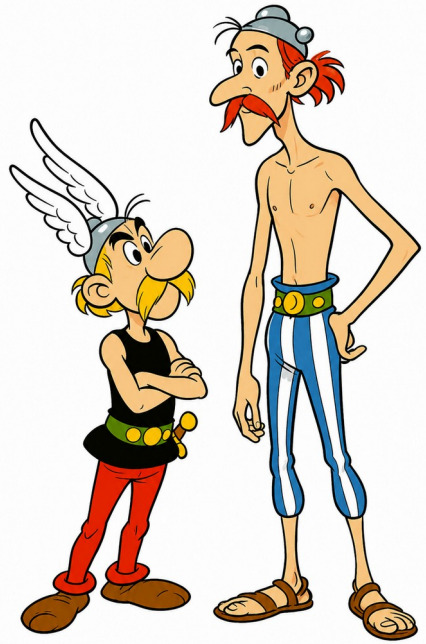
Mikro i makronutritivni suport pacijentima koji se liječe agonistima GLP-1 ili GLP-1/GIP receptora

Andrej Belančić, dr. med.
Specijalist kliničke farmakologije
SCOPE certificirani liječnik za liječenje debljine
tajnik Hrvatskog društva za debljinu HLZ-a
EASO ECN
EACPT ECCP WG chair
ESH





Global, regional, and national prevalence of adult overweight and obesity, 1990–2021, with forecasts to 2050: a forecasting study for the Global Burden of Disease Study 2021

*GBD 2021 Adult BMI Collaborators**

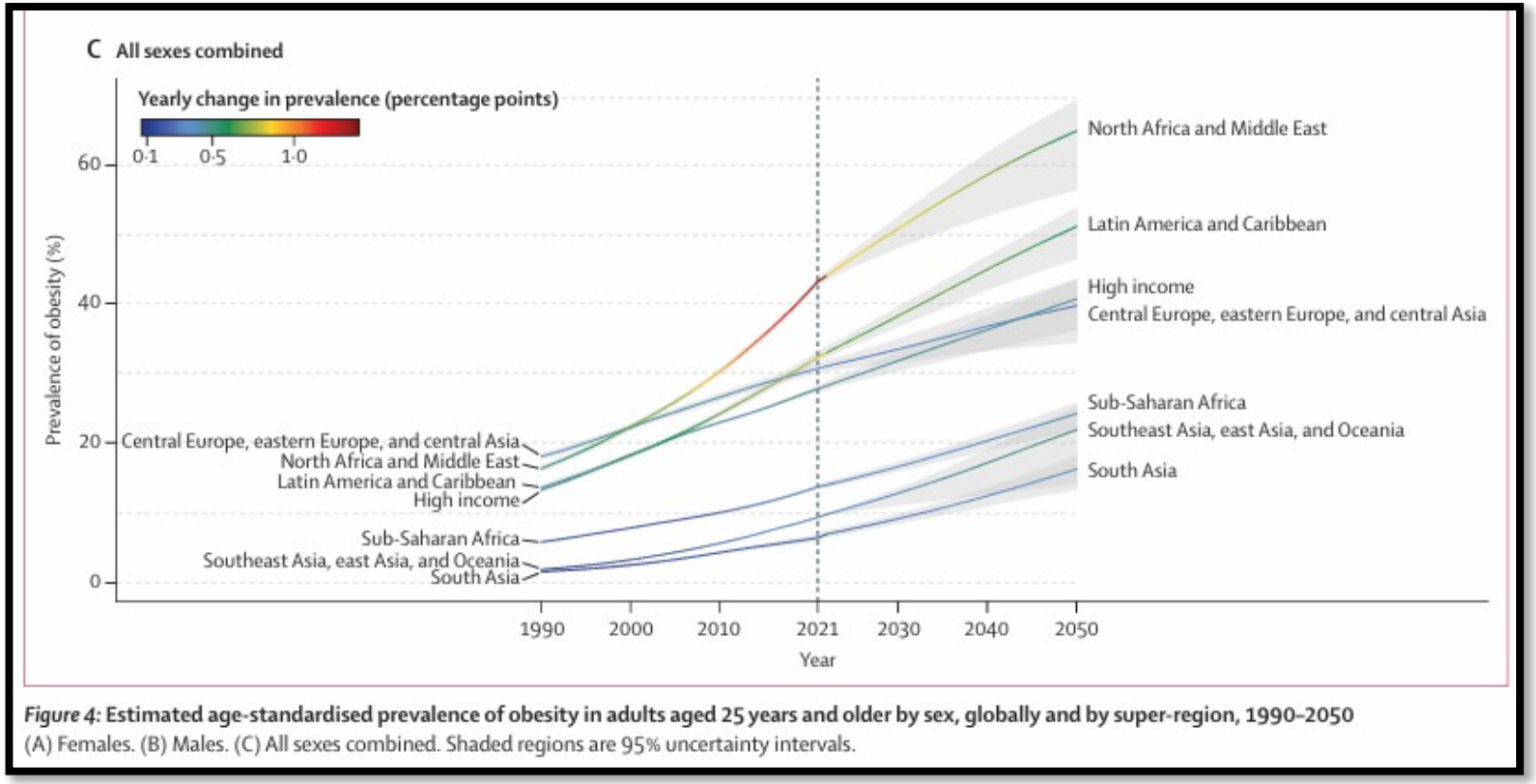
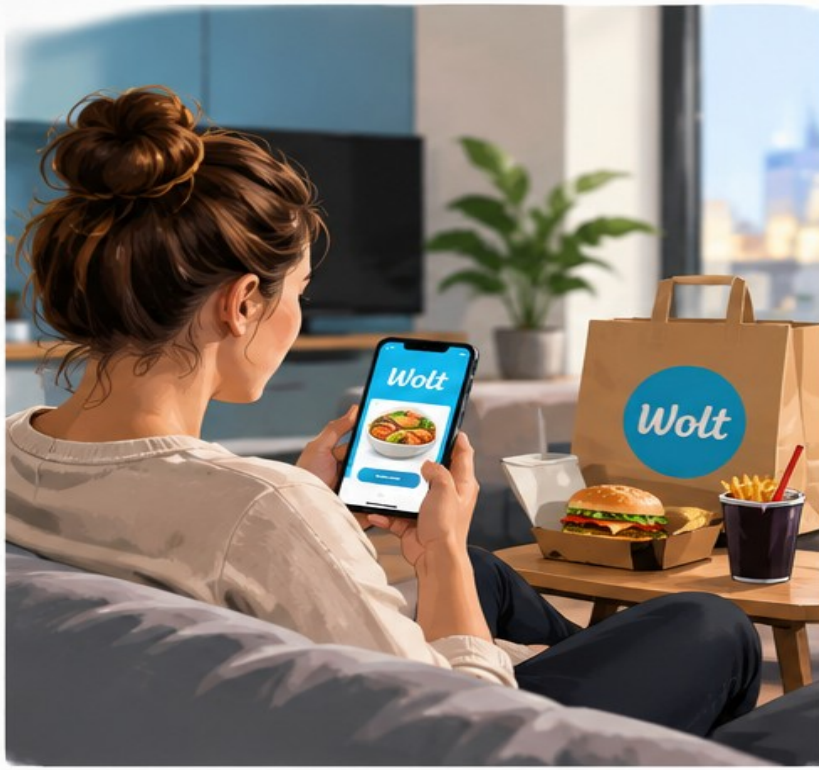


