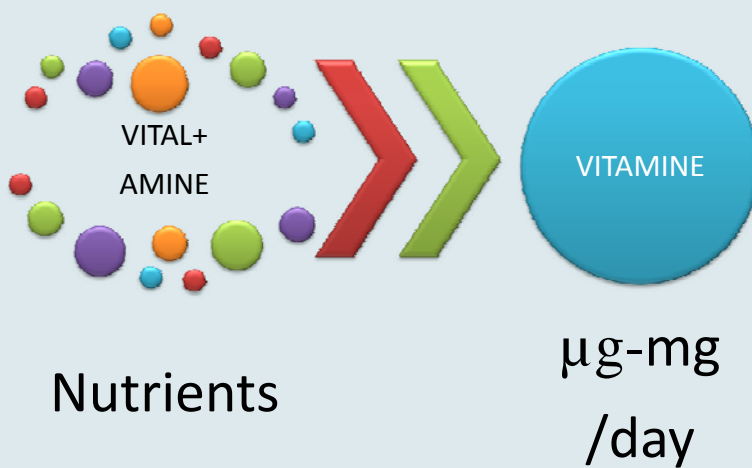


vitamins

## VITAMINS



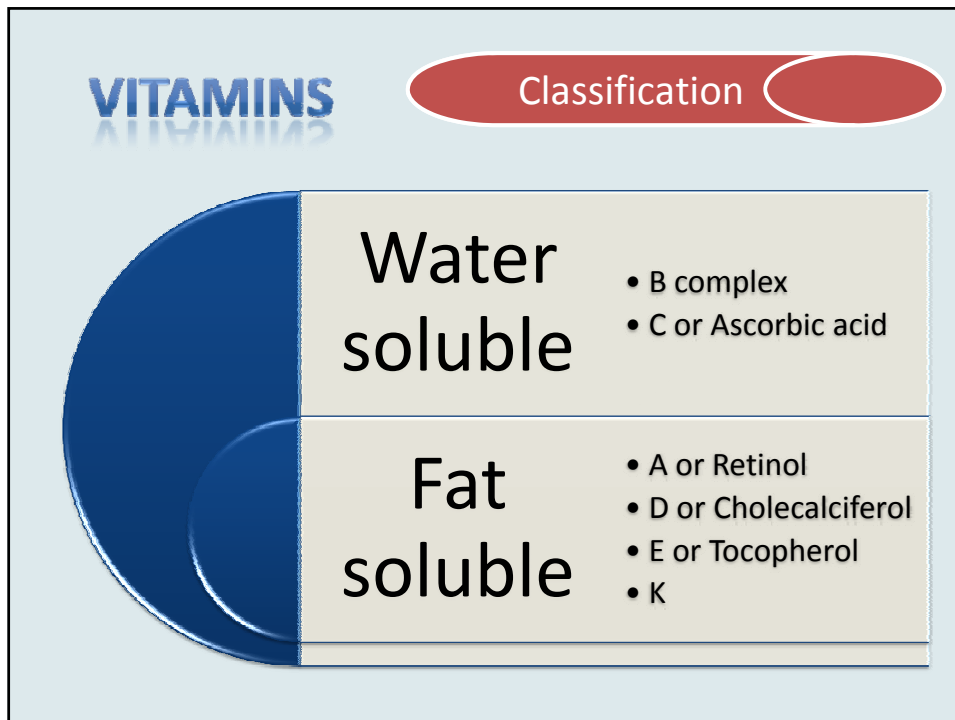
## VITAMINS

### Definition

Vitamins are organic nutrients that are required in small quantities for a variety of biochemical functions and which generally cannot be synthesized in the body and must be supplied by the diet

## IMPORTANCE OF VITAMINS

VITAMINS	FUNCTION
B1, B2, B3, B5, B 6, B7, B9, B12, C, K	COENZYME
B1, B2, B3, B5, B6, B7	METABOLISM OF ENERGY YIELDING NUTRIENTS
B 6, B 9, B12	RED BLOOD CELL SYNTHESIS
B6, B9, B12	AMINO ACID METABOLISM
B 7, B 5, B 3	FATTY ACID SYNTHESIS
C, E	ANTIOXODENT PROTECTION
B1, B6, B12	NERVE TRANSMISSION
A, D	GENE EXPRESSION



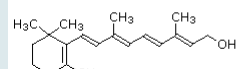
## FACTS ABOUT VITAMINS

- Vitamins are found in almost everything you eat
- Processing affects vitamin content
- Dietary supplements can boost vitamin intake
- Not all of what you eat can be used by the body

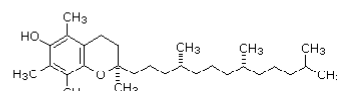
## FAT-SOLUBLE VITAMINS

- VITAMIN A
- VITAMIN D
- VITAMIN E
- VITAMIN K

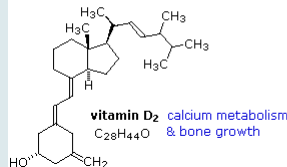
### Lipid Soluble Vitamins



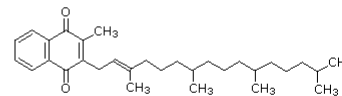
**vitamin A**  
C<sub>20</sub>H<sub>30</sub>O  
part of the visual pigment



