

## Solutions to [Test Your Knowledge: Phosphate Metabolism](#)

1. C: Calcitonin
  2. B: Lactic acidosis
  3. D: Pseudohypoparathyroidism
  4. C: Autosomal dominant hypoparathyroidism
  5. D: Chronic kidney disease
- 1C. PTH and FGF-23 stimulate increased urinary phosphate excretion through decreased phosphate absorption in the proximal tubule. Besides PTH and FGF-23, soluble klotho is also a phosphaturic hormone. Deficiency of 1,25 vitamin D stimulates both PTH and FGF-23 secretion. Also, phosphate is absorbed throughout the small intestine through paracellular transport and 1,25 vitamin D dependant active transport via the sodium-dependant phosphate transporter 2b (NPT2b). Calcitonin plays no role in regulating phosphate balance in the body.
- 2B. Laboratory artifact is occasionally encountered in patients with hyperglobulinemia, hyperlipidemia, and hyperbilirubinemia. Pseudohyperphosphatemia is caused by [colorimetric interference](#) with the assay. Lactic acidosis causes true hyperphosphatemia through [impaired cellular uptake of phosphate](#).
- 3D. Hypomagnesemia results in defective cyclic adenosine monophosphate generation in the parathyroid glands and PTH target organs, resulting in both impaired secretion and action of PTH. Hypermagnesemia, through its calcimimetic effect on the calcium-sensing receptor (CaSR), can also [impair PTH secretion](#). Pseudohypoparathyroidism is a hereditary form of hypocalcemia in which PTH levels are high. It is characterized by [resistance to PTH actions](#) specifically in the proximal tubule, which leads to hyperphosphatemia.
- 4C. Autosomal dominant hypoparathyroidism is characterized by activating mutations in the CaSR. This results in the parathyroid glands constitutively “sensing” hypercalcemia and suppressing PTH secretion, with subsequent hypocalcemia and hypercalciuria. Treatment with calcium and vitamin D often worsens hypercalciuria and nephrocalcinosis, and GFR loss can follow.
- 5D. Chronic Kidney Disease is the most common cause of hyperphosphatemia. Among the other conditions, FGF-23 levels are also expected to be elevated in kidney injury. Please refer to [Figure 1 from Leaf and Wolf](#) for more detailed information.