NEONATAL HYPOCALCEMIA

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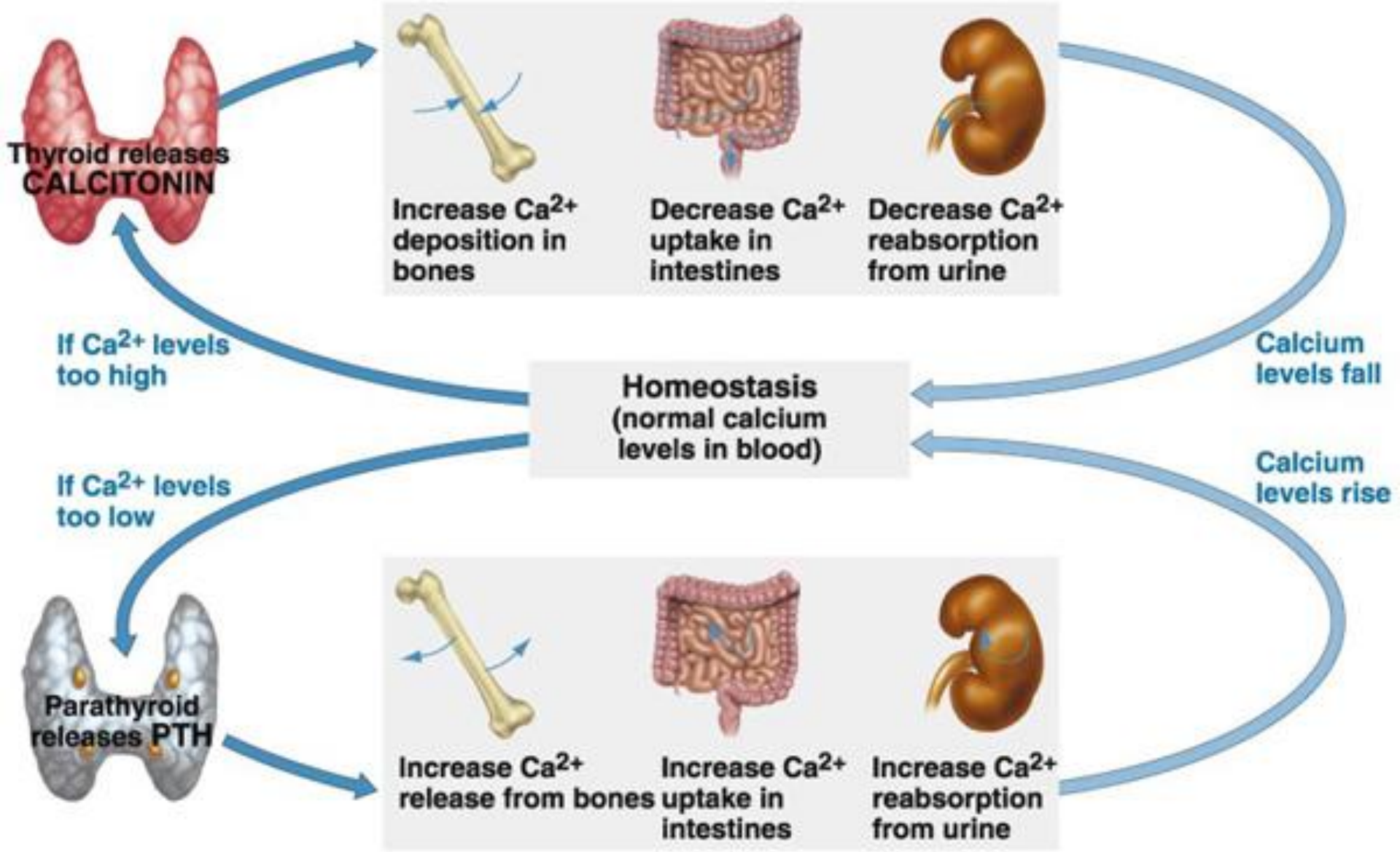
Calcium, the most abundant mineral in the body, is found in some foods, added to others, available as a dietary supplement, and present in some medicines (such as antacids).

