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Nutrition 102 – Class 4

Angel Woolever, RD, CD

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Nutrition 102

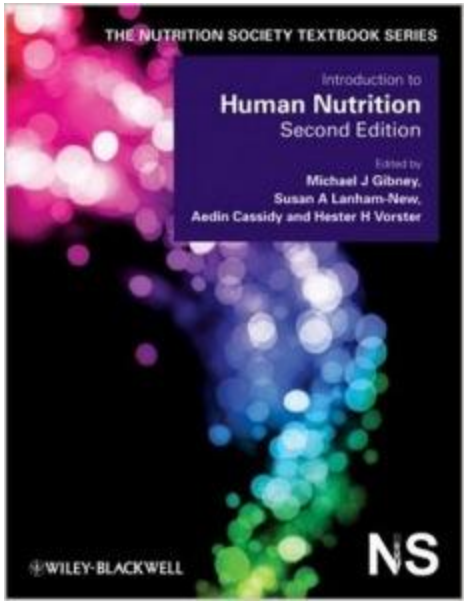
- "Introduction to Human Nutrition" second edition

  Edited by Michael J. Gibney, Susan A. Lanham-New, Aedin Cassidy, and Hester H. Vorster

  May be purchased online

  but is not required for

  the class.



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Technical Difficulties

Contact:
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Questions

- You may raise your hand and type your question.
- All questions will be answered at the end of the webinar to save time.

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Review from Last Week

- B Vitamins
  - What they are
  - Source
  - Function
  - Requirement
  - Absorption
    - Deficiency
    - Toxicity

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Priorities for Today's Session

- Minerals: Calcium, Magnesium, Phosphorus, Sodium and Chloride, Potassium, Iron
  - What they are
  - Function
  - Source
  - Requirement
  - Absorption
    - Deficiency
    - Toxicity

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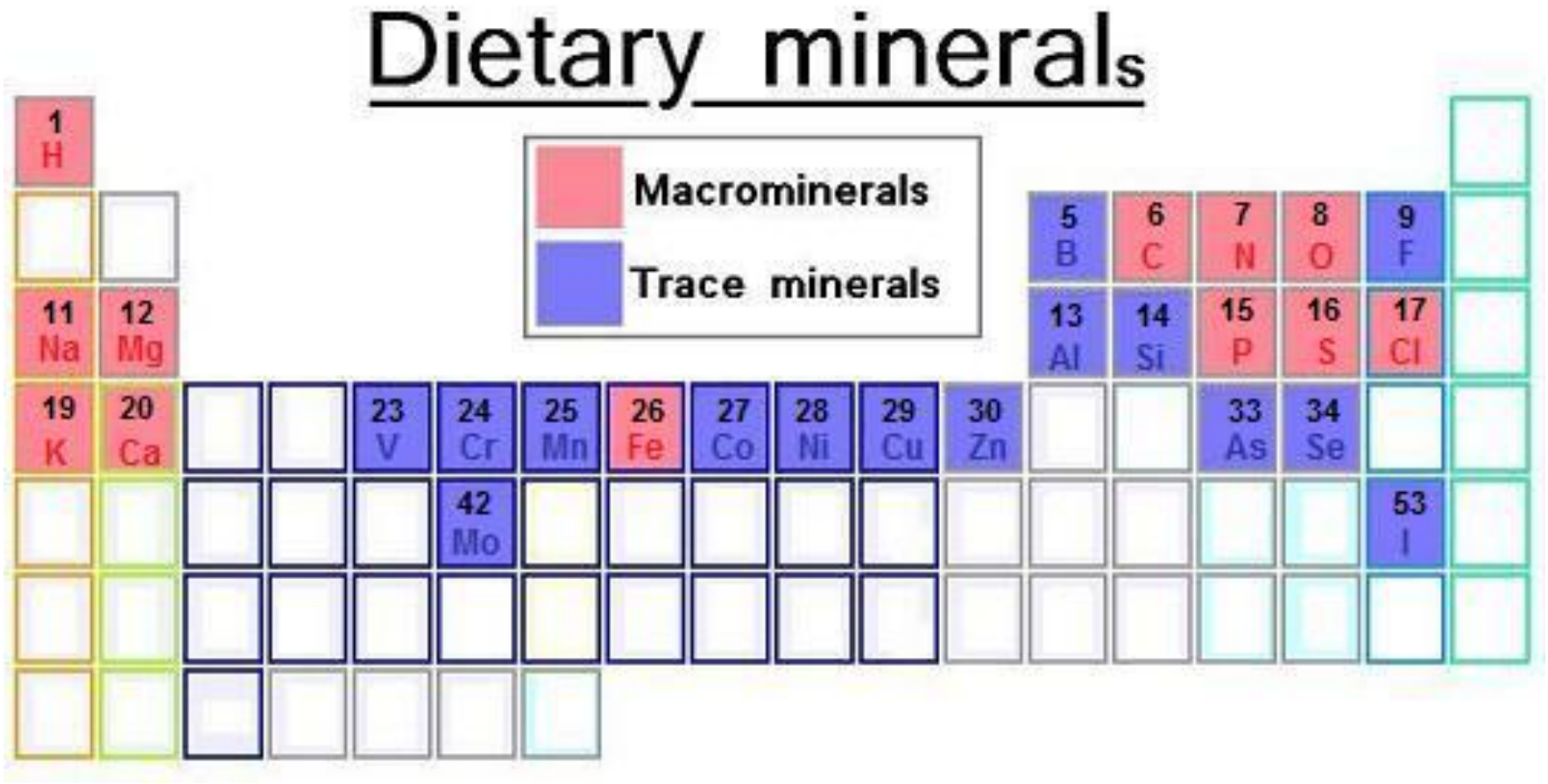
Minerals