Figure 4: **Estimated age-standardised prevalence of obesity in adults aged 25 years and older by sex, globally and by super-region, 1990–2050**
(A) Females. (B) Males. (C) All sexes combined. Shaded regions are 95% uncertainty intervals.







Lovio hranu
(prirodni unos, fizička aktivnost, ograničena dostupnost)

→

Frižider
(čuva hranu, produžuje dostupnost, više izbora)

→

Wolt dostava hrane
(maksimalna dostupnost, minimalan napor)

Više dostupne hrane + Manje fizičke aktivnosti =

Povećana debljina

Prehrambeni obrazac i mikronutritivni status bolesnika s debljinom



Energetski izdašno,
a mikronutritivno siromašno...

Tipičan nutritivni obrazac – „zapadnjačka prehrana”

Povećan unos / Prekomjerno

- Visok udio ultraprocesirane hrane
- Povećan unos dodanih šećera
- Povećan unos rafiniranih ugljikohidrata
- Povećan unos transmasnih i zasićenih masti
- Povećan unos soli
- Povećan unos energetski gustih napitaka

Ispodprosječan unos / Deficitarno

- voće
- povrće
- mahunarke
- orašasti plodovi
- cjelovite žitarice
- riba


Let food
be thy
medicine
and
medicine
be thy food.
Hippocrates

UČINKOVITO LIJEČENJE

KONTINUIRANO I PERSONALIZIRANO





Bihevioralna podrška



Tjelesna aktivnost



Farmakoterapija

MedicamentUM
STRUČNI MAGAZIN ZA FARMAKOTERAPIJU

Moderno doba liječenja debljine: od redukcije tjelesne mase prema personaliziranoj farmakoterapiji temeljenoj na fenotipu bolesti

Debljina je bolest složenih neuroendokrinih mehanizama u kojima organizam aktivno nastoji vratiti izgubljene kilograme povećanjem apetita i smanjenjem potrošnje energije. Cilj je ovog članka prikazati temeljna načela personalizirane farmakoterapije debljine u skladu s načelima medicine utemeljene na dokazima, s posebnim osvrtom na odabir liječenja prema fenotipu bolesti, odnosno prisutnim komorbiditetima



Andrej Belančić, dr. med., spec. kliničke farmakologije s toksikologijom,
Zavod za temeljnu i kliničku farmakologiju i toksikologiju, Sveučilište u Rijeci, Medicinski fakultet

Moderna farmakoterapija debljine omogućava dosad nezabilježene razine redukcije tjelesne mase, ali i, još važnije, sve veći broj dokaza pokazuje da pojedini lijekovi značajno poboljšavaju ishode povezane s komplikacijama debljine

ŽIVOTNE NAVIKE OSTAJU TEMELJ LIJEČENJA

Neovisno o razvoju novih lijekova, zlatni standard prevencije i liječenja debljine i dalje čine promjene životnog stila. Individualizirana prehrana, redovita tjelesna aktivnost, kvalitetan san, upravljanje stresom te dugoročna promjena životnih navika predstavljaju temelj svake uspješne terapijske strategije.

Tablica 1. Pregled ključnih kliničkih ispitivanja lijekova semaglutid i tirzepatid u liječenju debljine i pridruženih komorbiditeta.

