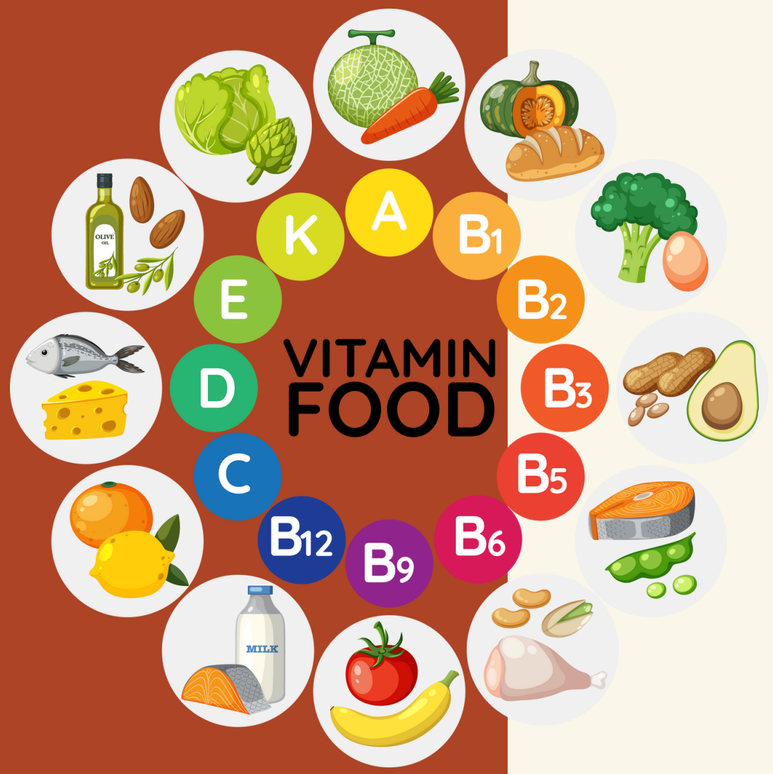

Chapter 2

Chapter 2: Nutrients and Supplements to Anti-Aging

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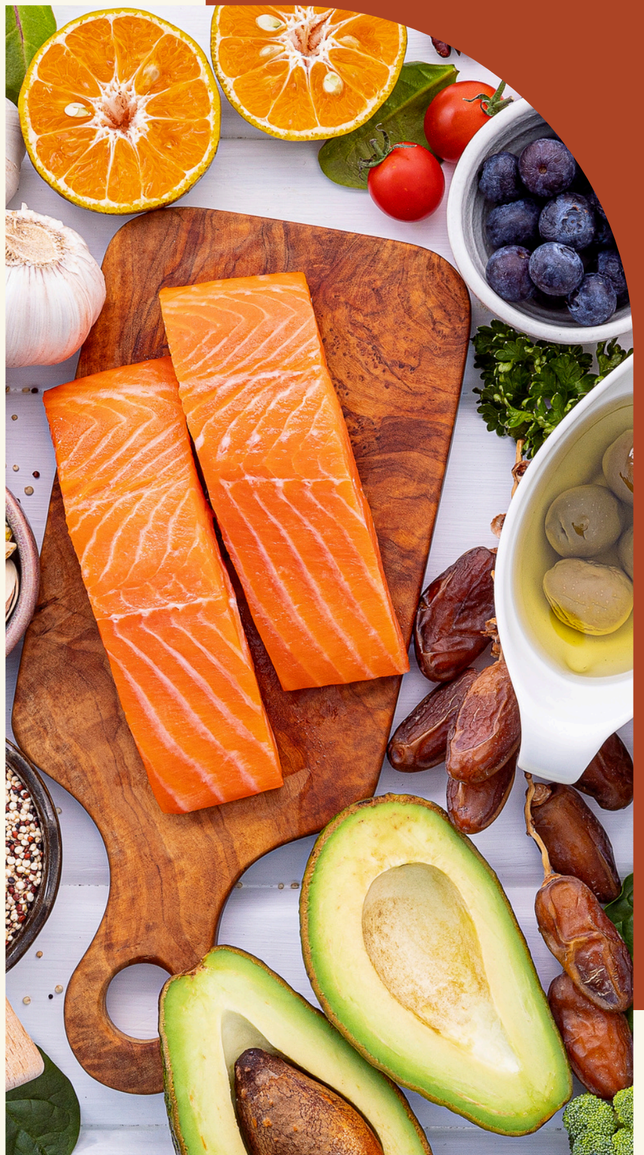
Table Of Content



