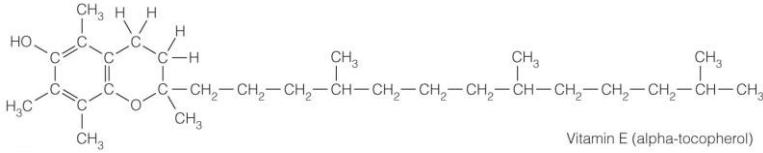


# Vitamina E – Tocoferol

(Tokos: parto / Feros: sostener)



Vídeos del Mooc de la Universidad de Wageningen (Holanda)

[Nutrition and Health: Micronutrients and Malnutrition](#)

<https://courses.edx.org/courses/course-v1:WageningenX+NUTR102x+2T2017/course/>

Metabolism and functions of vitamin E

[https://youtu.be/zuVTP\\_Qs3bw](https://youtu.be/zuVTP_Qs3bw)

Scientific Opinion on Dietary Reference Values for vitamin E as  $\alpha$ -tocopherol, EFSA, 2015

<http://www.efsa.europa.eu/en/efsajournal/pub/4149>

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# Vitamina E



Vitamin E functions as an antioxidant. By donating electrons to electron-seeking compounds (oxidizing agents), it neutralizes their action. One group of electron-seeking compounds, known as free radicals, can cause widespread destruction, both to cell membranes and to DNA. Vitamin E is one of several components in the body's defense system against oxidizing agents, which reduces damage to cells. Vitamin E is plentiful in plant oils. The more plant oils one consumes, the more vitamin E one needs, but this need is usually met by the same plant oils. To date, the use of megadose supplements of vitamin E by healthy adults to limit cardiovascular disease and cancer risk in people at high risk has not shown to be effective in most major trials.

[http://highered.mheducation.com/sites/0072287845/student\\_view0/chapter9/chapter\\_summary.html](http://highered.mheducation.com/sites/0072287845/student_view0/chapter9/chapter_summary.html)

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## Vitamin E – Snapshot

### SNAPSHOT 7-3

#### Vitamin E

DRI Recommended Intake  
Adults: 15 mg/day

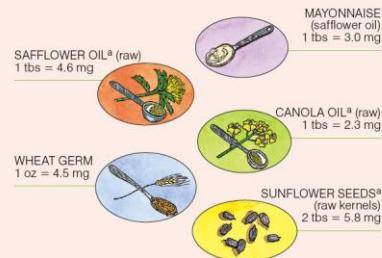
Tolerable Upper Intake Level  
Adults: 1,000 mg/day

**Chief Functions**  
Antioxidant (protects cell membranes, regulates oxidation reactions, protects polyunsaturated fatty acids)

**Deficiency**  
Red blood cell breakage, nerve damage

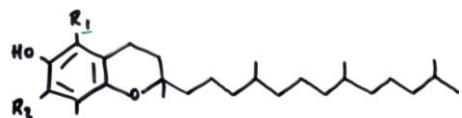
**Toxicity**  
Augments the effects of anticoagulation medication

#### GOOD SOURCES\*

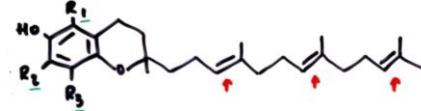


Sizer/Whitney, Nutrition: Concepts & Controversies, 2010

## Vitamina E – Vitámeros



Tocoferoles



Tocotrienoles

#### Tocotrienoles

Actividad  
20% —  $\alpha$  —  
5% —  $\beta$  —  
Inactivos — Resto

#### $R_1$

#### $R_2$

#### $R_3$

	$\alpha$	$\beta$	$\gamma$	$\delta$	otros
Actividad	20%	—	—	—	—
	$\alpha$	$\beta$	$\gamma$	$\delta$	otros
	$CH_3$	$CH_3$	$CH_3$	$CH_3$	