KLINIČKO PITANJE	SEMAGLUTID (*WEGOVY*)	TIRZEPATID (*MOUNJARO*)
Gubitak TM u osoba s debljinom	STEP 1 (-14,9% TM)	**SURMOUNT-1 (-20,9% TM)**
Debljina i šećerna bolest tipa 2	STEP 2	SURMOUNT-2
Izravna usporedba (*head-to-head*) po pitanju gubitka TM	**SURMOUNT-5 (tirzepatid vs. semaglutid)**	
Kardiovaskularni ishodi	**SELECT (HR = 0,80)**	SURMOUNT-MMO (u tijeku)
HFpEF uz debljinu	STEP-HFpEF	SUMMIT
MASH	**ESSENCE**	SYNERGY-NASH (faza II)
Osteoartritis koljena uz debljinu	**STEP 9**	/
Opstruktivna apneja u snu	/	**SURMOUNT-OSA**
Učinkovitost viših doza	STEP UP (-18,7% TM uz dozu od 7,2 mg)	/
Adolescenti	**STEP TEENS**	SURMOUNT-ADOLESCENTS (u tijeku)

***Napomena:** Podebljanim slovima označena je terapijska opcija koja je, do 30. srpnja 2026. godine (vrijeme pisanja ovog preglednog članka), imala dostupne/superiornije rezultate za naznačenu indikaciju. Ako su za određenu indikaciju oba lijeka imala kliničko ispitivanje iste faze, bez dostupnih *head-to-head* ispitivanja u toj indikaciji, nijedna opcija nije označena podebljanim slovima jer se smatra da imaju ekvivalentnu razinu dostupnih dokaza za tu (sub)indikaciju.

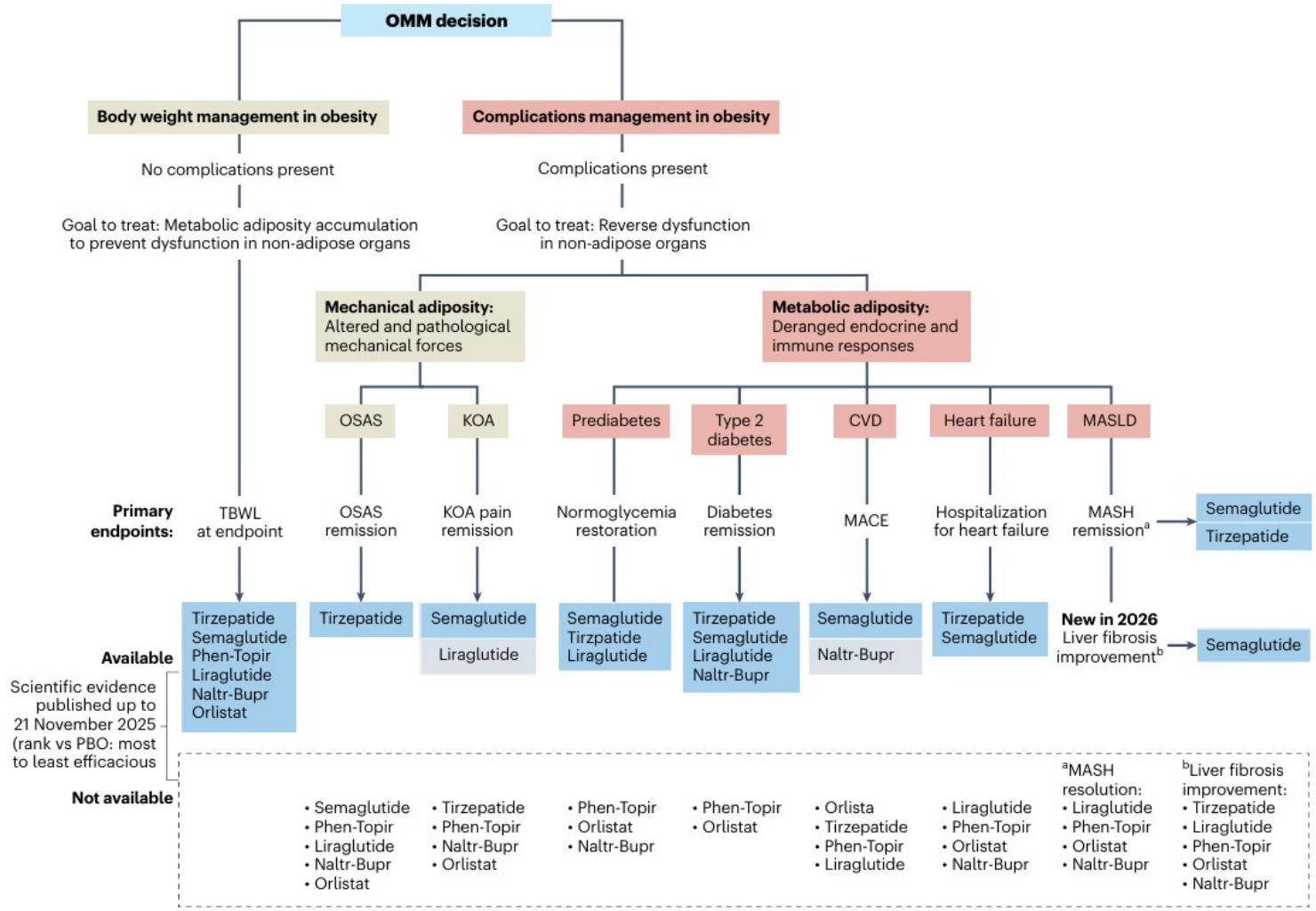
Skraćenice: HFpEF – kronično zatajivanje srca s očuvanom ejekcijskom frakcijom; HR – omjer hazarda; MASH – steatohepatitis povezan s metaboličkom disfunkcijom; TM – tjelesna masa.