C<sub>29</sub>H<sub>50</sub>O<sub>2</sub> **vitamin E** an antioxidant



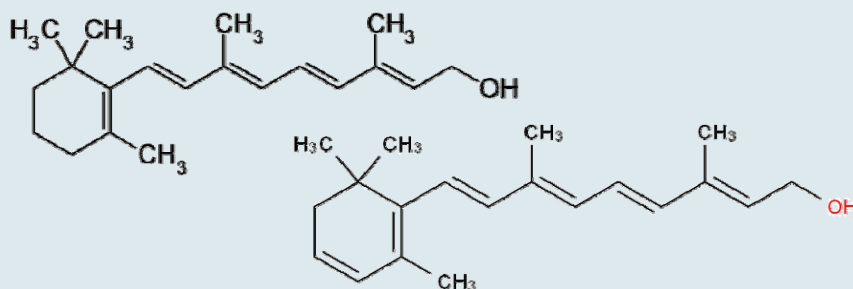
**vitamin D<sub>2</sub>** calcium metabolism  
C<sub>28</sub>H<sub>44</sub>O & bone growth



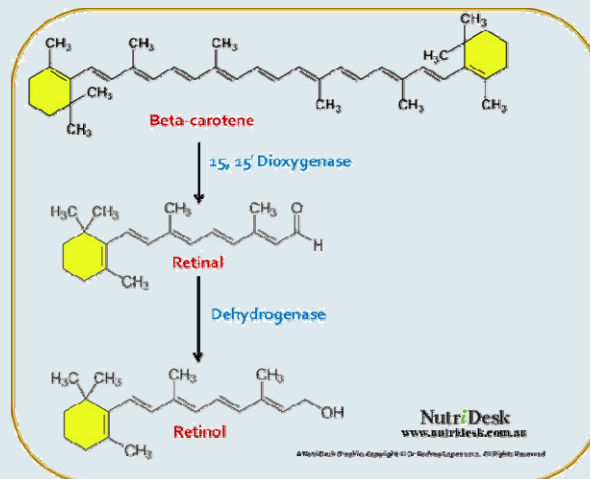
**vitamin K<sub>1</sub>** a blood clotting factor  
C<sub>31</sub>H<sub>46</sub>O<sub>2</sub>

## Vitamin A

- Assists with formation of skin and mucus membrane
- Maintains healthy eyes
- Assists with bone remodeling



## Vitamin A



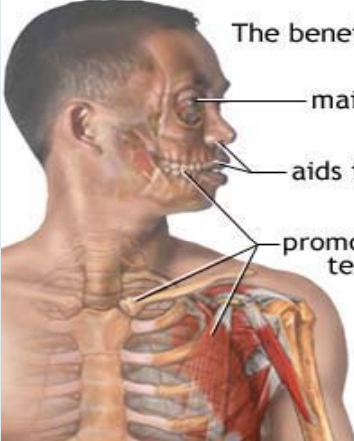
## Deficiency

- Dry skin, poor immunity and slow growth
- Night blindness, xerophthalmia (total blindness)

## VITAMIN A

Vitamin **A**

The benefits of vitamin A:



- 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

Adult RDA: 1000 µg RE

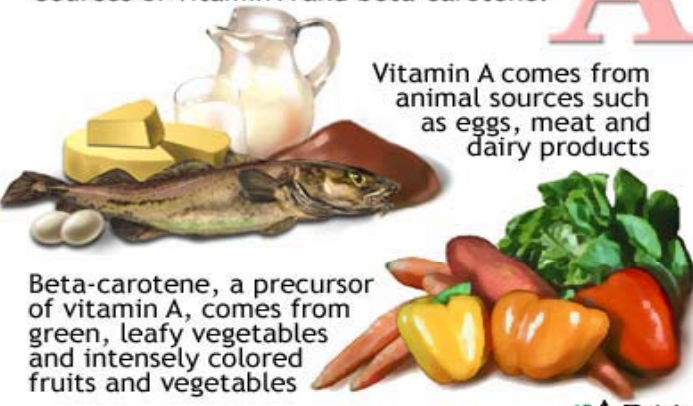
Fat-soluble

ADAM.

## sources

Vitamin **A**

Sources of vitamin A and beta-carotene:



Vitamin A comes from animal sources such as eggs, meat and dairy products

Beta-carotene, a precursor of vitamin A, comes from green, leafy vegetables and intensely colored fruits and vegetables

ADAM.

