VITAMINS





Learning Outcomes:

At the end of class, students should able to:

- Classify types of vitamins
- Differentiate fat-soluble and water-soluble vitamin
- Explain the food sources, deficiency, function of each vitamins.



Vitamins

- The term "vitamin" is used to describe certain organic compound that are needed by body.
- Cannot be manufactured by the body.
- The amounts required are very small (micronutrients)
- Functions:
 - → Promote and regulate body processes for growth
 - → Reproduction
 - → Maintenance of health

Hypovitamosis : decrease of vitamin amount in the organism

Hypervitamosis : increase of vitamin amount in the organism

Avitaminosis : condition resulting from lack of vitamin in the organism



• Vitamins do not supply energy

However, some vitamins do function as coenzyme in the release of energy from carbohydrate, proteins and fats

- Some vitamins available from foods in inactive forms known as precursors
 - Once inside the body, precursors are converted into an active form of the vitamin

Classification of Vitamins

- Based on solubility vitamins are classified as
 - → Fat- soluble vitamins
 - → Water-soluble vitamins





Classification of Vitamins

	Water-Soluble Vitamins: B Vitamins and Vitamin C	Fat-Soluble Vitamins: Vitamins A, D, E, and K	
Absorption	Directly into the blood.	First into the lymph, then the blood.	
Transport	Travel freely.	Many require protein carriers.	
Storage	Circulate freely in water-filled parts of the body.	Stored in the cells associated with fat.	
Excretion	Kidneys detect and remove excess in urine.	Less readily excreted; tend to remain in fat-storage sites.	
Toxicity	Possible to reach toxic levels when consumed from supplements.	Likely to reach toxic levels when consumed from supplements.	
Requirements	Needed in frequent doses (perhaps 1 to 3 days).	Needed in periodic doses (perhaps weeks or even months).	

NOTE: Exceptions occur, but these differences between the water-soluble and fat-soluble vitamins are valid generalizations.



Absorption of Vitamins in the Gastrointestinal Tract



VISION C O L L E G E

Fat-Soluble Vitamins

FAT SOLUBLE VITAMINS



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Two forms of vitamin A available in human diet:

- Preformed vitamin A (retinol)
- Comes from animal-based foods (liver, eggs, and dairy products)
- It is the preformed version of vitamin A (already in a form that your body can use directly)
- Retinol can be converted into other active forms, retinal (important for vision) and retinoic acid (important for cell growth and differentiation).
- Provitamin A (carotenoid)
- Found in plants foods (carrots, sweet potatoes, and spinach)
- Body convert these pigment into vitamin A

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Food sources:

Retinol: fortified milk, cheese, butter, eggs, liver

Beta-carotene: spinach, dark leaf green, broccoli deep orange fruits (apricot), Deep orange vegetable (carrots, pumpkin, sweet potato)





Functions:

- × Vision
- Maintenance of body linings and skin
- **×** Growth of bones
- × Normal development of cells
- **×** Reproduction



5 VITAMINA BENEFITS

PROTECTS EVE HEALTH

Vitamin A helps protect your eyes against macular degeneration, helps heal dry eye and fights eye disease.



Vitamin A has antioxidant properties that neutralize free radicals in the body that cause tissue and cellular damage, which helps decrease inflammation, the root of all illness and disease.



Vitamin A intake could help treat several forms of cancer thanks to the vitamin's ability to control malignant cells in the body. Lung, prostate, breast, ovarian, bladder, oral, and skin cancers have been demonstrated to be suppressed by retinoic acid.

S 2

Vitamin A helps regulate the genes for your body's immune response. It is critical to help fight illness, disease even cancer!

PROVIDES

SUPPORT



Vitamin A is necessary for wound healing and skin re-growth. It also helps decrease the signs of aging by increasing collagen production and reducing acne. It even helps keep your hair healthy!

REMEMBER

It is always best to get vitamin A from natural sources, like food, and not to overload on vitamin A supplements in hopes of preventing disease, as more is not necessarily better.