nature medicine

Framework for the pharmacological treatment of obesity and its complications from the European Association for the Study of Obesity (EASO): 2026 update

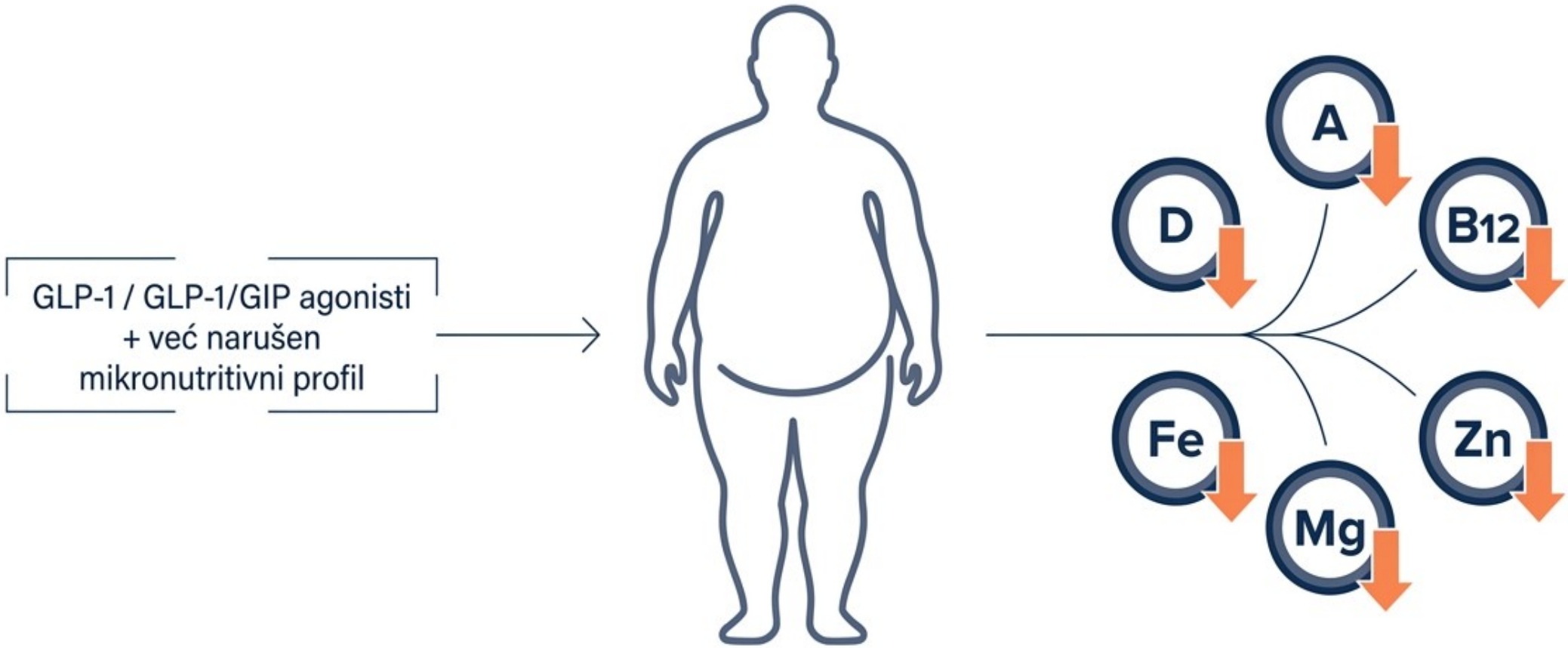
Andreea Ciudin, Jennifer L. Baker, Andrej Belančić, Luca Busetto, Dror Dicker, Ľubomíra Fábryová, Gema Frühbeck, Gijs H. Goossens, Jason Gordon, Matteo Monami, Paolo Sbraccia, Borja Martinez-Tellez, Volkan Yumuk & Barbara McGowan

Nature Medicine **32**, 1962–1966 (2026) | Cite this article



Naša misija u kliničkoj praksi: propisati pravi lijek pravom pacijentu, u pravoj dozi, u pravo vrijeme i na pravi način.

