Minerals

Humans get minerals from plant and animal foods

- Plants contain minerals that we eat and incorporate into our body.
  - Plants we eat have varying amounts of minerals depending upon the quality of soil it was grown in
  - Plants absorb minerals through its roots
- Animal foods that we eat contain minerals that we incorporate into our body

Major Minerals Humans Need for Health

- Calcium
- Phosphorous
- Sulfur
- Potassium
- Sodium
- Chloride
- Magnesium

Trace Minerals Human Need for Health

- Iron
- Fluoride
- Zinc
- Copper
- Manganese
- Iodine

Selenium

Chromium

Molybdenum

Calcium: a major mineral

- Most abundant mineral in our bodies
- Majority stored in bones
- Calcium found in teeth and blood
- Needed for muscle contraction
- Needed for heart contraction

Calcium

- Calcium in bones as storage
- Calcium in blood gets too low – take calcium from bones
- We need calcium for bone growth
- We need calcium for bone repair

Calcium

- We need calcium for bone remodeling
  - Lifelong process of breaking down and building up of bone
  - Why?
  - To replace micro-damage from normal activity
  - To respond to high intensity exercise - > thicker bones
  - To respond to inactivity -> thinner bones

Calcium

- Peak Bone Density
  - Reached between 25 – 30 years old
  - Bones are at their thickest density

After 30 years old,

each year we bone gets thinner due to hormones

can be influenced via physical activity

Calcium

- Every year after 30 years old, adults lose some bone mass
- This is normal and natural due to aging process
- This is called osteopenia
- Osteopenia – normal and nature loss of bone after reaching peak bone mass.

Calcium

- Osteopenia:
  - Thinning of bones as we age
  - Starts to occur after reaching peak bone mass at 25-30 years old
  - Physical activity can influence osteopenia
- Osteoporosis:
  - Severe loss of bone mass
  - After menopause for women
  - Men lose bone mass too

Food sources of calcium

- Dairy foods – milk, cheese, yogurt
- Nondairy food sources of calcium
  - Sardines
  - Almonds
  - Spinach

Calcium

- Calcium needs vitamin D in order to be absorbed into bloodstream
- Calcium in foods absorbed better than calcium supplements.

Magnesium: a major mineral

- Maintains rhythm of heart
- Plays role in maintaining healthy blood pressure
- Role in bone health
- Needed for muscle contraction
- Needed for nerve impulses

Magnesium: food sources

- Almonds
- Quinoa
- Cashews
- Dark chocolate (70%)
- Spinach

Magnesium

- Low intake of magnesium resulting in magnesium deficiency may increase risk of:
  - Atherosclerosis
  - Osteoporosis
  - Cancer
  - Diabetes
  - Hypertension

Sodium: a major mineral

- Functions of sodium –
  - Regulates fluid balance in body

  Sodium maintained in body at certain level by kidneys

  If sodium low, kidneys excrete less sodium

  If sodium high, kidneys excrete more sodium

Sodium

- Functions of sodium
  - Regulates blood pressure
  - Required for nerve impulses
  - Required for muscle contraction

Sodium

- Sodium is essential nutrient
- Sodium + Chloride = table salt
- Salt improves flavor of foods
- Salt used in processed foods as a preservative

Recommended intake of sodium

- Americans average 3,400 milligrams daily of salt
- Recommendations range from 2,300 mg – 1,500 mg/day

Salt and hypertension

- Does salt intake increase risk of hypertension?
- Depends upon whether person is:
- Salt sensitive or
- Salt insensitive

What is blood pressure?

- Blood measure measures:
  - Force of blood pushing against walls of arteries
  - Each beat of heart pumps blood into arteries; then heart rests

Blood Pressure

- Blood pressure measured with 2 numbers
- Systolic number:
  - The force of blood against artery when heart beats pumping blood
  - Is the top number
- Diastolic number:
  - Is heart resting between pumping
  - Is the bottom number
- 120/80 normal blood pressure

High Blood Pressure is Hypertension

- High blood pressure or hypertension is silent killer
- Need to check blood pressure regularly
- High blood pressure means greater than normal force pounding against walls of arteries
- If high blood chronic, artery walls become thicker and stiffer resulting in:
  - Atherosclerosis: plaque in coronary arteries
  - Enlarged and weakened heart due to overwork
  - Increases risk of heart attack, stroke and kidney disease

DASH Diet

- DASH Diet recommended to normalize blood pressure
- Dietary Approaches to Stop Hypertension
- Fruits and vegetables
- Low fat dairy
- Fish and poultry
- Nuts
- Whole grains

Minerals important for healthy blood pressure

- Magnesium
- Potassium
- Calcium

Potassium: major mineral

- Relaxes blood vessel walls, lowering blood pressure
- Nerve impulses for movement.
- Muscle contraction
- Maintains electrical activity of heart for steady heartbeat
- Tightly controlled in our body via kidneys

Potassium

- Mild deficiency common in USA
- Can increase risk of hypertension, stroke, heart attacks

Food sources of potassium

- Tomato Juice
- Orange Juice
- Banana
- Pork Loin
- Swiss Chard

Iron: Trace mineral

- 2 forms of iron
  - heme and nonheme
- Heme iron from animal products
  - easily absorbed
- Nonheme from plant products
  - not easily absorbed

Iron

- Iron not excreted in stool or urine
- Once absorbed, stays in body
- Most iron loss due to blood loss

Iron

- If iron body stores low, you will absorb more iron from food
- Vitamin C rich foods will enhance iron absorption
- Iron transports oxygen in blood
- Iron needed for brain function
  - Iron deficiency in children reduce ability to learn and retain information, reduced cognitive ability during later school years.

Iron sources

- Iron sources:
- Best is red meat with vitamin C source
- Poultry, fish
- Iron enriched bread
- Iron enriched cereals
- Cast iron pans and skillets

Iron

- Iron deficient anemia – lack of iron
  - Most common deficiency in world
  - Causes fatigue and weakness
- Excess iron in body – iron overload
  - Individuals absorb too much dietary iron
- Excessive iron can damage heart, kidneys, liver, nervous system.

Zinc: trace mineral

- Keeps immune system healthy
- Growth and development in infants through adolescence
- Helps wound healing
- Sharpens taste buds
- Best food sources are red meat and poultry

People at risk of zinc deficiency

- Vegans & vegetarians

Selenium: trace mineral

- Protects cells from aging
- Food sources: Cashews, pistachios, dark chocolate

Iodine: trace mineral

- Essential for thyroid health
- Thyroid needs iodine to make essential hormones.
  - Thyroid is butterfly shaped gland in neck
- Majority of thyroid hormone composed from iodine
- Iodine is required for normal functioning of thyroid gland.

Iodine

- Thyroid hormones
  - regulate metabolic rate in body
  - help heart, nerves, muscles, intestines function properly.

Iodine

- Children need thyroid hormones for normal bone growth and brain development.
- Lack of iodine during fetal development can cause mental retardation.
- Food sources of iodine:
  - Iodized salt
  - Seafood

Deficiency of Iodine

- Leads to :
- Goiter
- Hypothyroidism (underactive thyroid)

  Does not make enough thyroid hormone
  - Slows metabolism

Slowed metabolism

- Result is body processes slow down
  - Lower body temperature
  - Slower heart beat
  - Slower burning of calories (weight gain)
  - Feel sluggish in mind and body

    Remedy is to take thyroid hormone as medication