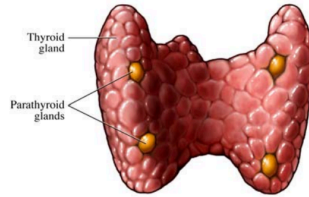


## A HYPOPARATHYROIDISM REFRESHER

By Leila Turner, ND

As we practice medicine over the years we get into our ruts and tend to see the same patterns over and over again. This expertise in recognizing patterns is of course essential as we become experts in the field, however we may also become less likely to remember to consider other things that might be going on. In my practice I treat a lot of menopause and osteoporosis and it's easy to just start treating the bones with our common and wonderfully effective treatments. However hypoparathyroidism must be considered in all moderate to aggressive osteoporotic patients. Muscle cramps and spasms also frequently get attributed to poor diet and electrolyte deficiencies; again hypoparathyroidism should be considered when you see these symptoms. What about patients with hypothyroid or with a history of partial or complete thyroidectomy? These patient too should be checked for hypoparathyroid. Here is a refresher that I hope you find helpful.

The parathyroid glands are located in the neck, behind the thyroid gland. There are approximately 4 of them, each about the size of a grain of rice.



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### WHAT DO PARATHYROID GLANDS DO?

When calcium levels in the blood decrease the calcium sensing receptors ("CaSR") signals the parathyroid glands to produce parathyroid hormone (PTH) in an attempt to restore calcium levels in the blood. PTH has a number of actions that ultimately result in restored calcium levels in the blood.

In the kidneys:

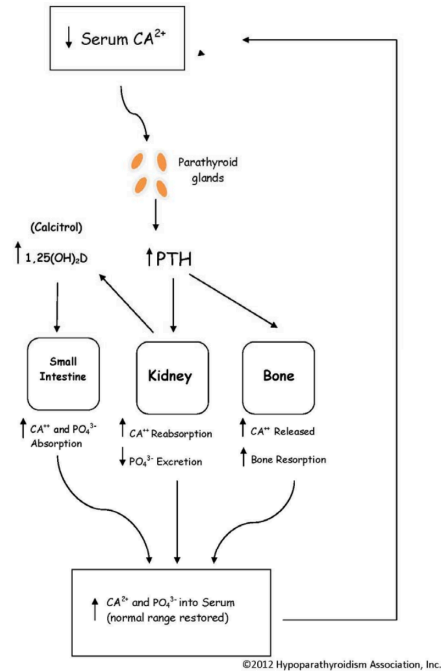
- PTH → stimulates calcium reabsorption in the kidneys thereby → ↑serum calcium
- PTH → decreases phosphate reabsorption in the kidneys

In the bone:

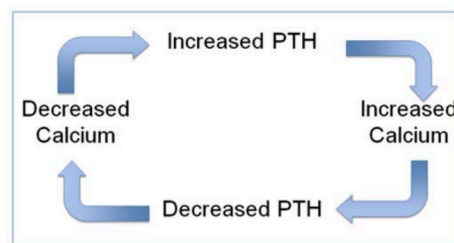
- PTH → stimulates osteoclasts to release calcium into the blood stream thereby → ↑serum calcium

In the intestines

- PTH → stimulates reabsorption of calcium in the intestines thereby → ↑serum calcium
- PTH → increases vitamin D absorption in the intestines → which in turn → ↑calcium in the serum



Once the calcium levels normalize, parathyroid hormone excretion also returns to normal. This sensitive balancing act occurs many times during the course of a day for all humans.



Hypoparathyroidism is a rare medical condition which is characterized by hypocalcemia (low blood calcium), hyperphosphatemia (high phosphate levels), and low or low-normal levels of parathyroid hormone (PTH).

**Causes of Hypoparathyroidism:**

- Post-Operative Hypoparathyroidism (most common)
- Idiopathic Hypoparathyroidism
- Congenital Hypoparathyroidism
- Familial Isolated Hypoparathyroidism
- APS -Autoimmune Polyglandular Syndrome
- Calcium Sensing Receptor (CaSR) mutation
- Multiple Endocrine Neoplasia
- DiGeorge Syndrome
- Pseudo Hypoparathyroidism
- Wilson's Disease
- Thalassemia
- Hemochromatosis

Calcium is a key electrolyte controlling the conduction of electricity in the body. When calcium levels are too low the electrical signals in the nervous system do not function properly.

