Utjecaj odabranih višesojnih probiotika na mikrobiotu i metabolički status

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Mikrobiota

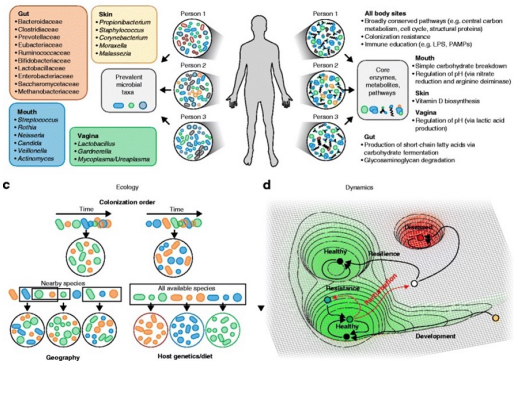
- svi mikroorganizmi koji žive u simbiozi s ljudskim tijelom
- 2000 različitih bakterijskih vrsta
- mikrobiom sadrži i 100-500 x veći broj gena negoli ljudski genom

https://www.vecteezy.com/vector-art/6582217

Lazar V et al. Aspects of gut microbiota and immune system interactions in infectious diseases, immunopathology, and cancer.Front. Immunol.2018.

Mikrobiota

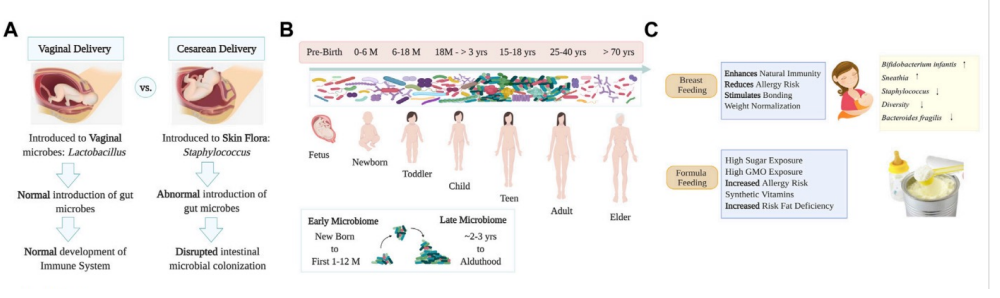
- bakterije su glavna sastavnica zdrave ljudske mikrobiote
- virusi (primarno bakteriofagi)
- gljive, neki članovi iz domene arheja
- metode detekcije nisu tako razvijene
- tehnologija za uzgoj



Lloyd-Price J et al.The healthy human microbiome. Genome Med 2016.

Imamo li istu mikrobiotu?

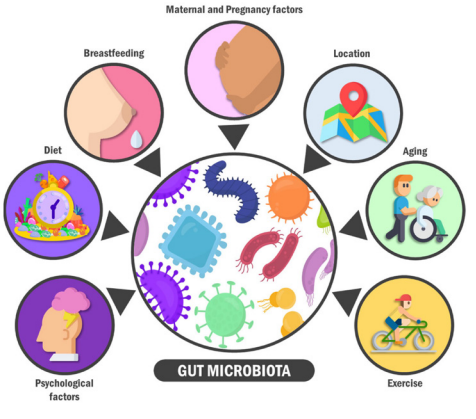
- mikrobiota je različita među zdravim ljudima
- jedinstvena je za pojedinca



Reynoso-García J et al. A complete guide to human microbiomes: Body niches, transmission, development, dysbiosis, and restoration. Front. Syst. Biol., 2022

Utjecaj na mikrobiotu

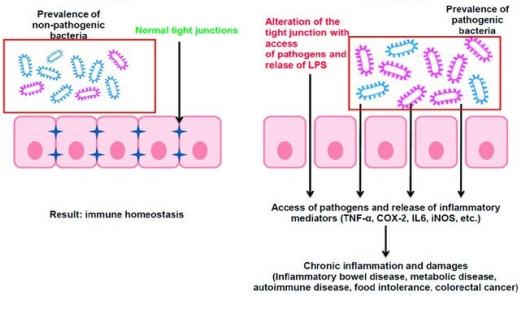
- utjecaj različitih čimbenika
- nepoznanica što je točno zdrava mikrobiota…



Salazar J et al. Exploring the Relationship between the Gut Microbiota and Ageing: A Possible Age Modulator. Int. J. Environ. Res. Public Health 2023.

