Overview of Vitamins
A. Vitamins in general
   1. structure
   2. function
   3. vitamins are found in _________ quantities in food
      a. typically mg or ug
   4. many vitamins are inactive in food and must be activated by metabolic pathways
      a. protovitamins (or precursors)
   5. organic nature but not energy nutrients
   6. solubility
      a. water soluble:
      b. fat soluble:
   7. comparison of water and fat soluble vitamins (page 308)
   8. bioavailability -
      a. content of the vitamin in food
      b. vitamin absorption (rarely is this 100%)
   9. dose levels and effects
      a. more vitamin does not necessarily mean more effect
      b. see diagram top of page 309

B Vitamins
A. Thiamin – ______________________ (summary pg 313)
   1. energy metabolism - conversion of pyruvate to acetyl-coA
   2. RDA was set as 0.5mg per 1000kcal in diet
      a. change in 1998 removed RDA
      b. average American diet is not deficient in thiamin
   3. deficiency in thiamin
      a. associated with low INQ foods
      b. common among alcoholics
      c. Beriberi is the disease state
   4. food sources (fig 10-3)
      a.

B. Riboflavin – _____________________ (summary page 316)
   1. coenzyme in energy metabolism
      a. electrons and the Krebs cycle
   2. dietary recommendation are the same as thiamin
      a. RDA removed in 1998
   3. deficiency - no disease states, problems with skin and nervous system functions
   4. foods (fig 10-5)
      a.
   5. processing
      a. destroyed by light and irradiation
      b. stable in heat
C. Niacin – ________________ (summary page 319)
   1. energy transfer reactions
      a. metabolism of glucose, fat, alcohol
   2. may be manufactured from the amino acid tryptophan (precursor)
      a. 1 mg per 60mg tryptophan
      b. niacin equivalents (NE)
   3. dietary recommendations
      a. same as thiamin
   4. deficiency - no direct disease state, skin and nervous system problems
   5. toxicity occurs at 10 times the RDA
      a. niacin flush
      b. damage to capillary beds
      c. small levels may be used for control of high cholesterol
   6. foods: (fig 10-7)
      a.
      b.

D. Biotin (summary page 320)
   1. coenzyme associated with carbon dioxide use
      a. coenzyme of the Krebs cycle
   2. no RDA or deficiency states known
      a. AI (adequate intake) used in place of RDA
   3. foods
      a. made by intestinal bacteria?
      b. widespread in most foods

E. Pantothenic acid (summary page 320)
   1. coenzyme in over 100 metabolic pathways
      a. coenzyme A component
   2. widespread in foods so deficiencies are rare
   3. no RDA set - but AI values in use

F. Vitamin B₆ (summary page 322)
   1. active in amino acid metabolism, immune system, steroid hormone production
   2. actively destroyed by alcohol in the diet
      a. note interactions with other drugs
   3. RDA: between 1.6 and 2.0 mg per day
   4. deficiency results in immune system problems, mood problems and sleep disorders
   5. toxicity - irreversible nervous disorders
      a. PMS and carpal tunnel syndrome studies
   6. foods (fig 10-9)
      a. destroyed by heat processing
      b.
G. Folate (summary page 328)
1. also called _______________ and _______________
2. coenzyme in DNA synthesis
   a. requirements for rapidly dividing cells
3. dietary recommendations
   a. <50% of folate in food is absorbed
   b. RDA is set high to compensate
   c. increase levels for pregnancy
4. possible prevention of heart disease
5. deficiency -
   a. anemia and GI tract disorders
   b. cancer
   c. drugs such as aspirin and antacids
   d. vitamin B-12 deficiency (fig 10-11)
6. food source (page 330)
   a. FDA mandates grain products be fortified with folate
   a.
   b. destroyed by heat during cooking

H. Vitamin B-12 (summary page 314)
1. activates and recycles folate
2. requires an intrinsic factor (carrier protein) to be absorbed
3. RDA: approx 2 ug per day
4. deficiencies are associated with poor absorption of the vitamin
   a. decrease in intrinsic factor production
   b. folate masks vitamin B-12 deficiencies
   c. nervous system problems
5. food sources - found exclusively in foods made from animals
   a. vegetarian problems
   b. soy and spirulina not sources!

I. B vitamin impostors
1. inositol, choline and lipoic acid are not classified as B vitamins
   a. supplements not needed
2. not required in human physiology
   -
   -
   -
   -
   -

J. B vitamin summary
1. role in metabolic pathways (fig 10-12, page 333)
2. relationships between B vitamins often make diagnosis of a specific deficiency difficult
3. B vitamins are found in a wide-variety of food groups
   a. need for a well-balanced diet
4. toxicities are primarily associated with supplement abuse
Vitamin C - Ascorbic acid
A. Roles of vitamin C (summary page 341)
   1. antioxidant - protection for water-soluble vitamins and materials
      a. preservative
   2. promotes iron absorption
   3. used in the synthesis of collagen
   4. stress response by the body
      a. hormone production
   5. common cold cure
      a. no direct link established
      b. secondary role in protecting lungs, lowering histamine and immune system health may be factors
   6. cancer and disease prevention
      a. role of high INQ foods

B. Dietary input
   1. RDA is set at __________ per day
   2. deficiencies result in
      a. lowered immune response
      b. bleeding from capillary beds
      c. anemia
      d. scurvy
   3. toxicities - supplement megadoses may damage the GI tract, kidney stones, ineffectiveness of anti-clotting medicines
   4. there is no medical evidence that doses of vitamin C higher than 300 mg per day have any direct health benefit for most people
   5. food sources (fig 10-17, page 340)
      a. destroyed by heat processing
      b.
      c.
      d.