Drugs for Nutritional Disorders

Vitamins

- Organic substances are needed in small amounts
  - Promote growth
  - Maintain health

Vitamins (continued)

- Human cells cannot produce vitamins
  - Exception: vitamin D
  - Vitamins or provitamins must be supplied in diet
  - Deficiency will result in disease

Vitamins Serve Important Roles in Function of Body

- Vitamin B complex: coenzymes essential to metabolic processes
- Vitamin A: precursor of retinol needed for normal vision
- Vitamin D: regulates calcium metabolism
- Vitamin K: needed to produce prothrombin

Lipid-Soluble Vitamins (A, D, E, K)

- Must be ingested with lipids to be absorbed in small intestine
- Excess stored in liver and adipose tissue
  - Can be removed from storage areas and used as needed
- Excessive intake can lead to dangerously high levels

Water-Soluble Vitamins (C, B Complex)

- Absorbed with water in digestive tract
- Easily dissolved in blood and body fluids
Water-Soluble Vitamins (C, B Complex) (continued)

- Excess cannot be stored
  - Excreted in urine
  - Must be ingested daily

Recommended Dietary Allowances (RDAs)

- Minimum amount of a vitamin needed to prevent symptoms of deficiency
- Need for vitamins and minerals varies among individuals
- Supplements should never substitute for healthy diet

---

Vitamin Pharmacotherapy

- Indicated for certain conditions
  - Poor nutritional intake
  - Pregnancy
  - Chronic-disease states

Symptoms of Deficiency

- Usually nonspecific; occur over prolonged period
- Often result of certain factors
  - Poverty, fad diets
  - Chronic alcohol or drug abuse
  - Prolonged parenteral feeding
- Clients often present with multiple deficiencies

---

Deficiencies in Lipid-Soluble Vitamins

- Vitamin A (retinol)
  - Obtained from foods containing carotenes
- Vitamin D
  - D2 (ergocalciferol)—from dairy products
  - D3—from ultraviolet light

Deficiencies in Lipid-Soluble Vitamins (continued)

- Vitamin E (tocopherols)
  - Found in plant-seed oils, whole-grain cereals, eggs, certain organ meats
  - Primary antioxidant
- Vitamin K—mixture of several chemicals
  - K1 obtained from plant sources
  - K2 obtained from microbial flora in colon
  - Needed for clotting
Deficiencies in Water-Soluble Vitamins

- Vitamin C deficiency can cause scurvy
- Thiamine (B1) deficiency can cause beriberi
- Niacin (B3) deficiency can cause pellagra

Deficiencies in Water-Soluble Vitamins (continued)

- Cyanocobalamin (B12) deficiency can cause pernicious or megaloblastic anemia
- Deficiencies of riboflavin (B2), folic acid (B9), pyridoxine (B6)
  - Indicate need for pharmacotherapy with water-soluble vitamins

Minerals

- Inorganic substances
- Very small amounts needed to maintain normal metabolism
- Constitute 4% of body weight
- Can be obtained from normal diet
- Excess minerals can be toxic

Drug Therapy with Fat-Soluble Vitamins (continued)

- Assess for chronic overdose of vitamins
- Consider socioeconomic status and culture of client
  - Recommend foods that treat deficiency
  - Recommend foods that are affordable for and liked by client

Water-Soluble Vitamin Therapy

- Thiamine administered for hospitalized clients with severe liver disease
- Niacin and pyridoxine may cause severe flushing
  - Expected reaction for client; no permanent harm
- Assess women of childbearing age for folic acid deficiency
  - Prior to attempting or during pregnancy

Water-Soluble Vitamin Therapy (continued)

- Recommend multivitamin to avoid overdose
- Caution clients with history of kidney stones against using vitamin C
- Advise clients taking vitamin C to increase fluid intake
- Water-soluble vitamins are not stored in the body
  - Must be replenished daily
Macromineral Therapy

- For mineral deficiencies or eclampsia
- Large doses can cause life-threatening adverse effects
- Encourage well-balanced diet
  - Eliminates or reduces need for supplements

Calcium Supplements and Vit D Therapy

- Calcium supplements used for clients with hypocalcemia
- Deficiencies of parathyroid hormone, vitamin D, or dietary calcium.
- Vit D allows for increased absorption of calcium. (Source is our skin and proper exposure to light).