Zdravi mikrobiom-eubioza

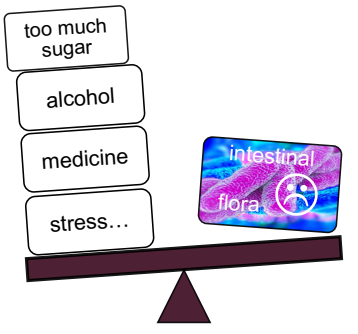
- potencijal da se suprotstavi štetnim događajima
- brži oporavak nakon izloženosti
- svaki čovjek ima jedinstveni mikrobiom



Lloyd-Price J et al.The healthy human microbiome. Genome Med 2016. The Human Microbiome Project Consortium. Structure, function and diversity of the healthy human microbiome. Nature 2012.
Capello F. Probiotics Can Cure Oral Aphthous-Like Ulcers in Inflammatory Bowel Disease Patients: A Review of the Literature and a Working Hypothesis. International Journal of Molecular Sciences.2019.

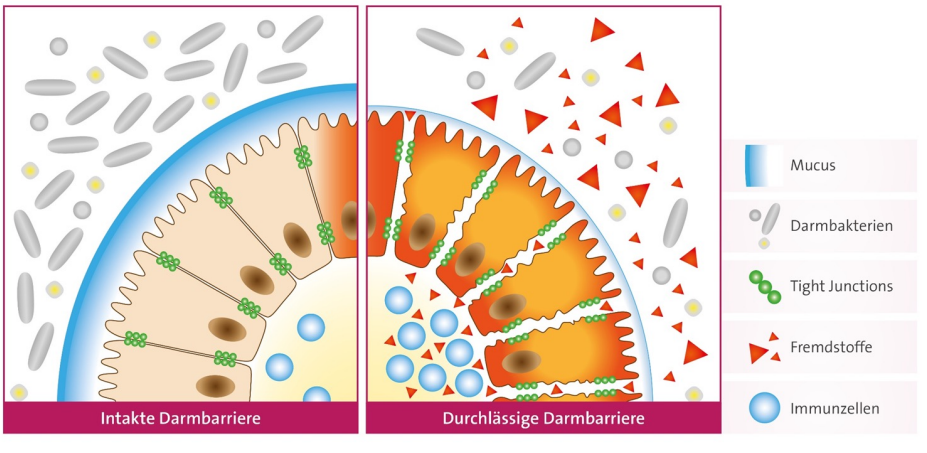
Disbioza

- narušena je ravnoteža složenog humanog ekosistema
- veći rizik razvoja bolesti
- uzrok bolesti?
- posljedica bolesti ?
- disbioza dovodi do kronične bolesti?
- kronična bolest dovodi do promjena u mikrobioti?



Maynard CL et al. Reciprocal interactions of the intestinal microbiota and immune system. Nature 2012.

Disbioza- „leaky gut”



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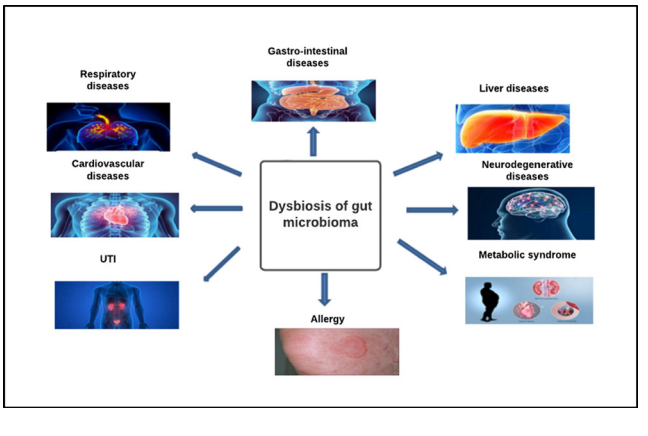
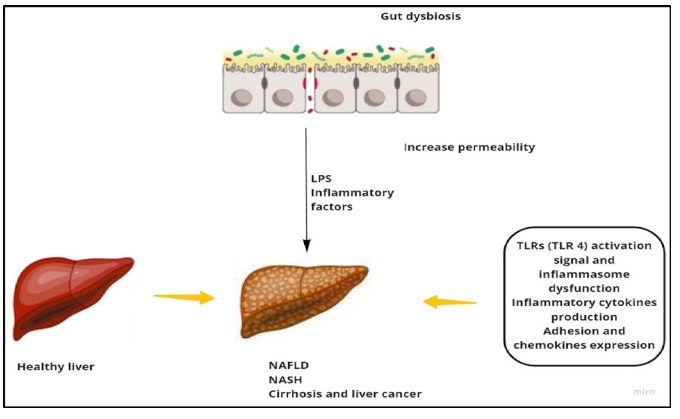
Disbioza -bolesti



