Hyperphosphatemia

May 9, 2019 by Josh Farkas

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Symptoms

Hyperphosphatemia itself is generally asymptomatic. However, hyperphosphatemia may indirectly cause symptoms in two ways.

more common: symptomatic hypocalcemia

- Phosphate binds calcium, which can lead to hypocalcemia.
- Hypocalcemia may cause symptoms, for example:
  - Paresthesias (tingling around mouth, hands)
  - Muscle cramping, weakness, laryngospasm
  - Anxiety, confusion, seizure

rare: calciphylaxis

- Elevation of phosphate may promote calciphylaxis (the precipitation of calcium phosphate in tissues).
- This may manifest with necrotizing skin ulceration:
phosphate level

- 2.5-5 mg/dL = normal phosphate
- False elevation (pseudohyperphosphatemia) can occur due to:
  - hyperlipidemia
  - hyperbilirubinemia
  - hyperglobulinemia (e.g. multiple myeloma)
  - hemolyzed specimen
  - liposomal amphotericin B

calcium-phosphate product

- More important than the phosphate level alone, as this predicts the risk of calciphylaxis (precipitation of calcium phosphate in tissues).
- Defined as calcium level multiplied by phosphate level (with both measured in mg/dL).
- Calcium-phosphate product above 70 mg*mg/dL*dL causes a risk of calciphylaxis.

causes of hyperphosphatemia

Renal Failure Plus...

- Sustained hyperphosphatemia generally won't occur without renal failure (GFR < 25 ml/min). Normally the kidneys are highly efficient at phosphate excretion.
- However, there is also generally an inciting cause as well:

  tissue necrosis

  - Tumor lysis syndrome
  - Rhabdomyolysis
  - Hemolysis
  - Fulminant hepatitis
  - Severe hyperthermia

  endocrinopathy

  - Hypoparathyroidism
  - Hypothyroidism or hyperthyroidism
  - Adrenal insufficiency

  medications

https://emcrit.org/ibcc/hyperphos/
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- Exogenous phosphate intake (e.g. phosphate-containing laxatives/enemas, TPN)
- Vitamin D toxicity
- Bisphosphonates
- Fosphenytoin

**treatment**

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**Treatment of hyperphosphatemia**

Significant hyperphosphatemia (phosphate level >>5 mg/dL or >1.6 mM)

- **Acute treatments**
  - Phosphate restricted diet
  - Remove any treatable causes (e.g. offending medications such as Vitamin D)
  - Fluid resuscitation to euvelmia
  - For acute/severe hyperphosphatemia consider forced diuresis (with acetazolamide +/- furosemide), or dialysis

If ongoing renal failure with persistent hyperphosphatemia, consider:

- **Oral phosphate binder**
  - Use in ongoing renal failure
  - Doesn’t achieve immediate control; may prevent ongoing worsening of hyperphosphatemia

Occasional patients with **both** significant hypocalcemia and Ca-Phos product << 70

- **Calcium acetate**
  - 667 mg, two tablets TID with meals

If ineffective may consider

- **Sevelamer**
  - 800 mg TID with meals, double dose PRN
  - Check for drug interactions (adsorbs some PO meds)

Most patients

If no persistent hyperphosphatemia, you’re all set.

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**acute treatment**

- Reverse underlying problem.
- Volume resuscitation followed by forced diuresis using acetazolamide +/- loop diuretic.
- Hemodialysis may be required in severe renal dysfunction (especially in tumor lysis syndrome).
- Phosphate-restricted diet

**chronic treatment: phos-restricted diet plus phosphate binder**

  - 667 mg tablets, start with two tablets TID with meals
  - Can be useful in patients with hypocalcemia.
  - Avoid in hypercalcemia, vitamin D intoxication, Ca-Phos product > 66.
  - Start at 800 mg PO TID with meals, double dose if needed.
  - Nonabsorbable resin avoids problems with Mg, Ca (may be preferable for patients on dialysis).
  - May adsorb some drugs

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Success

If no persistent hyperphosphatemia, you're all set.

The Internet Book of Critical Care, by @EMCrit


Please note: The segment on hyperphosphatemia starts at 14:44.


The Podcast Episode

Want to Download the Episode?

[Right Click Here and Choose Save-As](http://traffic.libsyn.com/ibccpodcast/IBCC_EP_36_-_All_things_phosphate.mp3)

questions & discussion

To keep this page small and fast, questions & discussion about this post can be found on another page [here](https://emcrit.org/pulmcrit/phos/).


**Going further:**

- [Hyperphosphatemia](https://litfl.com/hyperphosphataemia/) (Chris Nickson, LITFL)

Image credits: [Calciphylaxis](https://en.wikipedia.org/wiki/Calciphylaxis#/media/File:Calciphylaxis.png)

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