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

**NAME: ODENIYI IBUKUN ABIOLA**

**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.