Al-Rashidi H.E. Gut microbiota and immunity relevance in eubiosis and dysbiosis. Saudi Journal of Biological Sciences.2022.

Disbioza i NASH

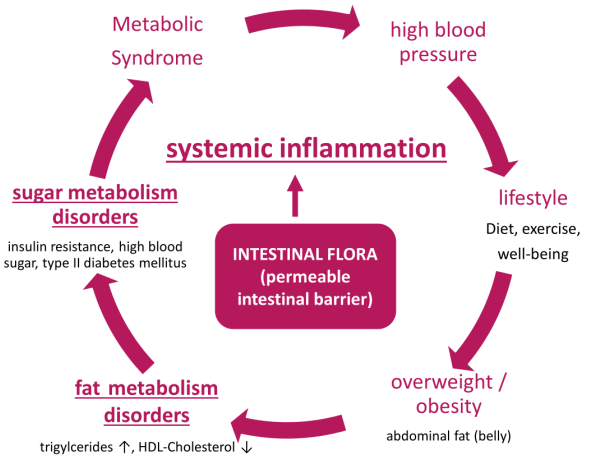


gram-negative bacterium

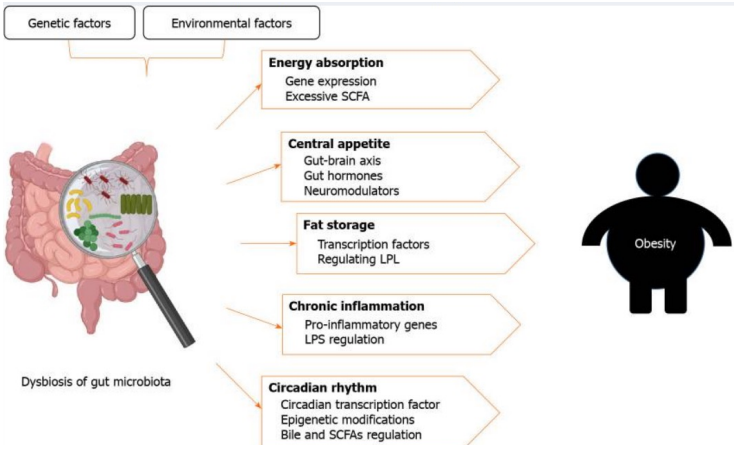
ENDOTOXIN
= LPS

Al-Rashidi H.E. Gut microbiota and immunity relevance in eubiosis and dysbiosis. Saudi Journal of Biological Sciences.2022.