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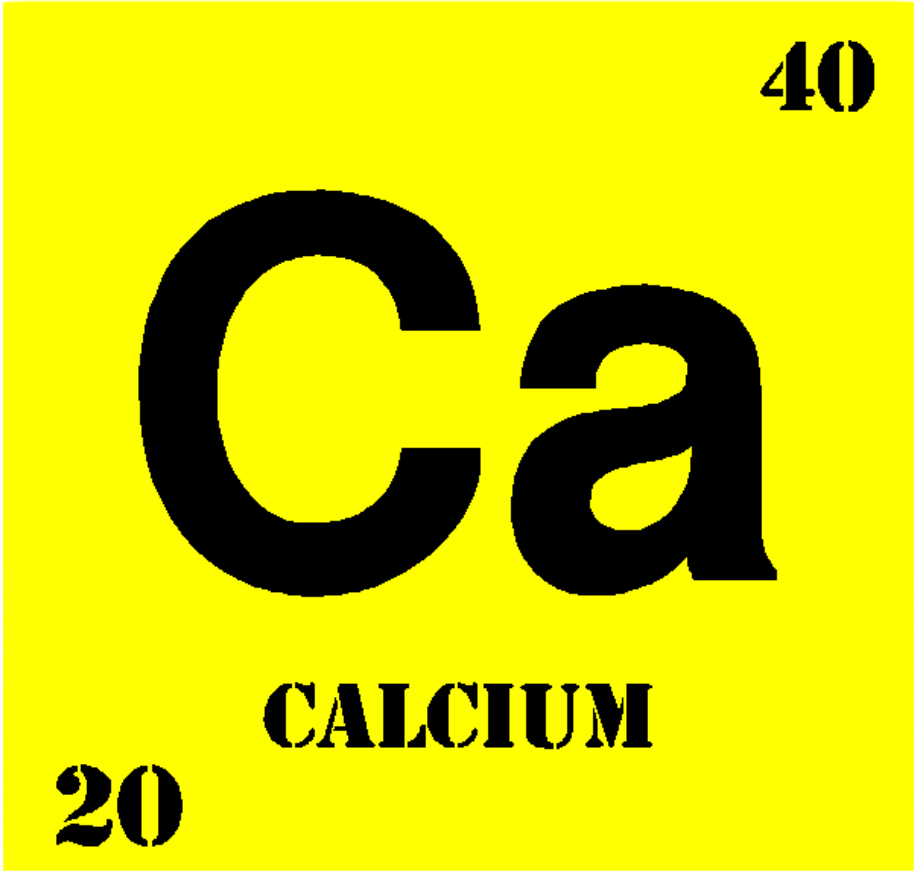
What Is Calcium

