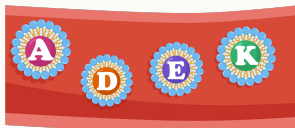



TOPIC: INTRODUCTION TO VITAMINS

What are Vitamins?

- ◆ **Vitamins:** _____, *noncaloric*, *essential* micronutrients important for overall health.
 - Essential even though the body can *inefficiently* synthesize some (e.g. Vitamin D).
 - Only required in _____ amounts.
 - Each has a *vitamin* name & a *chemical* name (e.g. Vitamin B₁ = Thiamin).
 - Vitamin letters & numbers *generally* reflect the _____ of their discovery.
- ◆ There are _____ vitamins that humans need, and they can be divided into 2 categories:

| 1 _____-Soluble Vitamins | 2 _____-Soluble Vitamins |
|---|---|
| <ul style="list-style-type: none">▶ Vitamin A▶ Vitamin D▶ Vitamin E▶ Vitamin K  | <ul style="list-style-type: none">▶ B Vitamins:<ul style="list-style-type: none">- Vitamin B₁- Vitamin B₂- Vitamin B₃- Vitamin B₅- Vitamin B₆- Vitamin B₇- Vitamin B₉- Vitamin B₁₂▶ Vitamin C  |

Note: Most of these vitamins represent _____ of related molecules with the same biological function.

PRACTICE

Which of the following statements best explains the naming of vitamins (A, B₁, B₂, C, D, E, K, etc.)?

- a) Vitamin names were assigned based on their molecular weight and function.
- b) Vitamins were named alphabetically based on the first letter of the food in which they were found.
- c) Vitamins were generally named in the order they were discovered, but some letters & numbers were discarded or reassigned over time.
- d) Vitamin letters and numbers were originally assigned in order of how much we need to consume.

PRACTICE

True or False? If false, select the answer that best corrects the statement:

Vitamins are essential in the diet but are only needed in small amounts compared to macronutrients.

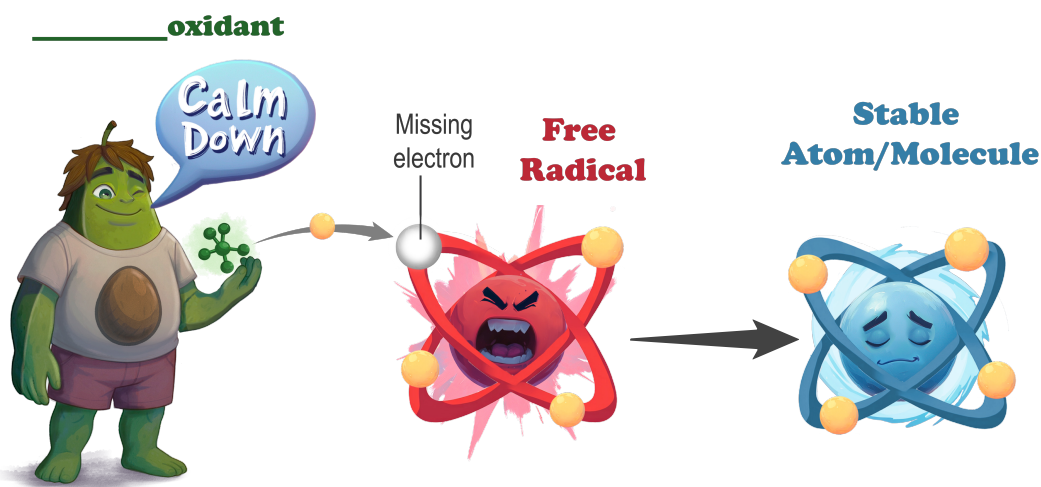
- a) True.
- b) False; you need a large amount of each vitamin because you cannot synthesize most of them yourself.
- c) False; you need a lot of vitamins because they directly provide calories & energy.
- d) False; you need a lot of vitamins because they are very healthy for you & they cannot be overconsumed.

TOPIC: INTRODUCTION TO VITAMINS

Antioxidants

◆ Vitamins E & C and some phytochemicals can function as antioxidants.

