce several cases referred to nephrologists for hypercalcemia (caused by primary hyperparathyroidism, lymphoma, familial hypocalciuric hypercalcemia) and hypocalcemia (caused by chronic kidney disease, drug). I will also explain a diagnostic approach for hypercalcemia and hypocalcemia, respectively.