## Vitamin D

- Considered as hormone that facilitates absorption of Ca and P
- It assists with bone formation by aiding the absorption of calcium

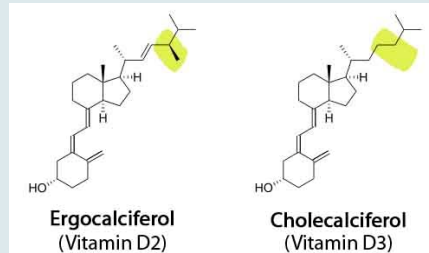
### VITAMIN D

it is also called **SUNSHINE VITAMIN**.

**it is available in 2 forms**

**D<sub>3</sub> – cholecalciferol**

**D<sub>2</sub> - ergocalciferol**




**Cholecalciferol (vitamin D<sub>3</sub>)**

**is made from 7-dehydrocholesterol in the skin of animals and humans.**

**Ergocalciferol - D<sub>2</sub>**

**obtained artificially by irradiation of ergosterol**

## Functions



Vitamin D

Vitamin D promotes the body's absorption of calcium, essential to development of healthy bones and teeth

DRI: 5  $\mu$ g

Fat-soluble

ADAM.

## sources



Vitamin D

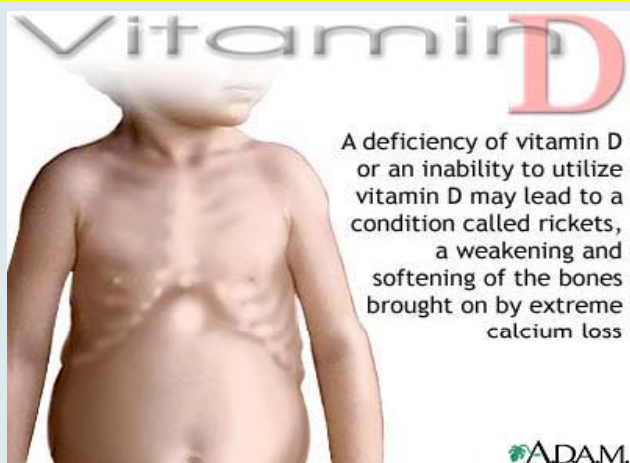
The body itself makes vitamin D when it is exposed to the sun

Cheese, butter, margarine, fortified milk, fish and fortified cereals are food sources of vitamin D

ADAM.



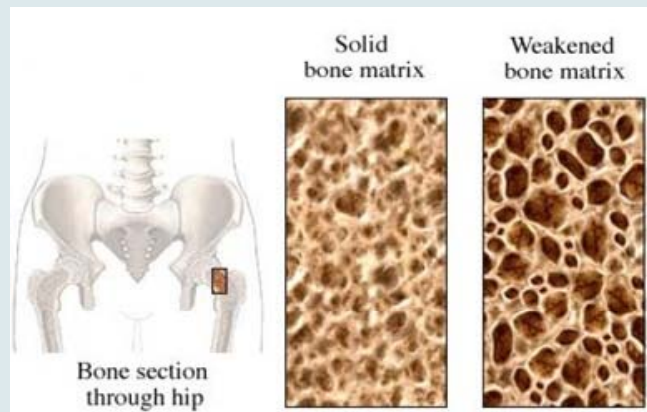
## Vitamin D deficiency



## Ricketts

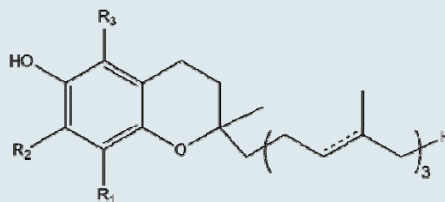


## Osteoporosis



## Vitamin E

- Antioxidant and promotes RBC
- Deficiency of vitamin E is hemolytic anemia
- RDA 15 mg / day



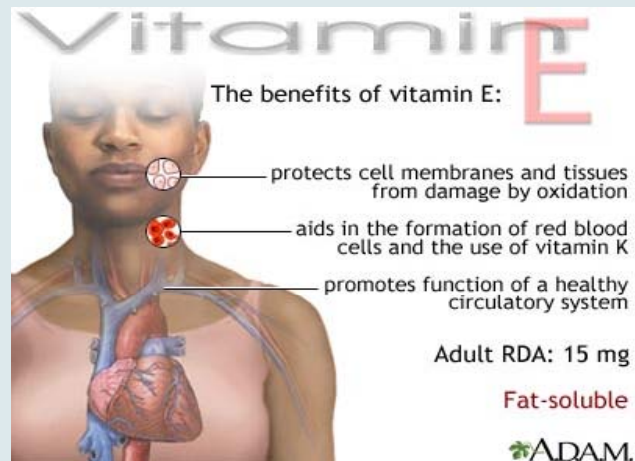
$\alpha$ -tocopherol,  $R_1 = R_2 = R_3 = \text{CH}_3$   
 $\alpha$ -tocotrienol,  $R_1 = R_2 = R_3 = \text{CH}_3$

$\beta$ -tocopherol,  $R_1 = R_3 = \text{CH}_3$ ;  $R_2 = \text{H}$   
 $\beta$ -tocotrienol,  $R_1 = R_3 = \text{CH}_3$ ;  $R_2 = \text{H}$