The benefits of vitamin A:

itan

 maintains health of specialized tissues such as the retina

aids in growth and health of skin and mucous membranes

 promotes normal development of teeth, soft and skeletal tissue

> RDA: 5000 iu (international units) Fat-soluble



Daily requirements:

Table 1: Recommended Dietary Allowances (RDAs) for Vitamin A [5]

Age	Male	Female	Pregnancy	Lactation
0–6 months*	400 mcg RAE	400 mcg RAE		
7-12 months*	500 mcg RAE	500 mcg RAE		
1-3 years	300 mcg RAE	300 mcg RAE		
4-8 years	400 mcg RAE	400 mcg RAE		
9–13 years	600 mcg RAE	600 mcg RAE		
14-18 years	900 mcg RAE	700 mcg RAE	750 mcg RAE	1,200 mcg RAE
19-50 years	900 mcg RAE	700 mcg RAE	770 mcg RAE	1,300 mcg RAE
51+ years	900 mcg RAE	700 mcg RAE		

* Adequate Intake (AI), equivalent to the mean intake of vitamin A in healthy, breastfed infan



Deficiencies:

- × Night Blindness (Inability to see in Dim light)
- × Xerophthalmia (permanent blindness)
- Conjuctival Xerosis (conjuctiva become dry)
- **×** Hyperkeratosis
- × Impaired growth
- Increased infections











Normal vision and night blindness vision



There are syndromes of vitamin A toxicity:

Acute Toxicity

- occurs in adults when >200 mg are ingested
- symptoms includes nausea, vomiting, vertigo and blurry vision

Chronic Toxicity

- occur with long term ingestion of doses higher than 10 times
- -symptoms includes problem talking,hair loss, vision problem, bone and muscle pain
- in post-menopausal women, it has been associated with increased fracture risk



- It is also called Sunshine vitamin
- Synthesis from body with help of sunlight
- It is available in 2 forms:
 - Vit D3 cholecalciferol (is made from 7dehydrocholesterol in the skin of animals and humans)
 - Vit D2 ergocalciferol (obtain from foods)





Ε

G



Foods High in Vitamin D



Food Sources

- Synthesized in the body with the help of sunlight
- Fortified milk, margarine, butter, cereals and chocolate mixes
- Veal, beef, egg yolk, liver, fatty fish (herring, salmon, sardines) and their oils



Functions:

- ➢Bone growth
- assist in the absorption of calcium and phosphorus from (mineralization of bones)
- ➤Calcium balance
- Development of teeth

Deficiency:

- ✓ Rickets
- ✓ Osteomalacia
 ✓ Osteomalacia
- ✓Osteoporosis

Osteomalacia in Adults Deficiency Symptoms

- Loss of calcium resulting in soft, flexible and deformed bones
- Progressive weakness
- Pain in pelvis, lower back and legs

Rickets in Children Deficiency Symptoms

- Inadequate calcification, resulting in misshapen bones (bowing of legs)
- Enlargement of ends of long bones (knees, wrists)
- Deformities of ribs (bowed, with beads or knobs)
- Delayed closing of fontanel, resulting in rapid enlargement of head
- Lax muscles resulting in protrusion of abdomen
- Muscle spasms







8 obvious signs you have a Vitamin D deficiency...





Toxicity (Hypervitaminosis D)

- × Nausea and vomiting
- × Hypertension
- × Drowsiness
- × Polyuria
- × Hyperkalaemia



- Known as tocopherols
- Alpha-tocopherol most active form in body
 They are naturally occurring anti-oxidant



Dietary sources:

- ✓ Seeds and seed oil
- ✓Nut and nut oils
- ✓ Palm oil (sunflower, olive, corn)
- ✓ Green leafy vegetables (spinach)







Wheat Germ





Peanuts



Abmonds





- **×** Protects cell membranes from damage
- Acts as an antioxidant and protects cells from damage



Deficiency:

- Red blood cell hemolysis and hemolytic anemia
- red blood cell breaks open
- Neuromuscular dysfunction and affects the spinal cord
- degeneration of nerve cells



Toxicity:

- Occasionally, muscle weakness, fatigue, nausea, and diarrhea occur.
- The most significant risk is bleeding. However, bleeding is uncommon unless the dose is > 1000 mg/day or the patient takes oral coumarin or <u>warfarin</u>.
- ✓ Thus, the upper limit for adults aged ≥ 19 yr is 1000 mg for any form of alpha-tocopherol.
- Analyses of previous studies report that high vitamin E intakes may increase the risk of hemorrhagic stroke and premature death.
Vitamin K

- Often called the blood coagulation vitamin or anti hemorrhagic vitamin.
- Known as Phyloquinone
- Can be obtained from a nonfood source.
- Bacteria in the GI tract synthesized Vit K.
- Food Sources:
- ➤ Vegetable oils (soybeans, olive), green and leafy vegetables.