Disbioza-metabolički sindrom



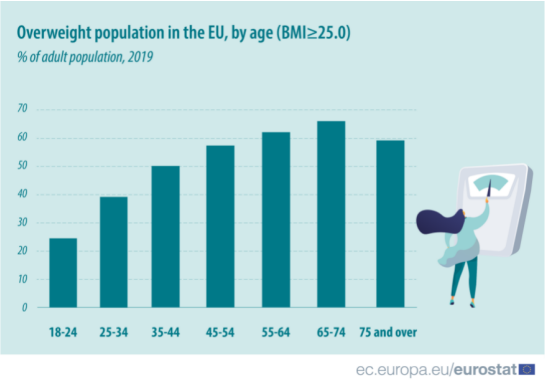
Disbioza-pretilost

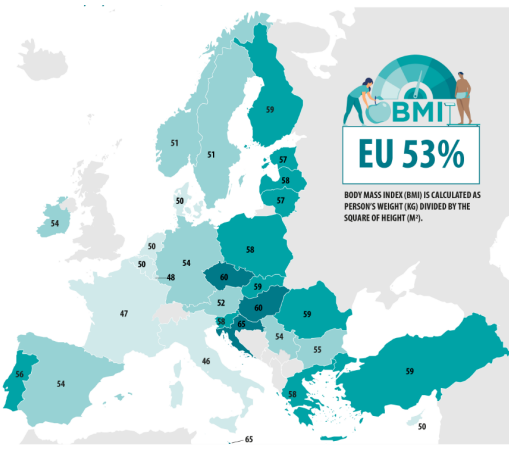


Liu BN et al. Gut microbiota in obesity. World J Gastroenterol. 2021;27(25):3837-3850.

EUROSTAT, 2019.

53% odraslih osoba koje žive u EU-u ima prekomjernu tjelesnu masu i debljinu

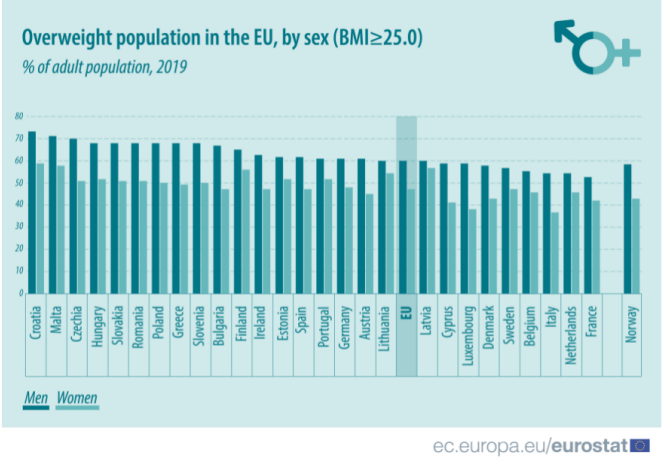




https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20210721-2

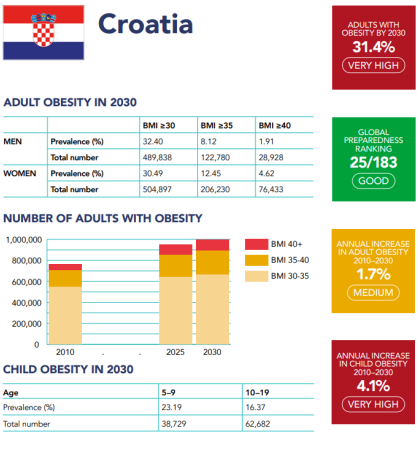
Eurostat 2019.

- 34% ima normalnu tjelesnu masu
- Hrvatska ima najveći udio onih s prekomjernom tjelesnom masom i debljinom
- **65%**
- Muškarci 73%
- Žene 59%
- pretilih oko 23%



https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20210721-2

Procjena prevalencije pretilosti u Hrvatskoj 2030.g.



https://s3-eu-west-1.amazonaws.com/wof-files/World_Obesity_Atlas_2022.pdf

Utjecaj višesojnih probiotika na razinu lipopolisaharida (LPS)

81 žena s prekomjernom tjelesnom masom (BMI: 30-45kg/m2),

45-70 godina

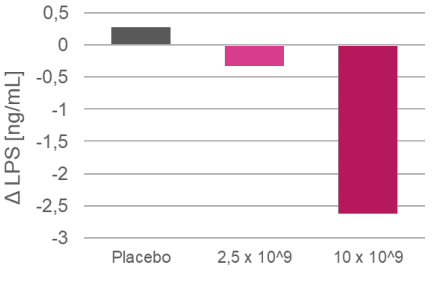
12 tjedna

3 skupine:
visoka probiotska doza (10 x 10^9 cfu)
niska probiotska doza (2.5 x 10^9 cfu)
placebo

Pratili su se parametri: glukoza, lipidogram, LPS razina u serumu

Szulińska M, et al. *Dose-Dependent Effects of Multispecies Probiotic Supplementation on the Lipopolysaccharide (LPS) Level and Cardiometabolic Profile in Obese Postmenopausal Women: A 12-Week Randomized Clinical Trial.* Nutrients 2018.

