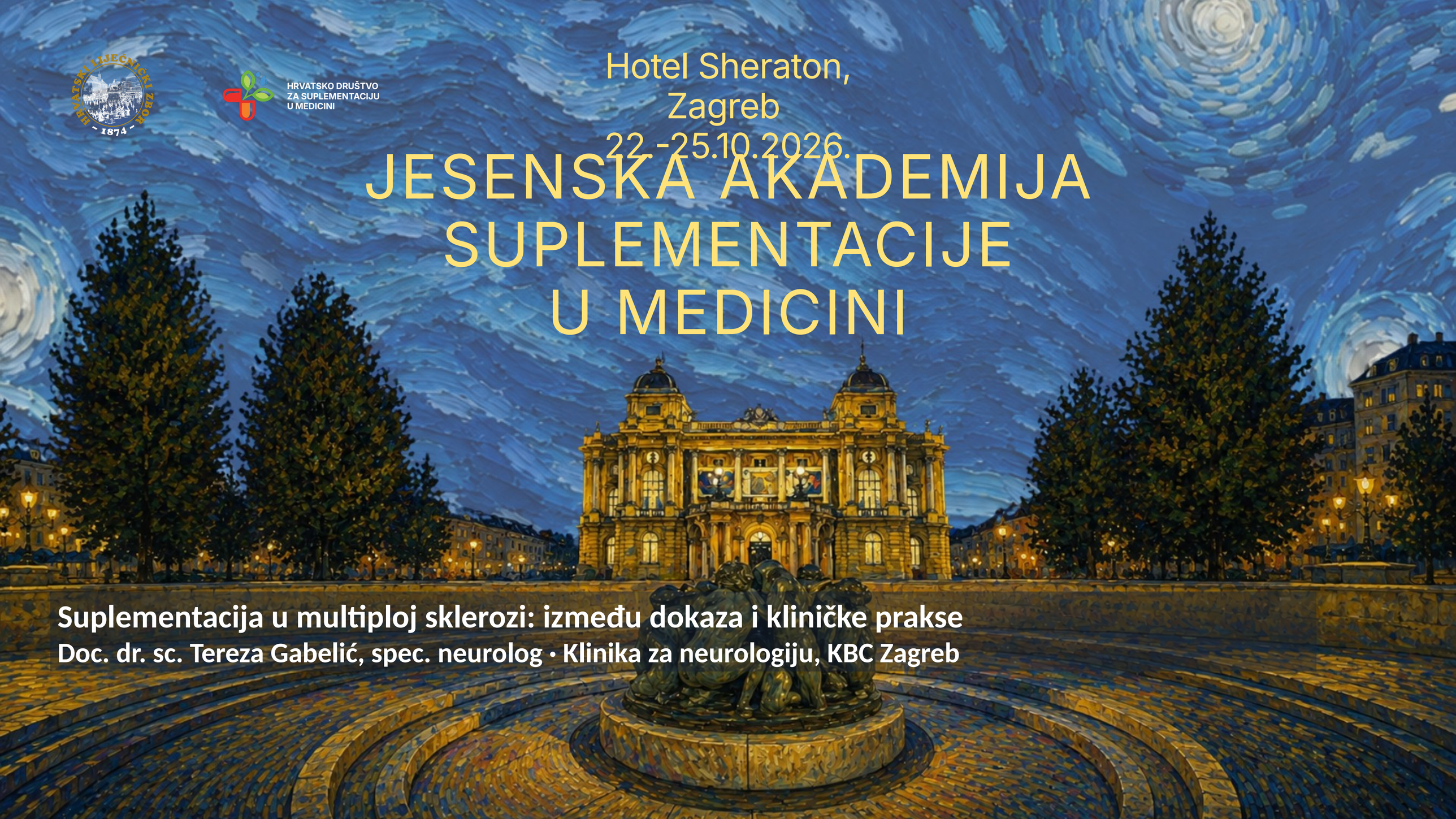

HRVATSKO DRUŠTVO
ZA SUPLEMENTACIJU
U MEDICINI
Hotel Sheraton,
Zagreb
22.-25.10.2026.
JESENSKA AKADEMIJA
SUPLEMENTACIJE
U MEDICINI
Suplementacija u multiploj sklerozi: između dokaza i kliničke prakse
Doc. dr. sc. Tereza Gabelić, spec. neurolog · Klinika za neurologiju, KBC Zagreb

Multipla skleroza: najčešća kronična upalna demijelinizacijska bolest SŽS-a

~2,9 mil.
oboljelih u svijetu

20–40 g.
bolest mladih odraslih osoba

2–3 : 1
omjer žena i muškaraca

Vodeći netraumatski uzrok invalidnosti u mladih odraslih

Goodin DS. The epidemiology, pathology and pathogenesis of MS: Therapeutic implications. Neurotherapeutics. 2025

Prevalencija multiple skleroze u Hrvatskoj: 8.518 oboljelih

Dobne skupine	Muškarci	Žene	Ukupan broj
10-14	6	9	**15**
15-19	24	52	**76**
20-24	85	194	**279**
25-29	141	376	**517**
30-34	238	537	**775**
35-39	307	601	**908**
40-44	342	808	**1.150**
45-49	326	767	**1.093**
50-54	290	709	**999**
55-59	235	600	**835**
60-64	151	589	**740**
65-69	131	417	**548**
70-74	79	244	**323**
75-79	38	97	**135**
80-84	8	71	**79**
85 i više	10	36	**46**
Ukupan broj	**2.411**	**6.107**	**8.518**