Vitamin K sources

Lloyd Healthcare Pvt. Ltd.



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Vitamin K

Roles:

Involved in blood clotting (activation of proteins – prothrombin)

Deficiency:

Hemorrhagic disease



Symptoms

- Bruising from bleeding into the skin
- Nose bleeds
- Blood in stool
- Extremely heavy menstrual bleeding



Water-Soluble Vitamins



Vitamin C

Food Sources

- Citrus fruits (oranges, grapefruits, tangerines, lemons, limes).
- Cabbage-type vegetables;
 Dark green vegetables (such as bell peppers and broccoli)
- Strawberries and other berries, cantaloupe and other melons, papayas, mangoes, potatoes, and tomatoes
- Destruction
 - Easily destroyed by heat and oxygen



Foods Sources

Cabbage, Pe-Tsai

v	Valencia Orange	Cabbage, Red	
I.	Issai Kiwi Fruit	Cantaloupe	
т	Turnip Greens	Carambola	
A	Apricots	Cauliflower	
M	Mango	Cauliflower, Green	
1	Ivy Gourd	Collard Greens	
N	Nori	Chili Pepper, Hot	
2	Cantaloune	Gooseberries	
C	Cantaloupe	Grapefruit	
Apricots		Guavas	
Beans, Yellow Snap		Kiwifruit	
Bell Pepper		Lemon	
Blackberries		Lime	
Broccoli		Nori	
Brussels Sproute		Mango	
Cabbaga Groop		Melon, Honeydew	
Cabbage, Green		Okra	

Onion

Orange Papaya Pineapple Potato **Prickly Pears** Pummelo Radishes Raspberries Rutabagas Spinach Squash, Summer Strawberries Sweet Potato Tangerines Tomato Watermelon Dietitians-Online©



Vitamin C

- Deficiency Disease
 - Scurvy
- Deficiency Symptoms
 - Anemia, pinpoint hemorrhages
 - Bone fragility, joint pain
 - Poor wound healing, frequent infections
 - Bleeding gums, loosened teeth
 - Muscle degeneration and pain
 - Hysteria, depression
 - Rough skin

A deficiency of vitamin C may lead to a condition called scurvy, characterized by weakness, anemia, bruising, bleeding gums and loose teeth





Periodontal images of the patient taken before periodontal treatment. (A) Extensive gingsial overgrowth with severe periodontal inflammation was observed in the maxiliary and manditular arches at the first visit (July, 2008).

Vitamin C

- Toxicity Symptoms
 - Nausea, abdominal cramps, diarrhea
 - Headache, fatigue, insomnia
 - rashes
 - Urinary tract problems, kidney stones

Thiamin

- Other Names
 - Vitamin B1

• RDA

- Men: 1.2 mg/day
- Women: 1.1 mg/day

Function

- Part of coenzyme TPP (thiamin pyrophosphate) used in energy metabolism
- Food Sources
 - Whole-grain, fortified, or enriched grain products
 - Moderate amounts in all nutritious food
 - Pork
- Destruction
 - Easily destroyed by heat

Health Benefits of Vitamin B1 or Thiamin

Organic Stacts www.organicfacts.net

Involved in energy production in body

Rich in anti-aging properties

Reduces risk of Alzheimer's disease

Improves appetite & memory



Helps maintain healthy heart

Aids in production of red blood cells 🔅

Prevents cataract

Aids in digestion

🛐 www.facebook.com/organicfacts 😡 pinterest.com/organicfacts 🌉 http://bit.ly/1dz.Jv4x 💽 twitter.com/OF_OrganicFacts

Vitamin B1 (Thiamine) is found in fortified breads

itamir

and cereals, fish, lean meats and milk

MADAM.

Thiamin

Deficiency Disease

- Beriberi (wet with edema; dry with muscle wasting)
- Deficiency Symptoms
 - Enlarged heart, cardiac failure
 - Muscular weakness
 - Apathy, poor short-term memory, confusion, irritability
 - Anorexia, weight loss
- Toxicity Symptoms
 - None reported



Riboflavin

Other Names

• Vitamin B2

• RDA

- Men: 1.3 mg/day
- Women: 1.1 mg/day

5 VITAMIN B2 HEALTH BENEFITS





SUPPORTS



PREVENTS & TREATS ANEMIA

• Function

 Part of coenzymes FMN (flavin mononucleotide) and FAD (flavin adenine dinucleotide) used in energy metabolism



