MEDICINAL CHEMISTRY 402
VITAMINS

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I. INTRODUCTION

A. Market size and importance

B. Pharmacist role

C. Definition

Vitamins are essential organic compounds required in small amounts and whose deficiency results in the disease state.

D. Assay -- biological assays now replaced by chemical assays.

E. Standardization

Units of biological activity now replaced by potencies based on weight of most active vitamin.

F. Requirements

1. DV (Daily Value) -- set by FDA and primarily used for labeling purposes (% DV).

2. Dietary Reference Intakes -- set by Food & Nutrition Board, National Academy of Sciences

   a) Estimated Average Requirement (EAR).

   b) RDA -- Where requirements are precisely known, RDA is set plus two standard deviations from average requirement for the population. POINT: RDA is not an "average" requirement but an excess amount that meets the needs of most of the population. In some cases the average requirements are not known with precision and RDA values are based on average dietary intake in a population, plus extra as a margin of safety to account for increased demands during illnesses, etc. The reference with the RDA values is deficiency. This implies but does not necessarily mean a value that when ingested will result in optimum health.

   c) Tolerable Upper Limit (UL) -- maximum level unlikely to cause harm

G. Function

Vitamins are part of the coenzyme that the body cannot synthesize, e.g. nicotinic acid is a vitamin and NADP is the coenzyme.

In some cases there is no coenzyme form of the vitamin. The vitamin is active without further transformation *in vivo*, e.g. Vit. C, E, A, K.

H. Intestinal Synthesis and Significance -- (fat soluble and water soluble vitamins)

No	Yes, but not absorbed	Yes
C	thiamin	B_6
A	riboflavin	K
D	niacin	biotin
E	B_{12}	pantothenic acid
folic acid		

Low intake plus antibiotic therapy or prolonged TPN can lead to deficiencies.

Table III -- Daily Values for Nutrition Labeling

	Unit	Adults and children 4 or more years of age
Vitamin A	IU	5000
Vitamin D	IU	400
Vitamin E	IU	30
Vitamin C	mg	60
Folacin	mg	0.4
Thiamin	mg	1.5
Riboflavin	mg	1.7
Niacin	mg	20
Vitamin B_6	mg	2
Vitamin B_{12}	μg	6
Biotin	mg	0.30
Pantothenic Acid	mg	10
Calcium	g	1.0
Phosphorus	g	1.0
Iodine	μg	150
Iron	mg	18
Magnesium	mg	400
Manganese[a]	mg	4.0
Copper	mg	2.0
Zinc	mg	15
Protein	g	45 (65)[b]