Calcium is required for vascular contraction and vasodilatation, muscle function, nerve transmission, intracellular signaling and hormonal secretion, though less than 1% of total body calcium is needed to support these critical metabolic functions. Serum calcium is very tightly regulated and does not fluctuate with changes in dietary intakes; the body uses bone tissue as a reservoir for, and source of calcium, to maintain constant concentrations of calcium in blood, muscle, and intercellular fluids.

- Calcium is an essential human bone growth and development of minerals, it also involved in the activities of motor excitability. The mediation of calcium in the body fluids in a dynamic equilibrium, constantly absorbed, discharges, plasma calcium concentration remains unchanged, so that bone growth, bone calcium deposition and the release continued.
- Rapid bone growth in children need calcium to more.

  If they can not replenish, calcium deficiency will occur, causing disease. Adult if the occurrence of intestinal calcium absorption barriers, in order to maintain the plasma calcium concentration, calcium will continue to release, this will result in osteoporosis; load-bearing bone marrow-side edge of bone calcium deposition of excessive formation of bone spurs, periosteal calcification, or even compression fractures and other bone degenerative joint disease.



Calcium regulation

- ***Fetal, neonatal, infant*** bone growth and development of rapid, often do not meet calcium needs, and therefore calcium supplement.
- People 40 years of age, the body organs were slowly removed, and intestinal calcium absorption is gradually reduced, to maintain the plasma calcium to protect the nerve excitability activities, the calcium will continue to release, The results will appear earlier in the bone degenerative joint disease, or prone to fracture.
- To prevent this from happening, people from 40 years of age, should be appropriate to add easy-to-active calcium absorption.
- Specifically, ***pregnancy, newborn, infant and child*** to a doctor under the guidance of an appropriate calcium supplement, the sun, taking cod liver oil in order to facilitate bone growth and development (source of vitamin D).
- After 40 years of age, to help the intestinal absorption of calcium, need to take active calcium. Because the food has enough calcium though, because intestinal absorption is reduced, then added after the activation of calcium easily absorbed by the need.

Prevent absorption of dietary calcium have?

1) excessive intake of plant foods: plant food in the oxalic acid, phytic acid, dietary fiber may prevent the absorption of calcium.
2) eating salty food: the ingredients for the NaCl salt, high-Na intake would affect the absorption of calcium.
3) drink a lot of coffee: Coffee contains caffeine, excessive influence of caffeine on calcium absorption.
4) too much meat: meat protein and phosphorus contents were higher, moderate protein diet helps calcium absorption, but too much protein and phosphorus can impair calcium absorption.

Low-fat dairy products

Skimmed milk, low fat cheese and yogurt are good sources of calcium, can help decompose fat cells. Studies have shown that if insufficient calcium intake and fat storage may increase.

Neonatal mineral requirements

Calcium deficiency is one of the **metabolic bone disease** in preterm newborns

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WolframAlpha computational knowledge engine

ionized calcium in blood, serum protein 8.5 mg/dl

total blood calcium: 9.5 mg/dL

Assuming total blood protein | Use serum albumin and serum globulin instead

Input information:

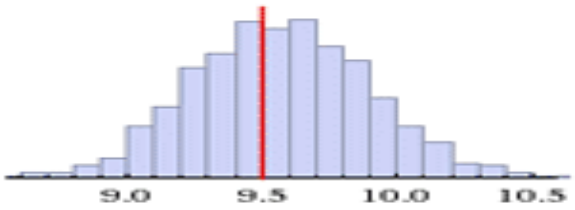
protein-bound serum calcium	
total blood protein	8.5 mg/dL (milligrams per deciliter)
total blood calcium	9.5 mg/dL (milligrams per deciliter)