Signs of Calcium Deficit

- Muscle twitching tremor and cramping.
- Numbness and tingling of extremities, convulsions
Osteomalacia (rickets)
- Softening of the bone in kids.
- Caused by lack of Vit D and calcium in diet
  - Can be secondary to kidney failure
  - Or inability to absorb calcium from intestines.
- Milk is fortified with vitamin D.

Osteoporosis
- Loss of calcium from the bones
- 1.5 million fractures annually.
- Risk factors
  - Postmenopause
  - ETOH or Caffeine consumption
  - Anorexia nervosa
  - Smoking
  - Physical inactivity
  - Low testosterone level
  - Lack of Vit D or calcium in diet
- Drugs: cortico-s, anticonvulsants, immunosuppresants

Calcium Supplements
- Normal Calcium Range
  - 4.5-5.5 mEq/L
  - 9-10.5mg/dL
- Take calcium at least 1hr apart from glucocorticoids, tetracycline and thyroid hormone
- Thiazide diuretics increase the risk of $^\text{Ca}^+$

Vitamin D: Calcitriol
- Uses: Impaired kidney function, hypoparathyroidism
- Effects: promotes intestinal absorption of calcium
  - Reduces bone resorption
- Side Effects
  - Hypercalcemia, hypermagnesium
- Muscle weakness, increased fatigue, depressed DTR’s

Signs of Hypocalcemia
- Chvostek’s sign
- Trousseau’s sign
- Hyperactive deep tendon reflexes
- Laryngospasm
How does phosphorus and calcium relate?

- Inverse relationship.

Macromineral Therapy (continued)

- If calcium prescribed
  - Inform health-care provider of use of glucocorticoids, thiazide diuretics, tetracyclines
  - Avoid zinc-rich foods, which impair calcium absorption

Macromineral Therapy (continued)

- If phosphorus prescribed
  - Inform health-care provider if on sodium-or potassium-restricted diet
  - Immediately report seizure activity; stop drug
  - Avoid antacids

- If client is taking magnesium sulfate, immediately report
  - Changes in consciousness, deep tendon reflexes
  - Thirst, confusion

- If client is taking magnesium sulfate, immediately report
  - Changes in consciousness, deep tendon reflexes
  - Thirst, confusion

Macrominerals

- Seven major (macro) minerals
  - Calcium, chlorine, magnesium, phosphorous
  - Potassium, sodium, sulfur

- Nine trace (micro) minerals
  - Include iron, iodine, fluorine, and zinc

- Required daily amount is 20 mg or less
## Undernutrition

- Many causes
  - Low dietary intake
  - Malabsorption disorders
  - Fad diets
  - Wasting disorders such as cancer or AIDS

## Undernutrition (continued)

- Reasons for low dietary intake vary
  - Poverty, depression, difficulty eating
- Nutritional consultation is appropriate

## Enteral Nutrition

- Provided orally or through feeding tube
- Means of meeting client’s nutritional needs

## Classification of Enteral Products

- Oligomeric (Vivonex, T.E.N., Peptamen)
- Polymeric—most common type (Compeat, Sustacal, Ensure)
- Modular—given to supplement single nutrient (Casec, Polycose, Microlipid, MCT Oil)
- Specialized—given for special disease states (Amin-Aid, Hepatic-Aid II, Pulmocare)

## Total Parenteral Nutrition (TPN)

- Also known as hyperalimentation
- Means of supplying nutrition to clients
  - Peripheral vein (short term)
  - Central vein (long term)
- Administered through infusion pump for precise monitoring