- 99% bones and teeth
- 1% blood, ECF, muscle, tissues



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Calcium Functions

- Bones
- Teeth
- Regulating blood pressure
- Muscle and nerve impulses
- Heart beating
- Blood clotting
- Weight loss
- Colon cancer prevention

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Calcium Sources

- Dairy products
- Green leafy vegetables
- Salmon and sardines
- Enriched breads
- Fortified orange juice
- Soybeans
- Fortified soymilk
- Fortified cereals

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Calcium Requirements

Life Stage in Years	RDA (mg/day)
1 – 3	700
4 – 8	1,000
9 – 18	1,300
19 – 50	1,000
51 – 70 women	1,200
51 – 70 men	1,000
Pregnant or lactating 14 – 18	1,300
Pregnant or lactating 19 – 50	1,000

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Calcium Absorption

Increase Absorption

- Adequate Vitamin D
- Calcium deficiency
- Phosphorus deficiency
- Pregnancy
- Lactation
- Hyperparathyroidism
- Lactose in infants
- Small calcium load
- Ingestion with a meal

Decrease Absorption

- Vitamin D deficiency
- Menopause
- Old age
- Decreased gastric acid
- Malabsorption problems
  - Celiac
  - Crohn's
  - hypoparathroidism
- Larger calcium load
- Ingestion without a meal

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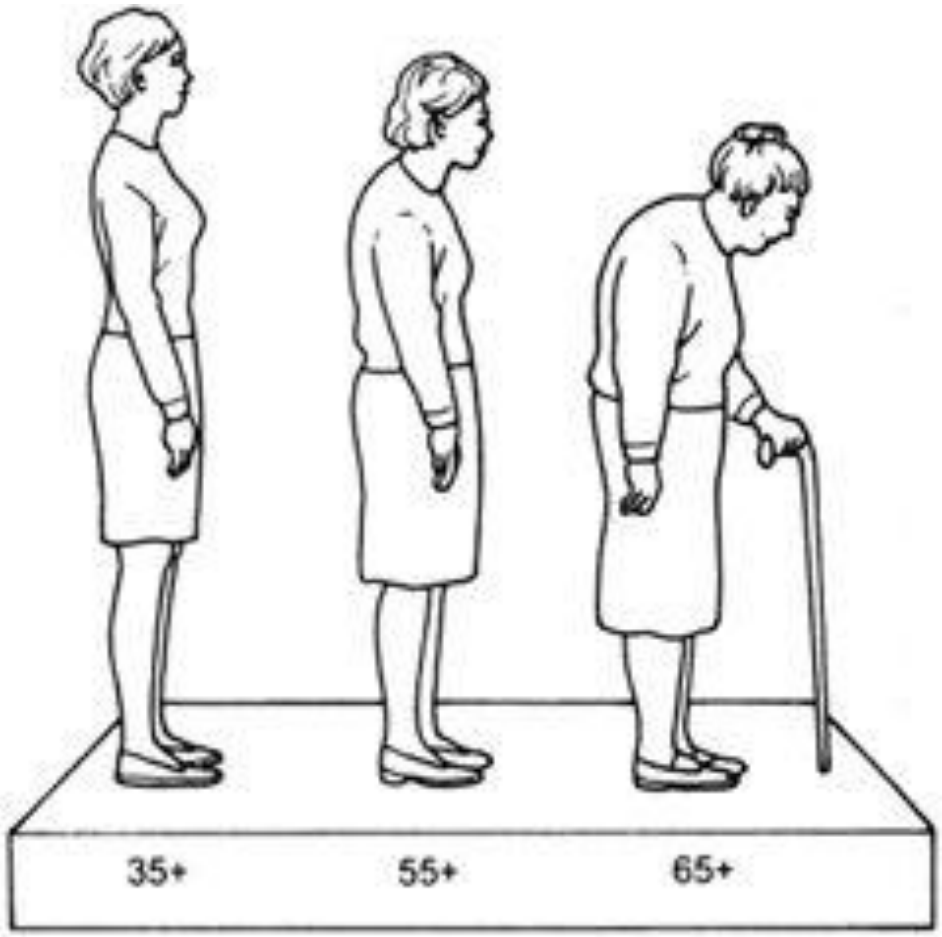
Calcium Deficiency