VITAMINS

What are vitamins?

Vitamins are substances that are important for the body to allow the body to grow and develop normally. Although vitamins are classified as secondary nutrients (micronutrients), which are nutrients that do not provide energy and the body needs to use them in small amounts, they are very important for the body.

Types of vitamins

01

Vitamins can be divided into two main groups.

02

Fat-soluble vitamins include vitamins A, D, E, and K.

Water-soluble vitamins include vitamin C and B complex vitamins.

Vitamin A

Vitamin A (retinol, retinoic acid) is a nutrient important to vision, growth, cell division, reproduction and immunity. Vitamin A also has antioxidant properties. Antioxidants are substances that might protect your cells against the effects of free radicals – molecules produced when your body breaks down food or is exposed to tobacco smoke and radiation. Free radicals might play a role in heart disease, cancer and other diseases.

Vitamin A is found in many foods, such as spinach, dairy products and liver. Other sources are foods rich in beta-carotene, such as green leafy vegetables, carrots and cantaloupe. Your body converts beta-carotene into vitamin A.

Vitamin C

Antioxidants **slow down cell degeneration**. It has good antioxidants that prevent premature cell degeneration. Vitamin C can also enhance the antioxidant effect of vitamin E and beta-carotene.

Nourishes the skin
Vitamin C helps in the production of proteins, collagen and elastin, which are important in increasing the elasticity of the skin to be firm and not wrinkled prematurely.

Strengthen immunity
Helps white blood cells work efficiently. Acts as an Anti-Histamine, building immunity for the body, resisting bacteria, viruses.

Vitamin C

Vitamin C has a saturation point for absorption, which is when the body receives vitamin C to a certain point, the body will not be able to absorb any more and the remaining vitamin C will be excreted.

The body can absorb 15-50% of the amount of vitamin C in one dose, for example, if you take 1,000 milligrams of vitamin C, the body will be able to absorb 150-500 milligrams. It has also been found that taking vitamin C at a high dose at one time will reduce the absorption rate, especially if you take a dose higher than 1,000 milligrams at one time, the absorption rate will be lower than taking vitamin C at a dose of 100-500 milligrams but dividing it into several doses per day.

Vitamin E

Vitamin E is a potent antioxidant that prevents cell damage or reduces organ degeneration caused by free radicals. It also helps protect the cell membranes (stabilize) lining organs such as the skin, eyes, liver, breasts, blood vessels, and red blood cells, allowing these organs to function more efficiently and with greater durability.

Vitamin E is an essential nutrient with powerful antioxidant properties that can help maintain the health of your brain, eyes, skin, and blood cells. You can naturally find vitamin E from food sources such as **almonds, tomatoes, spinach, and olive oil**. A deficiency in vitamin E can lead to nerve pain, vision problems, and even miscarriage.

Astaxanthin

What is Astaxanthin?