**Symptoms of low calcium:**

- Paresthesia (pins and needles or numbness) in the extremities or around the mouth
- Mood changes (such as anxiety, depression, and irritability)
- Cognitive dysfunction (“brain fog” and an inability to concentrate)
- Memory problems
- Tetany (muscle spasms)
- Muscle/bone pain
- Low bone density
- Difficulty swallowing or speaking (raspy voice)
- Fatigue or weakness
- Dizziness

**Long term symptoms may include:**

- Dental problems
- Dry hair and/or brittle nails
- Psoriasis (dry, red, flaky patches of skin)
- Cataracts (cloudy vision)
- Reduction in bone turnover (necessary for healthy bones)
- Kidney disease: kidney stones or hardening of the kidneys (nephrocalcinosis)
- Soft tissue calcification
- Seizures
- Heart attack
- Laryngospasm (seizure of the voice box)

**Common triggers of hypocalcemia?**

- Insufficient calcium or vitamin D levels
- Strenuous exercise
- Anxiety or stressful situations
- Diarrhea, constipation or other intestinal conditions that keep a person from absorbing their calcium effectively
- Changes in medications for other conditions
- Changes in diet that reduce your calcium or vitamin D intake
- Any illness that causes diarrhea, vomiting or loss of appetite
- Abnormalities to your magnesium and/or phosphorus levels
- Menstruation

**Tests and Tips to Monitor Your Hypoparathyroid Patient:**

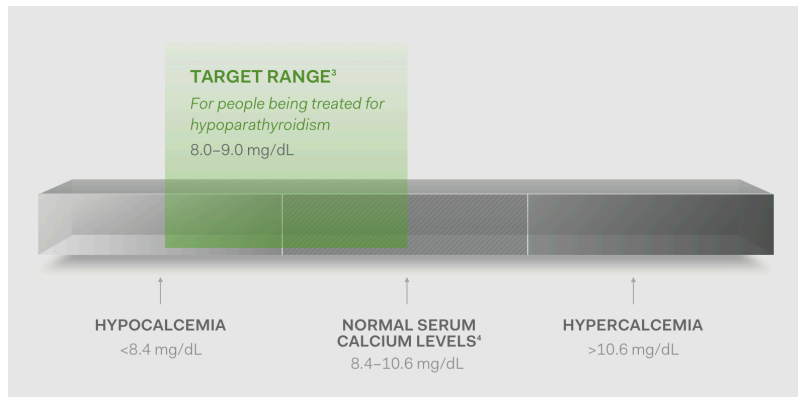
**INTACT PTH:**

- Most hypoparathyroid patients only get this test done once to confirm the dx
- Non-fasting/ Any time of day

**SERUM CALCIUM:**

- Non-fasting
- Avoid calcium the morning of blood draw

- Therapeutic Goal: control serum calcium in the low-normal range to prevent ectopic soft tissue calcifications in the brain, kidney, vascular system and other tissues
- Typical Range: 7.5–9.5 mg/dL
- Optimal Range: 8 to 8.5 mg/dL
- I have seen some patients who complain of paresthesia's and muscle cramping when they exercise, which drives ionized calcium down transiently. I just advise taking an extra calcium tablet before engaging in activities that predictably elicit symptoms of hypocalcemia.
- Monitor weekly or every other week after a change in treatment
- Monitor every 3-6 months



#### IONIZED CALCIUM (albumin-adjusted total calcium):

- A measure of the **free unbound** calcium in blood. Ionized calcium testing is useful especially when a serum calcium result does not seem to explain the symptoms a patient is experiencing.

#### MAGNESIUM

- Therapeutic Goal: control serum magnesium levels to avoid Hypomagnesaemia
- Monitor weekly or every other week after a change in treatment
- Monitor every 3-6 months

#### PHOSPHORUS

- Therapeutic Goal: keep serum phosphate levels within reference range to prevent ectopic soft tissue calcifications in the brain, kidney, vascular system and other tissues
- Typical range: 2.5 – 4.5 mg/dL
- Optimal 3.0-4.0 mg/dL
- Monitor weekly or every other week after a change in treatment
- Monitor every 3-6 months

#### KIDNEY FUNCTION TESTS

- CREATININE / eGFR
- Monitor weekly or every other week after a change in treatment
- Monitor every 3-6 months

#### 24-HOUR URINE CALCIUM:

- This test measures the amount of calcium excreted in a 24-hour period
- The amount of calcium contained in a 24-hour sample of urine is important for determining how much calcium is being eliminated versus how much the body holds onto.
- Typical Range: 50 to 300 mg per day
- Optimal Goal:
  - Females =250 mg / 24-hour-period for females

- Males =300 mg / 24-hour-period for males
- Monitor weekly or every other week after a change in treatment
- Monitor every 3-6 months

### **CALCIUM - PHOSPHORUS PRODUCT**

- Controlling the calcium-phosphate product levels will help to reduce the risk of ectopic soft tissue calcifications in the brain, kidneys and vascular system.  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3513540/>
- For patients with hypoparathyroidism, experts recommend a calcium-phosphate product of less than 55 mg<sup>2</sup>/dl.
- This number is calculated using serum calcium levels multiplied by the serum phosphorus levels
  - For example:
    - Serum calcium = 9mg/dL
    - Serum phosphorus = 4.7mg/dL
    - $9 \times 4.7 = 42.3$  (Goal is <55)
- Monitor weekly or every other week after a change in treatment
- Monitor every 6 months

### **RENAL IMAGING**

- If patient has symptoms of renal stone disease or if serum creatinine levels start to rise
- Avoid renal (nephrocalcinosis/nephrolithiasis) calcifications

