**MATRIC NO: 18/MHS01/248**

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**DEPARTMENT: ANATOMY**

**COURSE: BCH 204**

**ASSIGNMENT TITLE:**

**VITAMINS AND COENZYMES**

**ASSIGNMENT**

**Vitamins and Coenzymes**

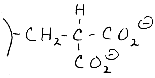
Water - Soluble Vitamins

1. Vitamin B1 - thiamine
   * Converted to thiamine pyrophosphate coenzyme
   * Acts by nucleophilic attack on C = O
   * Permits C - C bond cleavage and formation
2. 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+
3. 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
4. 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
5. Nicotinamide (NIacin, nicotinic ACid vimintIN)
   * Converted to NAD and NADP coenzymes
   * Functions in Redox Reactions by accepting and donating 2e- and 1 H+
6. Pantothenic Acid
   * Converted to Phospho-form coenzyme
   * Activates Acyl moieties for condensation and enolization
7. Biotin (vitamin H)
   * Coenzyme
   * Incorperates CO2 in *B* carboxylation reactions
   * "Binds the egg white glycoprotein avidin with Kd= 10-15 M
   * Vitamins #5-7 are part of the B complex
8. Vitamin C - ascorbic acid ("antiscorbutic") ("anti-scurvy")
   * involved in hydroxylation of proline in collagen, therefore important for wound healing
   * Prevent common cold? How?
9. 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

Non-Vitamin Coenzyme

1. 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.

Lipid-Soluble Vitamins

1. Vitamin A - trans-retinol
   * Converted to visual pigment cis-retinal
   * (Also contributes to animal growth and development - How? Retinoic acid?)
2. Vitamin D - 7-dehydrocholesterol
   * Converted to hormone 1,25-Dihydroxy vitamin D3
   * (Stimulates gene expression to regulate calcium metabolism)
3. Vitamin E - *a*-tocopherol
   * Antioxidant
   * Prevents sterility - in rats, How?
4. 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 CO2.