$\gamma$ -tocopherol,  $R_1 = R_2 = \text{CH}_3$ ,  $R_3 = \text{H}$   
 $\gamma$ -tocotrienol,  $R_1 = R_2 = \text{CH}_3$ ,  $R_3 = \text{H}$

$\delta$ -tocopherol,  $R_1 = R_2 = R_3 = \text{H}$   
 $\delta$ -tocotrienol,  $R_1 = R_2 = R_3 = \text{H}$




## Functions of vitamin E



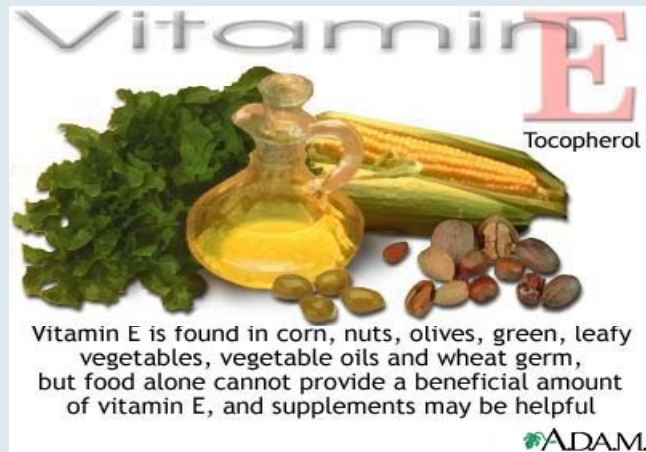
## Functions of vitamin E

---

***Recent studies suggest vitamin E may help:***

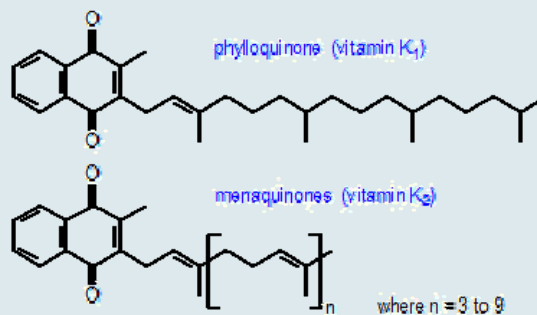
-  Slowing cognitive decline in Alzheimer's patients
  -  Lower blood pressure and cholesterol levels
  -  Protect tissues from the destructive action of oxidants
-

## Sources

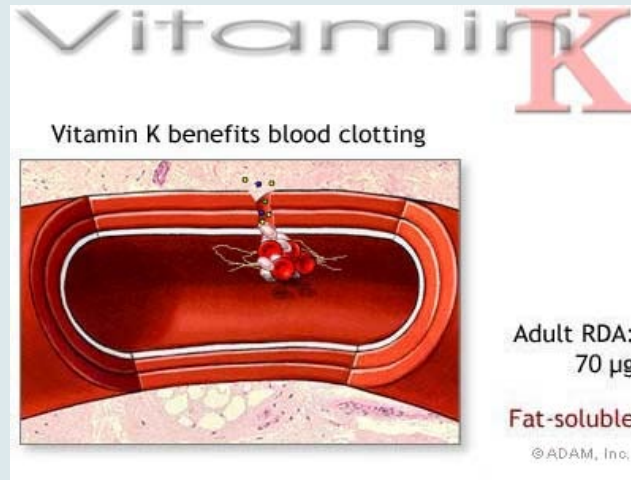


## Vitamin K

- Assists in the synthesis of prothrombin required for blood clotting
- Deficiency symptoms are prolonged bleeding and increased clotting time.



## Functions of vitamin K



## Vitamin K deficiency

- Increased risk with
  - Fat malabsorption syndromes
  - Diffuse liver disease
  - Absence of vitamin K-synthesizing bacterial flora
- Deficiency causes bleeding diathesis (skin, gums, .....)

## Sources of vitamin K

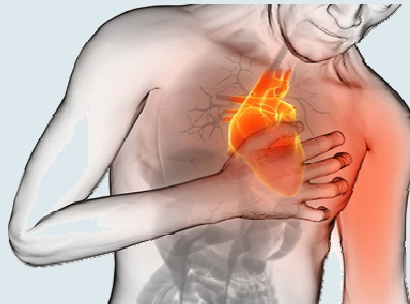


## Vitamin F

- Essential fatty acids (EFAs) cannot be made by the body and have to be supplied through nutrients. These EFA's are also known as unsaturated fatty acids or polyunsaturated fatty acids.
- The most essential of all EFAs are linoleic acid and alpha-linolenic acid (LNA).
- Your daily requirement should be 10 - 20% of your total calorie intake of the day.

## Vitamin F deficiency

- They are often advised to patients from doctors to lower cholesterol levels, blood pressure levels and reduce strokes and heart attacks.