Δ

ANTIOXIDANT & CANCER PREVENTION

HELPS MAINTAIN

ENERGY LEVELS



PROTECTS



Riboflavin

- Food Sources
 - Milk and dairy products (yogurt, cheese).
 - Enriched or whole grains
 - Liver
- Destruction
 - Easily destroyed by ultraviolet light and irradiation





Riboflavin

- Deficiency Disease
 - Ariboflavinosis
- Deficiency Symptoms
 - Sore throat
 - Cracks and redness at corners of mouth (cheilosis)
 - Painful smooth, purplish red tongue (glossitis)
 - Inflammation characterized by skin lesions covered with greasy scales
- Toxicity Symptoms
 - None reported





Niacin

Other Names

- Vitamin B3
- Nicotinic acid, nicotinamide, niacinamide
- Precursor : amino acid tryptophan
- RDA
 - Men: 16 mg NE/day
 - Women: 14 mg NE/day
- Upper Limit
 - Adults: 35 mg/day

Functions

Part of coenzymes NAD
(nicotinamide adenine
dinucleotide) and NADP
(its phosphate form)
used in energy
metabolism

Food Sources

- Milk, eggs, meat, poultry, fish
- Whole-grain and enriched breads and cereals
- Nuts
- All protein-containing foods

Niacin

- Deficiency Disease
 - Pellagra
- Deficiency Symptoms
 - Diarrhea, abdominal pain, vomiting
 - Inflamed, swollen, smooth, bright red tongue (glossitis)
 - Depression, apathy, fatigue, loss of memory, headache
 - Bilateral symmetrical rash on areas exposed to sunlight
 - Toxicity Symptoms
 - Painful flush, hives, and rash (niacin flush)
 - Nausea, vomiting
 - Liver damage
 - Impaired glucose tolerance



An inability to absorb niacin (vitamin B3) or the amino acid tryptophan may cause pellagra, a disease characterized by scaly sores, mucosal changes and mental symptoms



Pyridoxine

Other Names

- Pyridoxine, pyridoxal, pyridoxamine
- B6

RDA

Adults: 1.3 mg/day (19-50 yr)

Upper Level

• Adults: 100 mg/day

Functions

- Part of coenzymes PLP (pyridoxal phosphate) and PMP (pyridoxamine phosphate) used in amino acid and fatty acid metabolism
 - Helps to make red blood cells

Vitamin B6 (pyridoxine) is important for maintaining healthy brain function, the formation of red blood cells, the conversion of protein and the synthesis of antibodies in support of the immune system

> RDA: 2 mg Water-soluble

> > *ADAM

Pyridoxine

- Food Sources
 - Meats, fish, poultry, liver
 - Potatoes, legumes, soy products
 - Non-citrus fruits
 - Fortified cereals
- Destruction
 - Easily destroyed by heat



Pyridoxine

- Deficiency Symptoms
 - Scaly dermatitis
 - Anemia (small-cell type)
 - Depression, confusion, convulsions
- Toxicity Symptoms
 - Depression, fatigue, irritability, headaches, nerve damage causing numbness and muscle weakness leading to an inability to walk and convulsions
 - Skin lesions

Symptoms of Vitamin B6 Deficiency

Skin disorders: Dermatitis (skin inflammation), Stomatitis (inflammation of the mucous lining of any of the structures in the mouth), Glossitis (is inflammation or infection of the tongue), and Painful fissures and cracks at the angles of the mouth and on the lips.

Abnormal brain-wave patterns, convulsions, and muscle twitching.

Depression, irritability, anxiety, confusion, headache, and insomnia.



Dermatitis



Stomatitis



Glossitis



Abnormal brainwave patterns



nursing care plans benign febrile convulsions

convulsion

Folate

Other Names

 Folic acid, folacin, pteroylglutamic acid (PGA)

RDA

Adults: 400 µg/day

Opper LimitAdults: 1,000 µg/day

Function

- Part of coenzymes THF (tetrahydrofolate) and DHF (dihydrofolate) used in DNA synthesis and therefore important in new cell formation
- Activates vitamin B12; Works with vitamin B12 to form hemoglobin in red blood cells
- Helps prevent neural tube defects, such as spina bifida.

