Nutraceuticals: Sources, Delivery & Function

Introduction

A. General Purpose/Uses of Nutraceuticals

Nutraceuticals provide dietary supplementation. They are intended to provide health benefits by fulfilling daily nutrient requirements (Scheme 1).\(^1\) Tens of billions of dollars are spent annually on these supplements in the United States. It is estimated that half of all Americans take a daily multivitamin, a type of nutraceutical.\(^2\) Despite such prominent use, consumers may not understand how these supplements work. Food and nutrition literacy describes how well people understand the nutrition information. A correlation exists between food and nutrition literacy and overall health status. Nutritional information is complex and poorly understood by consumers.\(^3\)

Therefore, consumers may not comprehend the benefits, or lack thereof, of nutraceuticals they consume. Multivitamins have been marketed as having some health benefits, but research supporting these claims is lacking. The literature does not show a link between multivitamin intake and cardiovascular health. However, further research is needed to determine if there is an association between multivitamin intake and other conditions.\(^4\) Consumers must understand food and nutritional information and how nutraceuticals impact their health.

Scheme 1. Nutraceuticals Provide Health Benefits

B. General Types of Nutraceuticals

Major types of nutraceuticals include vitamins, antioxidants, and oils and fatty acids (Scheme 2). Vitamins are nutrients the body needs in small amounts to maintain good health.\(^1\) They can be
attained from a variety of sources such as foods, or may be synthesized by your body. An example of a vitamin is Vitamin D—a fat soluble compound involved in maintenance of blood and bone calcium levels. Vitamin D promotes normal mineralization of bones and is needed for bone growth. Insufficient Vitamin D may lead to thinning of bones. Adequate Vitamin D and calcium intake protects adults from osteoporosis. Vitamin D is found in very few foods. Exposure to UV rays causes your body to synthesize Vitamin D.\(^5\) The second type of nutraceuticals, antioxidants, are compounds that scavenge free radicals produced by cellular metabolism in your body. Free radicals damage DNA, RNA, proteins, and lipids. Antioxidants also regulate enzymes that produce free radicals.\(^6\) One example of an antioxidant is Vitamin C. This compound can be acquired from a variety of fruits and vegetables. Many foods and beverages also have some Vitamin C added to them.\(^6\) Oils and fatty acids are the third type of nutraceuticals. These are typically polyunsaturated fatty acids. Omega-3 fatty acids are an example of this class of nutraceuticals. The body does not produce these compounds, so all omega-3 fatty acids must be attained from diet or supplementation. Omega-3 fatty acids are found in leafy green vegetables, vegetable oils, and fish oils. Benefits associated with omega-3 fatty acids include decreased triglyceride and very low density lipoprotein levels. They may also improve brain performance and cardiovascular health.\(^7\) Each class of nutraceuticals include many
different compounds—the structures of three of the aforementioned examples are shown in Scheme 3.

Scheme 3. A: Ascorbic Acid (Vitamin C, Antioxidant); B: Cholecalciferol (Vitamin D₃); C: Eicosapentaenoic Acid (omega-3-Fatty Acid, Oil)

Three major terms define nutrient intake: recommended daily amount (RDA), adequate intake (AI), and upper limit (UL). RDA is defined as the daily amount of nutrient needed for adequate nutrition. This value varies based on one’s age, sex, and health condition. AI is defined as the approximate nutrient level associated with adequate nutrition. This value is used when RDA has not been determined. UL is defined as the highest level of a nutrient that can be tolerated without adverse effects.⁸

C. Statement of Need and Outline of Approach

Materials & Methods

Results

Discussion

Conclusion

References