- Bone resorption
- Hypertension
- Pre-eclampsia
- Colon cancer



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Calcium Toxicity

- Kidney stones
- Hypercalcemia and renal insufficiency

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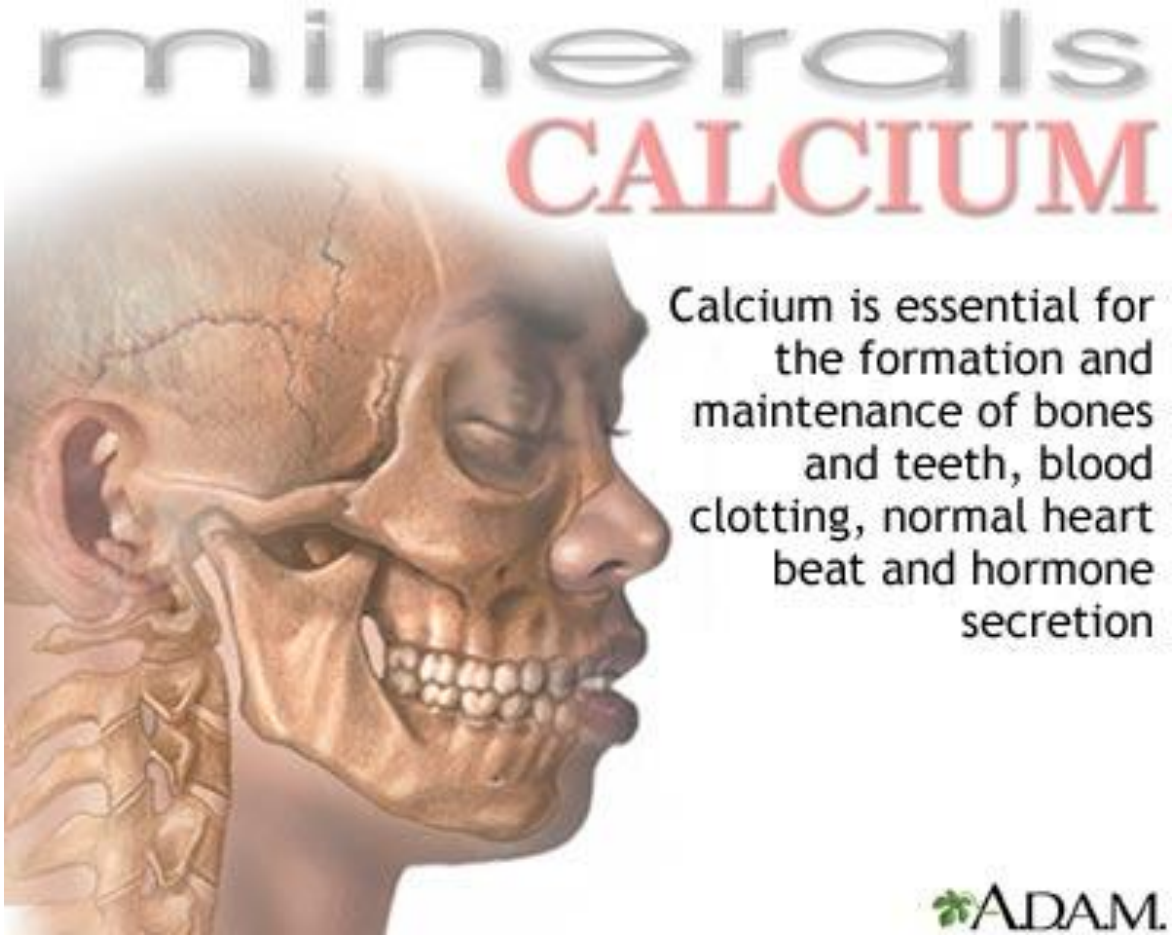
Calcium Review



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What Is Magnesium

- Skeleton
- Soft tissues

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Magnesium Functions

- Cellular reactions
- Metabolism
- Bone maintenance and development

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Magnesium Sources

- Whole grains
- Legumes
- Green vegetables
- Nuts and Seeds

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RDA for Magnesium

Age (years)	Males (mg/day)	Females (mg/day)	Pregnancy (mg/day)	Lactation (mg/day)
1 – 3	80	80	NA	NA
4 – 8	130	130	NA	NA
9 – 13	240	240	NA	NA
14 – 18	410	360	400	360
19 – 30	400	310	350	310
31+	420	320	360	320

