

The research progress of vitamins nutrition fortifier

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ABSTRACT

Nutrition enhancer has an important significance for the view of national economy to improve the national nutritional status. Nutrition enhancer of vitamin are what natural or synthetic food additives add in food to strengthen the nutrition. In this study, research progress of nutrition enhancer in food is reviewed, including Vitamin A, Vitamin B, Vitamin C. Comparing with mechanisms, extraction methods, synthetic methods, detection methods and security respectively, this paper will provide a reference on all kinds of vitamins nutrition enhancer for researchers in order to keep food security effectively.

Keywords : food; nutrition enhancer; vitamin; detection; security

1 INTRODUCTION

Vitamin is an indispensable trace components to human body. It is an important method to decrease malnutrition rates of proteins or prevent the hypovitaminosis by adding vitamins nutritional fortifier[1]. Vitamin A deficiency is one of The world's four big deficiency disease, and the data indicates that lack of vitamin A of the world's lead to 1.0-2.5 million deaths a year. Majority of vitamin will not synthetic by body or rarely content in natural food, so the use of vitamins nutritional fortifier has realistic significance and economic significance. Our country is the one of the contries which can produce all types of vitamins, also is the world's largest vitamin products production and exporter. In recent years, scholars at home and abroad[2-3] do more researches on its function, extraction or synthesis methods. The review of the author provides references for other scholars.

2 VITAMINS NUTRITIONAL FORTIFIERS

Vitamins are divided into water-soluble vitamins and fat-soluble vitamins. It participates in the metabolism of the body but do not provide energy. Since discovered and used in the 19th century, it is more and more brought to the attention of the relevant researchers. In recent years, scholars at home and abroad have more researches on synthetic method, test method, strengthening effect, etc.

2.1 Vitamin A nutritional fortifiers

Belongs to the fat-soluble vitamin, vitamin A is the earliest discovered vitamins nutrition fortifier. Vitamin A deficiency is a major cause of leading night blindness affirmed on the inter-nation in 1920, which puts forward in human metabolism. The mechanism [4] is that vitamin A in organism internal energy into 11- cis - retinaldehyde, which combined opsin into protein rhodopsin, and the human sensitivity to weak light depends on the concentration of the rhodopsin. And studies have shown that vitamin A nutritional fortifiers participate in the synthesis of osteoblast and osteoclast differentiation and bone

cells. Domestic scholars Guo Chenfeng [5] et al will add Vitamin A into baby food by minimal particle liposomes, and let the baby who are lack of vitamin A eat. Results showed that the particle size is an important factor that affect vitamin A nutritional fortification.

The preparation of vitamin A liver oil extraction method has been adopted, which has low extraction efficiency and complex process, so its synthetic methods becomes hotspot in recent years. Academics have applicated allene acetate as intermediates, prepared vitamins from ethynyl - inverse- alpha-violet alcohol[6]. And a patent prepared vitamin A by β - ionone via Darzens condensation reaction[7]. Vitamin A is extremely unstable and will not absorpt by human body directly, so researches on stability and absorbent have a vital significance in the future.

2.2 Vitamin B nutritional fortifiers

Majority of vitamin B-complex are water soluble vitamin, the existing main kind of vitamin B nutrition fortifiers include vitamin B2, vitamin B3.

2.2.1 Vitamin B2 nutritional fortifiers

Vitamin B2 is called riboflavin, which belongs to water-soluble vitamin, and is the most widely exist vitamins in nature. It was found in 1879 and successfully extracted 50 years later by American scientists. Its mechanism is that vitamin B2 exists with flavin adenine dinucleotide (FAD) and flavin mononucleotide (FMN) in the body, they participant in metabolism by carbohydrate, protein, nucleic acid and fat in the body, and mainly have effect on hydrogen. They are essential nutrients of tissue metabolism and repair, and they can improve the utilization rate of the body for protein in order to promote the growth and development. Vitamin B2 is non-toxic, and will not accumulate in human body. Mild-to-moderate deficient will suffer from iron deficiency anemia, while severe cases are often accompanied by other B vitamins deficiency symptoms. It is fluorescence that we usually use to detection vitamin B2. Preparation of vitamin B2 will typically has three kinds, respectively are microorganism fer-

mentation, chemical synthesis and half chemical synthesis [8]. Some scholars put forward a new preparation [9], they add calcium chloride, sodium hydrogen phosphate and sodium polyacrylate to flocculation in vitamin B2 fermented liquid, and join hydrogen peroxide for crystallization after filtration. After the examination, the extraction rate of vitamin B2 reaches 85% ~ 87% and product purity could reach 98% ~ 100%. Dong Yonggang [10] put forward a extraction specially suitable for grain of vitamin B2, the method has a better condition for preparation of vitamin B2 and increases the extraction of vitamin B2 in object.

2.2.2 Vitamin B3 nutritional fortifiers

Vitamin B3 is called niacin, which is also known as vitamin PP, and is a water-soluble vitamin. Its mechanism is that [11] vitamin B3 is converted into niacinamide, which participates in the metabolism of lipid and tissue respiration oxidation and anaerobic decomposition, and is one of the essential vitamins our bodies need. Vitamin B3 toxicity is very small and will not accumulate in human body, people will get pellagra result in lacking vitamin B3, delirious when serious, and even dementia. Redistribution of national standard in 2010 (GB 14757-2010) pointed out that nicotinic acid detection method in food is infrared spectrum identification method. Industrial production of vitamin B3 are ammonia oxidation and nitric acid oxidation method. Domestic scholar Zhang Shurong [12] made vitamin B3 successfully by 3-cyanopyridine hydrolysis synthesis and improved the purity of vitamin B3 to a great extent. Vitamin B3 is stable and little loss in food, and is suitable added in many foods as a nutrition enhancer. But vitamin B3 absorption in the human body is different from person to person, therefore, how to better absorb vitamin B3 is one of the future research direction.

2.3 Vitamin C nutritional fortifiers

Vitamin C is called ascorbic acid and belongs to water-soluble vitamin. Hungary biologists isolated vitamin C from bovine adrenal gland in the lab for the first time. Its mechanism is that Vitamin C is absorbed by the human small intestine segment, and distributed to all body structure of water-soluble, after that it participated in hydroxylate and REDOX reaction in the human body. Vitamin C is minimal toxicity and will not accumulate in human body, and excessive diarrhea occurs. The deficiency of vitamin C is susceptible to scurvy, life threatening when serious. Domestic and foreign scholars showed that vitamin C can delay aging and make skin more elastic [13]. Detection method of Vitamin C in food is direct iodine quantity method [14]. Electrochemical method is a kind of new method put forward in recent years [15], which needs simple device structure, convenient operation and high accuracy. Domestic scholars Wang Xinxing [16] detect in colorimetric method, which has a good application prospect analysis. The stability of vitamin C in different food is not the same, the components of food, packing types and storage conditions are the main factors influencing the stability.

3 CONCLUSION

Vitamins nutrition fortifier is nutrient elements human body need, the use of it is of great significance to the health of human beings. The author reviews the development, mechanism and synthetic methods of Vitamin A nutritional fortifiers, Vitamin B nutritional fortifiers, Vitamin C nutritional fortifiers and Vitamin D nutritional fortifiers. But it has less researches in food safety, the author puts forward to research in the following several ways in the future. Part of the fat-soluble vitamins can accumulate in human body and we should pay more attention to safety; some vitamins are not stable and the stability need to be researched in the process of preservation; some vitamin nutrition fortifiers usage and dosage in different food have no clear specification.

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