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Review

Vitamin E: An overview of major research directions

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Abstract

During the last 90 years since the discovery of vitamin E, research has focused on different properties of this molecule, the focus often depending on the specific techniques and scientific knowledge present at each time. Originally discovered as a dietary factor essential for reproduction in rats, vitamin E has revealed in the meantime many more important molecular properties, such as the scavenging of reactive oxygen and nitrogen species with consequent prevention of oxidative damage associated with many diseases, or the modulation of signal transduction and gene expression in antioxidant and non-antioxidant manners. Research over the last 30 years has also resolved the biosynthesis and occurrence of vitamin E in plants, the proteins involved in the cellular uptake, tissue distribution and metabolism, and defined a congenital recessive neurological disease, ataxia with vitamin E deficiency (AVED), characterized by impaired enrichment of α -tocopherol in plasma as a result of mutations in the liver α -tocopherol transfer gene. This review is giving a brief

Abbreviations: AVED, ataxia with vitamin E deficiency; CEHC, carboxyethyl hydroxymethoxychroman; LDL, low density lipoproteins; MDT, marine derived tocopherol; PKC, protein kinase C; SPF, supernatant protein factor; TAP, tocopherol associated protein; TBP, tocopherol binding protein; α -TTP, α -tocopherol transfer protein; α -TOS, α -tocopherol succinate; α -TEA, α -tocopherol oxyacetic acid; VLDL, very low density lipoproteins.

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introduction about vitamin E by following the major research directions since its discovery with a historical perspective.

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Keywords: Vitamin E; Tocopherol; Tocotrienol; History; Antioxidant; Non-antioxidant; Gene expression; Signal transduction

Contents

1. Introduction	401
2. Discovery of vitamin E	401
3. Research on the chemical structure of vitamin E	402
4. Research on the biosynthesis of vitamin E in plants	403
5. Research on the chemical properties of vitamin E	405
6. Research on the cellular uptake, transport and tissue distribution of vitamin E	406
7. Research on the metabolism of vitamin E	407
8. Research on cellular effects of vitamin E	408
9. Research on vitamin E analogues	409
10. Research on health benefits of vitamin E	410
References	413

1. Introduction

During the last almost 90 years since its discovery, research on vitamin E has focused on different properties of this molecule, the focus often depending on the specific techniques and scientific knowledge present at each time. For giving a brief overview and introduction about vitamin E for this special issue of “*Molecular Aspects of Medicine*”, it is therefore most convenient to follow the major research directions with a historical perspective (Fig. 1 and Table 1).

2. Discovery of vitamin E

Vitamin E has been discovered as “factor X” by Evans and Bishop while investigating dietary factors that are essential for reproduction in rats (Evans and Bishop, 1922). Similar experiments were performed by Sure, who then called the substance “vitamin E” (Sure, 1924). At about the same time Mattill and Conklin investigated whether milk represents a “perfect food”, and they came to the conclusion that milk may contain a substance that inhibited reproduction (Mattill and Conklin, 1920). Notably, the diet given in these experiments usually contained relatively high amounts of lard (10–22%), and Mattill later proposed that fats from animal sources are susceptible to auto-oxidation (Mattill, 1927).

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