Utjecaj višesojnog probiotika na razinu LPS



9 ljudskih bakterijskih sojeva

Lactobacillus casei W56
Lactobacillus acidophilus W37
Lactobacillus brevis W63
Lactobacillus lactis W58
Lactobacillus lactis W19
Lactobacillus salivarius W24

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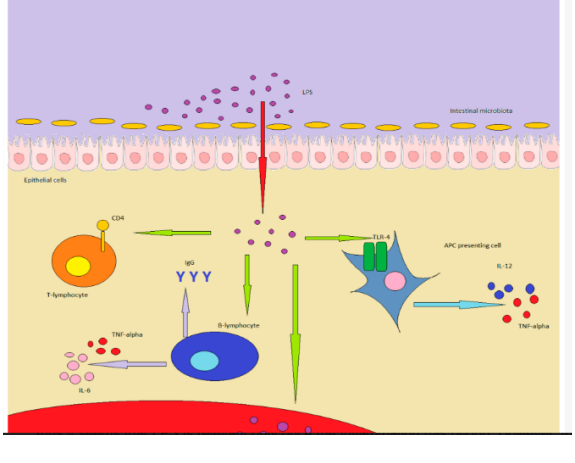
Szulińska M, et al. *Dose-Dependent Effects of Multispecies Probiotic Supplementation on the Lipopolysaccharide (LPS) Level and Cardiometabolic Profile in Obese Postmenopausal Women: A 12-Week Randomized Clinical Trial*. Nutrients 2018.

LPS-lipopolisaharid



gram-negativna bakterija

endotoksin = LPS

Candelli M et al. Interaction between Lipopolysaccharide and Gut Microbiota in Inflammatory Bowel Diseases. *International Journal of Molecular Sciences*. 2021.

Utjecaj višesojnih probiotika na kardiometaboličke parametre i upalu u osoba s DM2

61 ispitanika s DM2

30 - 60 g

10 x 10^9 cfu

tijekom 6 mj.

randomizirana, dvostruko-slijepa,

placebo kontrolirana studija

Razina endotoksina, tjelesna masa, glikemijski parametri,lipidogram, upalni markeri i adipocitokini

Sabico S. et al. Effects of a 6-month multi-strain probiotics supplementation in endotoxemic, inflammatory and cardiometabolic status of T2DM patients: A randomized, double-blind, placebo-controlled trial. Clin Nutr 2018.

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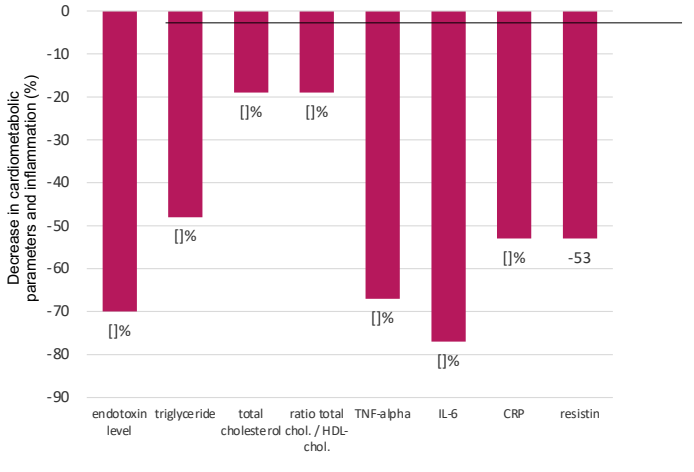