8.518

oboljelih od MS-a u Hrvatskoj

6.107

žena

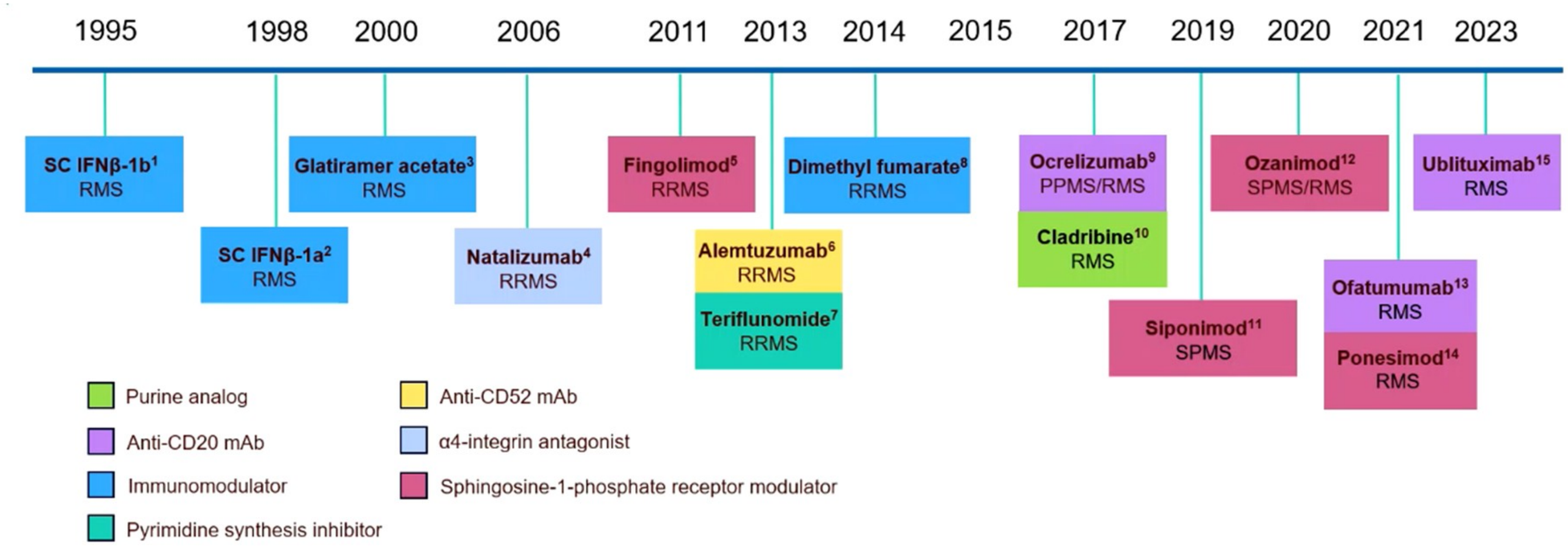
2.411

muškaraca

Omjer Ž : M ≈ 2,5 : 1

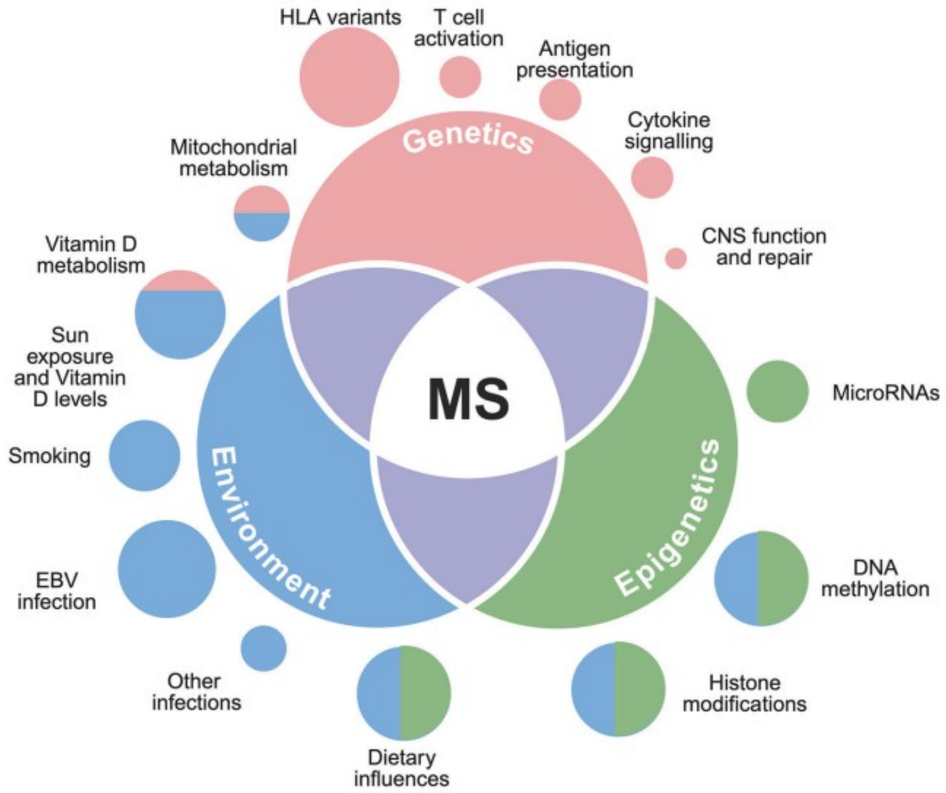
HZJZ. Učestalost vodećih javnozdravstvenih problema u Hrvatskoj, 2024. Pristupljeno 25. 2. 2026.

Terapija multiple skleroze: gotovo tri desetljeća novih lijekova



Abdelrahman A, Alvarez E. Advances in Multiple Sclerosis Neurotherapeutics, Neuroprotection, and Risk Mitigation Strategies. Neurol Clin. 2024

MS nastaje složenom interakcijom gena i čimbenika okoliša



GENETIKA
HLA varijante, aktivacija T-stanica, prezentacija antigena

OKOLIŠ
Vitamin D i izloženost suncu, pušenje, EBV i druge infekcije, prehrana

EPIGENETIKA
MikroRNA, metilacija DNA, modifikacije histona

Boutitah-Benyaich I, Eixarch H, Villacieros-Álvarez J et al. Multiple sclerosis: molecular pathogenesis and therapeutic intervention. Sig Transduct Target Ther. 2025

Četiri od pet bolesnika s MS-om uzima barem jedan suplement



Contents lists available at ScienceDirect

Multiple Sclerosis and Related Disorders

journal homepage: www.elsevier.com/locate/msard

Original article

Cross-sectional survey of complementary and alternative medicine used in Oregon and Southwest Washington to treat multiple sclerosis: A 17-Year update

Elizabeth Silbermann[a,b,*], Angela Senders[a,c], Lindsey Wooliscroft[a,b], Jessica Rice[a,b], Michelle Cameron[a,b], Carin Waslo[a,b], Anna Orban[a], Emma Chase[a], Vijayshree Yadav[a,b], Dennis Bourdette[a,b], Rebecca I Spain[a,b]

[a] Department of Neurology, Oregon Health & Science University, Portland, OR, United States
[b] Department of Neurology, Veterans Affairs Portland Health Care System, Portland, OR, United States
[c] Helfgott Research Institute, National University of Natural Medicine, United States

N = 1014

presječno anketno istraživanje, Oregon i jugozapadni Washington

81,3 %

barem jedan suplement ili biljni pripravak radi MS-a

84,1 %

uzimalo je vitamin D

19,6 %

šest ili više suplemenata

41,8 %

primjenjivalo je posebnu prehranu

Silbermann E, Senders A, Wooliscroft L et al. Mult Scler Relat Disord. 2020

Vitamin B12: razine u MS-u nisu niže, nadomjestak samo uz dokazan deficit

16 studija

Metaanaliza 2020. (2351 ispitanik): razina B12 kao u kontrola (SMD −0,08; p = 0,58)



DIFERENCIJALNA DIJAGNOZA

Deficit B12 može oponašati mijelopatiju i pogoršati umor i parestezije.

KADA MISLITI NA DEFICIT

Metformin, inhibitori protonske pumpe, veganska prehrana, dušikov oksidul.

ZAKLJUČAK

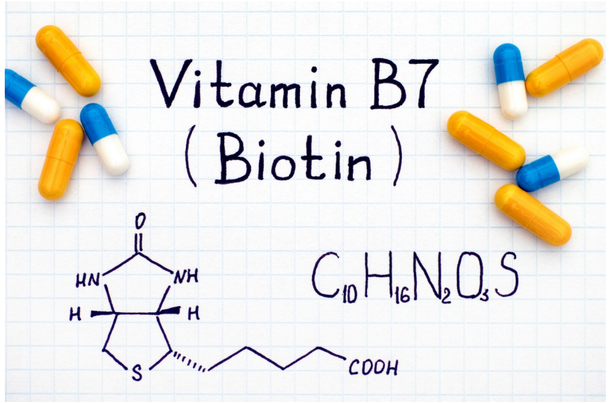
Odrediti razinu pri sumnji i nadomjestiti dokazan deficit; bez dokaza za rutinsku primjenu.