#### 8 Tocoferoles

#### [%]

#### Actividad

$\alpha$  — 90 % — 100

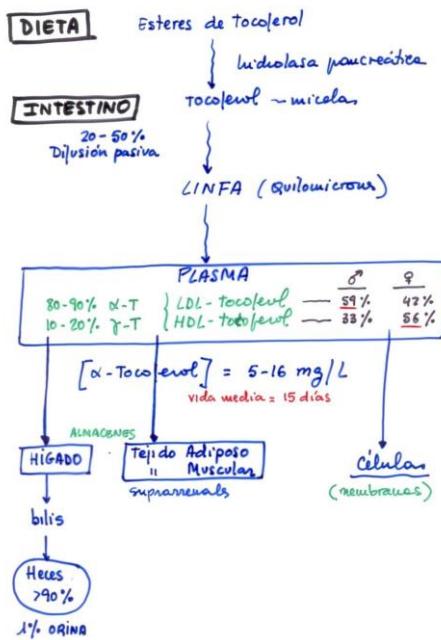
$\beta$  — 30 —

$\gamma$  — 15 —

$\delta$  —  $>$  casí inactivos —

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## Vitamina E – metabolismo



- Absorbed with **bile** and micelles
- Into **chylomicrons** → **lymph** → **blood** → liver
- 90% vitamin E stored in **Adipose** tissue

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## Vitamina E - Funciones

### Principal Antioxidante liposoluble de las células

(junto con: Glutation peroxidasa, Catalasa, Superóxido dismutasa)

- Protege AGP, vitamina A, LDL

### Mantiene el funcionamiento de los sistemas nervioso e inmune



#### Estabilización de membranas:

- α-tocoferol forma parte de todas las membranas
- Protege de la peroxidación (AGP)
- Forma complejos con residuos araquidónicos

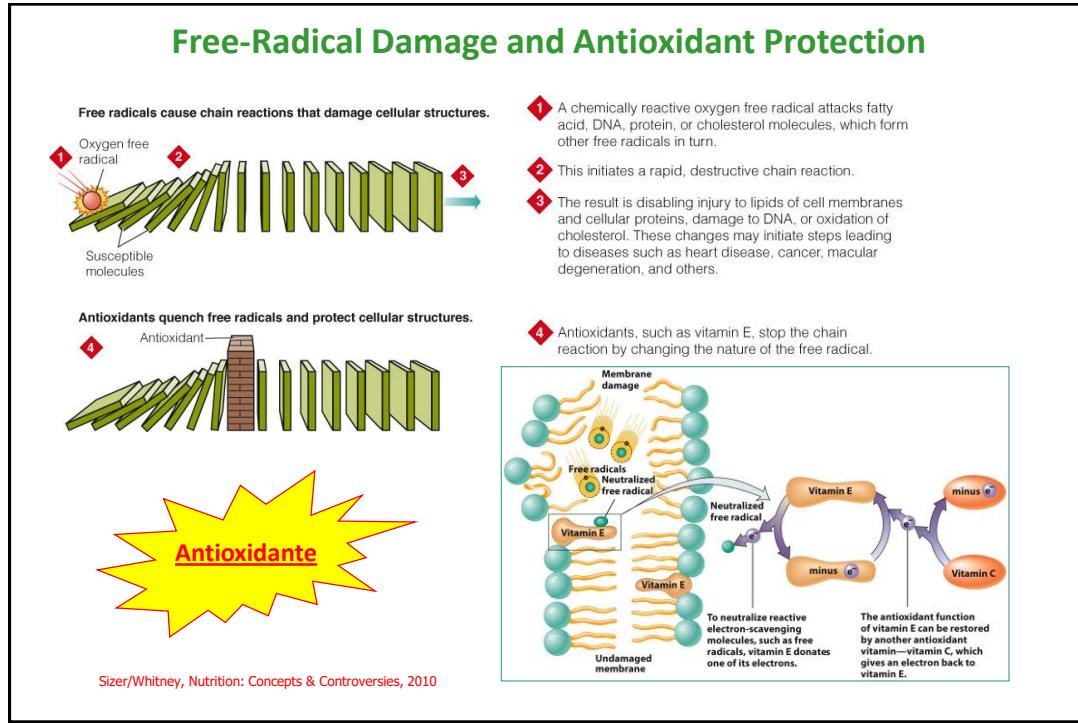
#### Antiagregante plaquetario:

- Inhibe síntesis de prostaglandinas (Tromboxano A<sub>2</sub>)
- Mantiene la permeabilidad de la membrana