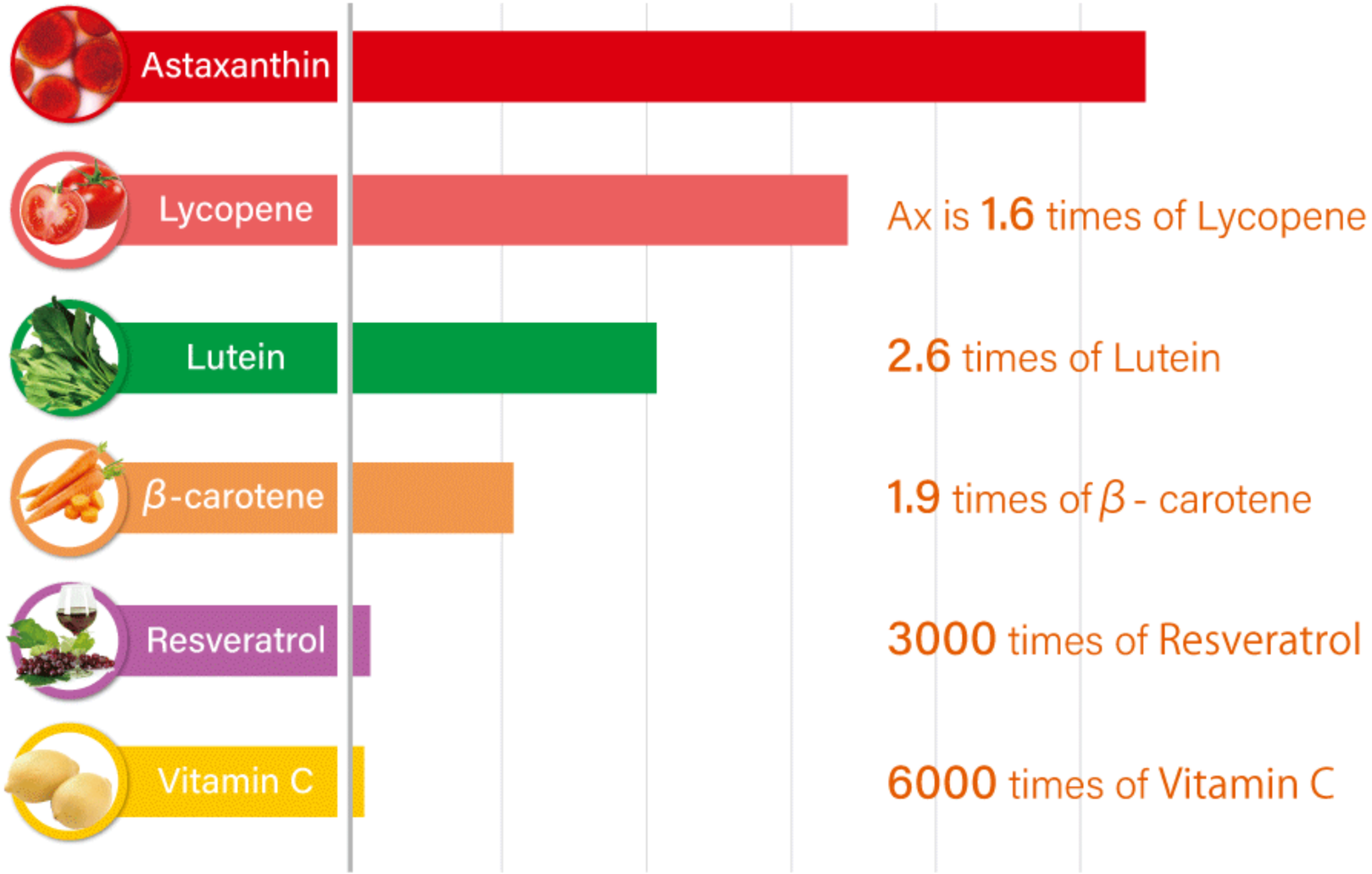
Astaxanthin is one of the carotenoids in nature that gives red or pink color to plants or animals. It has antioxidant properties that help prevent cell damage and oxidation processes that cause wrinkles and premature cell degeneration. It is a substance that is beneficial to the body's health and is used as a dietary supplement to take care of the health of the eyes and heart, reduce inflammation throughout the body, and help with the skin.

