

La evidencia científica como base de la intervención nutricional y las recomendaciones dietéticas

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Evidencia científica

Información contrastada para la toma de decisiones

"No hay parte de la medicina más mudable ni asentada sobre cimientos más movedizos, que la ciencia de la dietética; no pasa año que no cambie algo fundamental"

Gregorio Marañón, 1920

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Evidencia científica

Información contrastada para la toma de decisiones

- La vitamina C previene el resfriado y la gripe
- El consumo de aperitivos contribuye al incremento de peso
- El consumo de una copa de vino al día previene la ECV
- El consumo de antioxidantes aumenta la fertilidad en mujeres
-



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Evidencia científica

Información contrastada para la toma de decisiones

“Separar el grano de la paja” y sacar conclusiones

Importancia de la síntesis de la investigación

Necesidad de evidencia para práctica clínica y salud pública

¿Qué dieta es la mejor?

¿Qué le recomiendo al paciente o a la población?

Esto que dicen, ¿es cierto? ¿pueden decirlo?

¿Es cierto lo que dice esta etiqueta del lácteo?

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“Los hombres ciegos y el elefante”

*Es importante tener una **visión global** para interpretar bien lo que pasa*

Es un abanico!

Es una lanza!

Es una pared!

Es una cuerda!

Es una serpiente!

Es un árbol!

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**¡Demasiada información!
“paradoja de la información”**

La práctica clínica tiene que estar basada en la evidencia, pero, ¿en cuál?

1940 → 2.300 revistas biomédicas
2000 → > 30.000 revistas biomédicas
2016 → Cada año se publican más de 2 millones de artículos biomédicos
(Pérez-Rodrigo, Rev Esp Comun Salud 2016, S1, S43-S51)

CÓMO ESTAR AL DÍA ?

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¡Demasiada información! “paradoja de la información”

- “Los profesionales de la salud se enfrentan a enormes dificultades para mantener actualizados sus conocimientos y para acceder a la información que necesitan al tomar decisiones”.
- “Los profesionales sanitarios se ven desbordados por una cantidad de información imposible de manejar e interpretar”.
- “Need to read 17 articles a day, 365 days a year!”
- Información contradictoria/no unanimidad.

(Madhukar Pai)

Sackett DL, WM Rosenberg, JA Gray, RB Haynes and WS Richardson 1996..Evidence based medicine: what it is and what it isn't. BMJ; 312:71-72. Disponible en URL: <http://bmj.bmjournals.com/cgi/content/full/312/7023/71>

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La **evidencia científica** debe ser un marco de referencia clave para los grupos de interés, los responsables políticos, la comunidad y otras partes interesadas en el diseño, la implementación y la evaluación de **políticas públicas para generar cambios en estilo de vida** que permitan la prevención de enfermedades crónicas (Rigotti, 2013)



Los científicos producen la **Mejor evidencia posible** (*Research Epidemiology*)



Tomar decisiones:
Política nutricional →
Recomendaciones dietéticas (*Public Health Epidemiology*)

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Desarrollo de Políticas Públicas para Promoción de Estilo de Vida Saludable

Se requieren **iniciativas estratégicas colaborativas e integradas** de centros académicos, grupos privados (industria), gobiernos, grupos de interés y la comunidad, que permitan **un traspaso efectivo de la evidencia científica hacia medidas de salud pública** que promuevan hábitos de vida saludables en la población (Rigotti, 2013)



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Epidemiología nutricional. Objetivo final



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Summary of strength of evidence on lifestyle factors and risk of developing cardiovascular diseases (WHO, 2003)

Evidence	Decreased risk	No relationship	Increased risk
Convincing	Regular physical activity Linoleic acid Fish and fish oils (EHA and DHA) Vegetables and fruits (including berries) Potassium Low to moderate alcohol intake (for coronary heart disease)	Vitamin E supplements	Myristic and palmitic acids Trans fatty acids High sodium intake Overweight High alcohol intake (for stroke)
Probable	a-Linolenic acid Oleic acid NSP (fibra) Wholegrain cereals Nuts (unsalted) Plant sterols/stanols Folate	Linoleic acid	Dietary cholesterol Unfiltered boiled coffee
Possible	Flavonoids Soy products		
Inufficient	Calcium Magnesium Vitamin C		

Recomendaciones dietéticas BASADAS EN LA EVIDENCIA

Los científicos producen la **Mejor evidencia posible (Research Epidemiology)**

↑ Plant foods: wholegrain cereals, fruits and vegetables:
• ≥ 400 g fruits and vegetables a day

'5 a day' programmes in Germany, Poland, Spain, Sweden, the United Kingdom, '6 a day' in Denmark and '10 a day' in France and equivalent marketing-based initiatives in other countries (e.g., '3 a day' in Hungary).

- < 10% of daily energy intake from saturated fatty acids
- < 1% of daily energy intake from trans fatty acids
- < 10% of daily energy intake from free sugars
- < 5 g a day of salt

EPA, eicosapentaenoic acid; DHA, docosahexaenoic acid; NSP, non-starch polysaccharides
WHO/FAO, Diet, Nutrition and the Prevention of Chronic Diseases. WHO Technical Report Series 916. 2003.
<http://www.fao.org/WAIRDOCS/WHO/AC911E/AC911E00.HTM>

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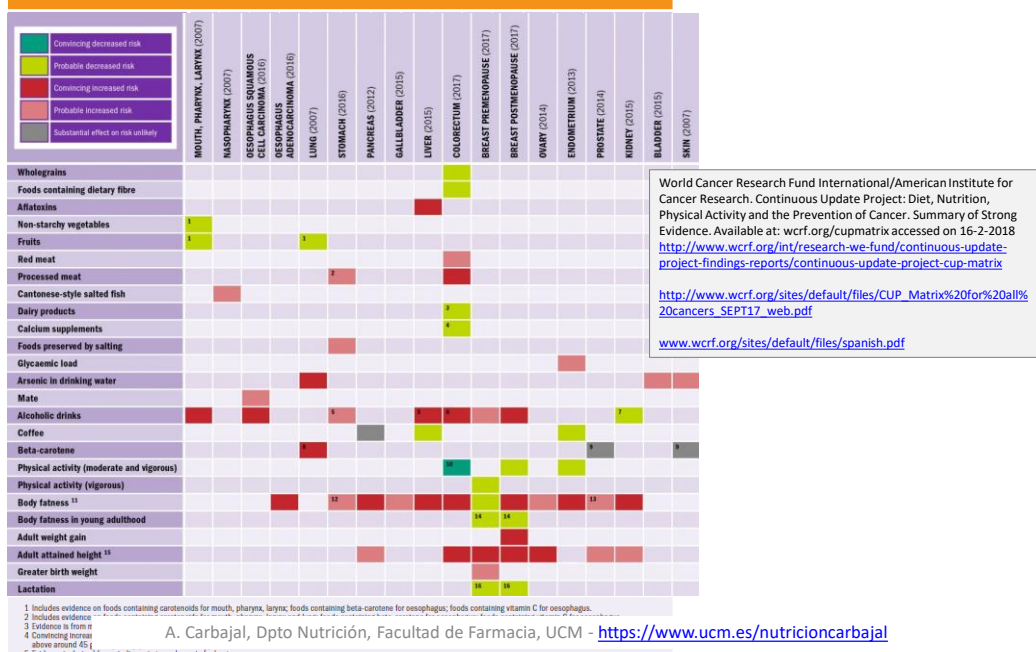
Resumen de la relación entre factores dietéticos y de estilo de vida y diabetes tipo 2 (WCRF, 1997)

Evidence	Decreased risk	No relationship	Increased risk
Convincing	Voluntary weight loss in overweight and obese people Physical activity	–	Overweight and obesity** Abdominal obesity*** Physical inactivity Maternal diabetes†
Probable	NSPs* Importancia en prevención y tratamiento	–	Saturated fats Intrauterine growth retardation (IUGR)
Possible	n-3 Fatty acids Low glycaemic index foods Exclusive breastfeeding‡	–	Total fat intake Trans fatty acids
Inufficient	Vitamin E Chromium Magnesium Moderate alcohol	–	Excess alcohol

* NSP – Non-starch polysaccharide.
** Overweight: BMI ≥ 25 kg/m², obesity: BMI ≥ 30 kg/m².
*** Waist circumference: men ≥ 102 cm, women ≥ 88 cm.
† This includes gestational diabetes.
‡ As a global public health recommendation, infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health.
(Steyn y col., 2004)

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SUMMARY OF STRONG EVIDENCE ON DIET, NUTRITION, PHYSICAL ACTIVITY AND PREVENTION OF CANCER



¿Cómo se llega a estas conclusiones, cuando se dispone de tanta información y TAN contradictoria?



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Práctica Basada en la Evidencia

Hay que *cribar / filtrar* con criterios de calidad y científicos la información que se publica para hacerla accesible al profesional que tiene que tomar decisiones.

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Evidencia científica

Información contrastada para la toma de decisiones

- Práctica clínica y salud pública
- Etiquetado nutricional: Aprobación de alegaciones nutricionales/salud
 - Medicina basada en la evidencia (MBE)
 - Nutrición basada en la evidencia (NuBE)
 - Práctica dietética basada en la evidencia (DNABE)

Cómo se prepara, cómo se jerarquiza, cómo interpreta, cómo se usa y aplica

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EAT FOR HEALTH - Australian Dietary Guidelines *Providing the scientific evidence for healthier Australian diets, 2013*

The guideline is designed to provide information to assist decision-making and **is based on the best available evidence at the time of development of this publication.**

<https://www.eatforhealth.gov.au/guidelines>

2015 Dietary Guidelines for Americans
SYSTEMATIC REVIEW OF THE SCIENTIFIC EVIDENCE

<http://health.gov/dietaryguidelines/2015-scientific-report/>



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Revista Española de Obesidad

Vol. 9 • Suplemento 1 • Octubre 2011

- Recomendaciones nutricionales basadas en la evidencia para la prevención y el tratamiento del sobrepeso y la obesidad en adultos (Consenso FESNAD-SEEDO)



http://www.naos.aesan.msp.es/naos/ficheros/investigacion/Consenso_SEEDO.pdf

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Las declaraciones de propiedades saludables de los alimentos solamente pueden autorizarse después de efectuar una evaluación científica del nivel más elevado posible. Reglamento (CE) N° 1924/2006 del Parlamento Europeo y del Consejo, de 20 diciembre 2006, relativo a las declaraciones nutricionales y de propiedades saludables en los alimentos.

Position of the American Dietetic Association:
Functional Foods

ADA. 2004;104/5:814-826

Table. Strength of evidence for functional foods currently on the US market^{a,b}

Functional food	Bioactive component	Health benefit	Type of evidence	Strength of evidence	Recommended amount or frequency of intake	Regulatory status
Fortified margarines	Plant sterol and stanol esters	Reduce total and LDL ^c cholesterol (43)	Clinical trials	Very strong	1.3 g/d for sterols 1.7 g/d for stanols	Health claim
Psyllium	Soluble fiber	Reduce total and LDL cholesterol (38)	Clinical trials	Very strong	1 g/d	Health claim
Soy	Protein	Reduce total and LDL cholesterol (22,42)	Clinical trials	Very strong	25 g/d	Health claim
Whole oat products	β -glucan	Reduce total and LDL cholesterol (38)	Clinical trials	Very strong	3 g/d	Health claim

^aFoods that have a Food and Drug Administration-approved health claim (sterol/stanol esters, oats, psyllium, soy) generally are supported by two dozen or more well-designed published clinical trials. For example, the soy health claim petition contained more than 40 clinical trials, whereas there are only a few clinical trials on cranberry juice and urinary tract infections.

^bReprinted with permission and adapted from the American Council on Science and Health: From: Hasler CM. *J Nutr.* 2002;132:3772-3781.

^cLDL=low-density lipoprotein.

^dTG=triglyceride.

^eEPA=eicosapentaenoic acid.

^fDHA=docosahexaenoic acid.