Narušen mikronutritivni profil

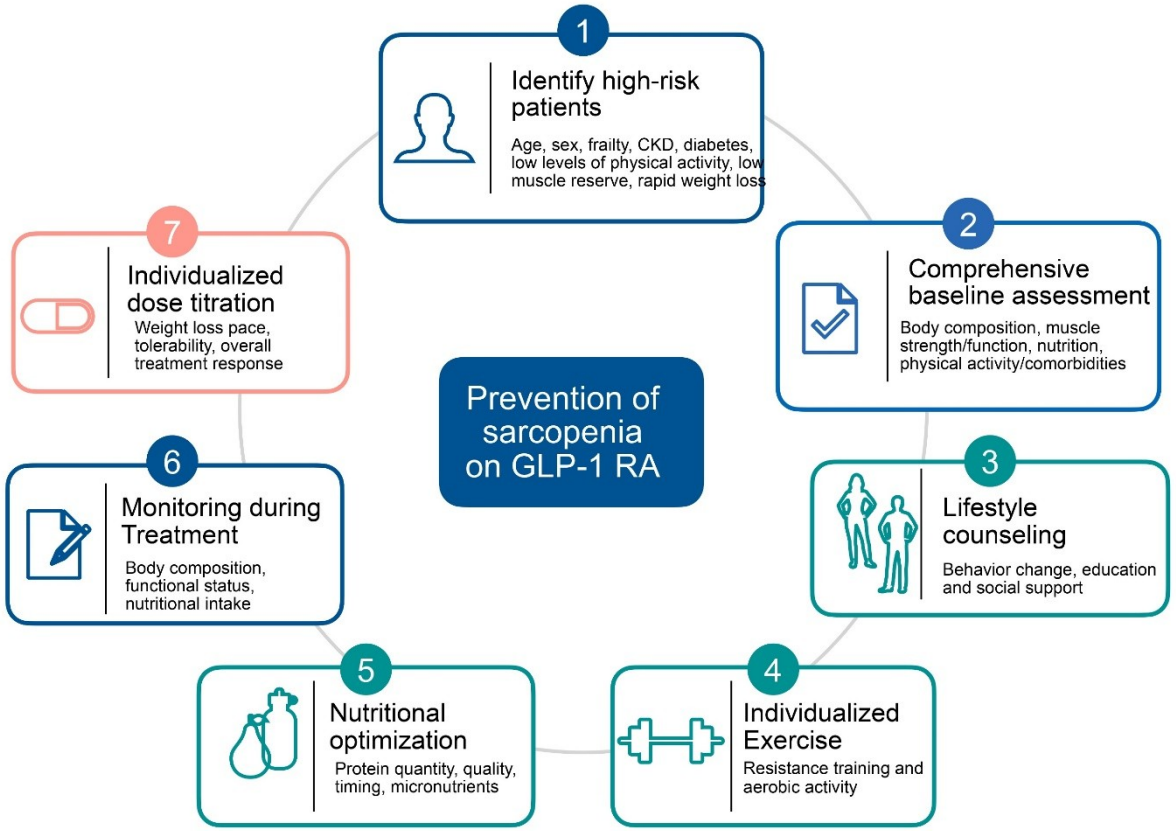


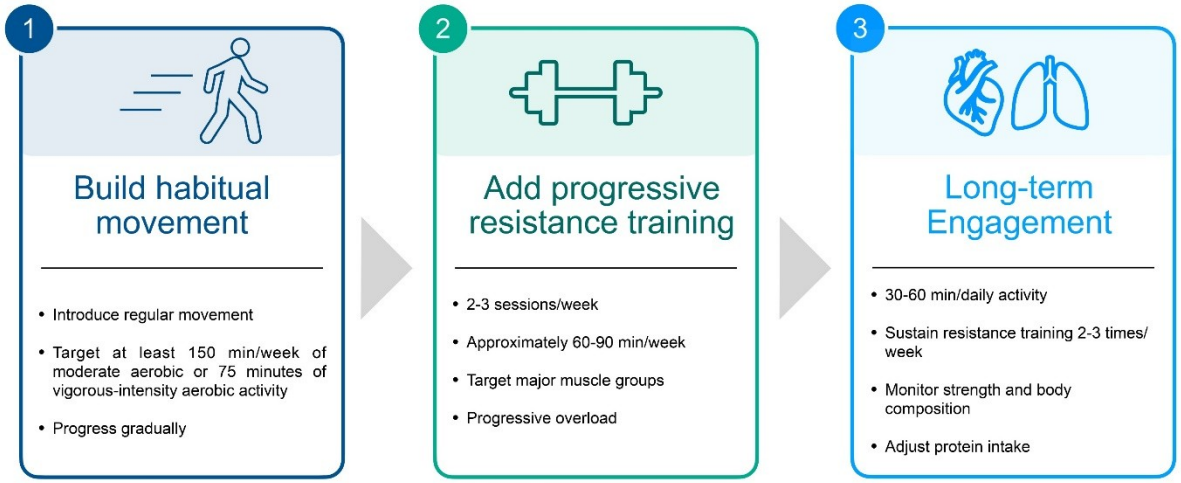
Bolesnike s debljinom, koji započinju terapiju GLP-1 i/ili GLP-1/GIP receptor agonistima, u pravilu već ishodno obilježava narušen mikronutritivni profil, s obzirom na širokoprisutan „energetski izdašno, mikronutritivno siromašno" obrazac prehrane.