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Magnesium Deficiency

- Progressive reduction in plasma magnesium and red blood cell magnesium
- Hypocalcemia and hypocalciuria
- Hypokalemia resulting from excess potassium excretion and leading to negative potassium balance
- Abnormal neuromuscular function

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Magnesium Toxicity

- Diarrhea
- Nausea
- Abdominal cramping

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Magnesium Review

- Function
- Source
- Requirement
- Deficiency
- Toxicity

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What Is Phosphorus

- 85% in bone
- 15% in soft tissues

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Phosphorus Functions

- Support tissue growth
- Bones and teeth
- ATP production
- Muscle contraction
- Kidney function
- Regular heartbeat
- Nerve conduction
- Works with B vitamins

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Phosphorus Sources

- Meat
- Dairy
- Cola

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Phosphorus Recommendations

- 0 to 6 months: 100 milligrams per day (mg/day)
- 7 to 12 months: 275 mg/day
- 1 to 3 years: 460 mg/day
- 4 to 8 years: 500 mg/day
- 9 to 18 years: 1,250 mg
- Adults: 700 mg/day
- Pregnant or lactating women:
  - Younger than 18: 1,250 mg/day
  - Older than 18: 700 mg/day

Phosphorus Deficiency

- Deficiency rare
- Hypophosphatemia

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Phosphorus Toxicity

- Hyperphosphatemia
- Calcification
- Decreased calcium absorption

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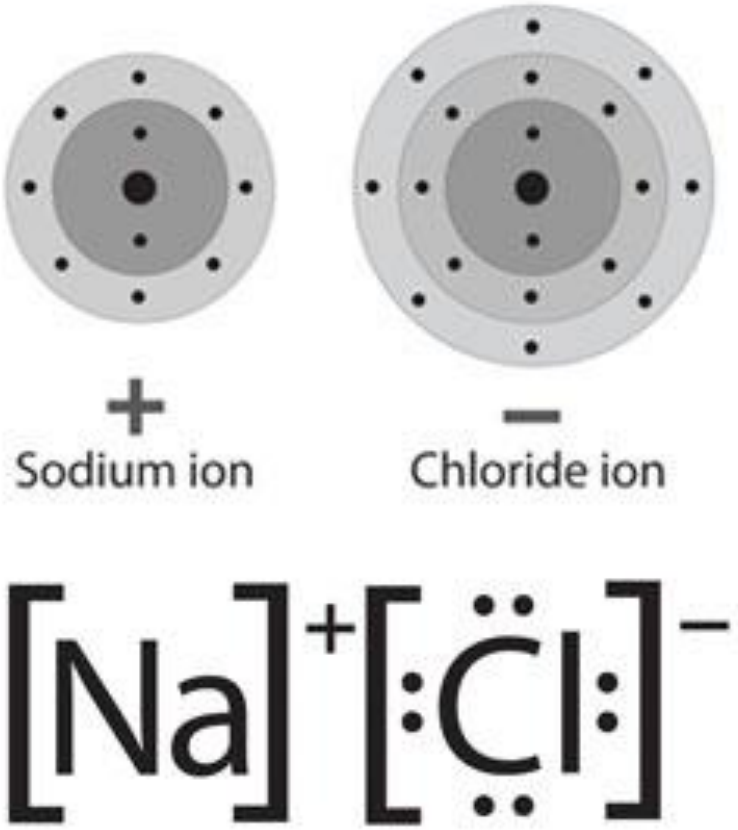
Phosphorus Review

- Function
- Source
- Recommendations
- Deficiency
- Toxicity

What Is Sodium and Chloride

- Salt
- Electrolytes



Sodium and Chloride Functions

Sodium

- Water balance
- Nerve conduction

Chloride

- Normal balance of fluids

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Sodium and Chloride Sources

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Sodium and Chloride Upper Limits