### **DEXA/ BONE DENSITY**

- Standard of care does not advise routine DEXA
- However based on age and menopausal/estrogen status DEXA should be used for screening and prevention of osteoporosis and fractures

### **THERAPEUTIC GOALS:**

- Prevent signs and symptoms of hypocalcemia
- Maintain the serum calcium concentration slightly below normal or in the low normal reference range
- Maintain the serum calcium-phosphate products <55 mg/dL
- Avoid hypercalciuria by monitoring urine calcium levels
- Avoid renal (nephrocalcinosis/nephrolithiasis) and other extraskeletal calcifications
- Maintain serum phosphate and magnesium levels with reference range
- Maintain 25-OH Vitamin D levels
- Personalize and focus care on the overall well-being and quality of life
- Monitor weekly or every other week after a change in treatment
- Monitor every 3-6 months

### **TREATMENT OPTIONS:**

#### **Recombinant Parathyroid Hormone (rPTH)**

- The FDA recently approved the use of a recombinant parathyroid hormone (rPTH), used with calcium and vitamin D to control hypocalcemia in people with hypoparathyroidism.
- Natpara® - Subcutaneous injection twice daily

#### **Calcium - The Daily Recommended Allowances (DRAs) for Calcium is:**

- Children 1-3 years old: 500 mg/day
- Children 4-8 years old: 800 mg/day
- Males and females 9-18 years old: 1,100 mg/day
- Males and females 19-50 years old: 800 mg/day
- Males 51-70 years old: 800 mg/day, Males greater than 70 years old: 1,000 mg/day

- Females 51 years old and older: 1,000 mg/day
- Common Naturopathic Dosages: 300-500mg 3x/ day (total daily dose (1,100-1,400mg/day)
- If optimal levels are not achieved try a different form of calcium.
- Optimal forms of calcium are the chelated forms:
  - Excellent absorption:
    - Calcium citrate
    - Calcium citrate malate
    - Calcium bisglycinate
    - Calcium aspartate
  - Moderate absorption:
    - Calcium carbonate
    - Dicalcium phosphate
    - Tricalcium phosphate
  - Poor Absorption (avoid)
    - Calcium Gluconate

### Vitamin D (25-OH-Dihydroxyvitamin D3) (aka Calcifediol)

- Calcifediol, also known as calcidiol, 25-hydroxycholecalciferol, or 25-hydroxyvitamin D (abbreviated 25(OH)D), is a pre-hormone that is produced in the liver by hydroxylation of vitamin D3 (cholecalciferol) by the enzyme cholecalciferol 25-hydroxylase.
- A very important role of native vitamin D is to increase the intestines' ability to absorb calcium.
- The Daily Recommended Allowance (DRA) for Vitamin D is 400IU (International Units, 400IU = 10 micrograms) per day for all ages and genders.
- Hypoparathyroid patients may need more than this.
- Common Naturopathic Dosages: 2000-6000IU (target 20-OH Vitamin D levels = 60-90ng/mL)
- SOURCES OF VITAMIN D
  - Sun exposure: 10-15 minutes at least twice a week of direct sun onto your skin usually provides adequate amounts of vitamin D. Limit exposure to sunlight as excess may cause skin cancer.
  - Food: Fortified cereals or milk, cod liver oil, eggs, fish (oysters, salmon), dark leafy vegetables (spinach, kale), mushrooms.

### Calcitriol (1,25-Dihydroxyvitamin D3)

- Calcifediol is converted in the kidneys (by the enzyme 25(OH)D1-alpha-hydroxylase) into calcitriol (1,25-(OH) 2D3), the active form of vitamin D.
- Calcitriol (also called Rocaltrol) is a prescription form of "activated" vitamin D.
- "Active" vitamin D is the type the body makes when "native" vitamin D and parathyroid hormone join forces.
- Hypoparathyroidism patients cannot make activated vitamin D because they do not make parathyroid hormone, which is why it is provided to hypoparathyroid patients in prescription form.
- Oral or IV route
- Dose:
  - Start 0.25-1mcg PO qd
  - Increase 0.25mcg/day every 2-4 weeks
  - Adjust dose based on calcium levels.
  - Monitor weekly or every other week after a change in treatment
  - If hypercalcemia or Calcium-Phosphate Product >70 may re-start at lower dose

### SAMPLE TREATMENT PLAN FOR HYPOPARATHYROID PATIENT

Product	Breakfast	Lunch	Dinner	8pm
Calcitriol	0.25mcg		0.25mcg	
Magnesium glycinate	120mg		120mg	120mg

Dicalcium Malate Capsules	500mg	500mg		500mg
Vitamin D				4000IU

**Some helpful resources:**

<https://www.hypoparaanswers.com/hcp/managing-hypoparathyroidism.html>

<https://www.hypopara.org/>

[https://www.hypopara.org/wwwroot/userfiles/files/a\\_quick\\_guide\\_to\\_hypoparathyroidism.pdf](https://www.hypopara.org/wwwroot/userfiles/files/a_quick_guide_to_hypoparathyroidism.pdf)