Li X et al. Int J Med Sci. 2020;17(6):751–61 · Wade DT et al. J Neurol Neurosurg Psychiatry. 2002;73:246–9

Biotin (vitamin B7): faza 3 nije potvrdila rane pozitivne rezultate

12,6 % : 0 %

MS-SPI (n = 154): poboljšanje onesposobljenosti uz biotin prema placebu; p = 0,005



300 mg

dnevno (100 mg tri puta na dan), progresivna MS

LABORATORIJ

Netočni nalazi testova s biotiniliranim protutijelima. FDA upozorava na lažno nizak troponin i moguć propušten infarkt miokarda.

ZAKLJUČAK

MD1003 se ne može preporučiti za liječenje progresivne MS (autori SPI2).

Tourbah A et al. Mult Scler. 2016;22:1719–31 · Cree BAC et al. Lancet Neurol. 2020;19:988–97 · FDA Safety Communication: Biotin Interference with Troponin Lab Tests, 2017., ažurirano 2019.

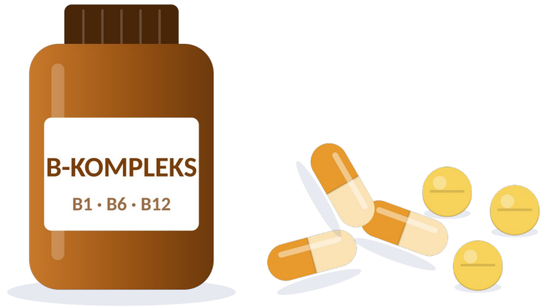
Vitamini B skupine: bez dokaza za dugotrajnu primjenu, uz rizik neuropatije zbog B6

12 mg

EFSA 2023.: gornja sigurna granica dnevnog unosa B6 za odrasle (ranije 25 mg)

238

prijava neuropatije uz pripravke B6 u Nizozemskoj (2007.–2024.); 100 uz ≤ 21 mg/dan





KLINIČKA ZAMKA

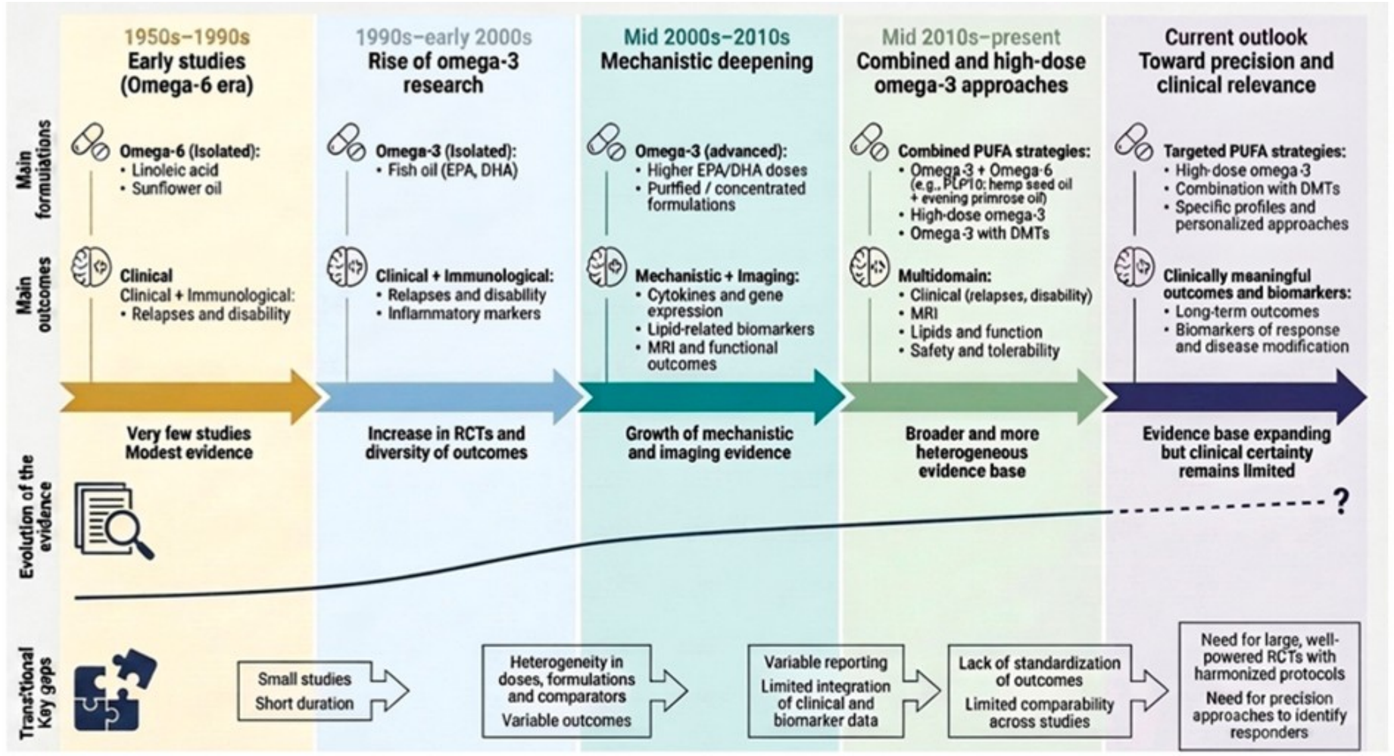
Senzorna neuropatija (trnci, žarenje u šakama i stopalima) može se zamijeniti za relaps. B6 se zbraja iz magnezija, multivitamina i B-kompleksa.

ZAKLJUČAK

Nadomjestiti dokazan deficit (B12, folat); B-kompleks ne uzimati godinama „preventivno“. Uz nove parestezije pitati za B6.

EFSA NDA Panel. EFSA J. 2023;21(5):8006 · Lareb. Vitamin B6 and neuropathy, 2024 · TGA Safety Alert, 2023 · Nemazannikova N et al. Med Chem. 2018;14:170–80

Višestruko nezasićene masne kiseline: dokazi i dalje nedostatni



STANJE DOKAZA

Baza dokaza raste, ali klinička sigurnost ostaje ograničena

ŠTO NEDOSTAJE

Veće, dobro dizajnirane RCT studije s usklađenim protokolima

Oliveira R, Lopes CM, Silva C, Guerra RS. Polyunsaturated Fatty Acid Supplementation in Multiple Sclerosis Management: A Scoping Review. Nutrients. 2026