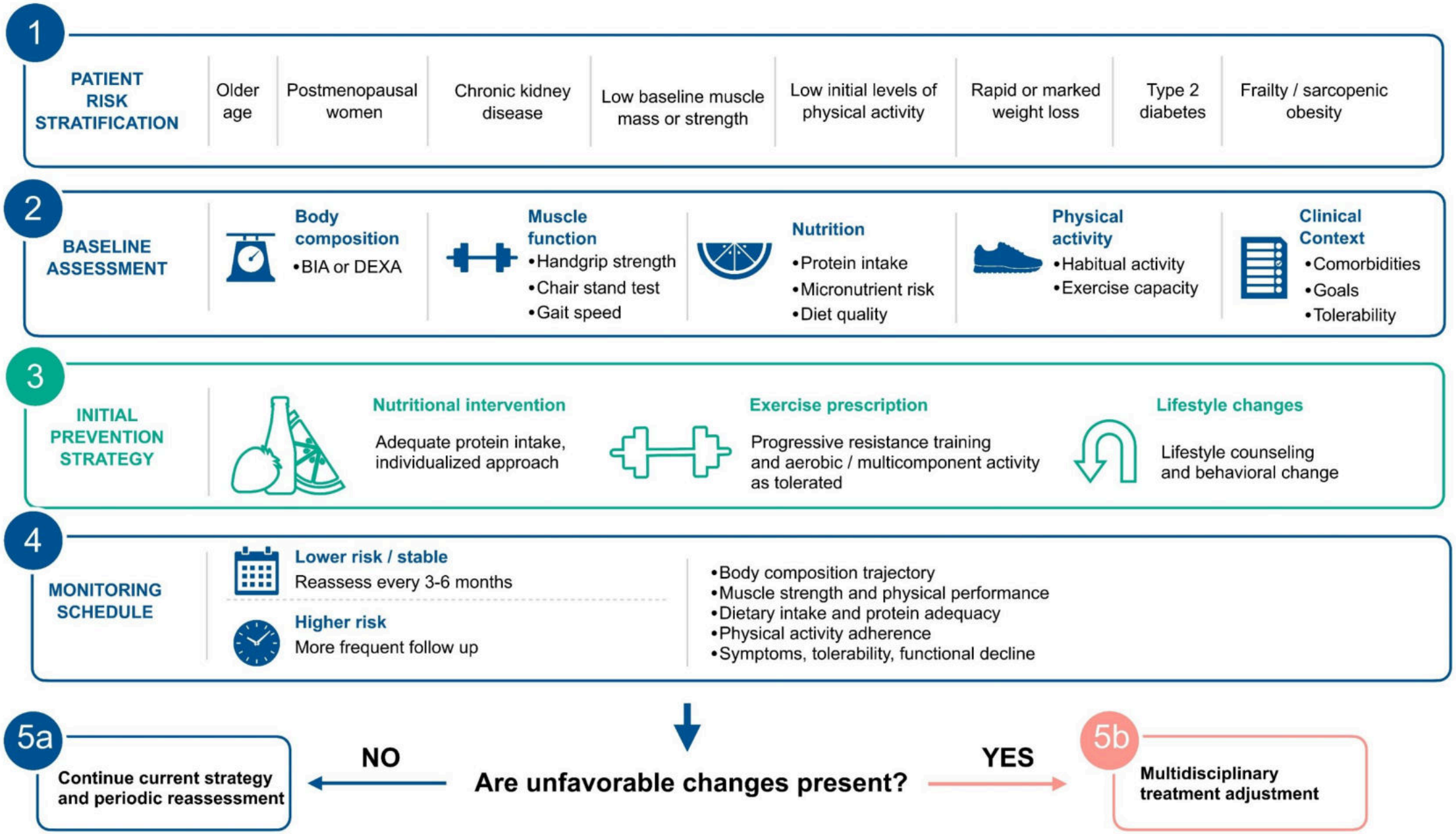
Review > J Clin Med. 2026 Jul 27;15(15):5870. doi: 10.3390/jcm15155870.

Preventive Strategies to Reduce Sarcopenia Risk During GLP-1-Based Anti-Obesity Therapy

Andrej Belančić [1], Kristina Skroče [2 3], Elvira Meni Maria Gkrinia [4], Mihaela Marinović Glavić [5], Man Ki Kwok [6]

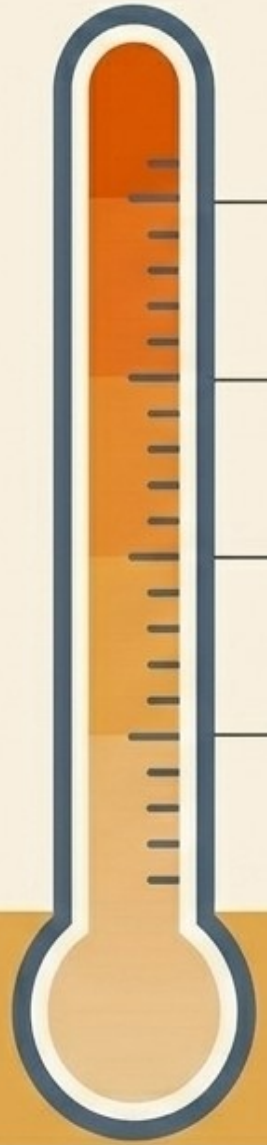






Belančić A et al. Preventive Strategies to Reduce Sarcopenia Risk During GLP-1-Based Anti-Obesity Therapy. J Clin Med. 2026 Jul 27;15(15):5870. doi: 10.3390/jcm15155870.

Identifikacija rizika prije prve doze





Osobe >65 godina: Prisutna bazalna anabolička rezistencija.



Postmenopauzalne žene: Nedostatak estrogena ubrzava gubitak.



Pacijenti s Dijabetesom Tipa 2: Inzulinska rezistencija otežava sintezu proteina (diabetička miopatija).



Bubrežni bolesnici (CKD): Dodatni metabolički izazovi.



Kronično neaktivne osobe: Manjak mehaničkog stimulusa.

ZLATNO PRAVILO: Prevencija mora biti proaktivna, integrirana paralelno s inicijacijom lijeka, nikada reaktivna!

Preporuke: Prehrana (Količina i Kvaliteta)

Izazov:
GLP-1 smanjuje ukupni unos hrane za 20-30%. Spontani unos proteina često pada ispod 1.0 g/kg zbog mučnine i rane sitosti.

Kvaliteta (Leucin - mTORC1 okidač):
Potrebno je >2.5 g leucina po obroku za aktivaciju staničnog signala za mišićnu sintezu.



Cilj (Količina):
1.2 – 1.6 g/kg/dan (bazirano na idealnoj/prilagođenoj tjelesnoj masi). Kod visokog rizika (osobe >65 god) do 2.0 g/kg/dan.