- **Antioxidant:** substance that _____ our cells from *oxidation* damage caused by *free radicals*.
- **Oxidation:** chemical process where a substance _____ electrons, potentially producing free radicals.
- **Free Radicals:** highly reactive molecules with unpaired electrons causing *damaging* chain reactions in cells.



PRACTICE

Antioxidants work by _____ free radicals.

- a) Destroying.
- b) Copying.
- c) Stabilizing.
- d) Cooling down.

PRACTICE

Which of the following statements is true?

- a) Phytochemicals can function as antioxidants, helping prevent damage to cell membranes by free radicals.
- b) Vitamins A & D primarily serve as antioxidants.
- c) Free radicals primarily disrupt cell membranes by donating extra electrons.
- d) Oxidation is the chemical process where a substance gains electrons.
- e) All of the above are true.

TOPIC: INTRODUCTION TO VITAMINS

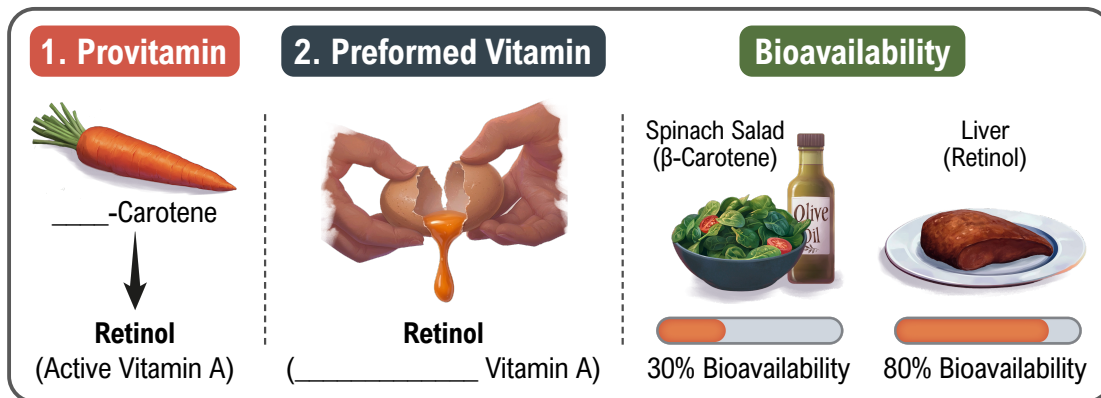
Forms of Vitamins & Bioavailability

◆ Vitamins can be consumed in 1 of 2 different forms:

1. **Provitamin:** _____, unusable precursor that, upon absorption, can be *converted* into an *active* vitamin.
2. **Preformed Vitamin:** already active/usable form of vitamin the body can utilize immediately without conversion.

◆ Regardless of their form, _____ all of the vitamins we consume will be available to be utilized by our bodies.

- **Bioavailability:** the amount of consumed vitamin that is absorbed & available for _____.
- *Provitamins*, *fat*-soluble vitamins, & *plant*-based vitamins are typically _____ bioavailable.



EXAMPLE

A spinach salad contains 4,000 μg of β -carotene (a provitamin A), 30% of which is absorbed in the small intestine. Of this β -carotene that is absorbed, 10% is converted to retinol, the active form of vitamin A that the body can use. A small serving of beef liver contains 4,000 μg of retinol, 80% of which is absorbed by the small intestine. Which of the following statements is true?

- a) The spinach salad provides more retinol because the other 90% of β -carotene can still function as vitamin A.
- b) The spinach salad contains more β -carotene, but the beef liver will provide more useable vitamin A.
- c) Since the spinach salad does not provide preformed vitamin A, it is not considered a source of vitamin A.
- d) Answers b) and c) are both correct.

PRACTICE

What is the difference between provitamins and preformed vitamins?

- a) Provitamins are already in usable form; preformed vitamins need to be converted into an active form.
- b) Preformed vitamins are already in usable form; provitamins need to be converted into an active form.
- c) Preformed vitamins are only found in supplements; provitamins are only found in natural foods.
- d) Provitamins are only found in supplements; preformed vitamins are only found in natural foods.