Source of Astaxanthin

The natural sources of astaxanthin are algae (Haematococcus pluvialis), yeast, salmon, trout, krill, shrimp and crayfish.

Astaxanthin' s Antioxidant Power

(Singlet Oxigen Quenching Power)



Graph created from Nishida Y, *et al.*, (2007), *Carot Sci.* 11: 16-20.

Daily intake of astaxanthin

The recommended dosage for adults is 4–18 mg per day, taken continuously for no more than 12 weeks. The dosage depends on the desired results. For example, 4 mg per day has been shown to reduce inflammation, while 12 mg per day has been shown to increase antioxidant levels.

Alpha lipoic acid

Alpha lipoic acid (ALA)

Alpha-lipoic acid is an antioxidant made by the body. It is found in every cell, where it helps turn glucose into energy. Antioxidants attack "free radicals," waste products created when the body turns food into energy. Free radicals cause harmful chemical reactions that can damage cells, making it harder for the body to fight off infections. They also damage organs and tissues.

Alpha lipoic acid (ALA)

Other antioxidants work only in water (such as vitamin C) or fatty tissues (such as vitamin E). But alpha-lipoic acid is both fat and water soluble. That means it can work throughout the body. Antioxidants in the body are used up as they attack free radicals. But evidence suggests alpha-lipoic acid may help regenerate these other antioxidants and make them active again.

Several studies suggest alpha-lipoic acid helps lower blood sugar levels. Its ability to kill free radicals may help people with diabetic peripheral neuropathy, who have pain, burning, itching, tingling, and numbness in arms and legs from nerve damage. Researchers believe Alpha-lipoic acid helps improve insulin sensitivity.

Source of Alpha lipoic acid

alpha-lipoic acid. It is also found in red meat, organ meats (such as liver), and yeast particularly brewer's yeast.

Selenium

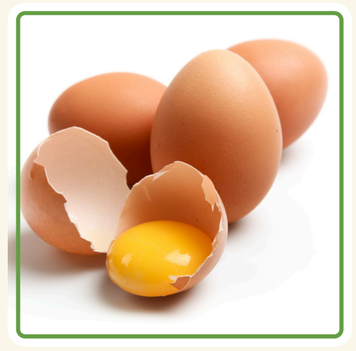
What is Selenium?

Selenium is a trace mineral, which means that the body only needs a small amount of it. It is found naturally in foods or as a supplement. Selenium is an essential component of various enzymes and proteins, called selenoproteins, that help to make DNA and protect against cell damage and infections; these proteins are also involved in reproduction and the metabolism of thyroid hormones. Most selenium in the body is stored in muscle tissue, although the thyroid gland holds the highest concentration of selenium due to various selenoproteins that assist with thyroid function.

sources of selenium

Oysters

Brazil nuts



Eggs

Shiitake mushrooms

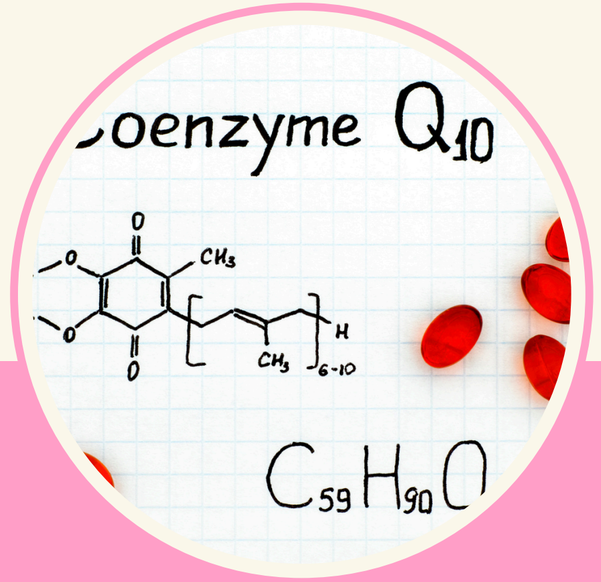
Oatmeal

cereals, grains and vegetables

The amount of selenium in plant-based foods varies depending on the selenium content of the soil in which they were grown.