#### Protege de la hemólisis:

- Deficiencia vit. E → membrana + frágil (oxidación)

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## Vitamina E - Funciones

### Actividades enzimáticas:

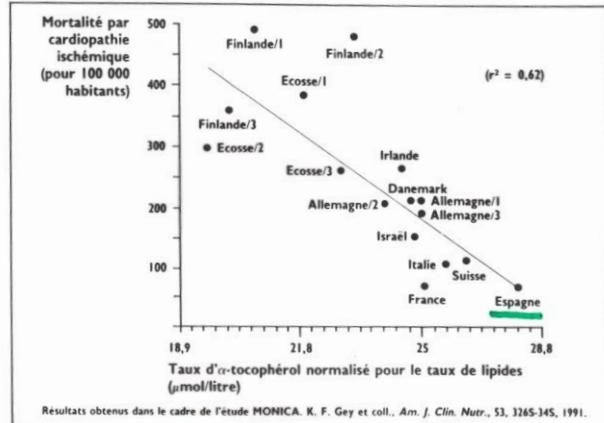
- Síntesis de enzimas
- Protege a los enzimas de la oxidación
- Impide la salida de enzimas (manteniendo la integridad de la membrana)

### En 1975 → se empieza a estudiar su papel en la prevención de enfermedades crónicas:

- ECV: Antioxidante de LDL (estudio MONICA) (reduce peroxidación de lípidos de membrana, de LDL, inhibe proliferación de células de músculo liso y agregación plaquetaria)
- Cáncer:
  - Inhibe la formación de mutágenos
  - Estimula la respuesta inmune
  - Antioxidante
- Inmunidad
- Cataratas
- Parkinson, Alzheimer, .....

## MONICA: MONItoring CArdiovascular disease

Corrélation entre la mortalité coronarienne et les taux plasmatiques de vitamine E

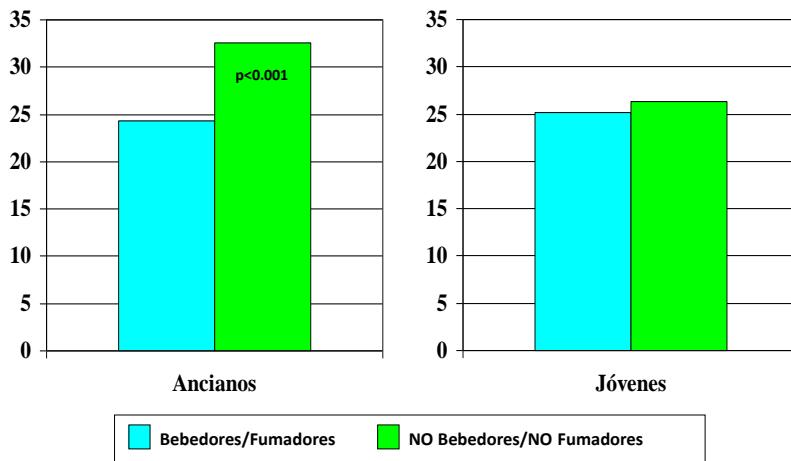


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## Consumo de alcohol y tabaco y α-tocoferol ( $\mu\text{mol/L}$ )

SENECA. Estudio de cohortes longitudinal. 2600 personas europeas (>70 años)  
(Moreiras y Carbajal, 1994)

Moreiras O, Carbajal A. Antioxidant vitamin intake of the Spanish population. The influence of smoking and alcohol on the status of two age groups. Bibliotheca Nutritio et Dieta 1994;51:150-156.



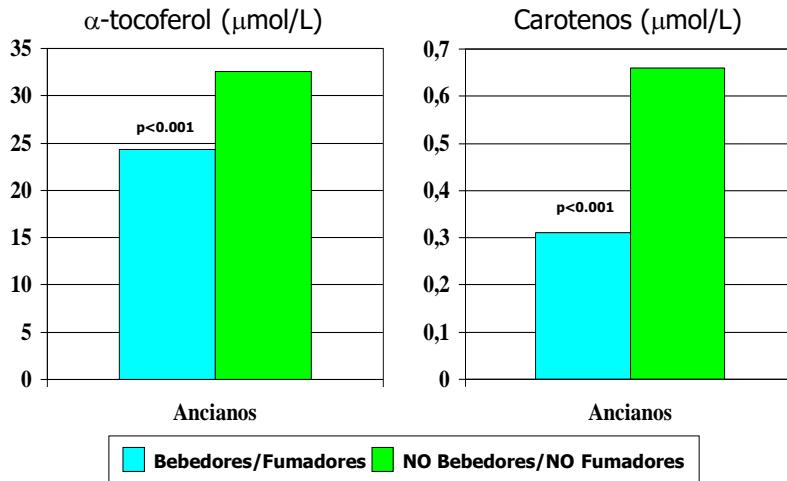
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## Consumo de alcohol y tabaco y status de antioxidantes

