

A young boy with dark skin and short hair is looking towards the camera with a slight smile. He is wearing a white shirt. In front of him is a white plate filled with various fruits, including several green apples, a few red apples, and a bunch of yellow bananas. The background is slightly blurred, showing what appears to be a window or a wall with some texture.

Nutritional knowledge

Vitamins

Nigeria, March 2005

Presentation

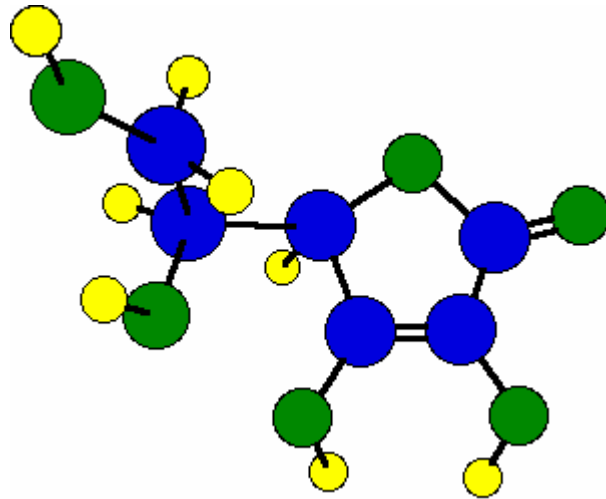
- Chemical structure
- Classification:
 - Fat-soluble & water-soluble vitamins
- General function
- Synthesis vitamin A, D, & K
- Specific functions
 - A, D, K
 - B-group & C
 - Anti-oxidative action: β -carotene, vitamin E, C
- Requirements
- Cow's milk & vitamins
- Check your knowledge

The key lines

- **Vitamins** are essential for life
- **Vitamins** are needed in small amounts
- **Vitamins** do not provide energy
- **Vitamins** have to be supplied by food

Chemical structure

- Organic compounds (C)



Vitamin C

Classification

- Classified according to solubility
 - Determines site in body where they function
- Body tissues: watery or fatty (oily)
 - Fluids outside/inside body cells = water-based
 - Cell membranes (layers)/nerve tissues = fatty substances
- Vitamins that function in the watery areas = *water-soluble vitamins*
- Vitamins that function in fatty tissues = *fat-soluble vitamins*

13 Vitamins for good health: 2 groups

Fat soluble vitamins

- Vitamin A = retinol
- Vitamin D3 =
cholecalciferol
- Vitamin E = α -
tocopherol
- Vitamin K1 =
phylloquinone

Water soluble vitamins

- B-group
 - B1 = thiamin
 - B2 = riboflavin
 - Niacin = nicotinamide =
nicotinic acid = B3
 - Pantothenic acid = B5
 - B6 = pyridoxine
 - Biotin = vitamin B8 = vitamin H
 - Folic acid = folate = B11
 - B12 = cobalamin
- Vitamin C = ascorbic acid

Fat versus water soluble vitamins

Fat-soluble vitamins

- Dissolve in fat
- Need fat: for absorption & transport
- Can be stored in body: liver, adipose tissue

Water-soluble vitamins

- Dissolve in water
- Are easily absorbed and excreted (via urine)
- Are not easily stored

Function

- Essential for many processes in body
- Vitamins play a role in digestion & utilisation of
 - Protein
 - Fat
 - Carbohydrates
- Vitamins are components of enzymes

Some vitamins can be synthesised by body itself

- β -carotene → vitamin A
 - β -carotene = pro-vitamin A = vitamin A precursor (fore-runner)
- From cholesterol → vitamin D
 - In skin under influence of sunlight
 - Daily: 5-10 minutes
- Bacterial flora in GI-tract → vitamin K

Role of vitamin A & D


Vitamin A

- Growth & repair of body tissues
- Bone formation
- Normal vision
- Immune function
- *Deficiency: eye diseases leading to blindness*

Vitamin D

- Ca & P absorption / utilization: building bone mass & preventing bone loss
- Skeletal integrity
- *Deficiency: rickets (malformation of bones)*

Importance of vitamin K

- Blood-clotting factor
 - to prevent & control internal bleedings
- *Deficiency: blood-clotting time , bleedings*

Role of B-vitamins & vitamin C

B-group

- Play a role as co-enzyme in metabolism of protein, fat and/or carbohydrates

Vitamin C

- Healthy cell development
- Wound healing, resistance to infections
- Absorption of iron (Fe)
- Anti-oxidative action
- *Deficiency: scurvy (bleeding gums)*

**Anti-oxidative action of
 β -carotene, vitamin E & vitamin C**

Normal body process: formation of free radicals

- O₂ = essential component of living organisms
- Body cells: energy producing processes + O₂ → formation free radicals
- Normal circumstances: free radicals are constantly produced
 - Needed in several body processes

Oxidative stress: overproduction of free radicals

- Overproduction of free radicals → oxidative stress → *damage of body cells*
- Due to today's modern life styles / environment
 - pollutants we inhale
 - excess to ultra-violet light
 - illnesses
- Increasing scientific evidence linking cell damage to chronic diseases
 - e.g. cancer, cardiovascular disease (heart disease), diabetes mellitus, cataracts, aging

Anti-oxidants: protect body cells against overproduction of free radicals

- Dietary anti-oxidants: substances (nutrients) in food → neutralise free radicals → protect body cells against overproduction

Anti-oxidants:

- β -carotene (+ other carotenoids)
- vitamin E & C
- Se, Zn, Mn, Cu: components of anti-oxidative enzymes

Vitamin requirements

- Requirements depends on e.g. age and gender
- Every country: own, local nutrient recommendations
 - Internationally: US/Canadian Dietary Reference Intakes (DRIs)

Milk: good source of vitamins

Milk %RDA per 400 ml
adults