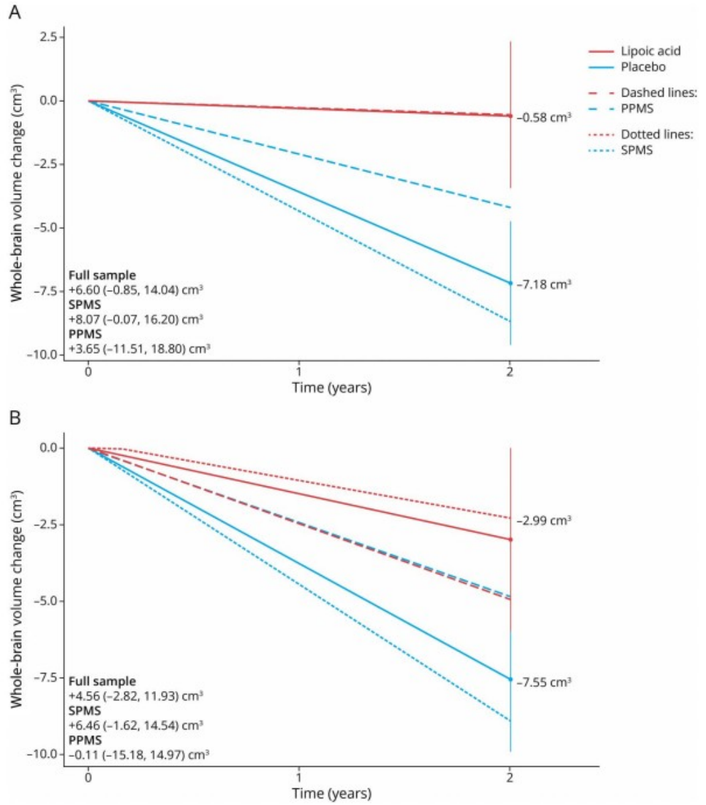
Alfa-lipoična kiselina: manji gubitak volumena mozga, bez statističke potvrde

DIZAJN
Faza 2, randomizirana studija: 115 osoba s progresivnom MS

INTERVENCIJA
1200 mg alfa-lipoične kiseline dnevno ili placebo tijekom 24 mjeseca

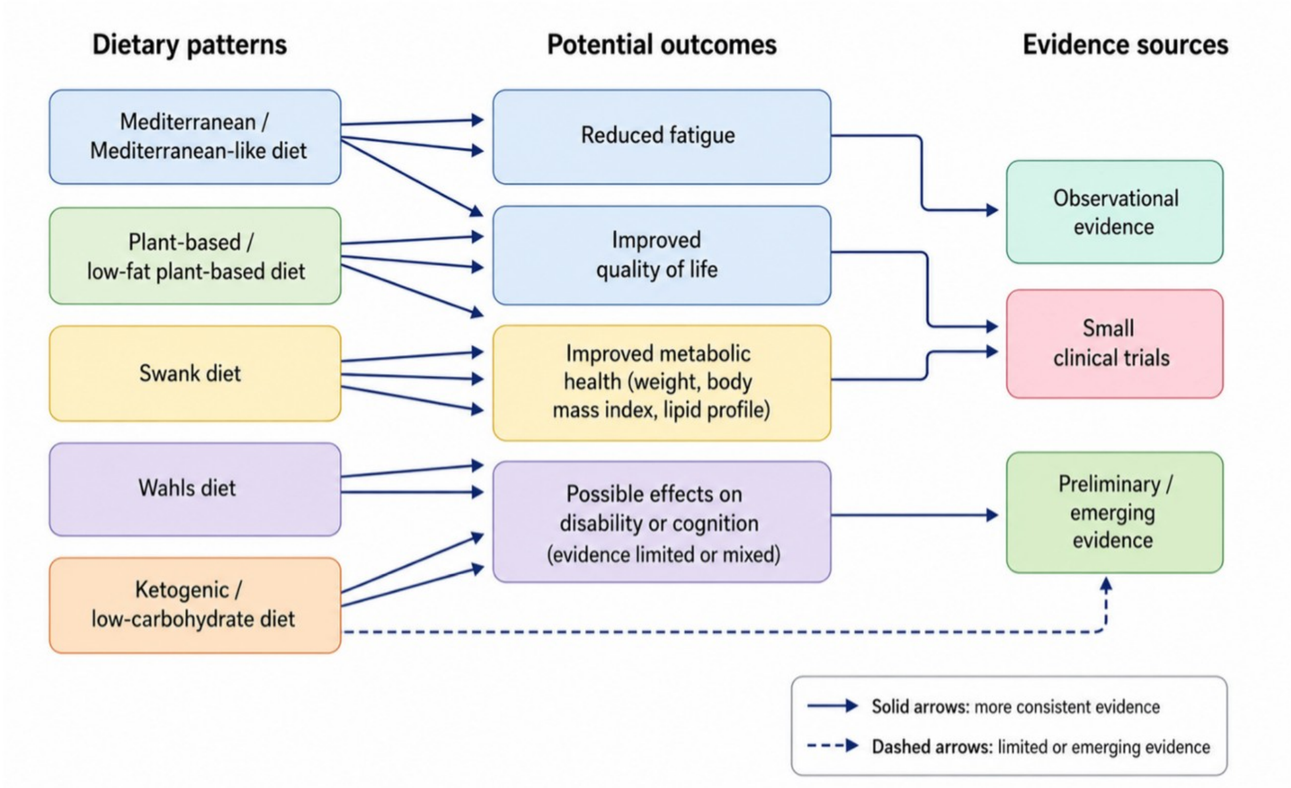
MR NALAZ
Manji gubitak volumena mozga uz ALA, bez potvrđene statističke razlike