^gCLA=conjugated linoleic acid.

^hGI=gastrointestinal.

2009: <http://www.eatright.org/ada/files/FuncionalFnp.pdf>

Conventional food

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Health Claims de avena, betaglucano y colesterol

EEUU (FDA, 21-enero-1997)

(US FDA final rule for federal labeling: health claims: oats and coronary heart disease. *Fed Regist* 1997;62:3584-681).
<http://www.cfsan.fda.gov/~lrd/fr970331.html>

"Una dieta alta en fibra soluble de avena integral y baja en grasa saturada y colesterol puede reducir el riesgo coronario"

- Consumo de 4 raciones diarias (0,75 g/ración: 3 g/día) → reduciría un 5% los niveles de colesterol → riesgo coronario

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ADA's Evidence Analysis Library (EAL)

Use of systematically reviewed scientific evidence in making food and nutrition practice decisions by integrating best available evidence with professional expertise and client values to improve outcomes.

Consuming diets high in total fiber (17-30 g/d) and soluble fiber (7-13 g/d) as part of a diet low in SFA and cholesterol can further ↓ TC by 2%-3% and LDL cholesterol up to 7%

(van Horn y col., J Am Diet Assoc 2008;108:287-331)

Grade I: Good

The evidence consists of results from studies of strong design for answering the question addressed. The results are both clinically important and consistent. The results are free of serious doubts. Studies with negative results have sufficiently large sample sizes to have adequate statistical power.

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¿Cómo valorar/evaluar la evidencia científica?

- Desde finales de 1990s, cualquier procedimiento realizado en Medicina, ya sea preventivo, diagnóstico, terapéutico, pronóstico o rehabilitador, tiene que estar definido por su nivel de evidencia científica (**Medicina basada en la evidencia** o basada en las pruebas).

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Medicina basada en la evidencia (MBE)

«La aplicación consciente, explícita y juiciosa de la **mejor evidencia clínica** disponible para tomar decisiones sobre el cuidado de los pacientes y cuya práctica integra la experiencia del clínico con la mejor evidencia externa disponible procedente de una investigación sistemática»

Prof. David Sackett, 1996



Expresión utilizada por primera vez en **1991 por Gordon Guyatt**.

En **1992** se constituyó el **primer grupo de trabajo en MBE en Canadá**



Dr. Gordon Guyatt

Sackett DL, WM Rosenberg, JA Gray, RB Haynes and WS Richardson 1996. Evidence based medicine: what it is and what it isn't. BMJ; 312:71-72. Disponible en URL: <http://bmj.bmjournals.com/cgi/content/full/312/7023/71>

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Nutrición basada en la evidencia (NuBE)

Incluiría:

- Aplicación sistemática de métodos científicamente rigurosos para evaluar la efectividad de las intervenciones sanitarias, tanto terapéuticas como preventivas, a nivel individual, lo que permitiría juzgar su pertinencia y decidir su aplicabilidad teniendo en cuenta las circunstancias y preferencias de los pacientes en las decisiones clínicas.
- Y, de forma implícita, también estos principios son aplicables a nivel poblacional, lo que se ha dado en llamar **Atención o Política Sanitaria Basada en la Evidencia**, mediante los que debemos valorar la tecnología, la cartera de servicios y los modelos de gestión más efectivos y eficientes, y sus resultados, y así por ejemplo las políticas alimentarias.

(Doreste y Serra, 2005)

http://www.respyn.uanl.mx/vi/2/ensayos/NuBE_Indexado.htm

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Práctica dietética basada en la evidencia (DNABE)

(desde 2009) (ICDA Evidence-based Dietetic Practice Working Group = 16 asociaciones de dietistas en el mundo)

“La práctica dietética basada en la evidencia consiste en la búsqueda sistemática de evidencia científica y la evaluación de la validez, aplicabilidad e importancia de dicha evidencia para que, combinada después con la experiencia clínica del dietista-nutricionista, las opiniones y las circunstancias y valores específicos del cliente o la comunidad, sirva de guía en la toma de decisiones en el ámbito de la dietética”

Además, la práctica dietética basada en la evidencia:

- se utiliza para tomar decisiones en todas las áreas de la práctica dietética con la finalidad de mejorar la salud de clientes (y pacientes), comunidades y poblaciones.
- establece claramente la fuente de la evidencia que sustenta las recomendaciones prácticas. Para ser pertinente y efectiva, la práctica dietética basada en la evidencia debe integrar el conocimiento de otras disciplinas.
- está fundamentada en los principios éticos y códigos de buena práctica. Esto incluye la necesidad de reflexionar acerca de cómo las perspectivas o sesgos personales pueden influenciar la interpretación de la evidencia científica.

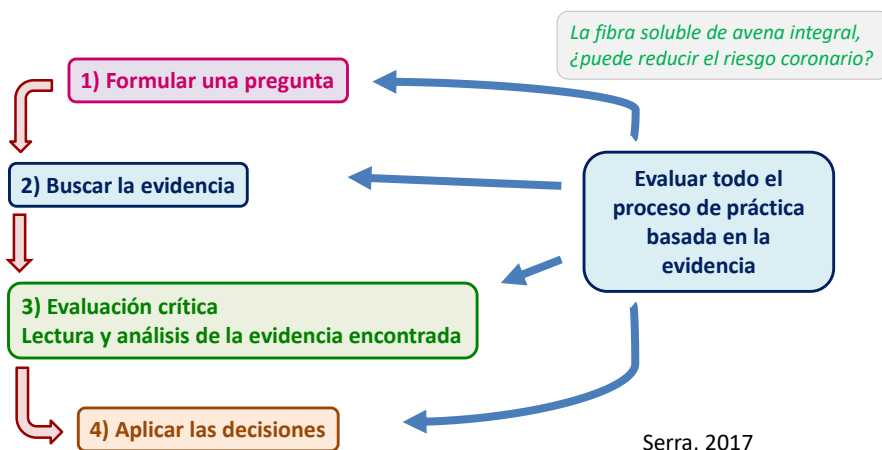
Approved by the ICDA Board of Directors, November 13, 2010

<http://www.grep-aedn.es/newsletter/diciembre2010.htm>

<http://www.internationaldietetics.org/Downloads/ICDA-Report-Evidence-based-Dietetics-Practice-2010.aspx>

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Etapas de la práctica basada en la evidencia



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¡Demasiada información! “paradoja de la información”

Estado de la cuestión, state of the art

- 1) Revisiones bibliográficas narrativas o clásicas
- 2) Revisiones sistemáticas
- 3) Meta-análisis
- 4) *Umbrella reviews: evidence synthesis with overviews of reviews and meta-epidemiologic studies*

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1) Revisiones bibliográficas narrativas o clásicas

(Traditional, Narrative Review, non-systematic or selective reviews)

2 o más publicaciones

No hay pregunta ni “material y métodos”

Usan métodos «informales», no explícitos y a menudo personales y subjetivos

No se especifica el proceso seguido para buscar, reunir y evaluar la información para sacar conclusiones y, sin esta información, no será posible repetir y verificar los resultados y las conclusiones de la revisión.

J Am Coll Nutr. 1995 Apr;14(2):124-36.

The health effects of vitamin C supplementation: a review.

Bendich A, Lanaseth L.

Hoffman La-Roche Inc., Paramus, New Jersey 07652, USA.

Erratum in:

J Am Coll Nutr 1995 Aug;14(4):398.

J Am Coll Nutr 1995 Jun;14(3):218.

Abstract

A comprehensive review of the literature indicates that populations with long-term consumption of higher than RDA levels of vitamin C (> or = 60 mg/day) from foods and/or supplements have reduced risks of cancer at several sites, cardiovascular disease, and cataracts. The safety of higher than RDA intakes of vitamin C is confirmed in eight placebo-controlled, double-blind studies and six non-placebo clinical trials in which up to 10,000 mg of vitamin C was consumed daily for up to 3 years. There are no clinical data which suggest that vitamin C's enhancement of non-heme iron absorption in individuals with low iron status could be a critical factor in the possible increased risk of heterozygous hemochromatosis-related cardiovascular disease. In fact, the cumulative data do not confirm that iron status is related to risk of cardiovascular disease. Moreover, higher than RDA intakes of vitamin C have been associated with several indices of lowered cardiovascular disease risk including increases in HDL, and decreases in LDL oxidation, blood pressure and cardiovascular mortality.



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2) Revisiones sistemáticas

(Overview, Systematic literature review)

Trabajo de investigación realizado por expertos que revisa la evidencia científica sobre una pregunta claramente definida.

Usa métodos sistemáticos y explícitos para identificar, seleccionar y evaluar críticamente estudios relevantes y extraer y analizar datos de interés para obtener conclusiones consistentes (The Centre for Review and Dissemination).

Primera revisión sistemática en el área de nutrición fue publicada en 1953:

Stewart CP & Guthrie P (editors) (1953)

Lind's Treatise on Scurvy.

A bicentenary volume containing reprint on the first Edition of a Treatise of the Scurvy, by James Lind, M. D. with additional notes, p. 314. Edinburgh: Edinburgh University Press.

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2) Revisiones sistemáticas

(Overview, Systematic literature review)

Pretenden ser:

- a) Rigurosas**, en cuanto a los estudios incluidos (con criterios de calidad, etc.)
- b) Informativas**, enfocadas hacia **problemas reales**, tratando de contestar una **pregunta claramente delimitada o específica**, e idealmente analizando y presentando los datos de la forma que mejor **ayude a la toma de decisiones**
- c) Exhaustivas**: su objetivo es identificar y utilizar la **mayor cantidad posible de información pertinente**, sin introducir sesgos (de publicación, de selección, etc.)
- d) Explícitas**, ya que todos los métodos utilizados en la revisión deben describirse con suficiente detalle.

(Gisbert y Bonfill, 2004)

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Importante: “explicit methods section”

REVIEW ARTICLE

A Systematic Review of the Evidence Supporting a Causal Link Between Dietary Factors and Coronary Heart Disease

Andrew Mente, PhD; Lawrence de Koning, MSc; Harry S. Shannon, PhD; Sonia S. Anand, MD, PhD, FRCPC

Background: Although a wealth of literature links dietary factors and coronary heart disease (CHD), the strength of the evidence supporting valid associations has not been evaluated systematically in a single investigation.

Methods: We conducted a systematic search of MEDLINE for prospective cohort studies or randomized trials investigating dietary exposures in relation to CHD. We used the Bradford Hill guidelines to derive a causation score based on 4 criteria (strength, consistency, temporality, and coherence) for each dietary exposure in cohort studies and examined for consistency with the findings of randomized trials.

Results: Strong evidence supports valid associations (4 criteria satisfied) of protective factors, including intake of vegetables, nuts, and “Mediterranean” and high-quality dietary patterns with CHD, and associations of harmful factors, including intake of *trans*-fatty acids and foods with a high glycemic index or load. Among studies of higher methodologic

quality, there was also strong evidence for monounsaturated fatty acids and “prudent” and “western” dietary patterns. Moderate evidence (3 criteria) of associations exists for intake of fish, marine ω -3 fatty acids, folate, whole grains, dietary vitamins E and C, beta carotene, alcohol, fruit, and fiber. Insufficient evidence (≤ 2 criteria) of association is present for intake of supplementary vitamin E and ascorbic acid (vitamin C); saturated and polyunsaturated fatty acids; total fat; α -linolenic acid; meat; eggs; and milk. Among the dietary exposures with strong evidence of causation from cohort studies, only a Mediterranean dietary pattern is related to CHD in randomized trials.

Conclusions: The evidence supports a valid association of a limited number of dietary factors and dietary patterns with CHD. Future evaluation of dietary patterns, including their nutrient and food components, in cohort studies and randomized trials is recommended.

