



DEFINITION: low ionized calcium

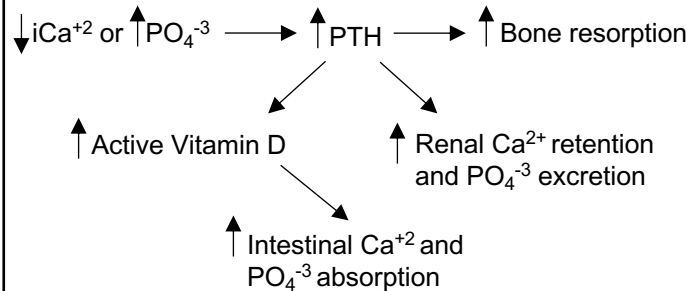
Causes divided based on PTH response:

Inappropriately low PTH: Congenital or acquired hypoparathyroidism

Appropriately high PTH:

- **Vitamin-D related:** Deficiency or disorders of vitamin D metabolism
- **Non-vitamin D related:** Kidney disease, increased phosphate (i.e., enemas, tumor lysis), PTH resistance (i.e., pseudohypoparathyroidism)

CALCIUM METABOLISM



Hypocalcemia stimulates PTH causing Vitamin D activation, increased Ca²⁺ and net decreased PO₄⁻³

PRESENTATION

SYMPTOMS	SIGNS
Infants: <ul style="list-style-type: none"> ○ Muscle spasm ○ Feeding difficulties ○ Jitteriness Children: <ul style="list-style-type: none"> ○ Muscle spasm ○ Paresthesia ○ Numbness Life-threatening: <ul style="list-style-type: none"> ○ Laryngospasm ○ Seizure ○ Arrhythmia (i.e., QT prolongation) 	Chvostek's: <ul style="list-style-type: none"> ○ <u>Facial muscle contraction</u> elicited by tapping over the ipsilateral facial nerve Trousseau's: <ul style="list-style-type: none"> ○ <u>Carpal spasm</u> following inflation of a blood pressure cuff to above systolic for 3 mins.

INVESTIGATIONS

- PTH, Vitamin D, Ca²⁺, PO₄⁻³, Mg²⁺
- Urinary Ca, spot Ca:Cr ratio, blood gas, albumin
- **Caution:** Both Ca²⁺ and H⁺ bind albumin. Thus, alkalosis decreases iCa²⁺ causing true hypocalcemia.
- Hypoalbuminemia results in *pseudohypocalcemia*, as total Ca²⁺ is low but iCa²⁺ is normal. This is confirmed with a correction formula.

DIAGNOSIS

Diagnosis	PTH	Ca ²⁺	PO ₄ ⁻³	Vit D
Hypoparathyroidism	↓	↓	↑	WNL
Vit D deficiency	↑	WNL or ↓	WNL or ↓	↓
PTH resistance	↑	↓	↑	WNL

MANAGEMENT

Acute Symptomatic	Acute Asymptomatic	Long-term Management
<ul style="list-style-type: none"> ○ IV calcium bolus if tetany, seizures, QT prolongation, or laryngospasm <div style="border: 2px solid red; padding: 5px; margin-top: 10px;"> Arrhythmia alert: Cardiac monitoring is required during IV Ca²⁺ infusion </div>	<ul style="list-style-type: none"> ○ Oral therapy as per long-term management if asymptomatic or mild symptoms, such as paresthesia 	<ul style="list-style-type: none"> ○ Hypoparathyroidism or PTH resistance: Ca²⁺ and activated vitamin D supplements ○ Vitamin D deficiency: Inactive vitamin D supplement ○ Renal failure: Phosphate binders, activated vitamin D

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