Coenzyme Q10

Coenzyme Q10



Coenzyme Q10 (CoQ10) is an antioxidant that your body produces naturally. Your cells use CoQ10 for growth and maintenance.

Levels of CoQ10 in your body decrease as you age. CoQ10 levels have also been found to be lower in people with certain conditions, such as heart disease, and in those who take cholesterol-lowering drugs called statins.

Primary dietary sources of CoQ10 include oily fish (such as salmon and tuna), organ meats (such as liver), and whole grains. Most people get enough CoQ10 through a balanced diet, but supplements may help people with particular health conditions (see Uses section), or those taking certain medications (see Interactions section).

Coenzyme Q10

For adults 19 years and older: The recommended dose for CoQ10 supplementation is 30 to 200 mg daily. Soft gels tend to be better absorbed than capsules or other preparations. Higher doses may be recommended for specific conditions.

CoQ10 is fat soluble, so it should be taken with a meal containing fat so your body can absorb it. Also, taking CoQ10 at night may help with the body's ability to use it.

N-Acetyl cysteine

N-Acetyl Cysteine (NAC)

N-Acetyl Cysteine (NAC)

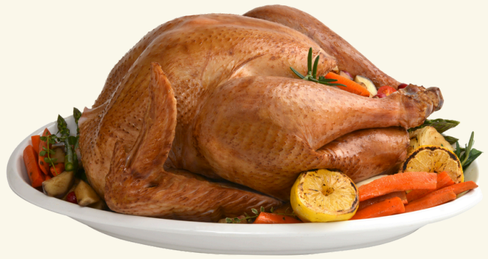
NAC is considered ‘conditionally essential’ because your body can produce it from other amino acids. It becomes essential only when the dietary intake of methionine and serine is low.

Consuming adequate cysteine and NAC is important for various health reasons, including replenishing the most potent antioxidant in your body, glutathione. These amino acids also help with chronic respiratory conditions, fertility, and brain health.

N-Acetyl Cysteine (NAC)

Source of NAC

Cysteine is found in most high protein foods, such as chicken, turkey, yogurt, cheese, eggs, sunflower seeds, and legumes.



N-Acetyl Cysteine (NAC)

N-Acetyl Cysteine (NAC)

Normally, the body has a natural antioxidant, which is gluthathione. The sulfhydryl group of gluthathione can react directly with free radicals. When there is a balance between free radicals and antioxidants, problems will not occur. Gluthathione plays an important role in protecting cells and eliminating toxins and free radicals that occur both inside and outside the body. Gluthathione consists of 3 amino acids: **glutamic acid, glycine, and cysteine**, with cysteine being the amino acid with the smallest amount in cells.

N-Acetyl Cysteine (NAC)

N-Acetyl Cysteine (NAC)

NAC is a drug that has the effect of dissolving phlegm and expelling phlegm. NAC and eliminates toxins and free radicals that are effective in treating many diseases or other disorders. Patients tolerate the drug well and have few side effects. From the study, it was found that the use of NAC to have the effect of eliminating toxins and free radicals should be at least 1,200 mg/day or more.

Lesson Summary and Application

- **Clinical Care and Health Promotion**

Students can apply their understanding of anti-aging nutrients in **advising patients on lifestyle and dietary choices** that may help delay the onset of chronic diseases.

- **Patient Education**

With scientific knowledge about Coenzyme Q10, vitamins, and antioxidants like astaxanthin, students will be better equipped to **explain the benefits and appropriate use of dietary supplements to patients—especially older adults** seeking to maintain their vitality.

Thank you!