Arch Intern Med. 2009;169(7):659-669

SEARCH STRATEGY AND STUDY SELECTION

We searched the MEDLINE database for prospective cohort studies and RCTs from 1950 through June 2007. The bibliographies of retrieved articles were scanned for additional cohort studies and RCTs. Two of us (A.M. and L.D.) independently assessed study eligibility. Excluded studies and reasons for exclusion were listed, and disagreement was resolved by discussion and consensus. We included original English-language articles pertaining to the effect of diet on the following primary outcomes: coronary or ischemic heart disease and fatal or non-fatal myocardial infarction. These articles were also evaluated for the following secondary outcomes: angina pectoris, sudden death, cardiovascular disease, and total mortality. Relative risks (RRs) of outcomes are presented with their 95% confidence intervals (CIs) after adjusting for potential confounders. We only considered studies that followed up subjects for at least 1 year. Cohort studies had to include estimates of dietary intake using conventional dietary assessment tools (eg, food frequency questionnaires, food records, or 24-hour diet recall). Clinical trials had to be randomized and to compare dietary exposure with a control diet or a placebo. Crossover trials were excluded if plasma biomarkers or atherosclerotic indicators were not evaluated because coronary outcomes occurring after a crossover would be difficult to interpret.

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Cochrane Collaboration

Medicina basada en la evidencia

La mayoría de las **revisiones sistemáticas** se han hecho bajo los auspicios de la Cochrane collaboration y publicados en la **Cochrane Library**.

Objetivo: preparar, mantener y divulgar revisiones sistemáticas en el campo de la salud.

“the best source of good-quality systematic reviews”

Comprende diversas BBDD:

Cochrane Database of Systematic Reviews (CDSR)
CRD Database of Abstracts of Reviews of Effectiveness (DARE)
Cochrane Controlled Trials Registers (CCTR)
Cochrane Review Methodology database

<http://www.cochrane.org/index.htm>

<http://www.cochrane.org/contact/entities.htm#CENTRES>

www.thecochranelibrary.com

Summerbell y Moore, 2007

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<http://es.cochrane.org/es>

Idiomas

- Spanish
- Catalan
- English

Buscar






Iberoamerican Cochrane Centre Module

- Información para recién llegados ▶
- Información para profesionales Sanitarios ▶
- Información para autores e Investigadores Cochrane ▶
- Información para los pacientes y ciudadanos ▶

Elaborar revisiones

- Boletines Cochrane
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- Red Cochrane Iberoamericana

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Uso de la evidencia en políticas sanitarias internacionales: la colaboración entre Cochrane y la OMS

<http://es.cochrane.org/es/news/uso-de-la-evidencia-en-pol%C3%ADticas-sanitarias-internacionales-la-colaboraci%C3%B3n-entre-cochrane-y-la>

2. The collaboration has contributed to the WHO Programme of Work in the following (below): **eLENA**

Category of Work: Non communicable diseases
Programme Area: Nutrition

Outcome target/s: Reduced nutritional risk factors
Short description of the collaboration:



WHO **e-Library of Evidence for Nutrition Actions (eLENA)** is an online library of evidence-informed guidance for nutrition interventions. It is a single point of reference for the latest nutrition guidelines and related information including supporting materials such as scientific evidence, background materials and commentaries from invited experts.

Cochrane has contributed to the development of eLENA since its launch in 2011. Thanks to an agreement with the publishers of the Cochrane Library, John Wiley & Sons, Ltd, eLENA users have access to the full reviews and are also able to track the use of reviews in guideline development processes⁴.




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e-Library of Evidence for Nutrition Actions (eLENA)

<http://www.who.int/elena/en/index.html>
 En español: <http://www.who.int/elena/es/index.html>

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- Are colloids more effective than crystalloids in reducing death in people who are critically ill or injured?**
- Cranberries for preventing urinary tract infections**
- Housing improvement as an investment to improve health
- Interventions to optimise prescribing for older people in care homes**
- Personalised risk communication for informed decision making about taking screening tests
- Physician use of red flags to screen for cancer in patients with new back pain**
- Physical rehabilitation for older people in long-term care**
- Training to recognise the early signs of recurrence in schizophrenia**
- Selective serotonin reuptake inhibitors for stroke recovery** <http://www.cochrane.org/>
- Selenium supplements for the prevention of cardiovascular disease**

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Selenium supplements for the prevention of cardiovascular disease

Rees K, Hartley L, Day C, Flowers N, Clarke A, Stranges S Published Online: January 31, 2013

Use of selenium enriched foods, supplements and fertilizers has increased in recent years in many countries because of the perception that selenium may reduce the [risk](#) of cardiovascular disease and other chronic conditions. Therefore, it is important to understand the effects of a nutrient that is frequently supplemented on common conditions such as cardiovascular disease or diabetes. This [review](#) assessed the effects of providing selenium supplements to healthy adults in order to prevent the occurrence of cardiovascular disease. Whether selenium supplements would reduce the [risk](#) factors associated with heart disease was also examined. We found 12 trials in which 19,715 healthy adults were randomly assigned to receive selenium supplements or placebo. The vast majority of participants involved in these trials were male individuals from the US, where people are already well nourished and take large amounts of selenium from natural foods. Overall, the included studies were regarded as at [low risk of bias](#). In our [review](#), providing selenium supplements to healthy adults did not prevent the occurrence of major cardiovascular disease. The increased [risk](#) of developing type 2 diabetes when taking selenium supplements, as suggested in some previous studies, could not definitely be ruled out in our [review](#). In summary, this [review](#) of the available evidence to date suggests that taking selenium supplements is neither beneficial nor harmful for cardiovascular disease, but it is probably unnecessary for those who are already well nourished and who take large amounts of selenium from natural foods.

► [Abstract \(click to read\)](#)

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[Selenium supplementation for the primary prevention of cardiovascular disease](#)

Primary Review Group: [Heart Group](#)

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Cranberries for preventing urinary tract infections

Jepson RG, Williams G, Craig JC Published Online: October 17, 2012

Cranberries (usually as cranberry juice) have been used to prevent urinary tract infections (UTIs). Cranberries contain a substance that can prevent bacteria from sticking on the walls of the bladder. This may help prevent bladder and other UTIs. This [review](#) identified 24 studies (4473 participants) comparing cranberry products with [control](#) or alternative treatments. There was a small trend towards fewer UTIs in people taking cranberry product compared to placebo or no treatment but this was not a significant finding. Many people in the studies stopped drinking the juice, suggesting it may not be an acceptable [intervention](#). Cranberry juice does not appear to have a significant benefit in preventing UTIs and may be unacceptable to consume in the long term. Cranberry products (such as tablets or capsules) were also ineffective (although had the same effect as taking antibiotics), possibly due to lack of potency of the 'active ingredient'.

Abstract (click to read)


Background:
Cranberries have been used widely for several decades for the prevention and treatment of urinary tract infections (UTIs). This is the third update of our [review](#) first published in 1998 and updated in 2004 and 2008.

Objectives:
To assess the [effectiveness](#) of cranberry products in preventing UTIs in susceptible populations.

Find the research

Get full text in *The Cochrane Library* for this Review titled:
[Cranberries for preventing urinary tract infections](#)

Primary Review Group: Renal Group



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Perlas Cochrane: Evidencia práctica para situaciones de la vida real

Breves resúmenes de revisiones sistemáticas orientadas a problemas atendidos en el ámbito de la atención primaria.

Abstract (click to read)

PEARLS - Practical Evidence About Real Life Situations (click to read)

Clinical question:
How effective are cranberry products in preventing urinary tract infections (UTIs) in susceptible populations?


Bottom line:
There was some evidence that cranberries (juice or capsules) may decrease the number of symptomatic UTIs over a 12-month period, particularly for women with recurrent UTIs (NNT*7). The evidence for elderly men and women was less clear, and there was evidence cranberry products were not effective in people who needed either intermittent or indwelling catheters. *NNT = number needed to treat to benefit 1 individual.

Caveat:
Many people in the trials stopped drinking the juice, suggesting it may not be a popular intervention. It is not clear how long cranberry juice needs to be taken to be effective or what the required dose might be.

Context:
No definite mechanism of action has been established for cranberries in the prevention or treatment of UTI. However, the main suggestion is cranberries prevent bacteria, particularly *Escherichia coli*, from adhering to uroepithelial cells lining the bladder. Without adhesion, *E. coli* cannot infect the mucosal surface of the urinary tract.

Cochrane Systematic Review:
Jepson RG and Craig JC. Cranberries for preventing urinary tract infections. *Cochrane Reviews* 2008, Issue 1. Article No. CD001321. DOI: 10.1002/14651858.CD001321.pub4. This review contains 10 trials involving 1049 participants.

Authored by:
Brian R McAvoy <http://www.cochraneprimarycare.org/pearls-2012-254-296>
Cochrane Primary Health Care Field <http://summaries.cochrane.org/CD001321/cranberries-for-preventing-urinary-tract-infections>



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3) Meta-análisis

Tipo de revisión sistemática que usa métodos estadísticos para obtener un estimado único (un riesgo relativo, una diferencia de riesgos) a partir de los **resultados de los estudios independientes**.

- Procedimiento estadístico que integra los resultados de estudios independientes pero con un diseño y objetivos similares.
- Proceso de recopilación y combinación de información de diversos estudios relacionados con el propósito de llegar a una conclusión.

Se consigue:

- Una mayor potencia estadística para detectar diferencias.
- Una estimación más precisa del efecto global.
- Una técnica claramente superior y más objetiva que la revisión bibliográfica tradicional.

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3) Meta-análisis

1904

Karl Pearson (matemático británico)

1976

Glass GV (Psicólogo)

Introduce el término de Meta-análisis

1970-1980

Se redescubre para la medicina (ECV, cáncer)

Tom Chalmers (EEUU)

Richard Peto (RU)

Iain Chalmers (RU)

1990

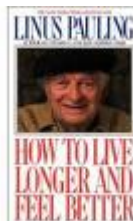
Meta-análisis: Término incluido como "Medical subject heading" en el sistema de indexación de MedLine de la National Library of Medicine
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Linus Pauling (1901-1994)

1954. Premio Nobel de Química

1962. Premio Nobel de la Paz



How to live longer and feel better
Vitamina C, resfriado común y gripe
Cáncer y vitamina C, 1970.



Portuguese edition of Vitamin C and the Common Cold, a book that was translated into nine different languages.

Linus Pauling; José María Ladero Quesada (trad.)
Madrid : AC, 1980; ISBN: 84-7288-202-0

Propone que el consumo de
1.000 mg/día de vitamina C reduce la
incidencia del resfriado común en un 45%.
(IDR: 60 mg/día)

USA: production of vitamin C increased from 8.9 million pounds in 1969 to 11.7 in 1971 (increase of 39% in two years and an annual growth rate of 18%) (CMR 1972a), in contrast to the annual growth rate of about 6% in the 1960s (CMR 1972c). About 5.6 million pounds of vitamin C were also imported to the US between January and November 1971, up about 160% from the amount imported during the same period in 1970 (CMR 1972b).

<http://paulingblog.wordpress.com/2010/11/09/vitamin-c-the-common-cold-and-controversy/>
<http://www.ltdk.helsinki.fi/users/hemila/reviews/pauling/>

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Proc. Nat. Acad. Sci. USA
Vol. 68, No. 11, pp. 2078-2081, November 1971

The Significance of the Evidence about Ascorbic Acid and the Common Cold

(Vitamin C/Double-blind studies/statistical significance)

LINUS PAULING

Department of Chemistry, Stanford University, Stanford, California 94305

Contributed by Linus Pauling, August 9, 1971

ABSTRACT Only four independent double-blind studies have been reported of the effect of ascorbic acid regularly ingested in daily amounts more than 100 mg. in comparison with a placebo, in decreasing the incidence and integrated morbidity of the common cold for subjects exposed to cold viruses in the ordinary way and without colds when the test period began. A statistical analysis of these four studies leads to rejection of the null hypothesis that ascorbic acid has no more protective power than the placebo, at the 99.96% level of confidence for the incidence of colds and the 99.9978% level of confidence for the integrated morbidity.