Folate

Food Sources

- Fortified grains
- Leafy green vegetables
- Legumes, seeds
- Liver
- Destruction
 - Easily destroyed by heat and oxygen



Folate

Deficiency

- Spina Bifida
- Anemia (large-cell type)
- Smooth, red tongue (glossitis)
- Mental confusion, weakness, fatigue, irritability, headache
- Toxicity
 - Mask B12 deficiency symptoms





Spina Bifida (Open Defect)



Instanto for Desease Transition and Proceedings STATEORY









FOLIC ACID DEFICIENCY



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Vitamin B₁₂

Other Names

• Cobalamin

• RDA

 Adults: 2.4 μg/day

Functions

- Part of coenzymes methylcobalamin and deoxyadenosylcobalamin used in new cell synthesis
- Helps to maintain nerve cells
- Reforms folate coenzyme
- Helps to break down some fatty acids and amino acids

Food Sources

- Animal products (meat, poultry, fish, shellfish, milk, cheese, eggs)
- Fortified cereals

Destruction

Easily destroyed by microwave cooking

8 Foods with VITAMIN B12





Clams - 3 oz. 84.1 mcg (1,402%DV)



Beef - 3 oz. 1.4 mcg (23%DV)



Liver - 3 oz. 70.7 mcg (1,178%DV)

Milk - 1 cup

1.2 mcg (18%DV)



5.4 mcg (90%DV)



Salmon - 3 oz. 4.8 msg (80%DV)



1.1 mcg (18%DV)



Eggs - 1 large 0.6 mcg (10%DV)

DV based on US FDA recommendation of 6.0 mcg - Source: ods.od.nih.gov





- Deficiency Disease
 - Pernicious anemia
- Deficiency
 Symptoms
 - Anemia
 - Fatigue
 - Degeneration of peripheral nerves progressing to paralysis
- Toxicity Symptoms
 - None reported



Biotin (B7)

- Adequate Intake
 - Adults: 30
 µg/day
- Functions
 - Part of coenzyme used in energy metabolism
 - Part of
 coenzyme used
 in fat synthesis,
 amino acid
 metabolism, and
 glycogen
 synthesis

Food Sources

- Widespread in foods
- Liver, egg yolks, soybeans, fish, whole grains
- Also producedby GI bacteria



5 Health Benefits Of **BIOTIN**

Biotin is a B-complex vitamin that has been recognized as a vital nutrient for centuries. It plays a essential role in many pathways of the metabolism.

> Strengthen Hair and Nails

> > Perk up The

This vitamin averts hair loss. It also helps thicken nail cuticles and stops breakage. It is suggested to take biotin orally for optimal results.

B vitamins play a key role in the functioning of nervous system
& influence hormone functions.
Hence, why depleting biotin levels, in turn they play a significant role in skin health.

Biotin plays a pivotal role in sustaining metabolic functions & works as a co-enzyme for breaking the food, especially carbohydrates. Therefore, it's crucial to have supplement to a healthy diet and exercise.

Biotin help reducing LDL (bad cholesterol) levels, which if elevated can lead to heart disease including heart attack and stroke.

Biotin intake helps fighting with diabetes, particularly type 2. A chromium picolinate/biotin combination can improve glycemic control in overweight or obese individuals with type 2 diabetes.

Health Of Your Skin

Lower Cholesterol

Regulates Blood Sugar

Biotin Deficiency

Deficiency symptoms include:

- brittle nails
- conjunctivitis
- depression
- dermatitis
- fatigue

- hair loss
- hallucinations
- loss of appetite
- muscle pain
- nausea
- neurological symptoms
- weakness





Pantothenic Acid (B5)

- Adequate Intake
 - Adults: 5 mg/day
- Functions
 - Part of coenzyme A used in energy metabolism

Food Sources

- Widespread in foods
- Chicken, beef, potatoes, oats, tomatoes, liver, egg yolk, broccoli, whole grains
- Destruction
 - Easily destroyed by food processing

Vitamins & Minerals	Sources o	f Vitamin B5	
Eggs	Cauliflower	Mushrooms	Corn

Avocado

Yogurt

Sweet Potato

Broccoli



Symptoms of Vitamin B5 Deficiency

1.Paresthesias (It is a sensation of tingling, pricking, or numbness of a person's skin) and burning sensation in lower legs and feets.

- 2. Joint and muscle aches
- 3. Fading of hair color
- 4. Anemia
- 5. Reduced immunity: impaired antibody response
- 6. Headache, depression, insomnia, and fatigue



Paresthesias



Muscle aches



Anemia



Insomnia Why can't it start in the Morning...?

Insomnia





TUTORIAL - State the name of vitamin, its function and the target organs.


THAT'S ALL FROM Vitamins..