SIGURNOST
Proteinurija u 20,4 % liječenih prema 3,3 % u placebo skupini



LAPMS: Lipoic Acid for Progressive Multiple Sclerosis, NCT03161028

Prehrana u multiploj sklerozi: mogući učinak na umor i kvalitetu života



ISPITIVANI OBRASCI

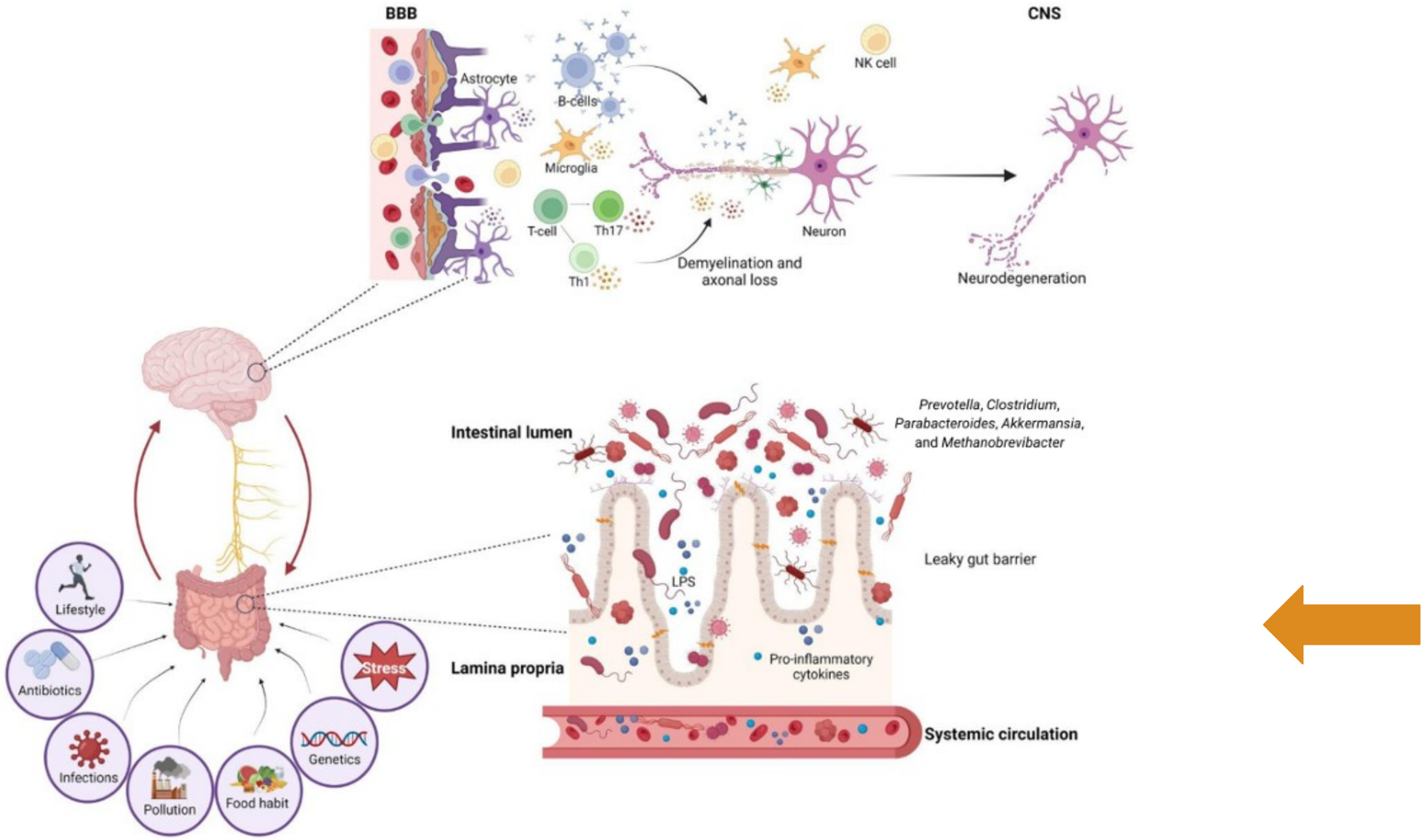
Mediteranska, biljna s malo masti, Swank, Wahls, ketogena

RAZINA DOKAZA

Opservacijski podaci i male kliničke studije; dio nalaza tek preliminaran

Mufti A, Almarhabi RZ, Bajandouh W et al. Dietary Patterns and Nutritional Factors in Multiple Sclerosis: A Narrative Review. Cureus. 2026

Crijevni mikrobiom i multipla skleroza: os crijevo–mozak



Campagnoli LIM, Marchesi N, Varesi A et al. New therapeutic avenues in multiple sclerosis: Is there a place for gut microbiota-based treatments? Pharmacol Res. 2024

Probiotici: metaanaliza pokazuje učinak na umor i bol, ne i na onesposobljenost

Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: http://www.elsevier.com/locate/clnu

Meta-analyses

Physical, mental and biochemical effects of probiotics in multiple sclerosis: A systematic review and meta-analysis

Tamar Blanca-Serrano [a], Marina Agredano-Sánchez [b], Rosa María López Gigosos [b,c], Manuel Francisco Jiménez Navarro [c,d,e,f], Carmen María González-Domenech [c,g,*], Mario Gutiérrez-Bedmar [b,c,d]

[a] PhD Program in Biomedicine, Translational Research, and New Technologies, School of Medicine, University of Malaga, Málaga, 29071, Spain
[b] Department of Public Health and Psychiatry, School of Medicine, University of Málaga, Málaga, 29071, Spain
[c] Institute of Biomedical Research of Málaga and Nanomedicine Platform (IBIMA- Plataforma BIONAND), Andalusia Technology Park (PTA), Severo Ochoa 35, Málaga, 29590, Spain
[d] Network Biomedical Research Centre for Cardiovascular Diseases (CIBER-CV), Carlos III Health Institute, Madrid, 28029, Spain
[e] Department of Cardiology and Cardiovascular Surgery-Heart Area, Virgen de la Victoria University Hospital, Málaga, 29010, Spain
[f] Department of Medicine and Dermatology, School of Medicine, University of Málaga, Málaga, 29071, Spain
[g] Department of Microbiology, School of Medicine, University of Málaga, Málaga, 29071, Spain

UMOR

−0,87

95 % CI −1,30 do −0,44

BOL

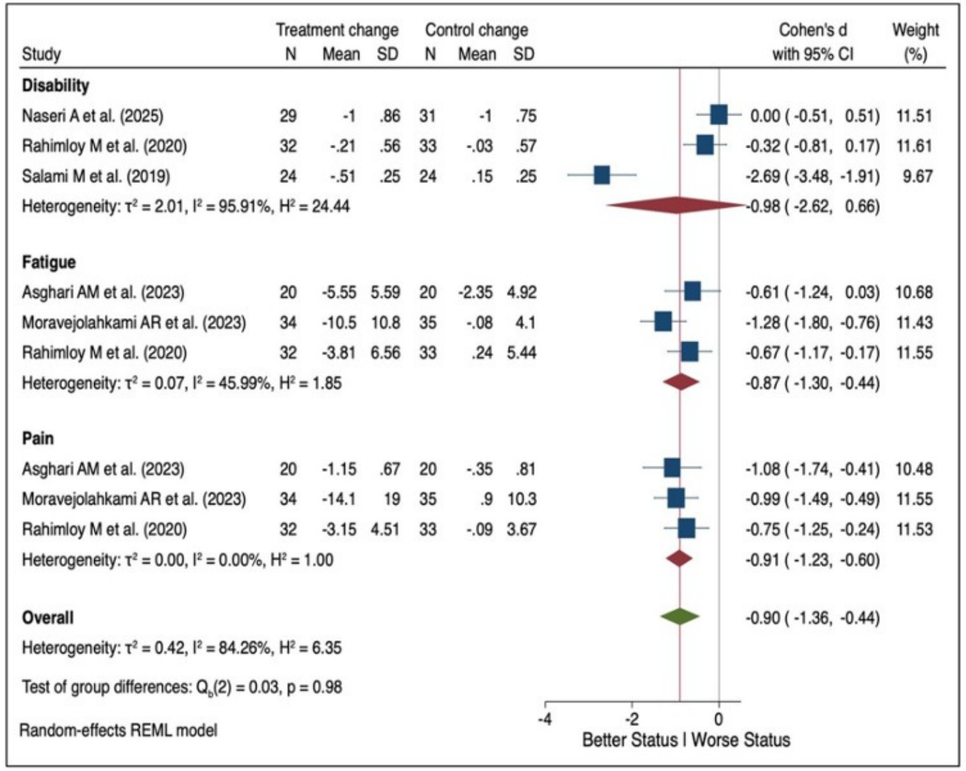
−0,91

95 % CI −1,23 do −0,60

ONESPOSOBLJENOST

−0,98

nije značajno (−2,62 do 0,66)



Blanca-Serrano T, Agredano-Sánchez M, López Gigosos RM et al. Physical, mental and biochemical effects of probiotics in multiple sclerosis: A systematic review and meta-analysis. Clin Nutr.2026