Praktično rješenje:
Birati nutritivno guste izvore (whey, jaja, riba, meso, soja). Trik: Koristiti tekuće kalorije (visokoproteinske smoothieje) kako bi se zaobišla spora želučana pasaža.

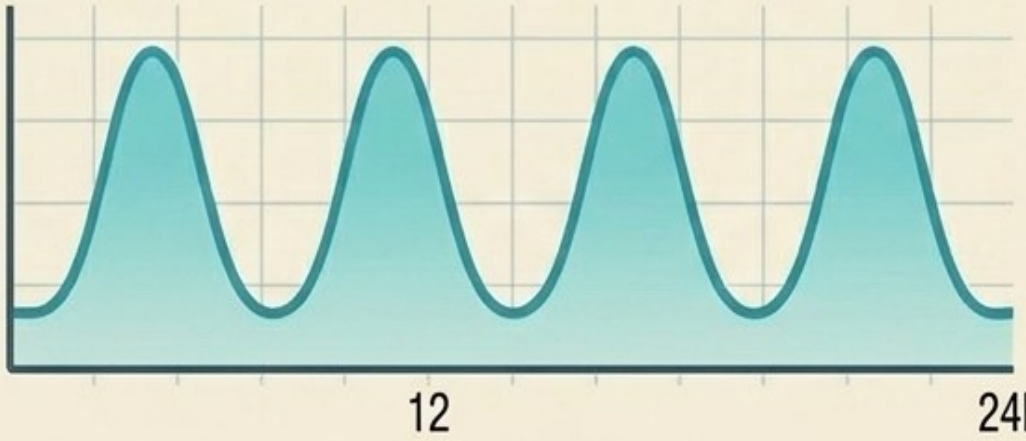
Prehrana: Tajming (Anaboličkі Pulsing)

Loš pristup (Skewed):



Loš pristup (Skewed):
Mali unos proteina ujutro, ogroman navečer. Rezultat = Suboptimalna sinteza.

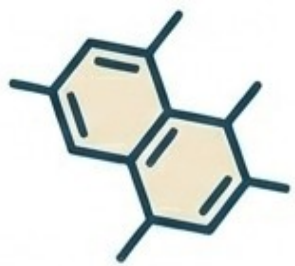
Ispravan pristup (Even distribution):



Ispravan pristup (Even distribution):
Kontinuirani pulsevi sinteze. 25 – 40 grama proteina ravnomjerno raspoređeno u 3 do 4 obroka dnevno.

Anabolički prozor

- **Post-trening:** Konzumacija 30-40 g proteina unutar 1-2 sata nakon treninga snage povećava sintezu za 30%.
- **Pred spavanje:** Sporo apsorbirajući proteini (kazein, 40 g) održavaju noćni anabolizam tijekom GLP-1 induciranog gladovanja.



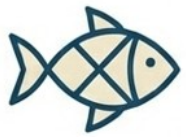
Kreatin monohidrat

Siguran dodatak koji dokazano povećava LBM i staničnu energiju (ATP) tijekom treninga snage, čak i u deficitu.



HMB (β-hidroksi-β-metilbutirat)

Doza od 3 g/dnevno. Povećava mišićnu sintezu za ~15%. Posebno koristan kod post-barijatrijskih pacijenata i starijih.



Omega-3 (EPA/DHA)
Pruža antiinflamatorni učinak i podršku sintezi mišićnih proteina (mTOR aktivacija).

Clinical Trial > N Engl J Med. 2019 Jan 3;380(1):11-22. doi: 10.1056/NEJMoa1812792. Epub 2018 Nov 10.

Cardiovascular Risk Reduction with Icosapent Ethyl for Hypertriglyceridemia

Deepak L Bhatt [1], P Gabriel Steg [1], Michael Miller [1], Eliot A Brinton [1], Terry A Jacobson [1], Steven B Ketchum [1], Ralph T Doyle Jr [1], Rebecca A Juliano [1], Lixia Jiao [1], Craig Granowitz [1], Jean-Claude Tardif [1], Christie M Ballantyne [1]; REDUCE-IT Investigators

Results: A total of 8179 patients were enrolled (70.7% for secondary prevention of cardiovascular events) and were followed for a median of 4.9 years. A primary end-point event occurred in 17.2% of the patients in the icosapent ethyl group, as compared with 22.0% of the patients in the placebo group (hazard ratio, 0.75; 95% confidence interval [CI], 0.68 to 0.83; P<0.001); the corresponding rates of the key secondary end point were 11.2% and 14.8% (hazard ratio, 0.74; 95% CI, 0.65 to 0.83; P<0.001). The rates of additional ischemic end points, as assessed according to a prespecified hierarchical schema, were significantly lower in the icosapent ethyl group than in the placebo group, including the rate of cardiovascular death (4.3% vs. 5.2%; hazard ratio, 0.80; 95% CI, 0.66 to 0.98; P=0.03). A larger percentage of patients in the icosapent ethyl group than in the placebo group were hospitalized for atrial fibrillation or flutter (3.1% vs. 2.1%, P=0.004). Serious bleeding events occurred in 2.7% of the patients in the icosapent ethyl group and in 2.1% in the placebo group (P=0.06).