For many years there has existed the popular belief that ascorbic acid has value in providing protection against the common cold and in ameliorating the manifestations of this viral disease. This popular belief has, however, not been generally shared by physicians, authorities on nutrition, and official bodies.

I was puzzled by the contradiction between the popular belief and the official opinion, so I studied the published reports of controlled trials of ascorbic acid in relation to the common cold. On the basis of this study and of some general arguments about orthomolecular medicine (1) (the preservation of good health and the treatment of disease by varying the concentrations in the human body of substances that are normally present in the body and are required for health) and the process of molecular evolution (2), I reached the conclusion that ascorbic acid, taken in the proper amounts, decreases the incidence of colds and related infections, and also decreases the severity of individual colds. These arguments were presented in my book "Vitamin C and the Common Cold" (3). The evidence and arguments presented in this book were not convincing to some physicians and authorities on nutrition. Many statements contradicting my conclusions were made.

amounts once or more every day, and those in the second group were administered an apparently identical inactive material, a placebo. The studies were double-blind, with neither the subjects nor the investigators knowing which subjects received the ascorbic acid and which received the placebo, that knowledge being kept by some other person until all of the information had been collected.

The question that I attempt to answer by analyzing the published reports is the following: Does the regular administration of ascorbic acid at a rate greater than 100 mg per day over a period of time beginning before the subjects have contracted a cold, and with the subjects exposed to cold viruses under ordinary living conditions, have an effect different from that of a placebo in decreasing the incidence and the severity of the common cold? A comparison with a placebo, with the subjects not knowing which group they are in, is essential because of the well-known "placebo effect" of even inactive medications.

The statistical methods used in the analysis are the conventional ones, for the most part Student's *t*-test or the calculation of χ^2 and then of the probability *P* (one-tailed) that the observed difference in effect of ascorbic acid and placebo (or a larger difference) would be obtained by chance alone in two groups taken at random from a uniform population if the null hypothesis of equal effectiveness of ascorbic acid and placebo were true. I have chosen to give *P* (one-tailed) rather than *P* (two-tailed) because no one contends that the placebo (usually citric acid) has a greater effect than ascorbic acid in preventing or ameliorating the common cold; the difference of opinion is between those people who state that ascorbic acid is no better than a placebo and those who say that it is better. Moreover, in some of the studies discussed did the investigators find a greater protective effect of the placebo than of ascorbic acid. In some studies ascorbic acid is reported to

Pauling (1971) carried out a meta-analysis of 4 placebo-controlled trials, which was one of the very first meta-analyses in medicine.

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC389499/?page=1>

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1971

Segundo metaanálisis

Ascorbic acid and the common cold

Linus Pauling, Ph.D.

The American Journal of Clinical Nutrition



For a number of years I have been interested in the possibility that the state of health of many people could be significantly improved by the ingestion in the optimum amounts of certain substances normally present in the human body, including the vitamins. This interest developed from the work that my associates and I have done on molecular diseases, especially the hemoglobinemias (1). I decided in 1953 that it would be worthwhile to make a study of the extent to which mental diseases could be described as molecular diseases. Work along these lines was carried out in our laboratory in the California Institute of Technology from 1954 to 1964, and was continued in the University of California, San Diego, and (since 1969) in Stanford University. In the course of this period I formulated some ideas about orthomolecular medicine, defined as the preservation of good health and the treatment of disease by varying the concentrations in the human body of substances that are normally present in the body and are required for health (2-4). I also became aware of arguments indicating that the optimum rate of intake of ascorbic acid may be far greater than the recommended daily allowance of this vitamin, which is approximately 50 mg/day.

For example, as recently as November 1970, Dr. Philip L. White (10), Secretary of the Council on Foods and Nutrition of the American Medical Association, stated that "Unfortunately, it is still a widespread belief that extra ascorbic acid can not only prevent colds but also lessen the severity and duration of colds and other respiratory infections. Even when consumed at the first sign of a sniffle, large doses of the vitamin are useless." Also, many statements contradicting my conclusions were made by physicians, experts in nutrition, and health officials within a few weeks after the publication of my book. For example, Dr. Charles C. Edwards, United States Food and Drug Commissioner, was reported in the press on December 29, 1970 as having said that the use of ascorbic acid was ridiculous, and that there was no scientific evidence and never have been any meaningful studies indicating that vitamin C is capable of preventing or curing colds. The Editors of *The Medical Letter* published an article in which nearly all my statements were contradicted; for example, it was stated that there had been no controlled trials of the effectiveness of vitamin C, in comparison with a placebo, against upper respiratory infections over a long period and including many hun-

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MEDICINA CÁNCER SIDA Y HEPATITIS DOLOR TABAQUISMO NEUROCIENCIA MUJER BIOCIENCIA CORAZÓN

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ANÁLISIS DE 30 TRABAJOS

El falso mito de la vitamina C para el resfriado

- Este micronutriente acorta los catarros y alivia los síntomas, pero no los previene
- En el caso de maratonianos o esquiadores sí reduce un 50% el número de resfriados

Actualizado viernes 20/07/2007 14:11 (CET)

ISABEL F. LANTIGUA

MADRID.- Durante más de 60 años el papel de la vitamina C para prevenir los resfriados comunes ha sido objeto de controversia. Una última revisión de más de 30 ensayos en los que han intervenido 11.350 participantes zanja la cuestión al afirmar que "hay claras evidencias que muestran que no tiene sentido tomar suplementos de vitamina C todo el año, ya que no reduce la incidencia de los catarros".

Aunque esta sustancia es muy popular entre la gente para no 'pillar' un resfriado "hemos comprobado durante varias décadas que no es la panacea", afirma Harri Hemilä, del departamento de Salud Pública en la Universidad de Helsinki (Finlandia) y uno de los autores de esta revisión que se publica en el último número de *'The Cochrane Library'*, una publicación que revisa las evidencias científicas sobre un tema.

Los 30 ensayos analizados muestran que la utilización de suplementos de vitamina C todos los días -una práctica bastante extendida- para prevenir los catarros "no está justificada, puesto que este efecto no se ha comprobado en la población general". Sin embargo, Hemilä explica que "sí tenemos

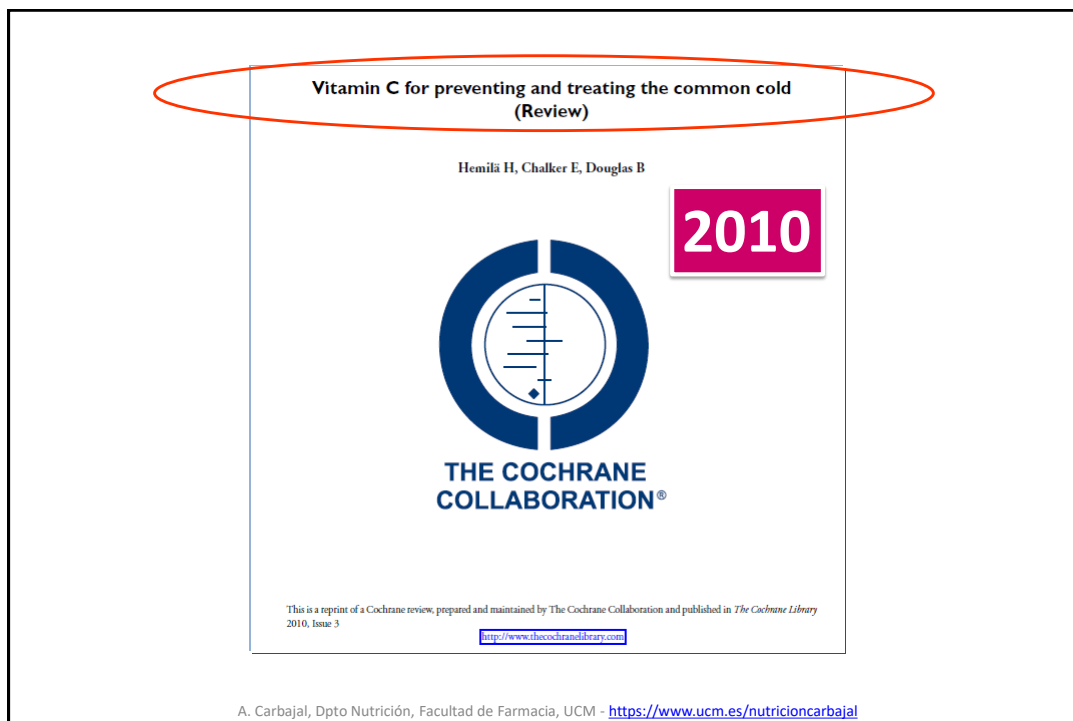
acorta la duración de los resfriados y alivia sus síntomas".



(Foto: José María Perras)

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AUTHORS' CONCLUSIONS

Implications for practice

The lack of effect of prophylactic vitamin C supplementation on the incidence of the common cold in the general population throws doubt on the usefulness of this practice. In special circumstances, where people are engaged in extreme physical exertion or exposed to significant cold stress, or both, vitamin C supplementation may have a beneficial effect, but caution should be exercised in generalising this finding.

The prophylaxis trials found a reduction in common cold duration of 8% in adults and 13% in children. The practical relevance of these findings is open. In our opinion, this level of benefit does not justify long-term prophylaxis in its own right. So far, therapeutic supplementation has not been shown to be effective.

Nevertheless, given the consistent effect of vitamin C on duration and severity in the regular supplementation studies, and the low cost and safety, it may be worthwhile for common cold patients to test on an individual basis whether therapeutic vitamin C is beneficial for them.

Implications for research

It does not seem worthwhile to carry out further regular supplementation trials in the general population. However, the findings in marathon runners, skiers and soldiers operating in subarctic conditions warrant further research.

None of the therapeutic trials carried out so far have examined the effect of vitamin C on children, even though the regular supplementation trials have found substantially greater effect on cold duration in children than in adults. In view of the greater incidence of respiratory infections in children, such therapeutic trials are warranted.

The findings in the Anderson 1974 study on the greater benefit of 8 g than 4 g dose on the day of onset of respiratory symptoms suggest that doses in further therapeutic trials with adults should be at least 8 g/day.

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Revisado, 2012

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Intervention review

Vitamin C for preventing and treating the common cold
Harri Hemilä^{1,*}, Elizabeth Chalker²

Database Title: The Cochrane Library

Editorial Group: Cochrane Adults
Respiratory Infections Group
Published Online: 31 JAN 2013
Assessed as up-to-date: 29 NOV 2012
DOI: 10.1002/14651858.CD000980.pub4
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Authors' conclusions
The failure of vitamin C supplementation to reduce the incidence of colds in the general population indicates that routine vitamin C supplementation is not justified, yet vitamin C may be useful for people exposed to brief periods of severe physical exercise. Regular supplementation trials have shown that vitamin C reduces the duration of colds, but this was not replicated in the few therapeutic trials that have been carried out. Nevertheless, given the consistent effect of vitamin C on the duration and severity of colds in the regular supplementation studies, and the low cost and safety, it may be worthwhile for common cold patients to test on an individual basis whether therapeutic vitamin C is beneficial for them. Further therapeutic RCTs are warranted.

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BMJ Sofi et al., BMJ 2008;337:a1344

Sofi F et al. Am J Clin Nutr 2010;92:1189-1196

Sofi et al., Public Health Nutr. 2014 Dec;17(12):2769-82

RESEARCH

Adherence to Mediterranean diet and health status: meta-analysis

Conclusiones: una mayor adherencia a la Dieta Mediterránea se asocia con una mejora de la salud, con reducciones significativas de:

- Mortalidad total (9%),
- Mortalidad cardiovascular (9%),
- Incidencia y mortalidad de cáncer (6%), y
- Incidencia de Parkinson y Alzheimer (13%).

Salud pública

Resultados clínicamente relevantes para la salud pública. Sería recomendable fomentar la Dieta Mediterránea para prevención primaria y secundaria de las principales enfermedades crónicas.

