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<i>The Vitamins: Fundamental Aspects in Nutrition and Health. 5th Edition, Academic Press, 2023.</i>	المصادر والمراجع
<i>Modern Nutrition in Health and Disease. 12th Edition, Wolters Kluwer, 2020.</i>	
<i>The Acute and Chronic Toxic Effects of Vitamin A.” American Journal of Clinical Nutrition, 2006, 83(2): 191–201.</i>	

### محتوى المحاضرة

#### What its RDA:

- The Food and Nutrition Board of the Institute of Medicine of the National Academy of Sciences periodically reviews the scientific evidence and publishes the **recommended daily allowance** (RDA) of vitamins and other nutrients.
- Their standard is usually set **two to six times higher than the minimum daily requirement**. which is the amount of vitamins required to protect healthy, normal people from vitamin deficiency.

- People take megadoses of vitamins to enhance their **appearance**, **live longer**, enhance **athletic performance** and **prevent** or **ameliorate** non deficiency-specific disease states e.g. **rickets**.
- The practice of taking megadose of vitamins gained popularity in the early 1970s when Linus Pauling published a monograph entitled Vitamin C and the Common Cold.
- However, clinical trials of vitamin supplementation have demonstrated **negative or equivocal results**.

Vitamins are not made in the body (or not in sufficient quantity) with exceptions of some Provitamins e.g.

- ✓ Exposure to sunlight can replace Vitamin D.
- ✓ Bacteria in the human colon synthesize Vit. K2
- ✓  *$\beta$ -carotenoids can replace Vit. A.*
- ✓ *Tryptophan containing proteins can replace Vit. B3 (niacin).*

### Classification of Vitamins

Vitamins are classified by their biological and chemical activity. Till now 13 vitamins are universally recognized :

#### ❖ Fat soluble vitamins:

1- Vit. A (Retinol, Retinal, Retinoic acid)

2- Vit. D:

\*Vit. D3: Cholecalciferol.

\*Vit. D2: Ergocalciferol.

3- Vit. E ( $\alpha$ -Tocopherol)

#### 4- Vit. K:

**\*Vit. K1: Phylloquinones.**

**\*Vit. K2: Menaquinones.**

#### 2-Water soluble vitamins:

**(1) Vit. C : (Ascorbic acid)**

**(2) Vit. H: (Biotin)**

**(3) Vit. B:**

- **B1 (Thiamin)**
- **B2 (Riboflavin)**
- **B3 (Niacin)**
- **B5 (Pantothenic acid)**
- **B6 (Pyridoxine)**
- **B9 (Folic acid)**
- **B12 (Cyanocobalamin)**

#### Vitamin A

- **1. Retinoid medications has higher risk of cumulative toxicity with Vit. A supplement.**
- **2. Use of mineral oil impairs absorption of all fat soluble vitamins.**
- **3. Cholesterol-lowering drugs (e.g. cholestyramine) and antacids containing (AL) inhibit absorption of Vit. A.**
- **4. Alcohol, barbiturates, caffeine, cortisone, tobacco and very high levels of vitamin E deplete Vit. A (over use of alcohol and Vit. A together increase the possibility of liver damage).**

#### **Toxicity**

- 1. Infants and children are more susceptible than adults to vitamin A toxicity.**

- 2. Vitamin A is a teratogen and high doses (more than 10.000 µg retinol) may produce birth defects, even with exposure for 1week in early pregnancy.**
- 3. Pregnant women should avoid excess intake of vitamin A from vitamin A rich foods, such as liver (100 g contains nearly 10.000 µg retinol).**
- 4. Daily dose should not exceed 2500 µg during pregnancy or better replaced by carotenoids (their conversion to Vit. A in the body is tightly regulated, thus carotenoids not produce vitamin A toxicity). Carrots contain carotenoids 40mg/100g.**

**Toxicity manifestation:**

- 1. Headache and blurred vision.**
- 2. Dry skin and lips.**
- 3. Nausea, vomiting and diarrhea.**
- 4. Pigmentation of skin (hypercarotenosis): differentiated from jaundice by the absence of scleral icterus.**
- 5. Retinyl esters appear in the blood and cause membrane lipoprotein damage and altered gene expression.**

**Excessive intake of Vitamin A during pregnancy has been associated with the following birth defects, collectively known as retinoic acid syndrome:**

- Encephalitis.**
- Microcephaly.**
- Craniofacial malformations (most commonly a cleft palate)**
- Cardiovascular malformations (most commonly a transposition of the great vessels)**
- Thymus malformation/dysfunction**