Table 1. Forty-five food parameters included in the dietary inflammatory index and their overall food parameter-specific inflammatory effect scores, global daily mean intakes and global standard deviations (SD). Modified according to reference 22

Food parameter	Weighted number of articles	Raw inflammatory effect score	Overall inflammatory effect score	Global daily mean intake (units/d)	Global standard deviation (SD)
Alcohol (g)	417	-0.278	-0.278	13.98	3.72
Vitamin B12 (µg)	122	0.205	0.106	5.15	2.70
Vitamin B6 (mg)	227	-0.379	-0.365	1.47	0.74
β-Carotene (µg)	401	-0.584	-0.584	3718	1720
Caffeine (g)	209	-0.124	-0.110	8.05	6.67
Carbohydrate (g)	211	0.109	0.097	272.2	40.0
Cholesterol (mg)	75	0.347	0.110	279.4	51.2
Energy (kcal)	245	0.180	0.180	2056	338
Eugenol (mg)	38	-0.868	-0.140	0.01	0.08
Total fat (g)	443	0.298	0.298	71.4	19.4
Fibre (g)	261	-0.663	-0.663	18.8	4.9
Folic acid (µg)	217	-0.207	-0.190	273.0	70.7
Garlic (g)	277	-0.412	-0.412	4.35	2.90
Ginger (g)	182	-0.588	-0.453	59.0	63.2
Fe (mg)	619	0.032	0.032	13.35	3.71
Mg (mg)	351	-0.484	-0.484	310.1	139.4
MUFA (g)	106	-0.019	-0.009	27.0	6.1
Niacin (mg)	58	-1.000	-0.246	25.90	11.77
n-3 Fatty acids (g)	2588	-0.436	-0.436	1.06	1.06
n-6 Fatty acids (g)	924	-0.159	-0.159	10.80	7.50
Onion (g)	145	-0.490	-0.301	35.9	18.4
Protein (g)	102	0.049	0.021	79.4	13.9
PUFA (g)	4002	-0.337	-0.337	13.88	3.76
Riboflavin (mg)	22	-0.727	-0.068	1.70	0.79
Saffron (g)	33	-1.000	-0.140	0.37	1.78
Saturated fat (g)	205	0.429	0.373	28.6	8.0
Se (µg)	372	-0.191	-0.191	67.0	25.1
Thiamin (mg)	65	-0.354	-0.098	1.70	0.66
Trans fat (g)	125	0.432	0.229	3.15	3.75
Turmeric (mg)	814	-0.785	-0.785	533.6	754.3

Obesity-related low-grade chronic inflammation: implementation of the dietary inflammatory index in clinical practice is the milestone?

Debljinom uzrokovana kronična upala niskog intenziteta: uvođenje DII-a (*dietary inflammatory index*) u kliničku praksu je prekretnica?

Andrej Belančić[1*], Gordana Kenđel Jovanović[2], Sanja Klobučar Majanović[1,3]

Alterations in food consumption have strong and significant effect on overall health throughout life. Various dietary factors seem to modulate key pro-inflammatory pathways, such as nuclear factor kappa B (NF-κB) pathway. Furthermore, not only dietary pattern as a whole, but various food-groups separately, have effect on inflammatory biomarkers.

LGCI reduction

Vitamin A (RE)	663	-0.401	-0.401	983.9	518.6
Vitamin C (mg)	733	-0.424	-0.424	118.2	43.46
Vitamin D (µg)	996	-0.446	-0.446	6.26	2.21
Vitamin E (mg)	1495	-0.419	-0.419	8.73	1.49
Zn (mg)	1036	-0.313	-0.313	9.84	2.19
Green black tea (g)	735	-0.536	-0.536	1.69	1.53
Flavan-3-ol (mg)	521	-0.415	-0.415	95.8	85.9
Flavones (mg)	318	-0.616	-0.616	1.55	0.07
Flavonols (mg)	887	-0.467	-0.467	17.70	6.79
Flavonones (mg)	65	-0.908	-0.250	11.70	3.82
Anthocyanidins (mg)	69	-0.449	-0.131	18.05	21.14
Isoflavones (mg)	484	-0.593	-0.593	1.20	0.20
Pepper (g)	78	-0.397	-0.131	10.00	7.07
Thyme/oregano (mg)	24	-1.000	-0.102	0.33	0.99
Rosemary (mg)	9	-0.333	-0.013	1.00	15.00

KAKO DOSKOČITI POTENCIJALNIM GASTROINTESTINALNIM NUSPOJAVAMA?





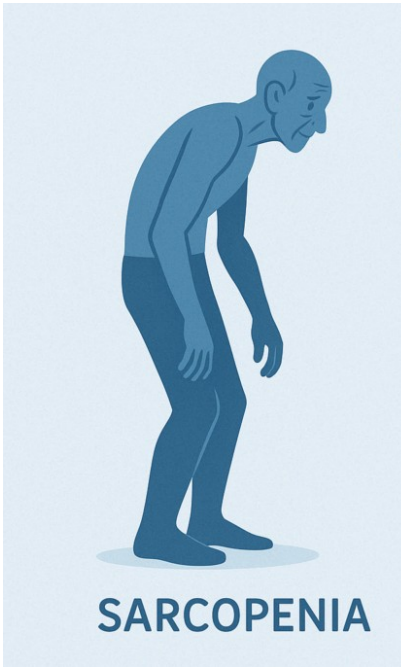






CILJANA MIKRONUTRITIVNA TERAPIJA KOD DOKUMENTIRANIH MANJKOVA ...





HRVATSKO DRUŠTVO ZA SUPLEMENTACIJU I MIKRONUTRICIJU U MEDICINI

Hrvatski liječnički zbor

PRIRUČNIK ZA MIKRONUTRICIJU I SUPLEMENTACIJU

U LIJEČENJU PRETILOSTI