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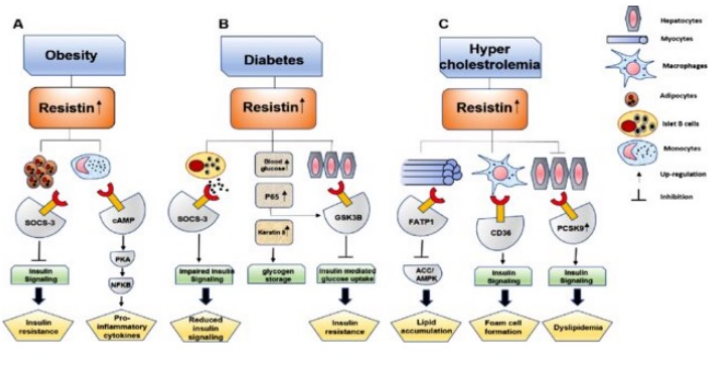
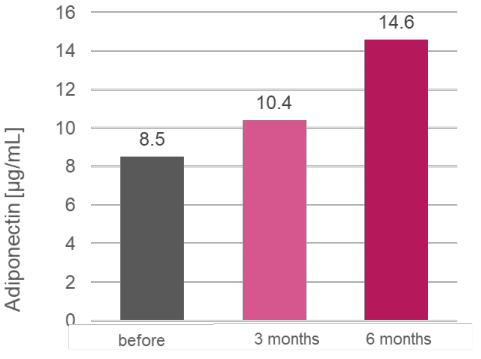
Sabico S et al. Effects of a 6-month multi-strain probiotics supplementation in endotoxemic, inflammatory and cardiometabolic status of T2DM patients: A randomized, double-blind, placebo-controlled trial. Clin Nutr 2018

Uloga resistina u razvoju metaboličkih poremećaja



Deb A. et al. Resistin: A journey from metabolism to cancer. Translational Oncology.2021.

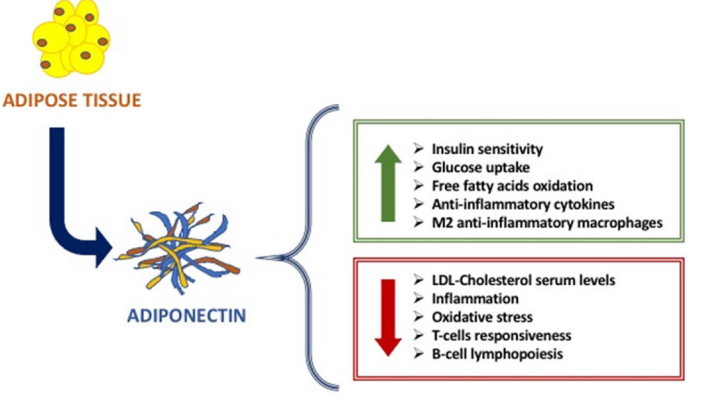
Utjecaj višesojnih probiotika na razinu adiponektina



Signifikantni porast adiponektina za 71.8%

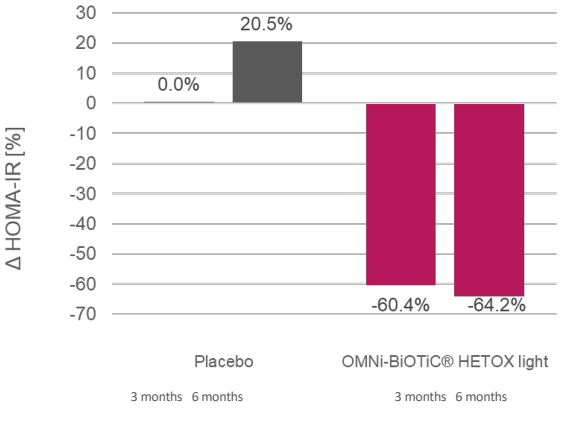
Sabico S. et al. Effects of a 6-month multi-strain probiotics supplementation in endotoxemic, inflammatory and cardiometabolic status of T2DM patients: A randomized, double-blind, placebo-controlled trial. Clin Nutr 2018.

Benefiti povećanja adiponektina



Polito R et al. Adiponectin Role in Neurodegenerative Diseases: Focus on Nutrition Review. International Journal of Molecular Sciences. 2020.

Utjecaj višesojnih probiotika na HOMA-IR



6 mjeseci

Smanjena je inzulinska rezistencija 64.2%

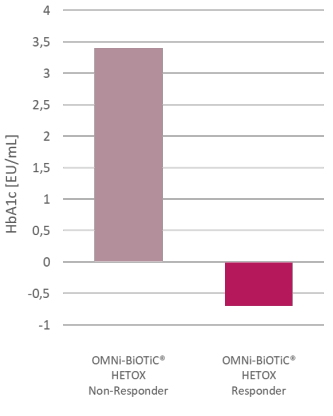
Sabico S. et al. Effects of a 6-month multi-strain probiotics supplementation in endotoxemic, inflammatory and cardiometabolic status of T2DM patients: A randomized, double-blind, placebo-controlled trial. Clin Nutr 2018.