Kurkumin kao dodatak interferonu: obećavajuće, ali samo pilot-podaci

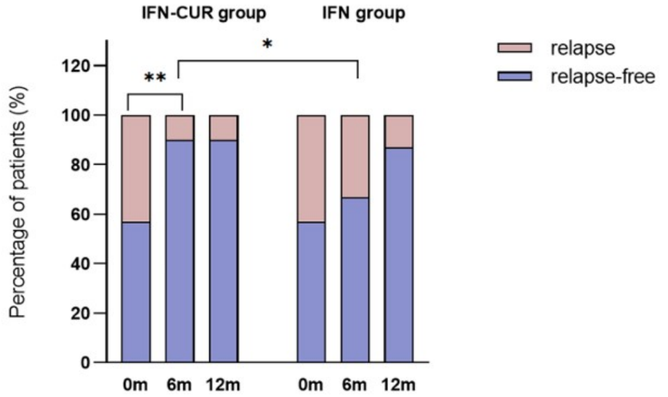
pharmaceutics

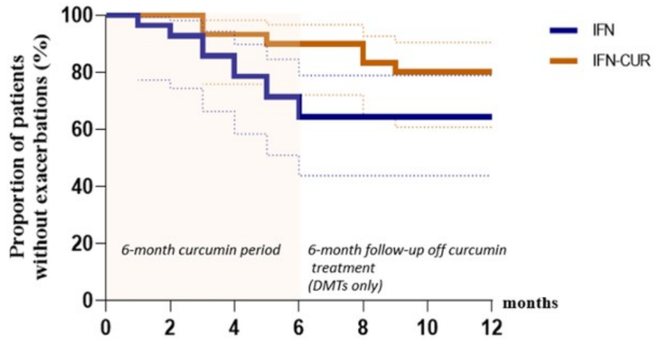
MDPI

Article

Anti-Inflammatory Properties of Curcumin as Add-On Therapy in Patients with MS—Prospective, Comparative, Randomized, Pilot Study

Anna Kukushkina [1,2,†], Vladimir Rogovskii [1,3,*,†], Olga Zhilenkova [4], Timur Sadekov [4], Mikhail Melnikov [1,5] and Alexey Boyko [1,5,*]





DIZAJN

Interferon + kurkumin prema samom interferonu; 6 mjeseci kurkumina, zatim 6 mjeseci praćenja

OGRANIČENJE

Mala pilot-studija: nalaz treba potvrditi u većem RCT-u

Kukushkina A, Rogovskii V, Zhilenkova O et al. Anti-Inflammatory Properties of Curcumin as Add-On Therapy in Patients with MS: Prospective, Comparative, Randomized, Pilot Study. Pharmaceutics.

Magnezij: bez dokaza o učinku na tijek multiple skleroze

23 studije

Metaanaliza 2024.: razina Mg u MS-u ne razlikuje se od kontrola (g = −0,18; p = 0,60)



1 studija

Nekontrolirana, Ca + Mg + vitamin D: manje relapsa od očekivanog (Goldberg, 1986.)



SIGURNOST

Proljev pri višim dozama; oprez uz bubrežnu insuficijenciju zbog hipermagnezijemije.

ZAKLJUČAK

Samo simptomatski ili uz dokazan deficit; dokazi ne podupiru rutinsku primjenu.

Kooshki A et al. PLoS One. 2024;19(12):e0313851 · Cortese M et al. Neurology. 2019 · Rossier P et al. Eur J Neurol. 2000 · Goldberg P et al. Med Hypotheses. 1986;21:193–200

Ashwagandha: bez studija u MS-u, uz dokumentiran rizik za jetru



B

LiverTox: vjerojatan uzrok klinički značajnog oštećenja jetre

2–12 tj.

tipična latencija; kolestatski ili miješani obrazac

25

slučajeva (pregled 2026.): 3 smrti uz cirozu, 1 transplantacija

UČINKOVITOST IZVAN MS-a

RCT-ovi od 6 do 12 tjedana: manje stresa i anksioznosti, bez učinka na kvalitetu života. Dugoročna sigurnost nije poznata.

REGULATORI U EUROPI

Danska: zabrana 2023. Nizozemska (RIVM), Francuska (ANSES) i Njemačka (BfR) 2024.: oprez, osobito uz bolest jetre i štitnjače te u trudnoći.

VAŽNO UZ DMT

Mogući učinak na imunosni sustav i interakcije s imunosupresivima; opisane tireotoksikoze. Aktivno pitati o uzimanju.

LiverTox (NIDDK), 2024 · McIntyre D et al. Cureus. 2026 · Philips CA et al. Hepatol Commun. 2023 · Björnsson HK et al. Liver Int. 2020 · BfR 39/2024 · ANSES 2024 · NIH ODS 2025 · Bachour G et al. BJPsych Open. 2025

Imunostimulatori u MS-u: nisu zabranjeni, ali traže oprez



10 dana

EMA: najdulja preporučena primjena ehinaceje; ne preporučuje se u autoimunim bolestima

CYP3A4

Gospina trava snažno inducira CYP3A4 i P-gp: klinički važne interakcije

EHINACEJA I BETA-GLUKANI

Aktiviraju urođenu imunost; u MS-u nema kliničkih podataka, rizik je teorijski. Isto vrijedi za astragalus i „imuno-boostere“.

GOSPINA TRAVA

Slabi učinak hormonske kontracepcije (važno uz teriflunomid i kladribin); interakcije sa siponimodom; serotoninski sindrom uz SSRI.

ZAKLJUČAK

Nije zabrana, nego oprez: kratkotrajno, izvan relapsa i uz znanje neurologa. Aktivno pitati i upisati u dokumentaciju.

EMA/HMPC. Echinacea purpurea herba recens, monografija 2015 · MS Trust: Echinacea, 2022 · Dotinga R. Neurology Reviews, 2022 (CMSC) · SmPC Mavenclad, Mayzent, Aubagio

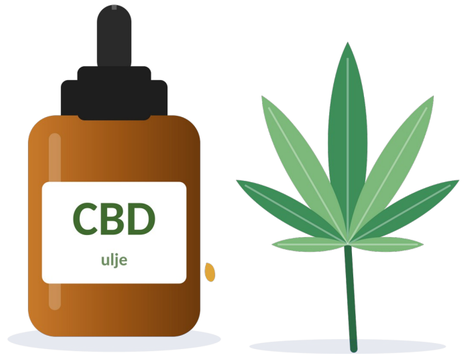
Kanabinoidi: dokazi postoje za nabiksimols, ne za CBD iz slobodne prodaje

25 RCT-a

Cochrane 2022. (3763 bolesnika): vjerojatno više bolesnika s važnim smanjenjem spastičnosti

27 RCT-a

Pregled 2026.: samo THC + CBD smanjuje subjektivnu spastičnost; objektivne mjere bez dosljedne koristi



NUSPOJAVE

Omaglica, umor, pospanost, suha usta, mučnina; nešto više prekida liječenja nego uz placebo.

SAM CBD

Podaci o samom CBD-u u MS-u oskudni su; pripravci iz slobodne prodaje nisu standardizirani.

