

VITAMINS: CHEMICAL PROPERTIES AND DEFICIENCY CONDITIONS

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Annotation. This article discusses the chemical structure of vitamins, their solubility in water and fats, their biological importance in the human body, and their role in metabolic processes. Each type of vitamin is examined individually, including their chemical properties, synthesis, and storage conditions. Furthermore, the article elaborates on pathological conditions associated with vitamin deficiencies—such as hypovitaminosis and avitaminosis—their clinical signs and consequences. The article is of significant importance in preventing health issues related to vitamin deficiencies and serves as a useful source for researchers in the fields of medicine and biology, as well as for practicing professionals.

Keywords: chemical properties, water-soluble vitamins, fat-soluble vitamins, hypovitaminosis, avitaminosis, vitamin deficiency, biochemical role, body functions, nutrition, health problems, metabolic processes.

Introduction

Vitamins are organic substances that are consumed in small amounts and are essential for the body's normal development and functioning. They play an important role in regulating various chemical processes in the body, including enzymatic reactions and metabolic activities. As biologically active compounds, vitamin deficiencies or absence can lead to various negative effects, diseases, and functional disorders.

Based on their chemical structure and solubility, vitamins are divided into two main groups: **water-soluble** and **fat-soluble** vitamins. Water-soluble vitamins, such as vitamin C and the B-complex group, are quickly absorbed in the body and rapidly eliminated, which is why they need to be consumed regularly through food.

Main Body

1. Types of Vitamins and Their Chemical Properties

Vitamins are classified into two main groups: **water-soluble** and **fat-soluble** vitamins.

Water-soluble vitamins: These vitamins are not stored in the body and are quickly excreted, so they must be taken regularly. They function as coenzymes and are involved in many metabolic processes. The most well-known water-soluble vitamins include:

Vitamin C (Ascorbic acid): Acts as an antioxidant, protecting cells from oxidative damage, supports the immune system, and promotes wound healing.

B-complex vitamins (B1, B2, B3, B6, B9, B12): Play a vital role in energy production and the functioning of the nervous system.

Fat-soluble vitamins: These vitamins are stored in fatty tissues and can remain in the body for a long time. Fat-soluble vitamins include:

Vitamin A (Retinol): Supports the visual system and skin health, and enhances immune system function.

Vitamin D: Aids in the absorption of calcium and phosphorus, contributing to bone health.

Vitamin E: Functions as an antioxidant and protects cells in the body.

Vitamin K: Regulates blood clotting and helps manage bleeding and coagulation processes.

2. The Role of Vitamins in the Body

Vitamins play a vital role in many physiological processes. Their main functions include:

Supporting enzymatic activity: Vitamins act as coenzymes and accelerate various chemical reactions, ensuring efficient metabolism.

Strengthening the immune system: Vitamins help defend the body against infections. For example, vitamin C supports immune health.

Cell growth and repair: Vitamins are essential for cell division and growth, as well as for accelerating recovery after injury or illness.

Energy production: B-complex vitamins support the body's energy production processes.

3. Vitamin Deficiency and Its Negative Effects

Vitamin deficiencies can lead to various health problems and impair the normal functioning of the body. Each vitamin deficiency affects specific chemical processes, including enzymatic reactions and metabolic activities. As biologically active substances, the lack or

absence of vitamins can cause negative effects, diseases, and functional disorders, with associated symptoms and medical conditions.

Vitamins are organic compounds essential for the body's proper development and functioning. Based on their chemical structure and solubility, they are classified into two main groups: water-soluble and fat-soluble. Water-soluble vitamins, like vitamin C and the B-complex, are quickly absorbed and eliminated from the body, so they must be regularly consumed with food.

Conclusion

Vitamins are essential nutrients necessary for the normal growth and function of the body. They participate in regulating various metabolic processes, support cell growth, energy production, immune function, and other important physiological activities.

Because vitamins are either water- or fat-soluble, their storage and usage in the body differ. Vitamin deficiencies can result in numerous health issues, such as **blindness, rickets, beriberi, pellagra**, and other diseases. These conditions usually arise due to insufficient intake or poor absorption of vitamins.

Therefore, it is important to maintain a balanced diet, consume vitamin-rich foods, and, when necessary, use supplements to ensure adequate vitamin intake. Vitamins are vital for the body's normal functioning, and their consistent and balanced consumption forms the foundation of a healthy lifestyle. Understanding the chemical properties of vitamins and their role in the body helps prevent deficiencies and allows for timely health interventions.

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