Age in years	Sodium (mg/day)	Chloride (mg/day)
1 – 3	1.5	2.3
4 – 8	1.9	2.9
9 – 13	2.2	3.4
14 – 18	2.3	3.6
19+	2.3	3.6
Pregnancy	2.3	3.6
Lactation	2.3	3.6

Sodium and Chloride Deficiency

- **Hyponatremia**
- **Hypochloremia**

Sodium and Chloride Toxicity

- **Hypernatremia**
- **Hyperchloremia**

Sodium and Chloride Review

- Function
- Source
- Recommendations
- Deficiency
- Toxicity

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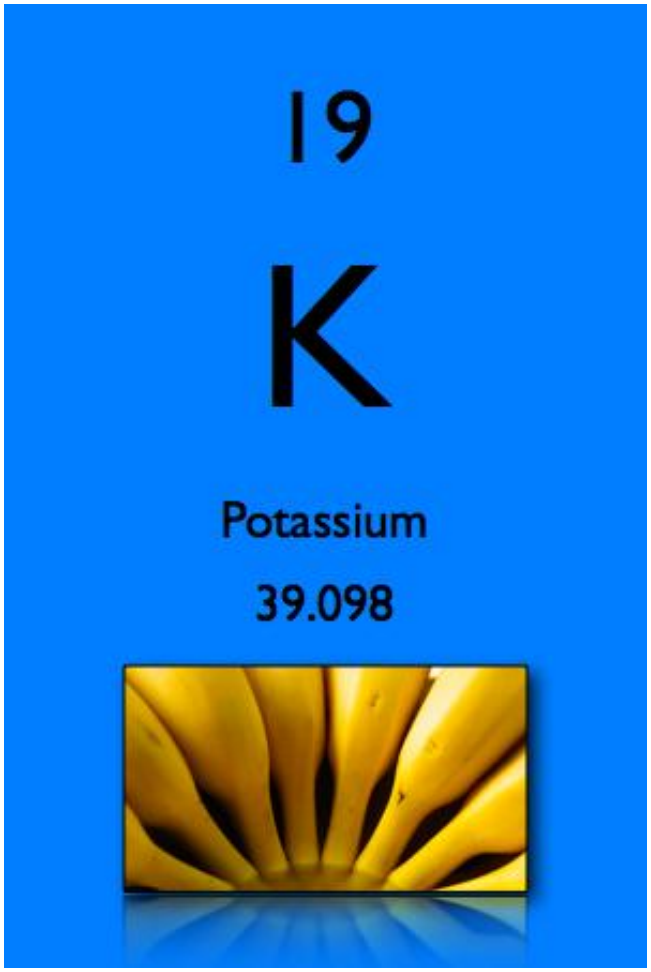
What Is Potassium

Electrolyte



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Potassium Functions

- Metabolism
- Cell, tissue, and organ function
- Acid-base regulation
- Electrical activity of the heart

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Potassium Sources

Tropicana Pure Premium Orange Juice (8 oz)  450mg	Winter squash (cooked) (1/2 cup)  448mg	Banana (1 medium)  422mg
Spinach (cooked) (1/2 cup)  419mg	Cantaloupe (1/4)  368mg	Skim Milk (8 oz)  382mg

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Potassium Requirements

Age	RDA (g/day)
0-6 months	0.4
7-12 months	0.7
1-3 years old	3.0
4-8 years old	3.8
9-13 years old	4.5
14-18 years old	4.7
19+ years old	4.7
Pregnancy and Lactation	5.1

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Potassium Deficiency

Hypokalemia

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Potassium Toxicity

Hyperkalemia

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Potassium Review

- Function
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What Is Iron

- Ferrous – Fe2+
- Ferric – Fe3+

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Iron Functions

- Hemoglobin – red blood cells
- Myoglobin – muscles
- Proteins – body

- Cytochromes – energy and immune system

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Iron Sources

Heme

- Egg yolks
- Liver
- Lean red meat
- Oysters
- Poultry, dark red meat
- Salmon
- Tuna

Nonheme

- Dried fruit
- Dried beans
- Green vegetables
- Wheat
- Millet
- Oats
- Brown rice

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Iron Requirements

Table 2. Recommended dietary allowances for iron for infants (7 to 12 months), children, and adults

Age	Males (mg/day)	Females (mg/day)	Pregnancy (mg/day)	Lactation (mg/day)
7 to 12 months	11	11	N/A	N/A
1 to 3 years	7	7	N/A	N/A
4 to 8 years	10	10	N/A	N/A
9 to 13 years	8	8	N/A	N/A
14 to 18 years	11	15	27	10
19 to 50 years	8	18	27	9
51+ years	8	8	N/A	N/A

Source: Institute of Medicine. Food and Nutrition Board. Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium and Zinc. Washington, DC: National Academy Press;2001.

