Elekwachi precious chioma
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Water - Soluble Vitamins

Vitamin B1 - thiamine

Converted to thiamine pyrophosphate coenzyme

Acts by nucleophilic attack on C = O

Permits C - C bond cleavage and formation

Vitamin B2 - riboflavin

Incorperated in FMN (Flavin MonoNucleotide) and FAD (Flavin Adenine Dinucleotide) coenzymes

Acts in Redox Reactions

Can accept and donate 2 e- and 2 H+

Vitamin B6 - pyridoxal (-ol, -amine)

Converted to pyridoxal phosphate coenzyme

Acts by forming Schiff base with -NH2 of substrate

Permits cleavage of C - C, C - O, C - S, C - H, and C - N bonds in area of attachment

Very versatile, but amino group needed in substrate

Vitamin B12 - cyanocobalamin

Coordination complex of Co+ in a corrin ring

Converted to 5'-deoxyadenosylcobalamin coenzyme

Acts to exchange -H and another group on adjacent C's

Transfers Methyl group from Me-THF to homocycteine to synthesize Met

Nicotinamide (NIacin, nicotinic ACid vimintIN)

Converted to NAD and NADP coenzymes

Functions in Redox Reactions by accepting and donating 2e- and 1 H+

Pantothenic Acid

Converted to Phospho-form coenzyme

Activates Acyl moieties for condensation and enolization

Biotin (vitamin H)

Coenzyme

Incorperates CO_2 in B carboxylation reactions

"Binds the egg white glycoprotein avidin with Kd= 10-15 M

Vitamins #5-7 are part of the B complex

Vitamin C - ascorbic acid ("antiscorbutic") ("anti-scurvy")

involved in hydroxylation of proline in collagen, therefore important for wound healing

Prevent common cold? How?

Folic Acid - pteroylglutamic acid

Converted to tetrahydrofolic acid (THF)

Carries C-1 groups at all oxidation levels

More properly considered a substrate than a coenzyme

<u>Non-Vitamin Coenzyme</u>

Lipoic Acid

(Isolated in 1951 by Lester Reed at UT-Austin - he obtained 30mg from 10 tons of liver residue.)

Relays electrons and acetyl groups between catalytic subunits of pyruvate dehydrogenase complex.

<u>Lipid-Soluble Vitamins</u>

Vitamin A - trans-retinol

Converted to visual pigment cis-retinal

(Also contributes to animal growth and development - How? Retinoic acid?)

Vitamin D - 7-dehydrocholesterol

Converted to hormone 1,25-Dihydroxy vitamin D3

(Stimulates gene expression to regulate calcium metabolism)

Vitamin E - a-tocopherol

Antioxidant

Prevents sterility - in rats, How?

Vitamin K - phylloquinone in plants; menaquinone in aminals and bacteria

Cofactor for formation of gamma-carboxyglutamic acid in serine proteases of blood clotting cascade, and some other Ca++binding proteins.

, chelates Ca++

e.g. 1st 10 glu residues of prothrombin are converted to gamma-carboxyglu, by addition of CO_2.