

VITAMINS-5

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Plan for today

- Review last lecture
- Summarize what's done

Pop Quiz !!

- Riboflavin exists in body as a part of

FAD, FMN

FTD, FSH

NAD,
NADH

I DON'T KNOW,
I'm busy
preparing for
exam!

Pop Quiz !!

- Ariboflavinosis is due to deficiency of vitamin

B2

B12

B3

Sorry forgot,
too many B's

Pop Quiz !!

- Vitamin B3 gets incorporated with which compound

NAD

DAD

FAD

Sorry , Don't
know

Pop Quiz !!

- Severe Niacin deficiency is medically termed

Allegra

Pellagra

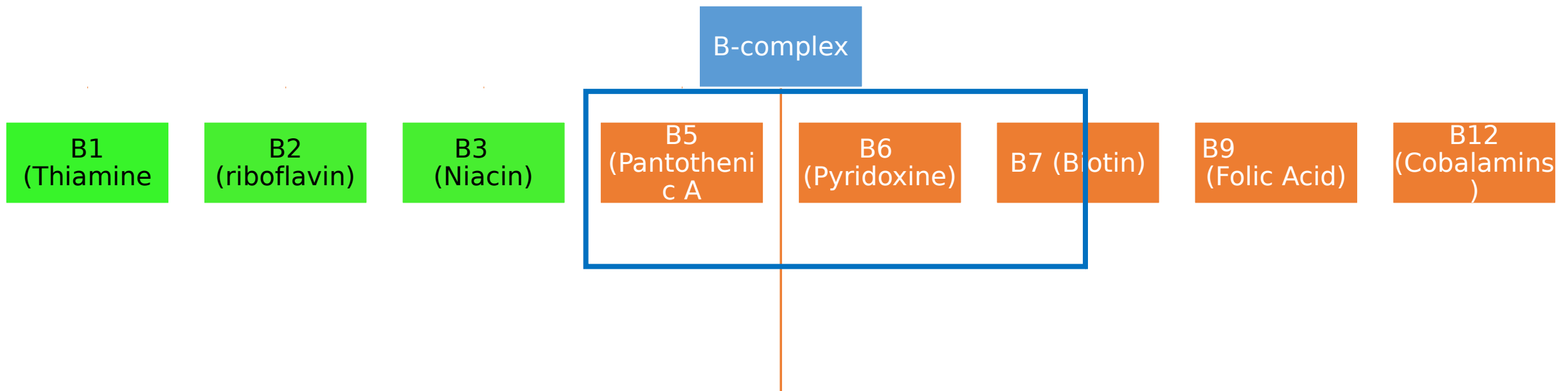
Deodra

Sorry , Don't
know

Vitamin B Complex

- Group of water soluble vitamins, chemically distinct
- Play an important role in metabolism

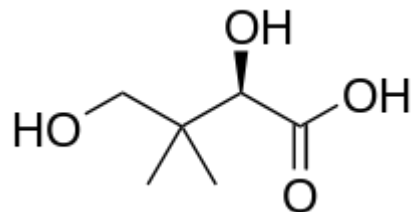
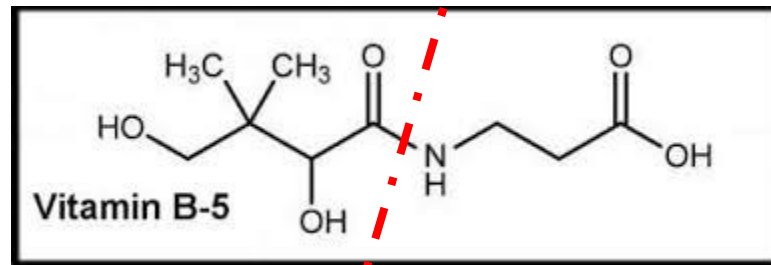
B-complex (Thiamine)



Vitamin B5

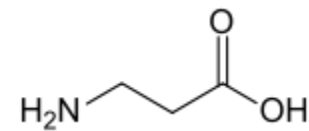
- B5 or Pantothenic acid or pantothenate
- Name derived from the Greek "*pantothern*" meaning "from everywhere" as small quantities of pantothenic acid are found in nearly every food
- Pantothenic acid was discovered by Roger J. Williams in 1933
- Required to synthesize coenzyme-A (CoA)
- **Synthesize** and **metabolize** : Proteins, carbohydrates, and fats

Vitamin B5 Structure



Pantoic Acid

+



β -alanine

Vitamin B5 : What's the role

- B5 is an important component of **coenzyme A (CoA)**
- Role of CoA
- Required for chemical reactions that generate energy from food (fat, carbohydrates, and proteins)
- Synthesis of essential fats, cholesterol, steroid hormones , acetylcholine, melatonin and Heme
- Metabolism of a number of drugs and toxins by the liver

- B5 is an important component of **acyl-carrier protein**
- Required for the synthesis of fatty acids