Ángeles Carbajal Azcona. Departamento de Nutrición. Facultad de Farmacia. Universidad Complutense de Madrid. <https://www.ucm.es/nutricioncarbajal/>

Características de la dieta Mediterránea tradicional (Mediterranean diet score)

1. Alta relación AGM/AGS
2. Consumo moderado de alcohol (vino)
3. Alto de leguminosas
4. Alto de cereales (integrales y pan)
5. Alto de frutas
6. Alto de verduras y hortalizas
7. Bajo de carnes y derivados
8. Moderado de leches y derivados
9. Alto consumo de pescados

Óptimo = *score* de 9

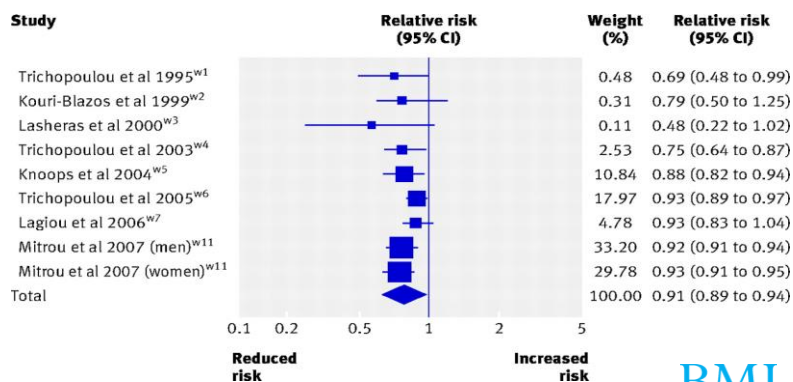
(Trichopoulou y col., 2000)



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Fig 2 Risk of all cause mortality associated with two point increase in adherence score for Mediterranean diet

Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size

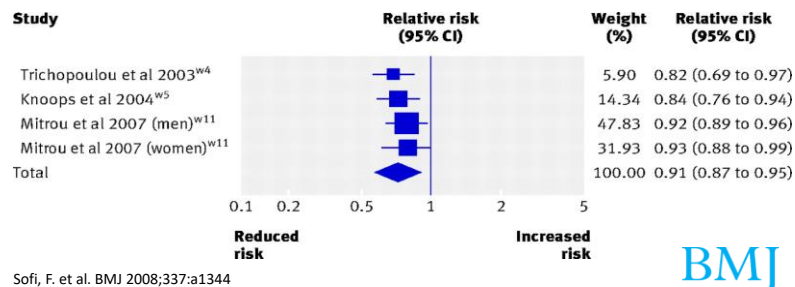


Sofi, F. et al. BMJ 2008;337:a1344

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BMJ

Fig 3 Risk of mortality from cardiovascular diseases associated with two point increase in adherence score for Mediterranean diet
Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size



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4) Umbrella reviews: evidence synthesis with overviews of reviews and meta-epidemiologic studies

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Format: Abstract - <https://www.ncbi.nlm.nih.gov/pubmed/28826374>

Annu Rev Nutr. 2017 Aug 21;37:131-156. doi: 10.1146/annurev-nutr-071816-064941.

Coffee, Caffeine, and Health Outcomes: An Umbrella Review.

Grosso G^{1,2}, Godos J^{1,3}, Galvano E³, Giovannucci EL^{4,5,6}.

⊕ Author information

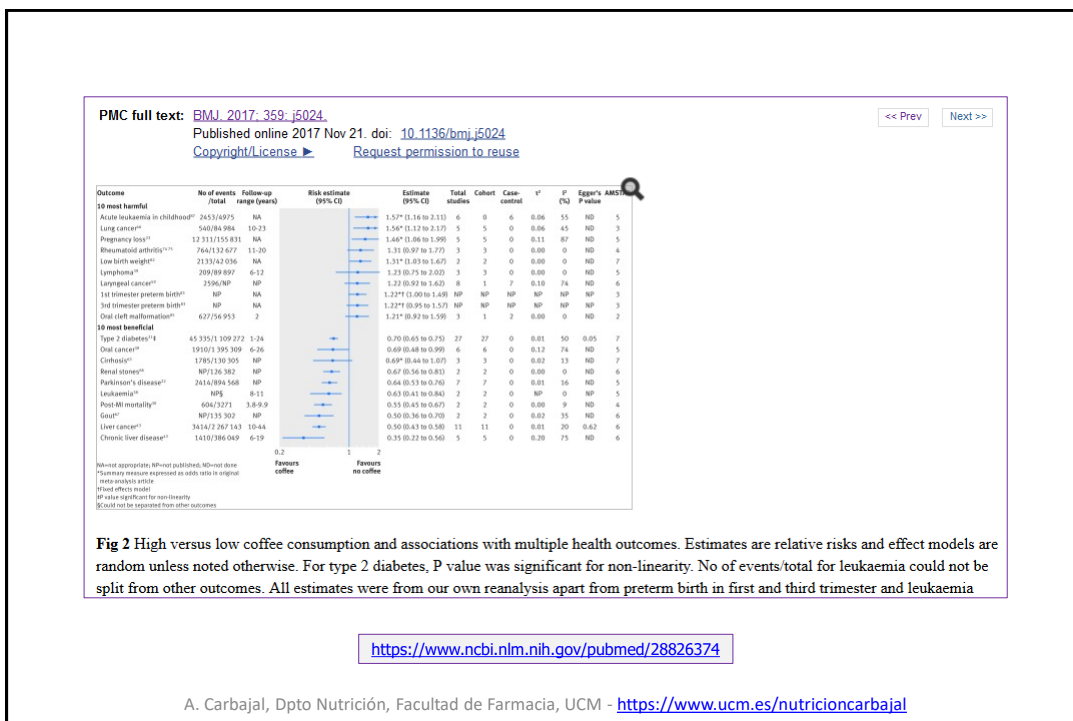
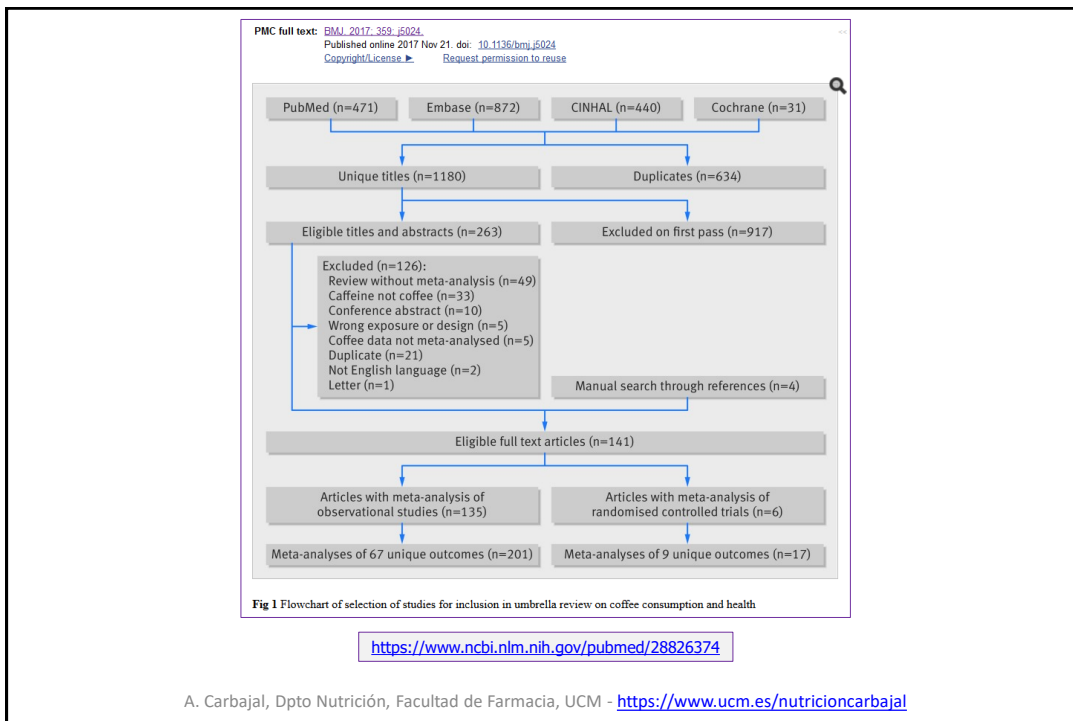
Abstract

To evaluate the associations between coffee and caffeine consumption and various health outcomes, we performed an umbrella review of the evidence from meta-analyses of observational studies and randomized controlled trials (RCTs). Of the 59 unique outcomes examined in the selected 112 meta-analyses of observational studies, coffee was associated with a probable decreased risk of breast, colorectal, colon, endometrial, and prostate cancers; cardiovascular disease and mortality; Parkinson's disease; and type-2 diabetes. Of the 14 unique outcomes examined in the 20 selected meta-analyses of observational studies, caffeine was associated with a probable decreased risk of Parkinson's disease and type-2 diabetes and an increased risk of pregnancy loss. Of the 12 unique acute outcomes examined in the selected 9 meta-analyses of RCTs, coffee was associated with a rise in serum lipids, but this result was affected by significant heterogeneity, and caffeine was associated with a rise in blood pressure. Given the spectrum of conditions studied and the robustness of many of the results, these findings indicate that coffee can be part of a healthful diet.

KEYWORDS: caffeine; cancer; cardiovascular disease; coffee; diabetes; neurodegenerative disease

PMID: 28826374 DOI: 10.1146/annurev-nutr-071816-064941

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The screenshot shows the NMC D (Nutrition, Metabolism & Cardiovascular Diseases) journal website. The article title is "Mediterranean diet and multiple health outcomes: An umbrella review of meta-analyses of observational studies and randomized trials" by M. Dinu, G. Pagliai, A. Casini, F. Sofi. The issue is January 2017, Volume 27, Issue 1, Page e21. The DOI is <https://doi.org/10.1016/j.numecd.2016.11.055>. The page includes navigation links, a search bar, and an "Article Tools" sidebar with options like PDF (49 KB), Email Article, Add to My Reading List, Export Citation, Create Citation Alert, Cited by in Scopus (0), and Order Reprints (100 minimum order).

[http://www.nmcd-journal.com/article/S0939-4753\(16\)30247-2/fulltext](http://www.nmcd-journal.com/article/S0939-4753(16)30247-2/fulltext)

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¿Cuándo hacer un meta-análisis?

- 1) Acumular evidencia sobre una situación ya documentada en distintos trabajos que individualmente no tienen suficiente peso estadístico para poder tomar decisiones sólidamente fundadas.
- 2) Aclarar resultados de trabajos contradictorios.
- 3) Resumir resultados cuando hay información muy abundante.
- 4) Para justificar la necesidad de realizar ensayos de mayor tamaño que los realizados hasta ese momento o, por el contrario, para justificar que no es necesario gastar más tiempo y recursos en estudios de mayor tamaño.

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AUTHORS' CONCLUSIONS**Implications for practice**

The lack of effect of prophylactic vitamin C supplementation on the incidence of the common cold in the general population throws doubt on the usefulness of this practice. In special circumstances, where people are engaged in extreme physical exertion or exposed to significant cold stress, or both, vitamin C supplementation may have a beneficial effect, but caution should be exercised in generalising this finding.

The prophylaxis trials found a reduction in common cold duration of 8% in adults and 13% in children. The practical relevance of these findings is open. In our opinion, prophylaxis in its own right. So far, therapeutic supplementation is not supported. Nevertheless, given the consistent effect of vitamin C in both prophylaxis and therapeutic supplementation studies, and the low cost and safety, a randomised controlled test on an individual basis whether therapeutic vitamin C supplementation is worthwhile.

AUTHORS' CONCLUSIONS

- Implications for practice
- Policy implications
- Implications for research

Implications for research

It does not seem worthwhile to carry out further regular supplementation trials in the general population. However, the findings in marathon runners, skiers and soldiers operating in subarctic conditions warrant further research.

None of the therapeutic trials carried out so far have examined the effect of vitamin C on children, even though the regular supplementation trials have found substantially greater effect on cold duration in children than in adults. In view of the greater incidence of respiratory infections in children, such therapeutic trials are warranted.

