

Disorders of Calcium and Phosphorus



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Disorders of Calcium and Phosphorus

You may have just heard that your baby or child has a medical condition affecting his calcium and/ or phosphorus levels. This booklet and your health care professional will help you understand what this means for you and your child. When you understand your child's condition and its treatment, you will feel confident that you can give him the medications he needs and get back to enjoying daily life together.

What do calcium and phosphorus do?

Calcium and phosphorus work together in a number of important systems in the body. They are important for forming healthy bones in growing children, for allowing muscles to contract and relax normally, and for proper signaling between the brain and the nerves. Your child has very likely been diagnosed with a condition that leads to abnormal blood levels of calcium and/or phosphorus because of problems with his bones, muscles or brain function.

How are calcium and phosphorus levels controlled?

Normally, the blood levels of calcium and phosphorus are kept within a very narrow range (see Appendix) by a complex system. This requires the work of two hormones, parathyroid hormone (PTH) and activated vitamin D.

The main source of calcium and phosphorus is the diet; that is, breast milk or formula in babies, and dairy products and other foods in children. Vitamin D is important for the absorption of calcium and phosphorus from the intestines into the

bloodstream. Once inside the body, calcium and phosphorus move into bones and muscles as needed. Any extra calcium or phosphorus is eliminated from the body into the urine by the kidneys. This process is under the control of PTH. If needed, PTH can also direct the bones to release calcium and phosphorus into the bloodstream, if their blood levels fall too low.

Any problems with the dietary intake of calcium, phosphorus or vitamin D; with the kidney's ability to eliminate calcium or phosphorus; or with the production or action of PTH can lead to one of the disorders listed in this booklet.

How much vitamin D do we need?

Health Canada recommends the following daily intake International Units (IU):

Recommended Vitamin D Intake	
Age	IU of Vitamin D a Day
0–12 months	400
1–70 years	600

How much calcium do we need in our diets?

Health Canada recommends the following as adequate intakes of calcium, in milligrams. In patients with some of the disorders described here, higher intakes may be required.

Recommended Calcium Intake	
Age	Milligrams of Elemental Calcium Per Day
0–6 months	200
7–12 months	260
1–3 years	700
4–8 years	1000
9–18 years	1300

Please see appendix for Canadian Vitamin D and Calcium products

What are the symptoms of low blood calcium levels?

Low blood calcium levels (also called hypocalcemia) can lead to the following:

1. Tingling and numbness of the face, hands and feet
2. Muscle twitching, cramping and spasms.
3. Irregular heart rhythm.
4. Seizures.
5. Difficulty breathing, barking (croup-like) cough.

What are the symptoms of high blood calcium levels?

If the calcium level becomes too high (also called hypercalcemia), the child will have:

1. Constipation, stomach cramps, nausea and vomiting.
2. Weakness and fatigue.
3. Headache and irritability.

What are some of the disorders of calcium and phosphorus?

1. Vitamin D deficiency and rickets.
2. Hypoparathyroidism.
3. DiGeorge syndrome.
4. Pseudohypoparathyroidism.

5. Hypophosphatemic rickets.

Ask your nurse or doctor for more information on your child's condition.

Questions from families

Q: How do you give calcium to a baby?

A: *There are many forms of calcium which may be used (see Appendix). Your doctor is planning to give your child a certain amount of elemental calcium per day.*

Calcium may be in a pre-mixed solution. NOTE THE INFORMATION ON THE CONTAINER AND SHAKE WELL IF INSTRUCTED. This means shaking hard for 2–3 minutes while watching the clock. Otherwise, the calcium settles out, and you are giving your child less than the recommended dose.

Calcium may be in the form of antacid tablets such as Tums®. Cut the tablet to the required size, crush and dissolve in milk or formula.

Q: Can I change my child's calcium to a cheaper product?

A: *Talk with your doctor and pharmacist before making a change. Each calcium product (see Appendix) has a different amount of elemental calcium. Some products have a low percentage of elemental calcium, and your child would have to take a large amount. Some products may have more side-effects, such as diarrhea.*

The calcium that your child takes has to be given 4 times each day, before each meal and at bedtime, to provide the body with a steady supply of calcium. It cannot be taken all at one time.

Q: My baby seems very fussy after I give her calcium.

A: *Some forms of calcium may be upsetting the stomach. Give the calcium as part of the feeding, not at the very beginning. It is also possible that your baby has a lax muscular connection between the esophagus (the food pipe) and the stomach, allowing the acid stomach contents to come up into the esophagus. This is called reflux. Your doctor may recommend a medication for this.*

Q: Can I use non- prescription vitamin D instead of calcitriol (Rocaltrol®) or alfacalcidol (One- Alpha®)?

A: *No! Vitamin D from the drugstore doesn't work in the body until is turned into the activated form of vitamin D. Because of his or her medical condition, your child's body is not able to convert vitamin D into the activated form.*

Q: My son is booked for a surgical procedure soon. I've been told he should have nothing to eat or drink before the surgery. Does this include the calcium and calcitriol (Rocaltrol®) or alfacalcidol (One-Alpha®)?

