

## Characteristics of Trace Minerals

- Vary in content in foods
- Vary in bioavailability
- Mild deficiencies easy to overlook; severe easy to recognize
- Toxic at levels close to requirements
- Many interactions, may lead to imbalances

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## 2001 Dietary Reference Intakes

- Iron
  - Men: was RDA of 10mg now 8 mg
  - Women: was RDA of 15 now 18 mg until age 51 when it changes to 8 mg

### Zinc

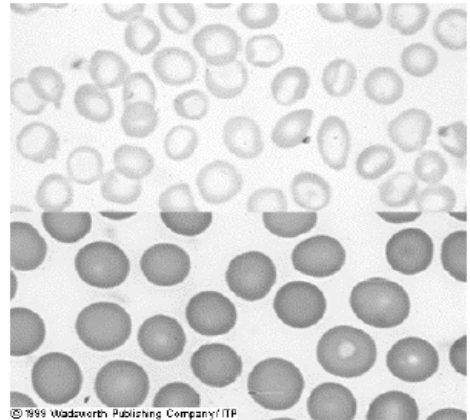
- Men: was RDA of 15 mg, now 11 mg
- Women: was RDA of 12 mg, now 8 mg
- Others released:
  - **arsenic, boron** chromium, **copper**, iodine, manganese, molybdenum, **nickel, silicon, vanadium**

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# IRON

- Most common nutrient deficiency worldwide.
- Deficiency leads to iron-deficiency anemia – pale skin, reduced resistance to cold; reduced immunity; weakness; fatigue; reduced learning ability; impaired cognitive function; pica



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## High risk for iron deficiency

- Women in reproductive years
- Pregnant women
- Infants and young children
- Teenagers

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## Pica

- Geophagia – clay, dirt
- Pagophagia – ice
- Other non-food items – laundry starch, paste, cigarette ashes, charcoal, toilet air freshener blocks, burnt matches, mothballs, soot, hair, coffee grounds and even tire inner tubes!!

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## Iron Toxicity

- Hemochromatosis
  - Usually a genetic disorder
  - More common in men
  - Enhanced by Vitamin C supplements
- May increase risk of heart disease and cancer
- Iron-containing supplements are leading cause of accidental poisoning in children

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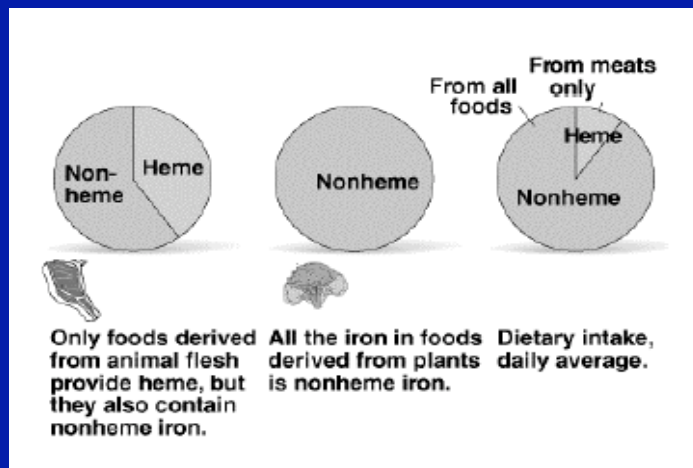
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## Iron Functions

- Part of hemoglobin
- Part of myoglobin
- In energy metabolism, works with Electron Transport Chain proteins in final steps of energy production
- Found in enzymes that oxidize compounds and that make amino acids, neurotransmitters and hormones

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## Iron absorption

- 10-15% of dietary iron absorbed
- Heme iron absorbed at 23%
- Non-heme iron absorbed 2-20%

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## Factors that Enhance Iron Absorption

- MFP Factor
- Vitamin C (ascorbic acid)
- Citric and lactic acids from foods; HCl from stomach
- Sugars

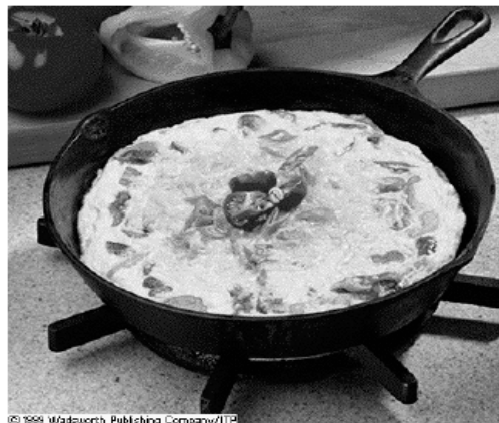
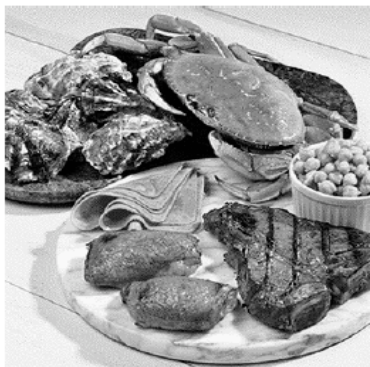
## Factors that Inhibit Iron Absorption

- Phytates and fibers
- Calcium and Phosphorus (milk)
- EDTA – a food additive
- Tannic acid and other polyphenols – tea and coffee

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## Significant Food Sources



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# Zinc

## FUNCTIONS:

Part of many enzymes

Assists in immune functions, growth and development

Associated with insulin

Involved in blood clotting, taste perception, wound healing, vitamin A transport

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## Zinc – Food Sources

- Protein-containing foods:
  - Meat
  - Fish
  - Poultry
  - Whole grains
  - Vegetables

## Deficiency and Toxicity

- Deficiency symptoms – growth retardation
- Toxicity symptoms – decreased calcium and copper absorption; may lead to atherosclerosis

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# IODINE

- Roles in the body: part of two thyroid hormones that help regulate growth, development and metabolic rate
- Deficiency disease - goiter



Goiter is a highly visible sign of iodine deficiency

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## IODINE – FOOD SOURCES

- Iodized salt
- Seafood
- Bread
- Dairy products

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# SELENIUM

- **FUNCTIONS:**
  - Antioxidant
- **DEFICIENCY**
  - Associated with heart disease, certain cancers
- **FOOD SOURCES**
  - Associated with protein in foods. Seafood, meat and grains are good sources

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# COPPER

- **FUNCTIONS:**
  - Part of several enzymes that are involved in reactions that consume oxygen(antioxidants)
  - Necessary of the absorption and use of iron in making hemoglobin
  - Helps manufacture collagen
- **FOOD SOURCES:**
  - Seafood, nuts, grains, seeds, legumes, maybe water

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# MANAGANESE

- FUNCTIONS:
  - Acts as a cofactor for many enzymes
- FOOD SOURCES:
  - Widely distributed in foods

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# FLUORIDE

- FUNCTIONS:
  - Makes bones and teeth; helps teeth resist decay

## FOOD SOURCES:

Drinking water, tea, seafood

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# CHROMIUM

- **FUNCTIONS:**
  - Participates in carbohydrate and lipid metabolism; Enhances insulin activity so less is needed to control glucose
- **Food Sources:**
  - Unrefined foods are best; liver, whole grains, nuts, cheese

# MOLYBDENUM

- **FUNCTIONS:**
  - Part of several enzymes
- **FOOD SOURCES:**
  - Legumes, cereals, organ meats