The findings in the Anderson 1974 study on the greater benefit of 8 g than 4 g dose on the day of onset of respiratory symptoms suggest that doses in further therapeutic trials with adults should be at least 8 g/day.

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Sesgos de publicación/selección/citación

- Resultados "positivos"
- Resultados significativos
- Muestras grandes
- Grupos de investigación de prestigio
- Rápida publicación
- Publicación múltiple
- Mayor citación
- Aumenta la probabilidad de que aparezcan en la bibliografía

BMJ 2005;331:433-434

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Why science needs to publish negative results

<https://www.elsevier.com/authors-update/story/innovation-in-publishing/why-science-needs-to-publish-negative-results>

Journal

of Negative & No Positive Results

<http://revistas.proeditio.com/jonnpr/index>



Figure 1: The most common approach taken by journals, in which only those experiments yielding positive results end up as publication material.

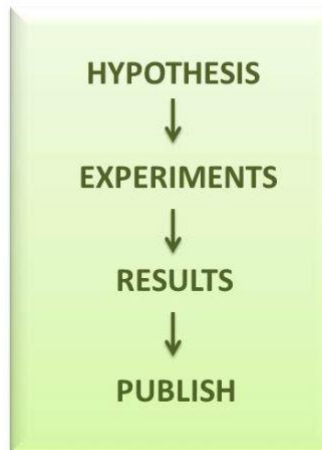


Figure 2: A more neutral approach, in which all results are published, as long as they are generated by well-carried out experiments based on sound hypotheses.

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Sesgo del idioma

- Revistas de lengua inglesa son las de mayor prestigio y difusión. Los trabajos escritos en inglés aparecen con mayor frecuencia en las bases de datos.

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Sesgos de publicación

- Financiación por parte de la industria: puede condicionar que sólo se publiquen los resultados favorables.
- Sesgo del propio autor en la selección de los trabajos (subjetividad) (es importante que en el meta-análisis queden bien definidos los criterios de selección).

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Conflicto de intereses

“No investigators have any affiliations or financial involvement (e.g., employment, consultancies, honoraria, stock options, expert testimony, grants or patents received or pending, or royalties) that conflict with material presented in this report.”

Los autores declaran que no existe ningún compromiso o vínculo con la entidad financiadora que pueda ser entendido como un conflicto de intereses.

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Estandarización, normas y control de revisiones sistemáticas y meta-análisis. Control de calidad

- MOOSE (Meta-analysis of Observational Studies in Epidemiology)
JAMA 2000;283:2008–12.
- **QUOROM (Quality of Reporting of Meta-Analyses)**
Lancet 1999;354:1896–900.
- Cochrane Handbook, <http://www.cochrane-handbook.org>
- AHRQ Methods Guide for Effectiveness and Comparative Effectiveness Reviews
- Institutes of Medicine Standards for Systematic Reviews
- The PRISMA Statement (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)
<http://www.prisma-statement.org/>

Reporting of systematic reviews of micronutrients and health: a critical appraisal^{1–4}
Mei Chung, Ethan M Balk, Stanley Ip, Gowri Raman, Winifred W Yu, Thomas A Trikalinos, Alice H Lichtenstein, Elizabeth A Yetley, and Joseph Lau
Am J Clin Nutr 2009;89:1–15.

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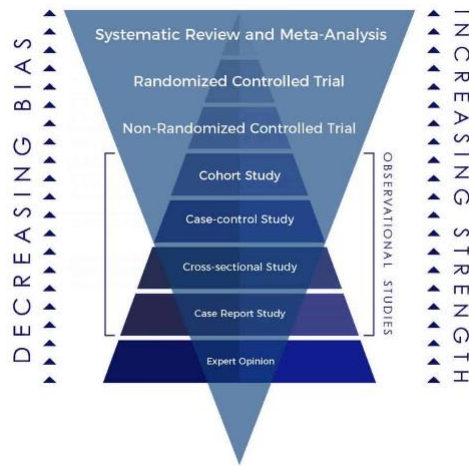
TODA LA INFORMACIÓN CIENTÍFICA ¿“PESA” LO MISMO?

NO



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Jerarquía de la Evidencia Científica



http://www.foodinsight.org/Evaluating_Scientific_Evidence

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Hierarchy of science evidence (Infographic) 01 March 2017

<http://www.eufic.org/en/understanding-science/article/hierarchy-of-science-evidence-infographic#WPXQO0rcE-M.twitter>

How strong is the scientific evidence?

Systematic reviews and meta-analyses
gather & summarise all relevant studies on a particular topic - lower chance of bias
systematic reviews
meta-analysis
KEEP IN MIND this is the strongest available evidence

Randomised controlled trials (RCT)
split into two random groups and then measure effects
one group is exposed to treatment being tested
one group is not exposed (control)
these studies can prove causation but keep in mind not to generalise too readily

Observational research
scientists use these studies to identify correlations and develop hypotheses for further testing
cohort study
case-control study
case study
don't forget that correlation does not necessarily mean causation

Animal & cell studies
effects in humans and animals are not always the same
isolated cells in the laboratory behave differently than cells in the body
always keep in mind the limitations of cell and animal research

Individual opinions & anecdotes
a single person's experience or opinion does not provide an objective picture
this evidence is too weak to draw conclusions

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Niveles de Evidencia Científica y Grados de recomendación

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Summary of strength of evidence on lifestyle factors and risk of developing cardiovascular diseases (WHO, 2003)			
Evidence	Decreased risk	No relationship	Increased risk
Convincing	Regular physical activity Linoleic acid Fish and fish oils (EHA and DHA) Vegetables and fruits (including berries) Potassium Low to moderate alcohol intake (for coronary heart disease)	Vitamin E supplements	Myristic and palmitic acids Trans fatty acids High sodium intake Overweight High alcohol intake (for stroke)
Probable	α -Linolenic acid Oleic acid NSP (fibra) Wholegrain cereals Nuts (unsalted) Plant sterols/stanols Folate	Aspartic acid	Dietary cholesterol Unfiltered boiled coffee
Possible	Flavonoids Soy products		
Inufficient	Calcium Magnesium Vitamin C		

Recomendaciones dietéticas BASADAS EN LA EVIDENCIA

Los científicos producen la **Mejor evidencia posible (Research Epidemiology)**

↑ Plant foods: wholegrain cereals, fruits and vegetables:
• ≥ 400 g fruits and vegetables a day

'5 a day' programmes in Germany, Poland, Spain, Sweden, the United Kingdom, '6 a day' in Denmark and '10 a day' in France and equivalent marketing-based initiatives in other countries (e.g., '3 a day' in Hungary).

- < 10% of daily energy intake from saturated fatty acids
- < 1% of daily energy intake from trans fatty acids
- < 10% of daily energy intake from free sugars
- < 5 g a day of salt

EPA, eicosapentaenoic acid; DHA, docosahexaenoic acid; NSP, non-starch polysaccharides
WHO/FAO, Diet, Nutrition and the Prevention of Chronic Diseases. WHO Technical Report Series 916. 2003.
<http://www.fao.org/WAIRDOCS/WHO/AC911E/AC911E00.HTM>

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Importancia de tomar decisiones

Convinciente: Evidencia de una relación causal concluyente. **Información suficiente para realizar recomendaciones dietéticas (RD) en la población en general.** Poca o ninguna evidencia de lo contrario. La asociación debe ser biológicamente plausible.

Probable: Evidencia lo suficientemente fuerte (RR/OR>2 o <0.5, estadísticamente significativo) para concluir que puede haber una relación causal. **En función de esta información también pueden realizarse RD.**

Posible: Puede existir una relación causal, pero la evidencia **no es lo suficientemente fuerte como para establecer RD.**

Insuficiente: Evidencia sugerente pero tan escasa o contradictoria que **no permite llegar a ninguna conclusión.**

WCRF, 2007; <http://eprints.ucl.ac.uk/4841/1/4841.pdf>

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Adapted from the World Health Organization, Diet, Nutrition and the Prevention of Chronic Diseases: report of a joint WHO/FAO expert consultation (WHO, FAO, 2003).

Grading	Evidence
Convinciente	Evidencia de estudios epidemiológicos que muestren <u>asociaciones consistentes</u> entre exposición y enfermedad, con poca o ninguna evidencia de lo contrario. Se basa en resultados de un <u>número importante</u> de estudios: <ul style="list-style-type: none"> • Observacionales prospectivos y • Ensayos controlados aleatorizados, realizados con muestras grandes y adecuada duración. La asociación debe ser biológicamente plausible
Probable	Evidencia basada en estudios epidemiológicos que muestren asociaciones <u>bastante consistentes</u> entre exposición y enfermedad. Limitaciones por: evidencia de lo contrario, insuficiente duración del estudio, insuficientes estudios, muestras inadecuadas, seguimiento incompleto, etc. La asociación debe ser biológicamente plausible
Posible	Evidencia basada principalmente en resultados de: <ul style="list-style-type: none"> • Estudios caso-control y • estudios transversales. Puede haber también resultados de algunos: <ul style="list-style-type: none"> • Ensayos controlados aleatorizados • Ensayos controlados no aleatorizados • Estudios observacionales Son necesarios más ensayos que apoyen la asociación. La asociación debe ser biológicamente plausible
Insuficiente	Pocos estudios que sugieran la asociación, insuficientes para establecer dicha asociación. Limitada información o ninguna procedente de ensayos controlados aleatorizados. Son necesarios más estudios mejor diseñados

(WCRF, 1997; WHO, 2003). World Cancer Research Fund, American Institute for Cancer Research. Food, Nutrition and Prevention of Cancer: a Global Perspective. 1997. <http://www.wcrf.org/>
WHO/FAO. 2003. Diet, Nutrition and the Prevention of Chronic Diseases. Technical Report Series 916. <http://www.who.int/dietphysicalactivity/publications/trs916/en/>

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Etiquetado nutricional de los alimentos

PASSCLAIM ("Process of the Assessment of Scientific Support for Claims on Foods")



Framework for strength of evidence

- **CONVINCING:** **A** Significant scientific agreement *can be trusted to guide practice*
- **PROBABLE:** **B** Good to moderate level of scientific agreement *can be trusted to guide practice in most situations*
- **POSSIBLE:** **C** Low level of scientific agreement *some support for the recommendations but care should be taken in its application*
- **INSUFFICIENT:** **D** Very low level of scientific agreement *evidence is weak and any recommendation must be applied with caution*

WCRF (2007); USFDA (2003); WHO (2004); CODEX (2007)

Professor D. P. Richardson, DPR Nutrition Ltd, UK
<http://www.eski.hu/new3/konyvtar/bookshop/EFSA%20Conference%20on%20Nutrition%20and%20Health%20Claims.pdf>

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Evidence Grading Summary

Types of Research: Evidence Hierarchies	
Agency for Healthcare Research and Quality (AHRQ)	
Level I	Meta-Analysis (Combination of data from many studies)
Level II	Experimental Designs (Randomized Control Trials)
Level III	Well designed Quasi Experimental Designs (Not randomized or no control group)
Level IV	Well designed Non-Experimental Designs (Descriptive-can include qualitative)
Level V	Case reports/clinical expertise

Strength of Evidence	
United States Preventive Services Task Force (USPSTF) Grading	
A	Strongly recommended; Good evidence
B	Recommended; At least fair evidence
C	No recommendation; Balance of benefits and harms too close to justify a recommendation
D	Recommend against; Fair evidence is ineffective or harm outweighs the benefit
I	Insufficient evidence; Evidence is lacking or of poor quality, benefit and harms cannot be determined

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Ejemplo

Revista Española de
Obesidad
Vol. 9 • Suplemento 1 • Octubre 2011

● Recomendaciones nutricionales basadas en la evidencia para la prevención y el tratamiento del sobrepeso y la obesidad en adultos (Consenso FESNAD-SEEDO)

fesnad

SEEDO

Con la colaboración de:

La Revista Española de Obesidad está indexada en: EMBASE, Excerpta Medica y SCOPUS

Sociedad Española para el Estudio de la Obesidad www.seedo.es

ACCION ALIMENTARIA

http://www.naos.aesan.msp.es/naos/ficheros/investigacion/Consenso_SEEDO.pdf

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LA DIETA EN LA PREVENCIÓN DE LA OBESIDAD

1. Equilibrio energético y peso corporal

1.1. Densidad energética

Evidencia

1. Los patrones alimentarios de alta densidad energética pueden conducir a un incremento de peso en adultos (nivel de evidencia 1+).