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## Vitamina E (mg/100 g parte comestible)



Ingestas recomendadas: 10-12 mg/d (adultos)

Ingesta en España: 13.3 mg/d

79% de aceites vegetales

7% hortalizas

Vit E/AGP = 0,67



En la dieta la relación debe ser:  
Vitamina E (mg) / AGP (g) > 0,4

Moreiras O, Carbajal A, Cabrera L, Cuadrado C. *Tablas de composición de alimentos. Guía de prácticas.* Ediciones Pirámide (Grupo Anaya, SA). 19ª edición revisada y ampliada. 2018. ISBN: 978-84-368-3947-0.

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## Vitamina E – deficiencia

### Poco frecuente

- Alteraciones hematológicas (Hemólisis de GR)
- Anemia hemolítica (prematuros)
- Alteraciones neuromusculares
- Alteraciones oculares
- Mayor riesgo de enfermedad crónica

### Epidemiología

- Menor aporte o bajas reservas
- Menor absorción

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### Cuidado con suplementos!!

#### Meta-Analysis: High-Dosage Vitamin E Supplementation May Increase All-Cause Mortality

Edgar R. Miller III, MD, PhD; Roberto Pastor-Barriuso, PhD; Darshan Dalal, MD, MPH; Rudolph A. Riemersma, PhD, FRCPE; Lawrence J. Appel, MD, MPH; and Eliseo Guallar, MD, DrPH

**Background:** Experimental models and observational studies suggest that vitamin E supplementation may prevent cardiovascular disease and cancer. However, several trials of high-dosage vitamin E supplementation showed non-statistically significant increases in total mortality.

**Purpose:** To perform a meta-analysis of the dose-response relationship between vitamin E supplementation and total mortality by using data from randomized, controlled trials.

**Patients:** 135 967 participants in 19 clinical trials. Of these trials, 9 tested vitamin E alone and 10 tested vitamin E combined with other vitamins or minerals. The dosages of vitamin E ranged from 16.5 to 2000 IU/d (median, 400 IU/d).

**Data Sources:** PubMed search from 1966 through August 2004, complemented by a search of the Cochrane Clinical Trials Database and review of citations of published reviews and meta-analyses. No language restrictions were applied.

**Data Extraction:** 3 investigators independently abstracted study reports. The investigators of the original publications were contacted if required information was not available.

**Data Synthesis:** 9 of 11 trials testing high-dosage vitamin E ( $\geq 400$  IU/d) showed increased risk (risk difference > 0) for all-cause mortality in comparisons of vitamin E versus control. The pooled all-cause mortality risk difference in high-dosage vitamin E trials was 39 per 10 000 persons (95% CI, 3 to 74 per 10 000 persons;  $P = 0.035$ ). For low-dosage vitamin E trials, the risk difference was -16 per 10 000 persons (CI, -41 to 10 per 10 000 persons;  $P > 0.2$ ). A dose-response analysis showed a statistically significant relationship between vitamin E dosage and all-cause mortality, with increased risk of dosages greater than 150 IU/d.

**Limitations:** High-dosage ( $\geq 400$  IU/d) trials were often small and were performed in patients with chronic diseases. The generalizability of the findings to healthy adults is uncertain. Precise estimation of the threshold at which risk increases is difficult.

**Conclusion:** High-dosage ( $\geq 400$  IU/d) vitamin E supplements may increase all-cause mortality and should be avoided.

*Ann Intern Med.* 2005;142:37-46.  
For author affiliations, see end of text.

[www.annals.org](http://www.annals.org)

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