## Sources of vitamin F



## VITAMINS

### • Water soluble vitamins

#### Vitamin B complex

- B<sub>1</sub> - Thiamine
- B<sub>2</sub> - Riboflavin
- B<sub>3</sub> - Niacin
- B<sub>5</sub> - Pantothenic acid
- B<sub>6</sub> - Pyridoxine
- Biotin
- Folic acid
- B<sub>12</sub> - Cobalamine

#### Vitamine C or Ascorbic acid

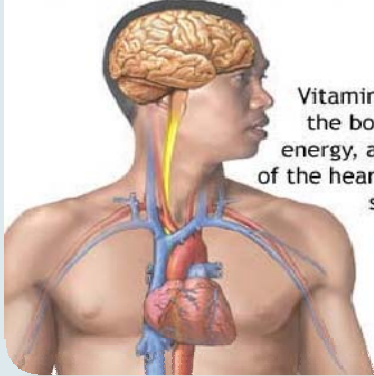
## THIAMIN OR VITAMIN B<sub>1</sub>

- Very important vitamin to prevent Beriberi
- A Japanese surgeon in the navy found that beriberi on ships could be avoided by adding meat and whole grains to the diet.
- Still occurs in developing countries where polished (white) rice is most of the diet



## THIAMIN IMPORTANCE

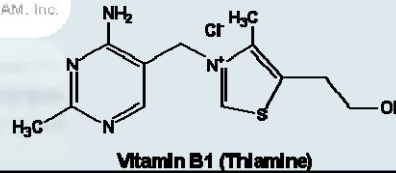
**Vitamin B<sub>1</sub>**



Vitamin B<sub>1</sub> (Thiamine) helps the body convert food into energy, and aids the function of the heart and cardiovascular system and the brain and nervous system

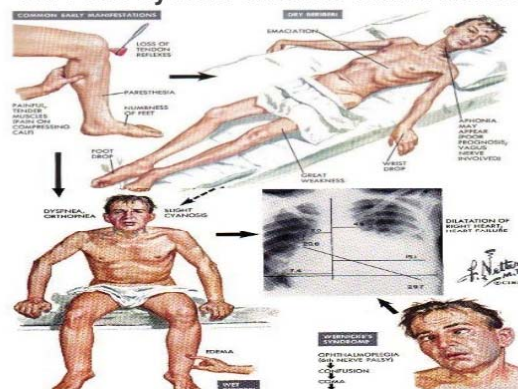
RDA: 1.5 mg  
Water-soluble

© ADAM, Inc.



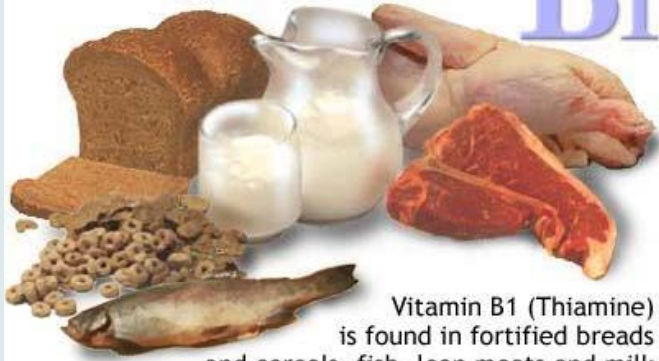
## BERIBERI (Thiamine Deficiency)

- Thiamin (vitamin B<sub>1</sub>) prevents the nervous system disease called beriberi.




## SOURCES OF THIAMIN

Vitamin **B<sub>1</sub>**



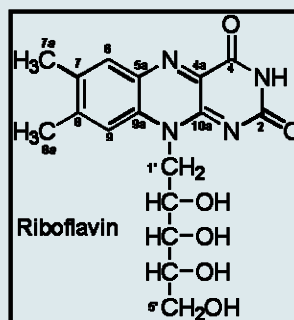
Vitamin B1 (Thiamine) is found in fortified breads and cereals, fish, lean meats and milk



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## RIBOFLAVIN OR VITAMIN B<sub>2</sub>

- Very important vitamin because it is part of two coenzymes (FMN) and (FAD) which are oxidizing agents



## RIBOFLAVIN IMPORTANCE



Vitamin **B<sub>2</sub>**

Riboflavin (vitamin B<sub>2</sub>) works with other B vitamins to promote healthy growth and tissue repair, and helps release energy from carbohydrates

Healthy skin RDA: 1.7 mg  
Water-soluble

Healthy red blood cell production

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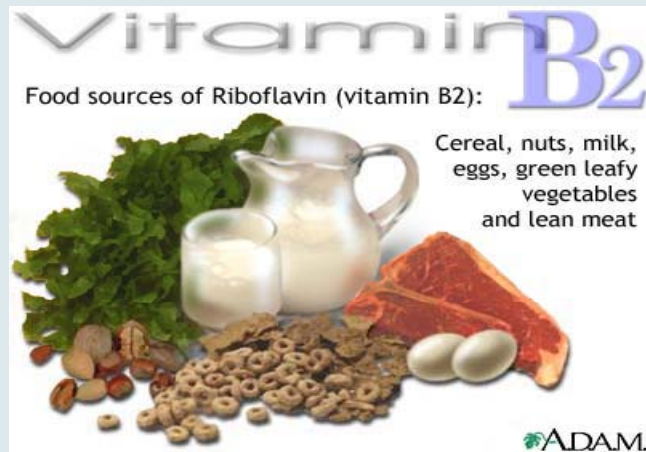
The infographic features a photograph of a young child's face and upper torso. A circular callout on the child's chest shows a magnified view of red blood cells. The text is arranged to the right of the child's face, and the ADAM logo is in the bottom right corner.

