

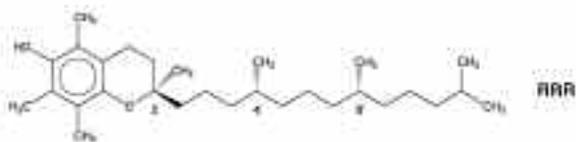
# NATURAL VS. SYNTHETIC

## HERE IS THE DIFFERENCE

### THE CHEMICAL DIFFERENCE

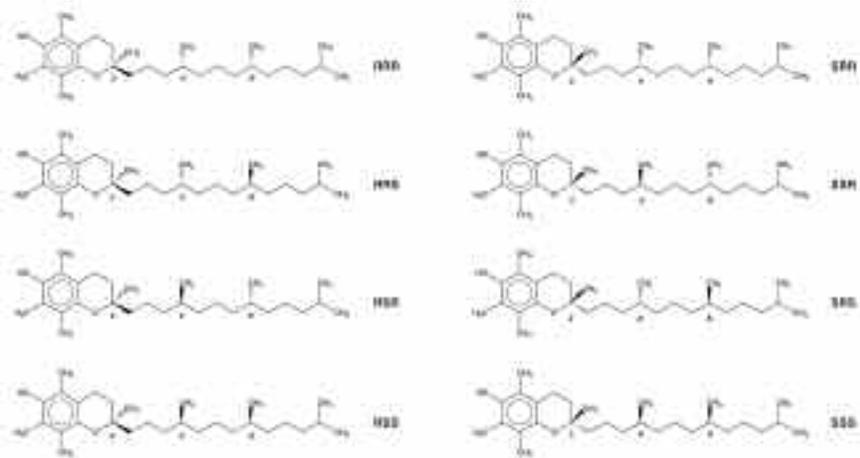
Novatol™ natural-source vitamin E is derived from corn, canola, sunflower, and primarily, soybean vegetable oils.

The vitamin E found in nature is commonly known as d-alpha-tocopherol or RRR-alpha-tocopherol. The succinate and acetate esters of natural-source alpha-tocopherol are also available.



*This is the only natural alpha form of vitamin E*

Synthetic vitamin E (commonly referred to as dl-alpha-tocopherol or all-rac-alpha-tocopherol) is a mixture of eight alpha-tocopherol stereoisomers in equal amounts. Only one of the stereoisomers, 12.5% of the total mixture, is RRR-alpha-tocopherol, the natural form. The remaining seven stereoisomers have different molecular configurations due to the manufacturing process.



<sup>1</sup>2000 Institute of Medicine Dietary Reference Indicates for Vitamin C, Vitamin E, Selenium, and Carotenoids, Chapter 6. NAP, Washington, DC.

### DIFFERENCES IN EFFECTIVENESS

Most vitamins manufactured via a synthetic process have the same molecular configuration as the form that occurs in nature. Consequently, these synthetic vitamins are truly identical to and can be substituted for the natural form with no loss of potency or efficacy.

This relationship does not hold true for vitamin E. As shown in the accompanying diagram, eight different structures result from the synthetic manufacture of vitamin E. These differences in molecular configuration affect how well the vitamin is retained in the body and, in turn, its biological availability.<sup>1</sup>



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# NATURAL VS. SYNTHETIC

## NUMEROUS STUDIES SUPPORT THE FOLLOWING DIFFERENCES BETWEEN NATURAL-SOURCE AND SYNTHETIC VITAMIN E

- Both natural-source vitamin E and synthetic vitamin E are absorbed well in the body. However, after absorption, a protein in the liver recognizes only the naturally occurring forms, such as d-alpha-tocopherol.<sup>1,3</sup> As a result, the unrecognized forms of synthetic vitamin E are preferentially excreted.<sup>4</sup>
- The body's ability to recognize only the natural form of vitamin E gives natural-source d-alpha-tocopherol a bioavailability of approximately twice that of the synthetic form.<sup>5,6</sup> To compensate for the lower retention of synthetic vitamin E, a person would have to ingest twice the amount of synthetic vitamin E (by weight) to match the bioequivalence of the natural form.
- Pregnant women transfer natural-source vitamin E to their babies approximately three times more efficiently than synthetic vitamin E.<sup>5</sup>
- ADM's Novatol™ natural-source vitamin E products parallel the vitamin E found in our food supply. They are available either as d-alpha-tocopherol or a mixture of all four d-isomer tocopherols (alpha, beta, gamma, delta) found in nature. Even though d-alpha-tocopherol has the highest biological activity of the four, recent studies indicate beta-, gamma-, and delta-tocopherols may have benefits that were previously unknown.<sup>6</sup> Synthetic vitamin E is presently available only as alpha-tocopherol.

### THE NATURAL ADVANTAGE

A number of recent studies have shown significant differences between natural-source and synthetic vitamin E. They have also shown that natural-source vitamin E is more efficiently retained by the body than its synthetic counterpart. Simply put, the human body has a preference for natural-source vitamin E over synthetic vitamin E.

ADM produces only Novatol™ natural-source vitamin E. In fact, ADM is the world's largest producer of natural-source vitamin E. Using resources like our people and market perspective, we are dedicated to providing natural-source products for customers worldwide. You can be assured that ADM produces only the highest quality natural-source vitamin E.

*For further information,  
please contact  
ADM Natural Health and Nutrition  
4666 Faries Parkway  
Decatur, IL 62526  
USA  
Telephone: 217-424-5387  
Fax: 217-451-4510  
E-mail: [nutrition@admworld.com](mailto:nutrition@admworld.com)*

*P.O. Box 2  
1540 AA Koog aan de Zaan  
The Netherlands  
Telephone: +31 75 64 64 861  
E-mail: [ingredients@admworld.com](mailto:ingredients@admworld.com)*

*Web site: [www.admworld.com](http://www.admworld.com)*

<sup>2</sup> *Biokinetics of and discrimination between dietary RRR- and SRR-alpha-tocopherols in the male rat. Lipids 1987;22:163-172.*

<sup>3</sup> *Human plasma and tissue alpha-tocopherol concentration in response to supplementation with deuterated natural and synthetic vitamin E. Am J Clin Nutr 1998;67:669-683.*

<sup>4</sup> *Synthetic as compared with natural-source vitamin E is preferentially excreted as alpha-CEHC in human urine: studies using deuterated alpha-tocopheryl acetates. FEBS Lett. 1998;437:145-148.*

<sup>5</sup> *Vitamin E underestimated as an antioxidant. Redox Rep. 2004;9:249-254.*

<sup>6</sup> *Transport of deuterium-labeled tocopherols during pregnancy. Am J Clin Nutr. 1998;67:459-464.*