Recomendaciones

1. El aumento de peso puede prevenirse mediante dietas que contengan alimentos con baja densidad energética (recomendación de grado A).

1.2. Equilibrio energético y ambiente obesogénico

Evidencia

2. La ausencia de supermercados con disponibilidad de frutas y hortalizas o su ubicación a grandes distancias, sobre todo en núcleos humanos con niveles socioeconómicos desfavorecidos, son factores condicionantes de un mayor IMC medio poblacional (nivel de evidencia 1+).

Recomendaciones

2. Deben arbitrarse estrategias que hagan posible la disponibilidad alimentaria y el acceso a alimentos saludables, en especial frutas y hortalizas, en esos ambientes favorecidos

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1.4. Equilibrio energético: tamaño de las raciones

Evidencia

4. El ofrecimiento de raciones de mayor tamaño condiciona un aumento en la ingesta energética de los individuos (nivel de evidencia 2++).

Recomendaciones

4. La utilización de raciones de menor tamaño limita la ingesta energética (recomendación de grado B).

1.5. Equilibrio energético: desayuno

Evidencia

5. Son controvertidas e inconsistentes las investigaciones que estudian la relación entre la omisión del desayuno en adultos y el riesgo de sobrepeso y obesidad.

1.6. Equilibrio energético: aperitivos

Evidencia

6. Son controvertidas e inconsistentes las investigaciones que sugieren que el consumo de aperitivos está asociado con el incremento de peso.

1.7. Equilibrio energético: frecuencia

Evidencia

7. Las investigaciones que estudian la relación entre la

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MÉTODO SIGN: Niveles de evidencia

(Scottish Intercollegiate Guidelines Network)

Tabla 1. NIVELES DE EVIDENCIA⁽¹⁹⁾

1	1++	Metaanálisis de alta calidad, revisiones sistemáticas de ECA, o ECA con un riesgo muy bajo de sesgo
	1+	Metaanálisis bien realizados, revisiones sistemáticas de ECA, o ECA con bajo riesgo de sesgo
	1-	Metaanálisis, revisiones sistemáticas de ECA o ECA con alto riesgo de sesgo
2	2++	Revisiones sistemáticas de alta calidad de estudios caso-control o de cohortes
	2+	Estudios caso-control o de cohortes de alta calidad con un riesgo muy bajo de confusión o sesgo, y una alta probabilidad de que la relación sea causal
	2-	Estudios caso-control o de cohortes bien realizados con un riesgo bajo de confusión o sesgo, y una probabilidad moderada de que la relación sea causal
3		Estudios no analíticos (p. ej.: casos clínicos o series de casos)
4		Opinión de experto/s

ECA: ensayo controlado aleatorizado

Tabla 2. GRADOS DE RECOMENDACIÓN⁽¹⁹⁾

A	Como mínimo un metaanálisis, revisión sistemática o ECA con una clasificación de 1++ y directamente aplicable a la población diana; o una revisión sistemática o ECA con un cuerpo de evidencia consistente principalmente en estudios puntuados como 1+, directamente aplicable a la población diana, y que demuestre una consistencia global en sus resultados
B	Un cuerpo de evidencias que incluya estudios puntuados como 2++, directamente aplicables a la población diana y que demuestre una consistencia global en sus resultados; o evidencias extrapoladas de estudios puntuados como 1++ o 1+
C	Un cuerpo de evidencias que incluya estudios puntuados como 2+, directamente aplicables a la población diana y que demuestre una consistencia global en sus resultados; o evidencias extrapoladas de estudios puntuados como 2++
D	Evidencias de nivel 3 o 4; o evidencias extrapoladas de estudios puntuados como 2+

ECA: ensayo controlado aleatorizado

Los estudios clasificados como 1- y 2- no deben usarse en el proceso de elaboración de recomendaciones, por su alto potencial de sesgo

http://www.naos.aesan.msp.es/naos/ficheros/investigacion/Consenso_SEEDO.pdf

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MÉTODO SIGN: Niveles de evidencia

(Scottish Intercollegiate Guidelines Network)

- SIGN evalúa la calidad de la evidencia científica en función de:

- Diseño del estudio:
 - Ensayos clínicos, revisiones sistemáticas o metaanálisis (1)
 - Opinión de expertos (4)
- Riesgo de sesgo:

++	Se han cumplido todos o la mayoría de los criterios de calidad metodológica. En los puntos en que no se han cumplido, se considera muy poco probable que dicho incumplimiento pueda afectar a las conclusiones del estudio o revisión.
+	Se han cumplido algunos de los criterios de calidad metodológica. Se considera poco probable que los criterios que no se han cumplido o que no se describen de forma adecuada puedan afectar a las conclusiones.
-	Se han cumplido sólo unos pocos criterios de calidad metodológica, o ninguno de ellos. Se considera probable o muy probable que esto afecte a las conclusiones.

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MÉTODO SIGN: Niveles de evidencia

(Scottish Intercollegiate Guidelines Network)

Niveles de evidencia	
1++	Metaanálisis de alta calidad, revisiones sistemáticas de ensayos clínicos o ensayos clínicos de alta calidad con muy poco riesgo de sesgo.
1+	Metaanálisis bien realizados, revisiones sistemáticas de ensayos clínicos o ensayos clínicos bien realizados con poco riesgo de sesgos.
1-	Metaanálisis, revisiones sistemáticas de ensayos clínicos o ensayos clínicos con alto riesgo de sesgos.
2++	Revisiones sistemáticas de alta calidad de estudios de cohortes o de casos y controles. Estudios de cohortes o de casos y controles con riesgo muy bajo de sesgo y con alta probabilidad de establecer una relación causal.
2+	Estudios de cohortes o de casos y controles bien realizados con bajo riesgo de sesgo y con una moderada probabilidad de establecer una relación causal.
2-	Estudios de cohortes o de casos y controles con alto riesgo de sesgo y riesgo significativo de que la relación no sea causal.
3	Estudios no analíticos, como informes de casos y series de casos.
4	Opinión de expertos.
Grados de recomendación	
A	Al menos un metaanálisis, revisión sistemática o ensayo clínico clasificado como 1++ y directamente aplicable a la población diana de la guía; o un volumen de evidencia científica compuesto por estudios clasificados como 1+ y con gran consistencia entre ellos.
B	Un volumen de evidencia científica compuesta por estudios clasificados como 2++, directamente aplicable a la población diana de la guía y que demuestran gran consistencia entre ellos; o evidencia científica extrapolada desde estudios clasificados como 1++ ó 1+
C	Un volumen de evidencia científica compuesta por estudios clasificados como 2+ directamente aplicables a la población diana de la guía y que demuestran gran consistencia entre ellos; o evidencia científica extrapolada desde estudios clasificados como 2++
D	Evidencia científica de nivel 3 ó 4; o evidencia científica extrapolada desde estudios clasificados como 2+

Scottish Intercollegiate Guidelines Network. A guideline developers' handbook (Publication no 50). Edinburgh: SIGN: 2001
[actualizado Noviembre 2011]. Disponible en: <http://www.sign.ac.uk/pdf/sign50.pdf>

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Innovadieta 

<https://www.ucm.es/innovadieta/nube>

<https://www.ucm.es/innovadieta/documentos-consenso>

En las BBDD de Innovadieta busca la evidencia sobre los efectos del chocolate negro en la salud

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BBDD de Evidencia científica

Algunos ejemplos

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Publicaciones RED NuBE



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BASADA en la EVIDENCIA

Entradas en le blog de RED-NuBE:
<http://www.rednube.net/blog/>



PEN
The Global Resource
for Nutrition Practice

Digestor semanal de movimiento en redes sociales:
<http://paper.li/e-1450136177>

Revistas Científicas y otras monografías

2017


- **Baladía E, Martínez-Rodríguez R. Revisión científica sobre la alimentación y nutrición en el embarazo.** RED-NuBE; 2017. Disponible en: http://diamundialdietistanutricionista.org/wp-content/uploads/2017/05/baladia_evidencias_new.pdf / en Researchgate

2016

- **Baladía E, Martínez-Rodríguez R. Legumbres y salud: resumen de evidencias rápidas.** RED-NuBE; 2016. Disponible en: http://www.rednube.net/docs/legumbres_2016.pdf / Presentación del documento en Youtube / en Researchgate
- **Baladía E, Martínez-Rodríguez R. Conflictos de interés en nutrición humana y dietética / Conflicts of interest in human nutrition and dietetics.** Rev Esp Nutr Hum Diet. 2016; 20(2):77-79. doi: 10.14306/renhyd.20.2.261
- **Baladía E, Frutos Pérez-Surío A, Martínez-Rodríguez R. Sumario de recomendaciones nutricionales basadas en la evidencia de la Guía de Práctica Clínica para el manejo de pacientes con enfermedad de Parkinson / Summary of evidence-based nutritional recommendations of the Clinical Practice Guideline for the management of patients with Parkinson's disease.** Nutr Hosp. 2016; 33(3):749-760 [factor de impacto = 1,487]. **Texto completo.** También en Researchgate.
- **Estarli M, Aguilar Barrera ES, Martínez-Rodríguez R, Baladía E, Duran Agüero S, Camacho S, Buhning K, Herrero-López A, Gil-González DM. Ítems de referencia para publicar Protocolos de Revisiones Sistemáticas y Metaanálisis: Declaración PRISMA-P 2015.** Rev Esp Nutr Hum Diet. 2016; 20(2):148 – 160. doi: 10.14306/renhyd.20.2.223

<http://www.rednube.net/publicaciones-red-nube/>

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Grade I: Good—The evidence consists of results from studies of **strong** design for answering the question addressed. The results are both clinically important and consistent with minor exceptions at most. The results are free of serious doubts about generalizability, bias, and flaws in research design. Studies with negative results have sufficiently large sample sizes to have adequate statistical power.

Grade II: Fair—The evidence consists of results from studies of strong design answering the question addressed, but there is uncertainty attached to the conclusion because of inconsistencies among the results from different studies or because of doubts about generalizability, bias, research design flaws, or adequacy of sample size. Alternatively, the evidence consists solely of results from weaker designs for the questions addressed, but the results have been confirmed in separate studies and are consistent with minor exceptions at most.

Grade III: Limited—The evidence consists of results from a limited number of studies of **weak** design for answering the questions addressed. Evidence from studies of strong design is either unavailable because no studies of strong design have been done or because the studies that have been done are inconclusive due to lack of generalizability, bias, design flaws, or inadequate sample sizes.

Grade IV: Expert Opinion Only—The support of the conclusion consists solely of the statement of informed medical commentators based on their clinical experience, unsubstantiated by the results of any research studies.

Grade V: Not Assignable—There is no evidence available that directly supports or refutes the conclusion.

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Conditional versus Imperative Recommendations

Recommendations can be worded as conditional or imperative statements. **Conditional** statements clearly define a specific situation, while **imperative** statements are broadly applicable to the target population without restraints on their pertinence.

More specifically, a **conditional recommendation** can be stated in **if/then** terminology (e.g., If an individual does not eat food sources of omega-3 fatty acids, then 1g of EPA and DHA omega-3 fatty acid supplements may be recommended for secondary prevention).

In contrast, **imperative recommendations** “require,” or “must,” or “should achieve certain goals,” but do not contain conditional text that would limit their applicability to specified circumstances. (e.g., Portion control should be included as part of a comprehensive weight management program. Portion control at meals and snacks results in reduced energy intake and weight loss).