## SYMPTOMS OF RIBOFLAVIN DEFICIENCY

- Anemia
- Swollen and dark tongue
- cracks in corners of mouth and lips



## SOURCES OF RIBOFLAVIN



## NIACIN OR VITAMIN B<sub>3</sub>

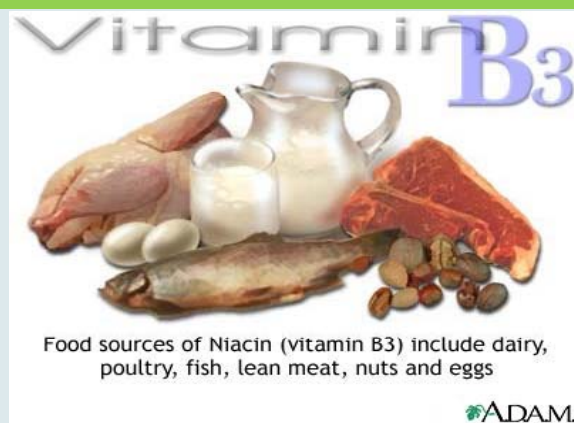
- Niacin is the compound that prevents development of Pellagra.
- It was isolated from nicotine acid
- It plays an important role in coenzyme NAD which is very important in protein metabolism.



## IMPORTANCE OF NIACIN OR VITAMIN B 3



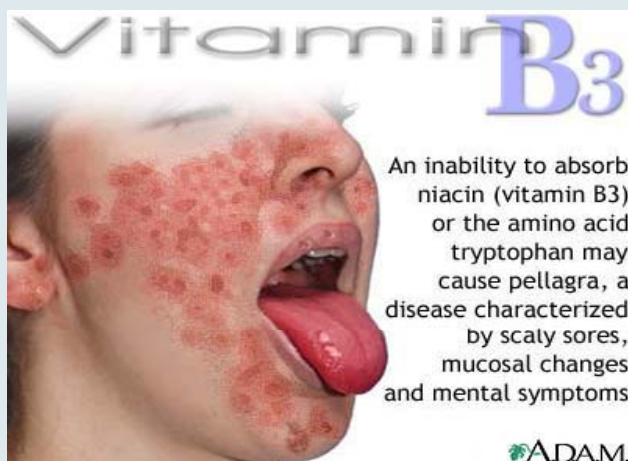
## SOURCES OF NIACIN



## DEFICIENCY OF NIACIN

- Pellagra: dermatitis
- Muscular weakness
- Anorexia
- Indigestion
- Skin eruptions
- Diarrhea

## DEFICIENCY OF NIACIN OR B3



## Pellagra



## Pellagra





## VITAMIN B<sub>5</sub> OR PANTOTHENIC

- Part of Coenzyme A which plays an important role in energy metabolism.
- Is essential for the formation of ATP from the breakdown of carbohydrates, protein, fat and alcohol.










## DEFICIENCY OF B<sub>5</sub>

- Headache
- Fatigue
- Impaired muscle coordination
- GI tract disorders



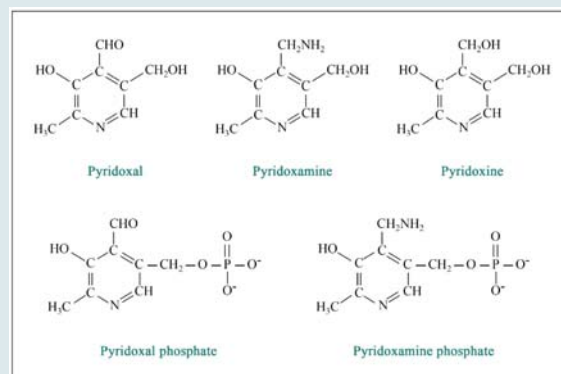


## SOURCES OF PANTOTHENIC

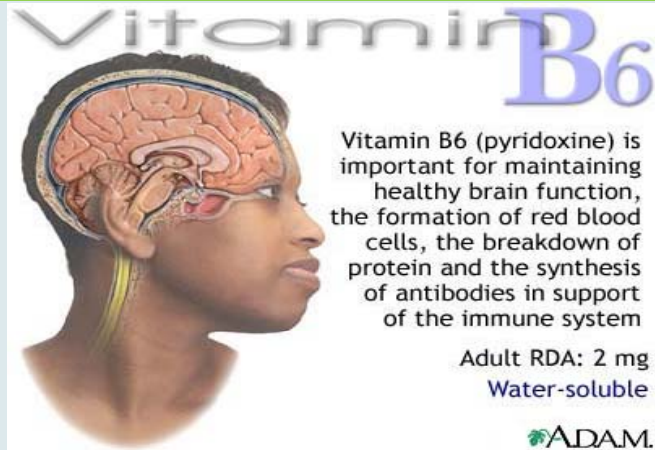
Vitamins & Minerals		Sources of Vitamin B5			
					