Vitamin B5 : Deficiency

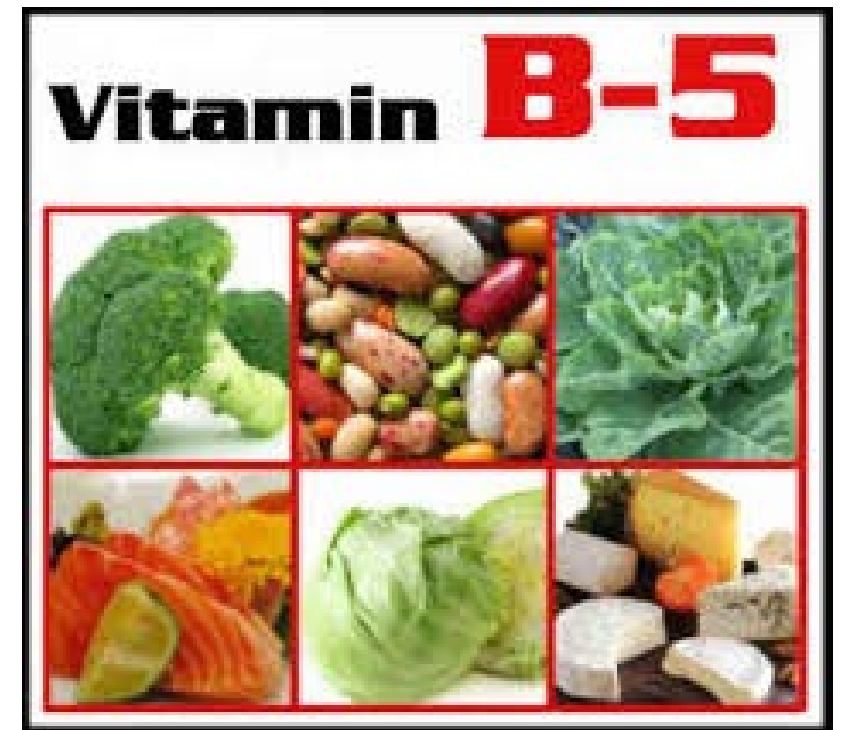
- Naturally occurring deficiency is rare in humans
- Only observed in cases of severe malnutrition
- Experimentally induced deficiency: headache, fatigue, insomnia, intestinal disturbances, numbness and tingling of their hands and feet
- Research on experimental animals to understand deficiency
- Symptoms show the diverse role of Vit B5 as a part of CoA

Vitamin B5 : How much do we need ?

1. Infants :
1.8 mg/day
2. Children:
2 - 4 mg/day
3. Adults:
5 mg/day

Vitamin B5 : Food Source

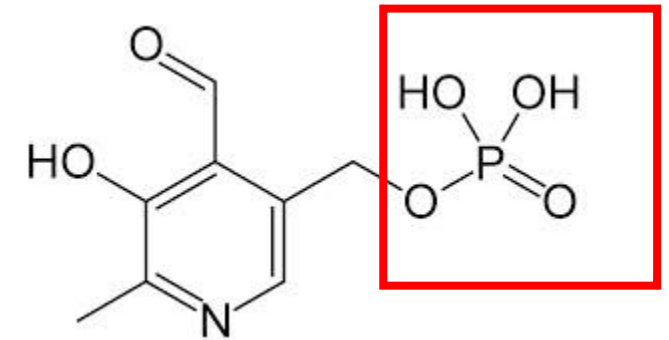
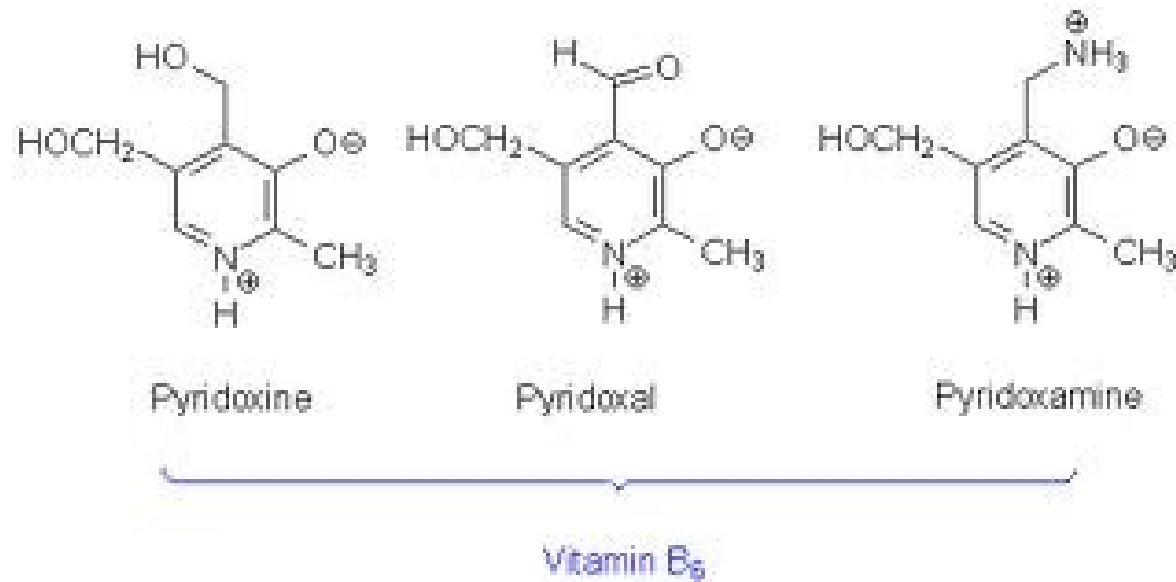
- Rich sources include liver and kidney, yeast, egg yolk, and broccoli
- Fish, shellfish, chicken, milk, yogurt, mushrooms, avocado, and sweet potatoes are also good sources
- When found in foods, most pantothenic acid is in the form of CoA or acyl carrier protein (ACP)
 1. CoA and ACP are hydrolyzed into 4'-phosphopantetheine
 2. The 4'-phospho-pantetheine is then dephosphorylated into pantetheine
 3. Pantetheine hydrolysed into free pantothenic acid