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¿Cuántas comidas al día deben hacerse?

Position of the American Dietetic Association: Weight Management
Journal of the American Dietetic Association - Volume 109/2, Pages 185-364 (February 2009)

Revisión sistemática de todos los estudios y concluyen:

EAL Recommendation “Total caloric intake should be distributed throughout the day, with the consumption of four to five meals/snacks per day including breakfast. Consumption of greater energy intake during the day may be preferable to evening consumption”

Rating: Fair, Imperative.

Conclusion. Several studies show that consumption of four to five meals or snacks per day is associated with reduced or no obesity risk, while three or fewer and six or more meals or snacks per day may result in increased risk of obesity, depending on gender. Higher eating frequency is related to lower total daily energy intake and body weights in men, but in women the data is less conclusive. Five studies demonstrate that consumption of greater energy intake in the morning vs. the evening is associated with lower body weights and greater loss of weight. Further research is needed on the distribution of calories consumed at meals and snacks during the day.

Grade II

Recommendation Strength Rationale

- Conclusion statements both given a Grade II
- Consistent findings among a variety of study designs
- Minority Opinions

Consensus reached

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WELCOME TO NEL

USDA's Nutrition Evidence Library (NEL) specializes in conducting systematic reviews to inform Federal nutrition policy and programs. NEL staff collaborate with stakeholders and leading scientists using state-of-the-art methodology to

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A Series of Systematic Reviews on the Effects of Nutrition Education on Children's and Adolescents' Dietary Intake

Full Report
Appendices A-C
Appendices D-I

Systematic Review Questions

Executive Summary

Consuming a healthy diet consistent with the Dietary Guidelines for Americans, 2010[1] can help individuals achieve and maintain a healthy weight, reduce the risk of developing chronic diseases, and promote good health. However, many children are consuming excess calories, while not meeting nutrient needs, and are overweight/obese and/or at increased

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Cont.

Systematic Review Questions

The systematic review questions addressed were identified and prioritized to focus the reviews on topics that would enhance current nutrition education practice and programs. A broad range of school- and community-based nutrition education interventions involving children in preschool, kindergarten, and elementary school and adolescents in middle and high school were considered, in order to answer the following systematic review questions:

1. [What is the effect of nutrition education delivered via digital media and/or technology on children's and adolescents' dietary intake-related behaviors?](#)
2. [What is the effect of nutrition education with parental involvement compared to no parental involvement on children's and adolescents' dietary intake-related behaviors?](#)
3. [Which type of educator who delivers nutrition education is most effective in changing children's and adolescents' dietary intake-related behaviors?](#)
4. [What are the effects of combining changes to the food environment and nutrition education compared to either of these strategies alone on children's and adolescents' dietary intake-related behaviors?](#)
5. [What are the effects of multi-component compared to single-component nutrition education interventions on children's and adolescents' dietary intake-related behaviors?](#)

Background and Methodology

USDA's Nutrition Evidence Library (NEL) conducted these systematic reviews. The NEL uses a rigorous, transparent, and reproducible methodology to conduct systematic reviews on food- and nutrition-related topics to support Federal nutrition policies and programs using a six-step process:

1. Develop systematic review questions
2. Create and implement literature search and sort plans
3. Develop evidence portfolios
4. Synthesize the bodies of evidence
5. Develop conclusion statements and grade the evidence
6. Describe research recommendations.

This NEL systematic review project was planned, organized, and guided by a NEL Systematic Review Management Team composed of Federal nutritionists trained in systematic review methodology. The NEL Systematic review team worked with a Technical Expert Collaborative (TEC), which consisted of eight leading nutrition education experts, whose expertise was needed to address specific issues related to the role of nutrition education to guide synthesis of the body of evidence.

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eLibrary of Evidence for Nutrition Actions (eLENA)

Iodine supplementation during pregnancy

Pregnant women need about 66% more iodine than non-pregnant women. This nutrient is essential for healthy brain development in the fetus and young child.

Most foods are relatively low in iodine content. To ensure that everyone has a sufficient intake of iodine, WHO and UNICEF recommend universal salt iodization as a global strategy. However, in certain countries salt iodization may not be feasible in all regions.

WHO and UNICEF therefore recommend iodine supplementation for pregnant and lactating women in countries where less than 20% of households have access to iodized salt, until the salt iodization programme is scaled up. Countries with a household access to iodized salt between 20 and 90% should make efforts to accelerate salt iodization or assess the feasibility of increasing iodine intake in the form of a supplement or iodine fortified foods by the most susceptible groups.

<http://www.who.int/elena/en/index.html>
En español: <http://www.who.int/elena/es/index.html>

Iodine supplementation during pregnancy
Status: guidelines under development
Publication year: expected 2012

Related links

- Publication: Nutrition essentials: a guide for health managers [pdf 1.9Mb]
- [Publication: Iodine deficiency in 2007: Global progress since 2003](#) pdf, 421kb
- [Publication: Prevention and control of iodine deficiency in pregnant and lactating women and in children less than 2 years old: conclusions and recommendations of the technical consultation](#) pdf, 87kb
- Publication: Iodized oil during pregnancy: safe use of iodized oil to prevent iodine deficiency in pregnant women [pdf 475kb]

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e-Library of Evidence for Nutrition Actions (eLENA)

eLENA

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- How to use eLENA

Increasing fruit and vegetable consumption to reduce the risk of noncommunicable diseases

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28 August 2015 13:48 CEST

Category 2 intervention
Systematic review(s) have been conducted but no recent guidelines yet available that have been approved by the WHO Guidelines Review Committee
— [More about categories of interventions](#)

Biological, behavioural and contextual rationale
— [Increasing fruit and vegetable consumption to reduce the risk of noncommunicable diseases](#)

Fruits and vegetables are important components of a healthy diet. Reduced fruit and vegetable consumption is linked to poor health and increased risk of noncommunicable diseases (NCDs). An estimated 6.7 million deaths worldwide were attributable to inadequate fruit and vegetable consumption in 2010.

Including fruits and vegetables as part of the daily diet may reduce the risk of some NCDs including cardiovascular diseases and certain types of cancer. More limited evidence suggests that when consumed as part of a healthy diet low in fat, sugars and salt/sodium, fruits and vegetables may also help to prevent weight gain and reduce the risk of obesity, an independent risk-factor for NCDs.

Moreover, fruits and vegetables are rich sources of vitamins and minerals, dietary fibre and a host of beneficial non-nutrient substances including plant sterols, flavonoids and other antioxidants and consuming a variety of fruits and vegetables helps to ensure an adequate intake of many of these essential nutrients.

WHO recommendations
As part of a healthy diet low in fat, sugars and sodium, WHO suggests consuming more than 400 grams of fruits and vegetables per day to improve overall health and reduce the risk of certain NCDs.

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Evaluar la calidad de la Evidencia

Grading of Recommendations Assessment, Development, and Evaluation (año 2000)



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<http://www.sciencedirect.com/science/article/pii/S0212656714000493>

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Ejemplo: Evaluation, Treatment, and Prevention of Vitamin D Deficiency:
an Endocrine Society Clinical Practice Guideline

<https://www.ncbi.nlm.nih.gov/pubmed/21646368>

1912	Holick et al.	Guidelines on Vitamin D Deficiency	J Clin Endocrinol
2.0 Recommended dietary intakes of vitamin D for patients at risk for vitamin D deficiency			
2.1 We suggest that infants and children aged 0–1 yr require at least 400 IU/d (IU = 25 ng) of vitamin D and children 1 yr and older require at least 600 IU/d to maximize bone health. Whether 400 and 600 IU/d for children aged 0–1 yr and 1–18 yr, respectively, are enough to provide all the potential nonskeletal health benefits associated with vitamin D to maximize bone health and muscle function is not known at this time. However, to raise the blood level of 25(OH)D consistently above 30 ng/ml (75 nmol/liter) may require at least 1000 IU/d of vitamin D (2⊕⊕⊕⊕).		vitamin D ₂ or vitamin D ₃ , or vitamin D ₃ once weekly of 25(OH)D above 30 ng/ml. Maintenance therapy of 400-1000 IU/d	
2.2 We suggest that adults aged 19–50 yr require at least 600 IU/d of vitamin D to maximize bone health and muscle function. It is unknown whether 600 IU/d is enough to provide all the potential nonskeletal health benefits associated with vitamin D. However, to raise the		3.3 For children aged 1–18 yr who are vitamin D deficient, we suggest treatment with vitamin D ₂ once a week for 8 wk or vitamin D ₃ for at least 8 wk for a level of 25(OH)D above 30 ng/ml. Maintenance therapy of 600-1000 IU/d	
		3.4 We suggest that all children aged 1–18 yr who are vitamin D deficient be treated with 50,000 IU of vitamin D ₂ or vitamin D ₃ once a week for 8 wk to raise the level of 25(OH)D above 30 ng/ml. Maintenance therapy of 1500–2000 IU/d is suggested for children aged 1–18 yr who are vitamin D deficient.	
		3.5 In obese patients, p	

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Método GRADE: Representación



Calidad de la evidencia científica		
Alta	⊕⊕⊕⊕	A
Moderada	⊕⊕⊕○	B
Baja	⊕⊕○○	C
Muy baja	⊕○○○	D
Fuerza de la recomendación		
Recomendación fuerte a favor de utilizar una intervención	↑↑	1
Recomendación débil a favor de utilizar una intervención	↑?	2
Recomendación débil en contra de utilizar una intervención	↓?	2
Recomendación fuerte en contra de utilizar una intervención	↓↓	1

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Método GRADE: Niveles de evidencia

Calidad de la evidencia científica	Definición
Alta (⊕ ⊕ ⊕ ⊕)	Estamos muy seguros de que el verdadero efecto se encuentra cerca de la estimación del efecto.
Moderada (⊕ ⊕ ⊕)	Estamos moderadamente seguros en la estimación del efecto: el verdadero efecto es probable que esté cerca de la estimación del efecto, pero hay una posibilidad de que sea sustancialmente diferente.
Baja (⊕ ⊕)	Nuestra confianza en la estimación del efecto es limitada: el verdadero efecto puede ser sustancialmente diferente de la estimación del efecto.
Muy Baja (⊕)	Tenemos muy poca seguridad en el efecto estimado: El verdadero efecto es probable que sea sustancialmente diferente de la estimación del efecto.

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Método GRADE: Grados de recomendación

Tipos de recomendación	Definición
Fuerte	El grupo elaborador confía en que los efectos beneficiosos que se pueden dar como resultado de adherirse/llevar a cabo una recomendación son mayores que los efectos perjudiciales.
Débil (Condicional, Discrecional)	El grupo elaborador concluye , aunque no está completamente seguro, que los potenciales efectos beneficiosos de llevar a cabo una recomendación probablemente son mayores que los potenciales efectos perjudiciales.

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Evidencia científica

Información contrastada para la toma de decisiones

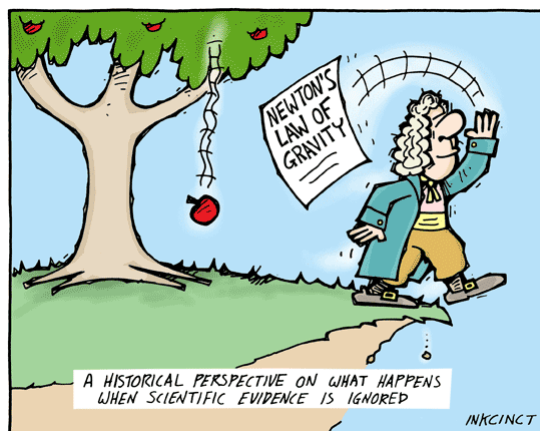
"¿Quién sabe, preguntó Robert Browning, si el mundo no terminará esta noche? Ciertamente, pero con la evidencia disponible, la mayoría de nosotros deberíamos prepararnos para salir a trabajar mañana a las 8.30 h."

A.B. Hill

[Schoenbach, 1999]

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