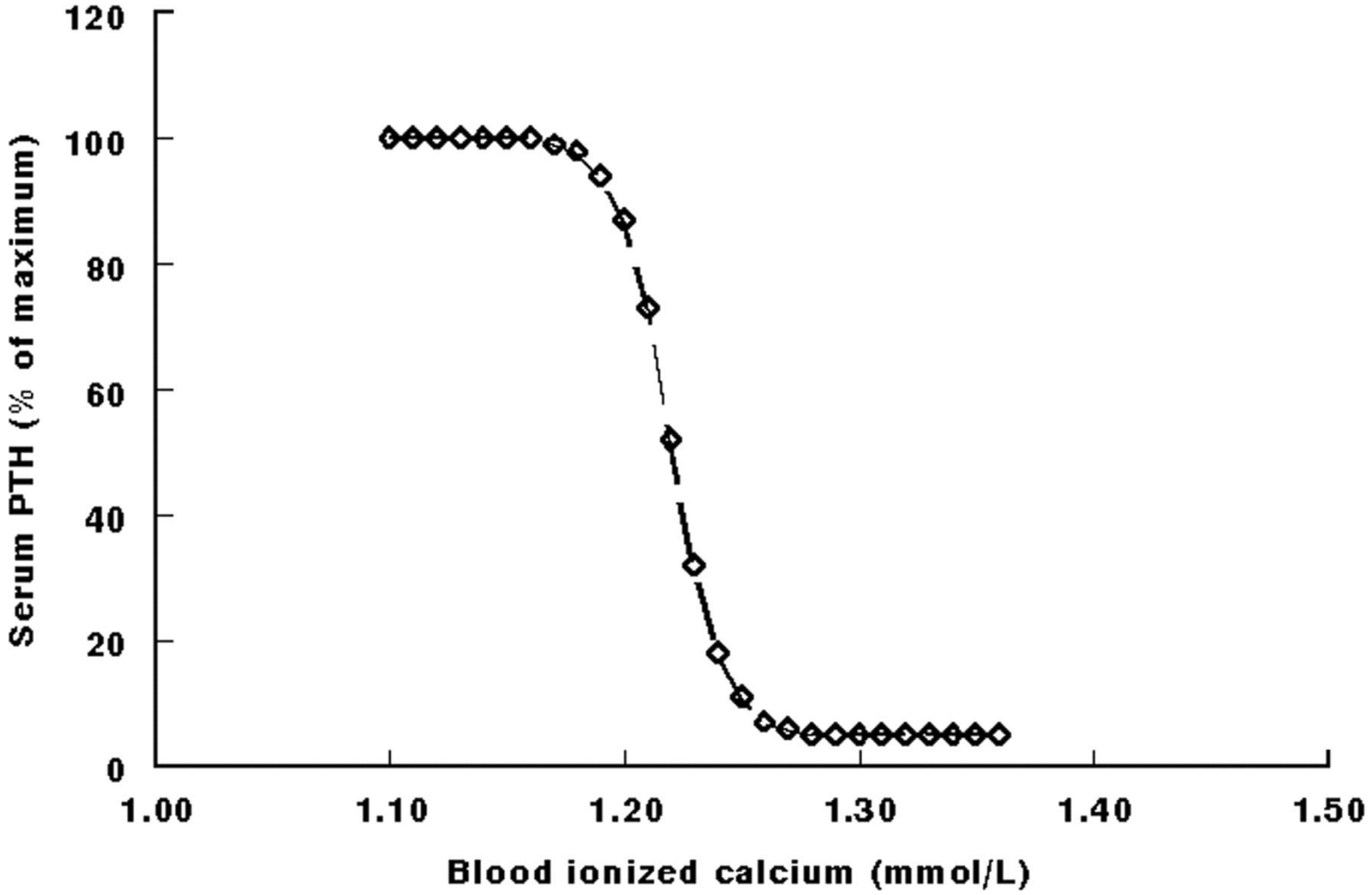
Results:

Am J Physiol Renal Physiol 2004 Jun 286(6) F1005-11, .Ink

unbound ionized calcium in serum	9.1 mg/dL (milligrams per deciliter)
protein-bound serum calcium	0.38 mg/dL (milligrams per deciliter)

Serum calcium reference distribution: More

95% reference range	(8.8 to 10.2) mg/dL
$\pm 1\sigma$ range	(9.1 to 9.9) mg/dL
distribution	
fraction below	53.7% of population



Chen R A , Goodman W G Am J Physiol Renal Physiol 2004;286:F1005-F1011

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Renal Physiology

Corrected total calcium

Corrected total calcium (mmol/L)=TCa (mmol/L) + 0.01 [30 (g/L) − albumin (g/L)].

Ionized Calcium:

Sodium Potassium Ionized Calcium And Chloride Electrolyte Analyzer

- Fully Automated Electrolyte Analyzer for the measurement of Sodium, potassium, Ionized calcium and chloride in whole blood, plasma, serum and diluted urine.
- Compact, economical and easy to use
- Long life, high performance, maintenance-free electrodes
- Automatic sampling, probe wiping and calibration
- Intelligent reagent pack with electronic chip
- Battery back-up facility
- Extremely low cost per test
- Technical specifications of these equipment are as follows:
- Principle: Direct measurement with ION Selective Electrode (ISE)
- Sample: 120 µL for Whole Blood, Serum, Plasma 700 µL for diluted (1:5)

This syndrome occurs in 1/4,000 newborns. In 90% of patients, the condition is caused by a deletion of chromosome 22q11.2.

Approximately 25% of these patients inherit the chromosomal abnormality from a parent.

Neonatal hypocalcemia occurs in 60% of affected patients, but it is transitory in the majority; hypocalcemia may recur or may have its onset later in life.

Associated abnormalities of the 3rd and 4th pharyngeal pouches are common; these include conotruncal defects of the heart in **25%**, velopharyngeal insufficiency in **32%**, cleft palate in **9%**, renal anomalies in **35%**, and aplasia of the thymus with severe immunodeficiency in **1%**.

This syndrome has also been reported in a small number of patients with a deletion of chromosome 10p13, in infants of diabetic mothers, and in infants born to mothers treated with retinoic acid for acne early in pregnancy.

LABORATORY EVALUATION FOR RESPIRATORY DISTRESS IN THE NEWBORN

Test	*Indication*
Blood culture	**May indicate bacteremia Not helpful initially because results may take 48 hours**
Blood gas	**Used to assess degree of hypoxemia if arterial sampling, or acid/base status if capillary sampling (capillary sample usually used unless high oxygen requirement)**
Blood glucose	**Hypoglycemia can cause or aggravate tachypnea**
Blood calcium	**Hypocalcemia can cause or aggrevate respiratory distress**
Complete blood count with differential	**Leukocytosis or bandemia indicates stress or infection**
	Neutropenia correlates with bacterial infection
	Low hemoglobin level shows anemia
	High hemoglobin level occurs in polycythemia
	Low platelet level occurs in sepsis
Lumbar puncture	**If meningitis is suspected**
Pulse oximetry	**Used to detect hypoxia and need for oxygen supplementation**

In man, calcium and bilirubin can react to form calcium bilirubinate gall**stones.**

Theoretically, calcium in serum could also be complexed with bilirubin and thereby decrease the concentration of ionized calcium. We investigated this possibility in vitro and also by assay of sera from six infants with hyperbilirubinemia.

Studor,D.J.,and Wilkie,L .The crystalline salt_'i of calcium hilirubinate in human gallstones. C/in. Sci. Mol. Med; 2010, 53: 101-103.

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بسم الله الرحمن الرحيم

ولا تحسبن الذين قتلوا في سبيل الله أمواتا بل

أحياء عند ربهم يرزقون

صدق الله العظيم