Eggs	Cauliflower	Mushrooms	Corn		
					
Avocado	Yogurt	Sweet Potato	Broccoli		

## Vitamin B<sub>6</sub> or Pyridoxine

- Very important vitamin since it plays a coenzyme role in more than 100 enzymatic reactions.



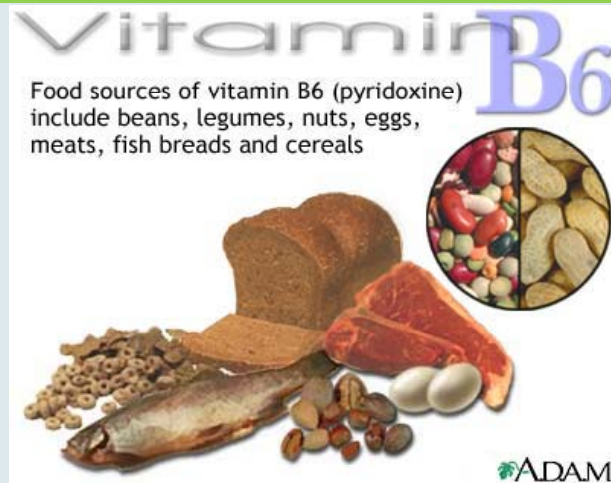
## VITAMIN B<sub>6</sub> FUNCTIONS



## DEFICIENCY OF VITAMIN B<sub>6</sub>

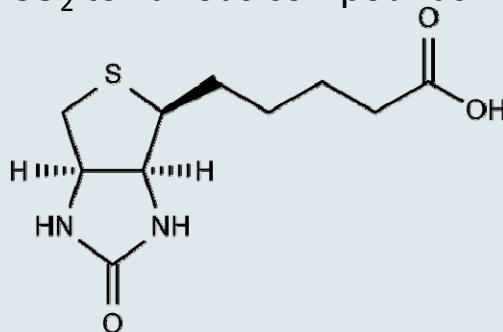
- Weakness
- Sleeplessness
- Personality changes
- Dermatitis

## VITAMIN B<sub>6</sub> SOURCES



## BIOTIN OR VITAMIN H/B<sub>7</sub>

- Biotin participate in reactions in which carbon dioxide is added to a compound.
- Essential cofactor for 5 carboxylase enzyme that add CO<sub>2</sub> to various compounds.



## DEFICIENCY OF BIOTIN

- Skin rash
- Neurological disorders
- Impaired growth
- Hair loss
- Fatigue
- Muscle pain

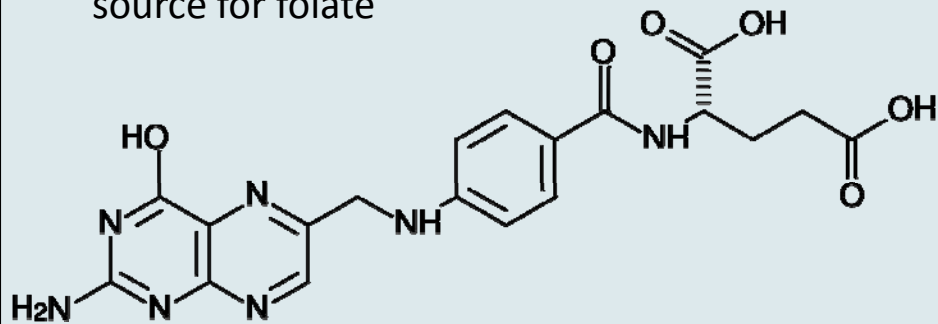
## SOURCES OF BIOTIN

- Whole grains
- Eggs
- Nuts
- legumes



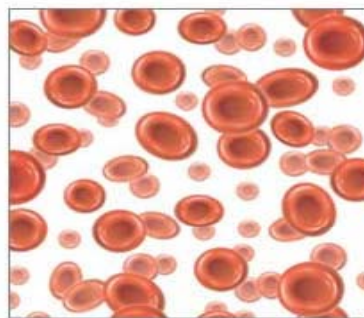
## FOLATE OR VITAMIN B<sub>9</sub>

- Folate is derived from Latin word means leaf because dark leafy vegetables are the best source for folate