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Iron Absorption

Increased Absorption

Heme
- Low iron status
- Low heme iron intake
- Meat

Nonheme
- Depleted iron status
- Pregnancy
- Disease states (aplastic anemia, hemolytic anemia, hemochromatosis)
- Ascorbic acid
- Meat, fish seafood
- Certain organic acids

Decreased Absorption

Heme
- High iron status
- High heme iron intake
- Calcium

Nonheme
- Replete iron status
- Achlorhydria (low gastric acid)
- Phytate
- Iron-binding phenolic compounds
- Calcium
- Tannins
- Polyphenols

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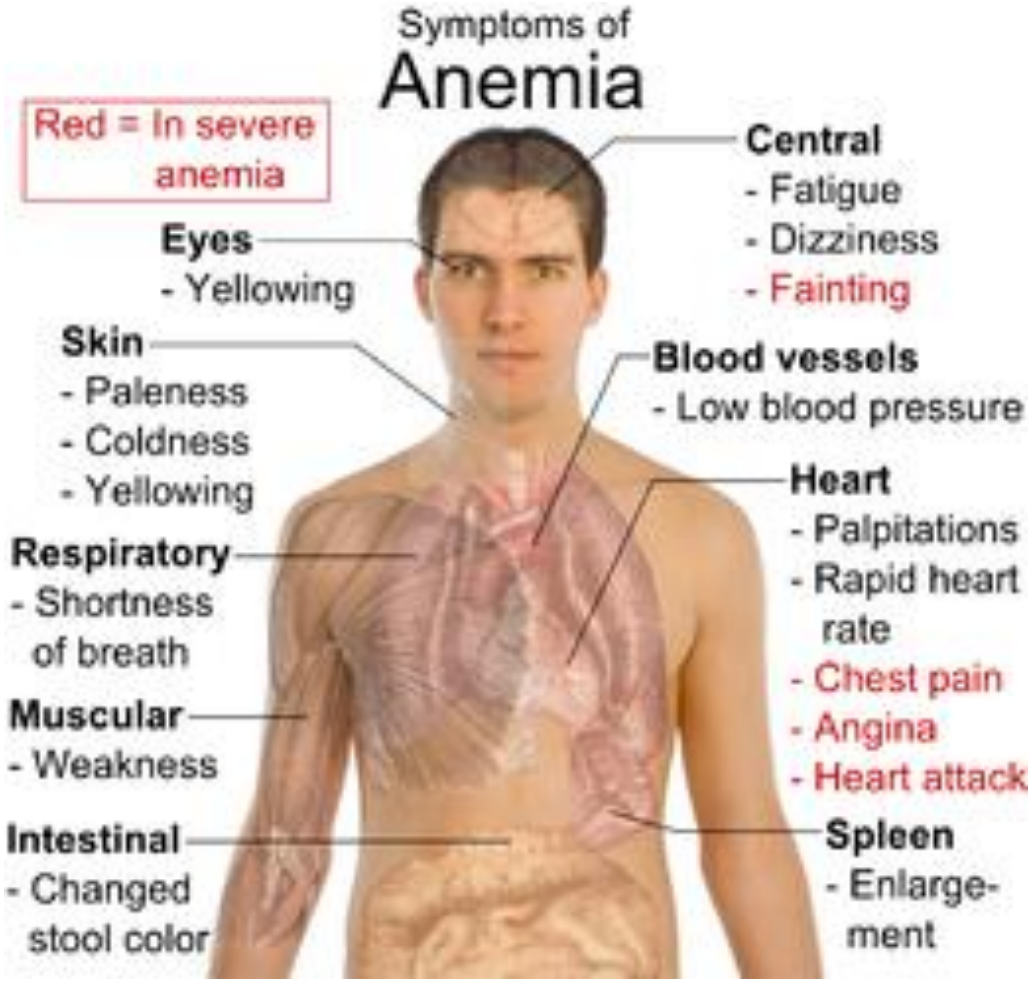
Iron Deficiency