A: *Speak with your endocrinologist about this—it can be dangerous to miss any doses. If the calcium level drops too low, the surgery will be cancelled. Often the doctor recommends taking all doses of medication with just a tiny sip of water.*

Q: What should I do if my child is vomiting and can't keep his medicine down?

A: *Since it can be dangerous to miss doses, you should speak to your endocrinologist about this.*

Q: I don't like giving my child medicine. Can I give her a special diet instead of the calcium and Rocaltrol® or One-Alpha®?

A: *Every day a child's body needs calcium—*

between 700 and 1300 milligrams a day. While it remains important to have a diet with lots of calcium (dairy products, fortified soy milk, and green vegetables), that unfortunately won't be enough for your child, because her body cannot absorb calcium normally. Much of calcium in the foods she eats is lost through the digestive system, and so she needs supplements as well. One of the activated forms of vitamin D, either calcitriol (Rocaltrol®) or alfacalcidol (One-Alpha®), is also needed in order for the calcium from the diet and from supplements to be absorbed by the digestive system.

As you can see, the process of treating your growing child with a disorder of calcium or phosphorus involves taking medications regularly and checking blood and urine to be sure the amounts are right for her. At first, it will take a lot of care, but soon it will become part of your everyday life, and you will be able to enjoy your child for the unique child that he or she is.

Websites and support groups for disorders of calcium and phosphorus

The Hypoparathyroidism Association:

<http://www.hypoparathyroidism.org>

Endocrine Web: Hypoparathyroidism:

<http://www.endocrineweb.com/hypopara.html>

The 22q and You Center:

<http://www.chop.edu/centers-programs/22q-and-you-center>

22q Central:

<http://www.22qcentral.com>

Chromosome 22 Central: VCFS

<http://www.c22c.org/vcfs.htm>

International 22q11.2 Deletion Syndrome Foundation, Inc.:

<http://www.22q.org>

X-Linked Hypophosphatemia Network:

<http://www.xlhnetwork.org>

HealthLink BC: Food Sources of Calcium and Vitamin D:

<http://www.healthlinkbc.ca/healthfiles/hfile68e.stm>

Medic Alert Canada:

<http://www.medicalert.ca>

More links are available from the

BC Children's Hospital Endocrinology & Diabetes Unit:

<http://endodiab.bcchildrens.ca>

Children with low blood calcium levels should wear a Medic Alert bracelet, to tell emergency personnel about potential calcium deficiency.

Appendix

Selected Canadian Calcium Products	
<i>Generic Name / Brand Name</i>	<i>Elemental Calcium</i>
Tums® Regular 500 mg	200 mg/tab
Tums® Extra Strength 750 mg	300 mg/tab
Tums® Ultra Strength 1000 mg	400 mg/tab
Viactiv® Chews	500 mg/chew
BCCH Pharmacy suspension	80 mg/mL
<p>Note: The regular Tums® tablet, for example, is called Tums® 500 mg. Since calcium carbonate is 40% elemental calcium, Tums® 500 mg actually contains only 200 mg of elemental calcium</p>	

Canadian Vitamin D Products	
<i>Generic Name</i>	<i>Trade Name and Dosages Available</i>
Cholecalciferol (vitamin D ₃)	Multivitamins: most contain 400 IU Supplements: usually 400 IU or 1000 IU <ul style="list-style-type: none"> • Baby Ddrops®: 400 IU/drop • Kids Ddrops®: 400 IU/drop • Adult Ddrops®: 1000 IU/drop
Alfacalcidol (1-hydroxy-vitamin D)	One-Alpha®: <ul style="list-style-type: none"> • 0.25-microgram capsules • 1-microgram capsules • 2 microgram/mL drops
Calcitriol (1,25-dihydroxy-vitamin D)	Rocaltrol®: <ul style="list-style-type: none"> • 0.25-microgram capsules • 1-microgram capsules

Normal Levels of Common Lab Tests for a Child 6–12 Months of Age*	
<i>Test</i>	<i>Normal Range</i>
calcium*	1.87–2.50 mmol/L
ionized calcium*	1.10–1.30 mmol/L
phosphorus*	1.29–2.58 mmol/L
magnesium*	0.78–1.03 mmol/L
intact PTH	1.0–5.5 pmol/L
alkaline phosphatase	110–320 U/L
25-hydroxy-vitamin D	25–110 nmol/L
1,25-dihydroxy-vitamin D	40–190 nmol/L
urinary calcium/creatinine ratio*	<1.69 mmol/mmol
<p>*Normal levels vary depending on the age of the child and the lab method used.</p>	

Canadian Phosphorus Products	
<i>Generic Name</i>	<i>Trade Name and Dosage Available</i>
Sodium phosphate monobasic	Phosphate-Novartis®: 500-mg fizzy tablets (16.1 mmol/tablet)
Sodium phosphates oral solution	Phoslax®: 125 mg/mL (4.1 mmol/mL)