## Folic acid function

Folic acid is necessary for red blood cell production and neural tube formation

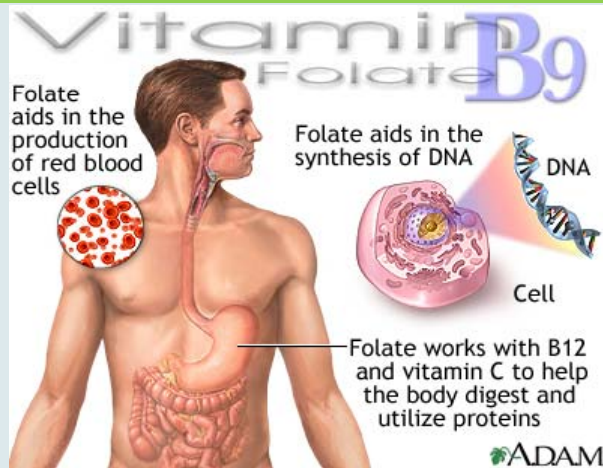


Neural tube



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## Folic acid functions



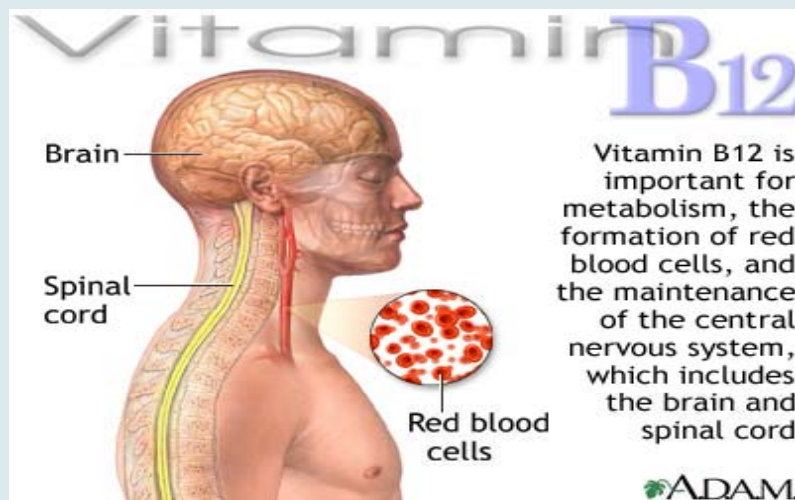
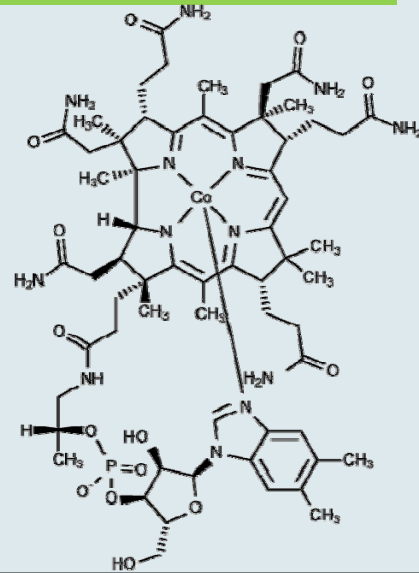
RDA for adults is 400 µg / day

## FOLATE OR VITAMIN B<sub>9</sub>



## VITAMIN B<sub>12</sub>

- Cyanocobalamin or vitamin B<sub>12</sub> is very important vitamin
- It plays an important role in many Coenzymes



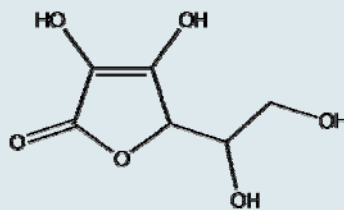
RDA for adults is 2.4 µg /day  
Deficiency can cause anemia

## Sources of VITAMIN B<sub>12</sub>



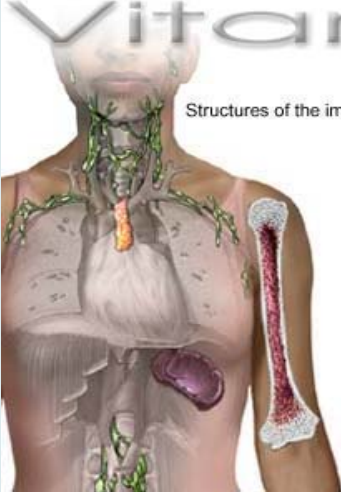
## VITAMIN C OR ASCORBIC ACID

- Is involved in many processes in human body
- The most important function for vitamin C is the synthesis of collagen, the principal tissue protein found in tendon





## ASCORBIC ACID OR VITAMIN C




Structures of the immune system

Vitamin C promotes a healthy immune system, helps wounds heal, maintains connective tissue and aids in the absorption of iron

RDA: 60 mg  
Water-soluble

ADAM.

RDA for vitamin c for adults is 60 mg / day



Vitamin C

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

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## SCURVY IN HUMAN



From "Fundamentals of Clinical Nutrition" by R. L. Vainuter copyright 1993 by Morby-Year Books Inc. N.Y.  
**Fig. 2-5** Periodontal disease seen in scurvy.

## SOURCES OF VITAMIN C