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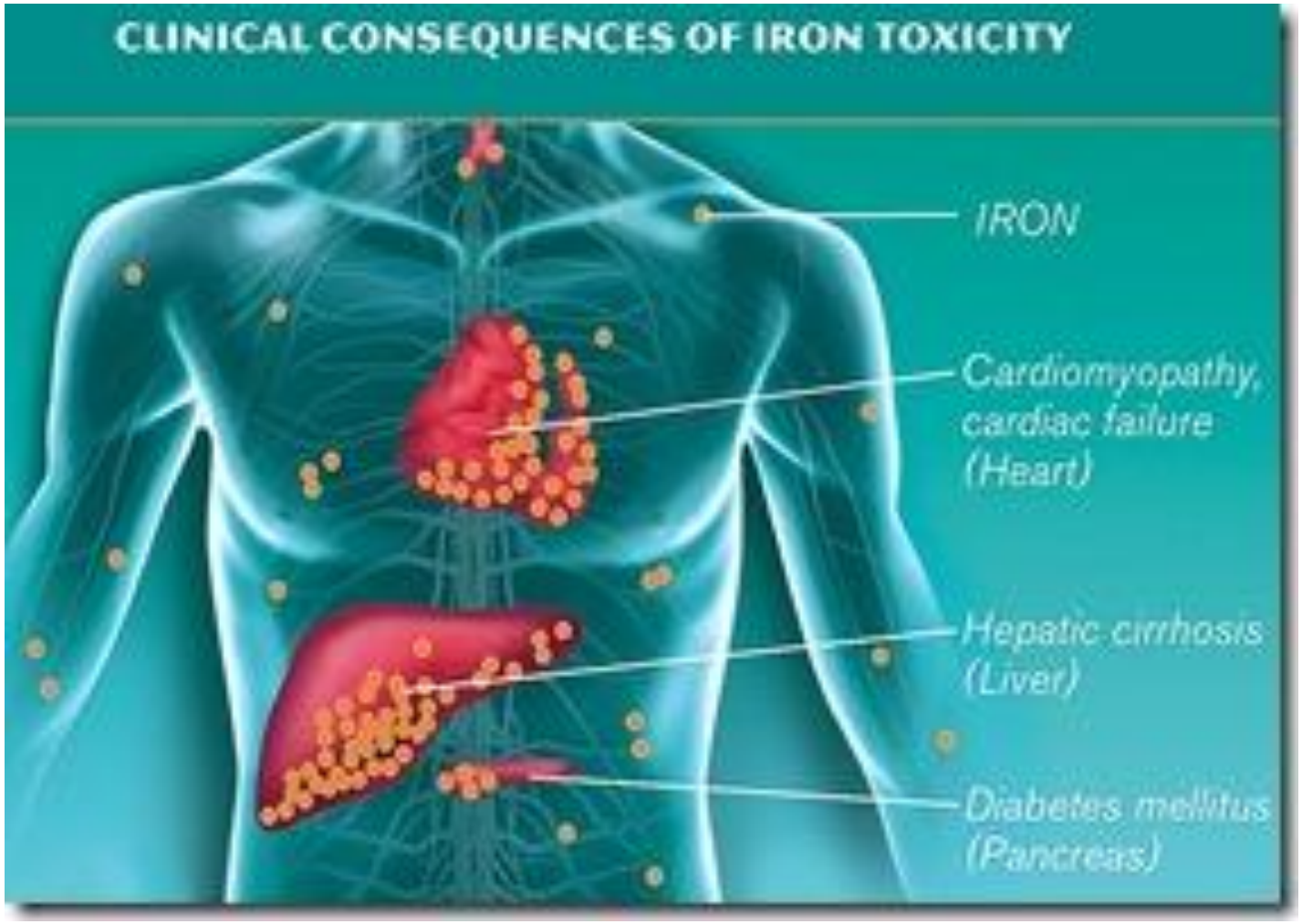
Iron Toxicity



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Iron Review

- Function
- Source
- Recommendations
- Deficiency
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Questions, Comments

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