ZAKLJUČAK

Nabiksimols je lijek za spastičnost, uz oprez; CBD ulje nije njegova zamjena.

Filippini G et al. Cochrane Database Syst Rev. 2022;5:CD013444 · Sustavni pregled RCT-ova, Br J Clin Pharmacol. 2026 · Florian J et al. JAMA Intern Med. 2025

Deficit vitamina D povezan je s većim rizikom za multiplu sklerozu

Contents lists available at ScienceDirect

Multiple Sclerosis and Related Disorders

journal homepage: www.elsevier.com/locate/msard

Review article

The association between vitamin D deficiency and multiple sclerosis: an updated systematic review and meta-analysis

Namal N. Balasooriya [a,*], Thomas M. Elliott [b], Rachel E. Neale [c], Paola Vasquez [a], Tracy Comans [a], Louisa G. Gordon [b]

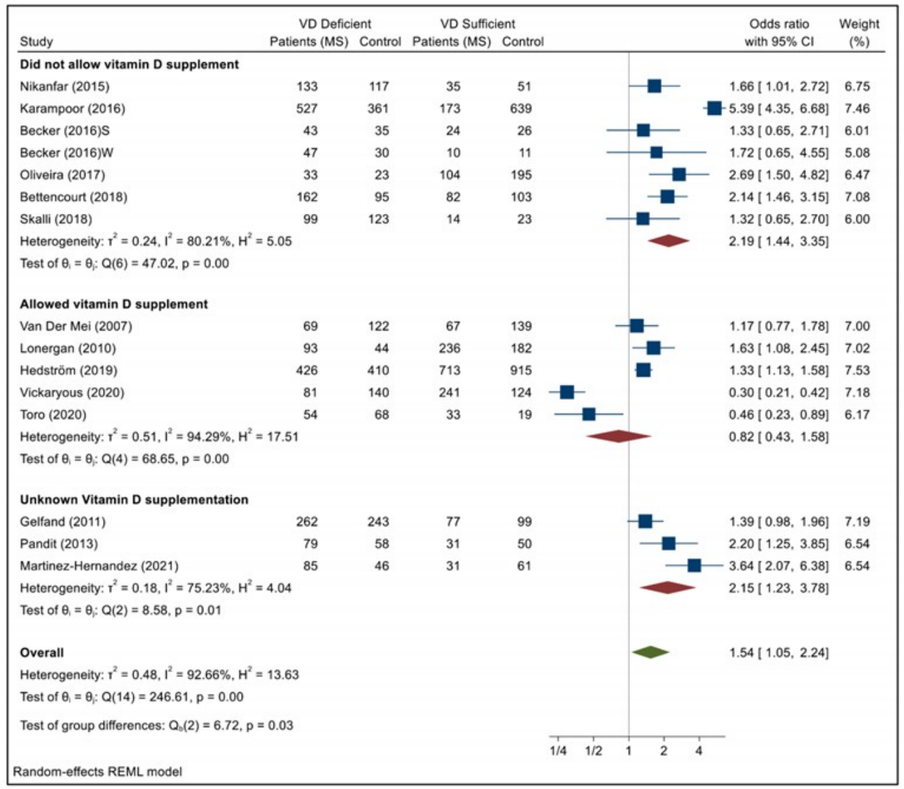
[a] Centre for Health Services Research, Faculty of Medicine, The University of Queensland, Brisbane, QLD 4006, Australia
[b] Population Health Department, QIMR Berghofer Medical Research Institute, Brisbane, QLD 4006, Australia
[c] Departments of Population Health and Computational Biology, QIMR Berghofer Medical Research Institute, Brisbane, QLD, Australia

OR 1,54

95 % CI 1,05–2,24

DEFINICIJA DEFICITA

U većini studija: serumski 25(OH)D < 50 nmol/L



Balasooriya NN, Elliott TM, Neale RE et al. The association between vitamin D deficiency and multiple sclerosis: an updated systematic review and meta-analysis. Mult Scler Relat Disord.

Coimbra protokol: vrlo visoke doze bez dokaza iz randomiziranih studija

100.000 IU
vitamina D dnevno (do)

0 Ca
prehrana bez kalcija („zero calcium diet“)

DOKAZI
Bez randomiziranih kliničkih studija

SMJERNICE
Bez neurološke preporuke za liječenje

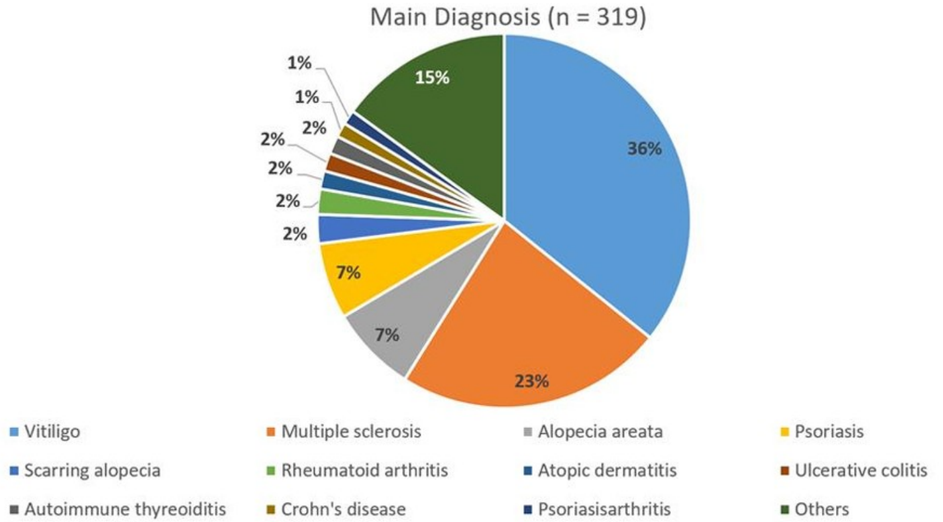
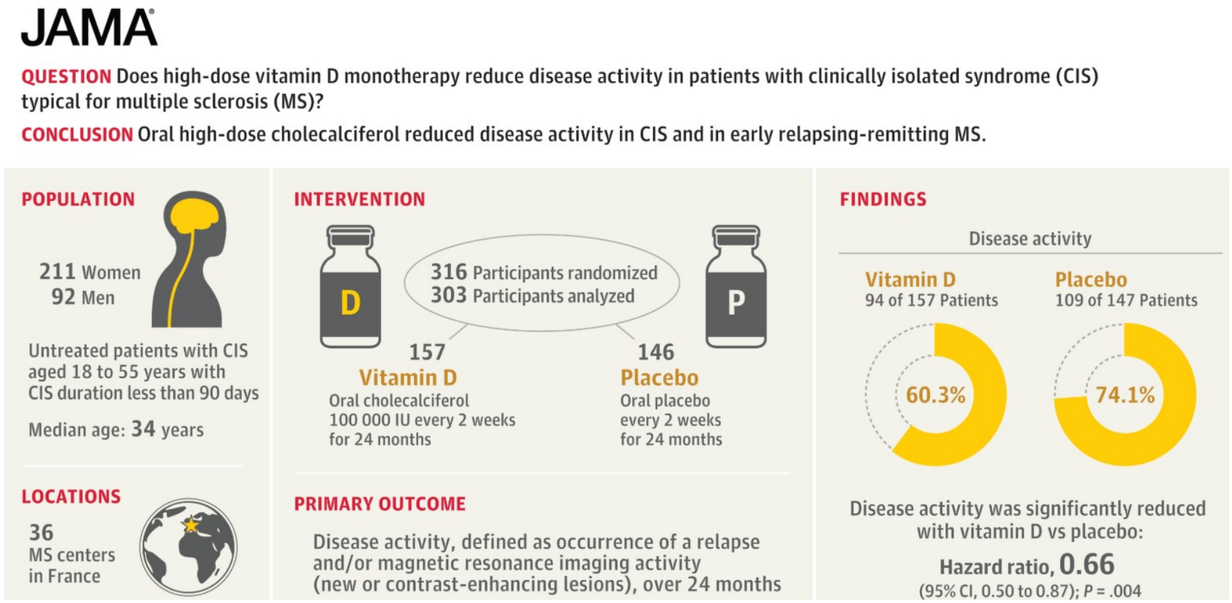