Vitamin B6

- First isolated in the 1930s
- Three compounds typically referred to as Vit B6: **Pyridoxine, Pyridoxal, Pyridoxamine**
- The phosphate ester derivative **Pyridoxal 5'-phosphate (PLP) is the Active form**
- PLP has an important role in human metabolism

Vitamin B6 Structure



Pyridoxal Phosphate

Based on a **Pyridine ring**, with hydroxyl, methyl, and hydroxymethyl substituents

Vitamin B6 : What's the role

- **PLP** plays a vital role in the function of **approximately 100 enzymes** that catalyze essential chemical reactions in the human body
- **Coenzyme for**
 - glycogen phosphorylase, an enzyme that catalyzes the release of glucose from stored glycogen
 - generating glucose from amino acids
- **Synthesis of**
 - Neurotransmitter- serotonin
 - Heme, an iron-containing component of hemoglobin

Vitamin B6 : What's the role

- **Hormonal function:**
- Inhibits the binding of steroid hormones, thus decreasing their effects

- **Nucleic Acid Synthesis**
- Coenzyme for synthesis of nucleic acids

Vitamin B6 : Deficiency

- Severe deficiency of vitamin B6 is uncommon
- Alcoholics are thought to be most at risk of vitamin B6 deficiency due to **low dietary intakes and impaired metabolism of the vitamin**
- Studies suggest that deficiency results in:
 - Abnormal EEG patterns
 - Neurologic symptoms
 - Inflammation

Vitamin B6 : How much do we need ?

1. Infants :
0.1 - 0.3 mg/day
2. Children:
0.5 - 1.0 mg/day
3. Adults:
1.3 mg/day

Vitamin B6 : Food Source

Vitamin B6

Food sources of vitamin B6 (pyridoxine) include beans, legumes, nuts, eggs, meats, fish breads and cereals



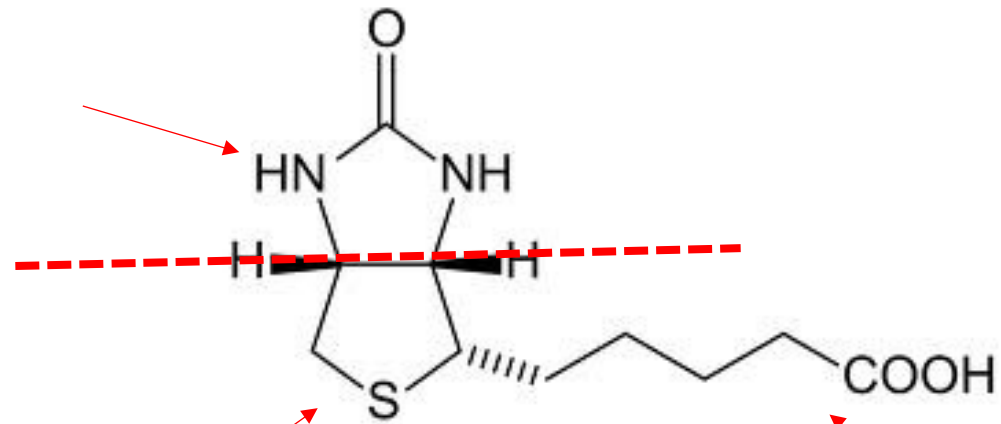
ADAM

Vitamin B7

- Also known as vitamin H or coenzyme R or Biotin
- Biotin is necessary for
 - cell growth,
 - production of fatty acids,
 - metabolism of fats and amino acids
- Synthesized only by bacteria, yeasts, molds, algae, and some plant species

Vitamin B7 Structure

Tetra-hydro-
imidizalone



tetra-hydro-thiophene

valeric acid