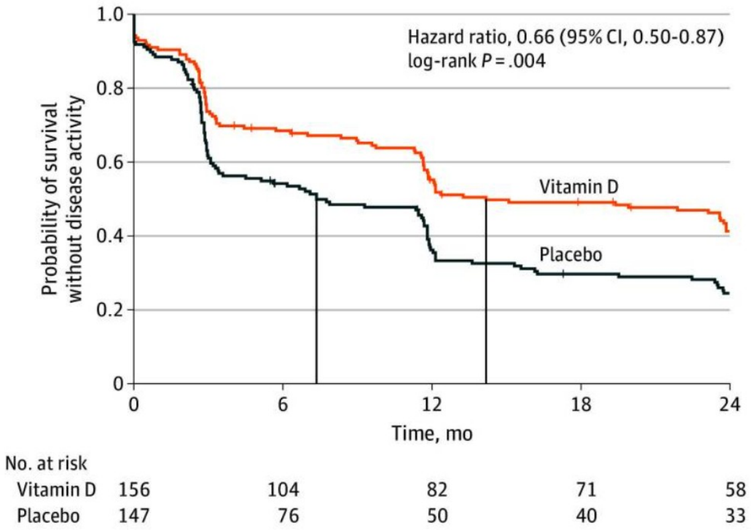
Figure 1. Distribution of primary (main) diagnosis (n = 319).

Glavne dijagnoze bolesnika na protokolu (n = 319): multipla skleroza 23 %

Amon U, Yaguboglu R, Ennis M et al. Safety Data in Patients with Autoimmune Diseases during Treatment with High Doses of Vitamin D3 According to the "Coimbra Protocol". Nutrients. 2022

D-Lay MS: visoke doze vitamina D smanjile su aktivnost bolesti u klinički izoliranom sindromu (CIS)





INTERVENCIJA
100.000 IU svaka 2 tjedna, 24 mjeseca

AKTIVNOST BOLESTI
60,3 % uz vitamin D, 74,1 % uz placebo

OMJER HAZARDA
HR 0,66 (95 % CI 0,50–0,87); p = 0,004

Thouvenot E, Laplaud D, Lebrun-Frenay C et al. High-Dose Vitamin D in Clinically Isolated Syndrome Typical of Multiple Sclerosis: The D-Lay MS Randomized Clinical Trial. JAMA. 2025

PrevANZ: nakon CIS-a vitamin D nije smanjio aktivnost bolesti

https://doi.org/10.1093/brain/awad409 BRAIN 2024: 147; 1206–1215 | 1206

BRAIN
CLINICAL TRIAL

Vitamin D did not reduce multiple sclerosis disease activity after a clinically isolated syndrome

Helmut Butzkueven,[1] Anne-Louise Ponsonby,[2] Mark S. Stein,[3] Robyn M. Lucas,[4] Deborah Mason,[5] Simon Broadley,[6] Trevor Kilpatrick,[2] Jeannette Lechner-Scott,[7] Michael Barnett.[8] William Carroll.[9] Peter Mitchell.[10] Todd A. Hardv.[11]

ISPITANICI
n = 199, nakon CIS-a

SKUPINE
1000, 5000 ili 10 000 IU dnevno prema placebu

PRAĆENJE
48 tjedana

SIGURNOST

Nuspojave po skupinama

	Placebo $n = 50$	1000 IU/day $n = 49$	5000 IU/day $n = 51$	10 000 IU/day $n = 49$	Total $n = 199$
AEs, *n* (%)	195 (28)	154 (22)	174 (25)	174 (25)	697
SAEs, *n* (%)	2 (15)	5 (38)	2 (15)	4 (30)	13 (2)
AEs, grading[a], *n* (%)					
Mild	120(62)	76 (49)	100 (57)	105 (60)	401 (58)
Moderate	74 (38)	76 (49)	67 (39)	67 (39)	284 (41)
Severe	1 (1)	2 (1)	7 (4)	2 (1)	12 (2)
Association with therapy, *n* (%)					
Not/unlikely	183 (93)	150 (97)	166 (95)	171 (98)	670(96)
Possible	11 (6)	4 (3)	3 (2)	2 (1)	20 (3)
Probable	0	0	5 (3)	1 (1)	6 (1)
Definite	1 (1)	0	0	0	1 (0)
Study drug discontinued, *n*	3	0	2	0	5

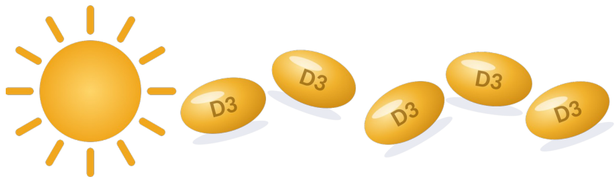
AE = adverse event; SAE = serious adverse event.
[a]AEs graded by site primary investigator.

Butzkueven H, Ponsonby AL, Stein MS et al. Vitamin D did not reduce multiple sclerosis disease activity after a clinically isolated syndrome. Brain. 2024

Vitamin D u KBC-u Zagreb: korekcija deficita i trajno održavanje

< 50 nmol/L

Nadoknada: 50.000-60.000 IU vitamina D tjedno tijekom 6–8 tjedana



100–150

nmol/L: ciljana serumska razina 25(OH)D

ODRŽAVANJE

Svim bolesnicima 25.000 IU (30.000 IU) jednom tjedno ili 4000 IU dnevno, osim ako je 25(OH)D > 150 nmol/L.

POSTMENOPAUZA

Održavanje 2000 IU dnevno.

OPREZ

Hiperkalcemija i bubrežne komplikacije.

Modificirano prema: Charoenngam N, Holick MF. Immunologic Effects of Vitamin D on Human Health and Disease. Nutrients. 2020

Četiri poruke

1

Pitajte svakog bolesnika

Većina uzima suplemente, često uz DMT.

2

Vitamin D: korigirati deficit

3

Suplement nije zamjena za DMT

4

Paziti na jetru i laboratorij

Hvala na pažnji!







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