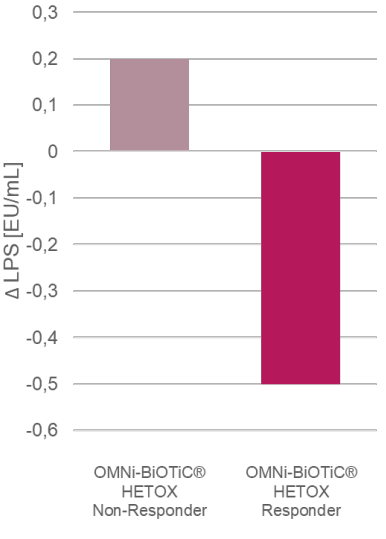
Utjecaj višesojnih probiotika na metaboličke parametre i crijevnu propusnost

Ispitanici	26 osoba s DM2 i BMI: 30-40 kg/m^2
Metode	Višesojni probiotik 2xdan tijekom 6mj. double-blind, randomizirano, placebo – controlirana studija
Parametri	Opseg kuka, propusnost crijeva (zonulin, endotoksin), glikemijski parametri, kvaliteta života

A. Horvath et al., "Effects of a multispecies synbiotic on glucose metabolism, lipid marker, gut microbiome composition, gut permeability, and quality of life in diabesity: a randomized, double-blind, placebo-controlled pilot study.," Eur. J. Nutr.,

Utjecaj višesojnih probiotika na HbA1c





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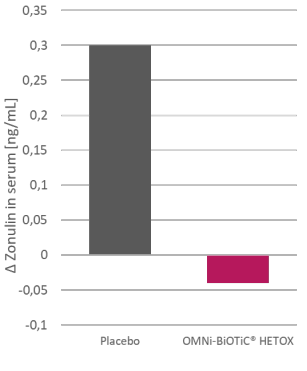
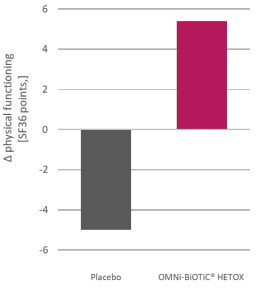
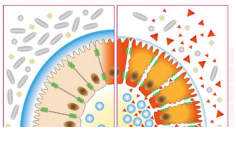
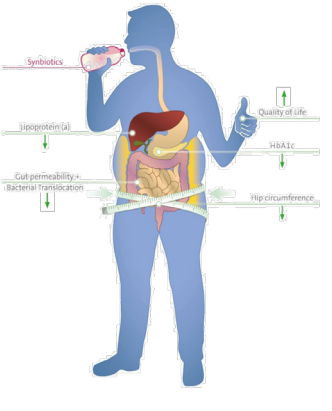


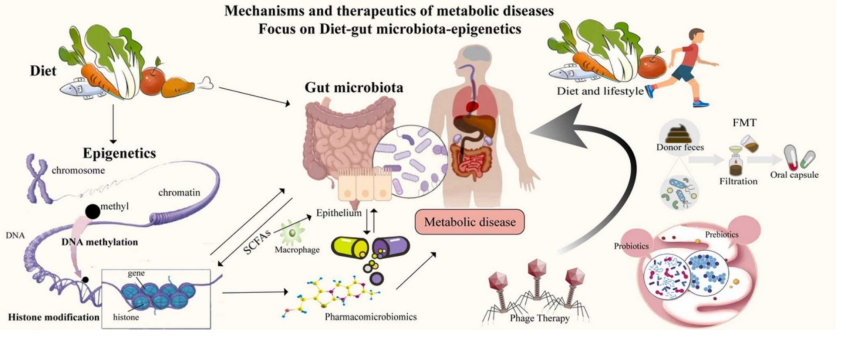






Budućnost...

Odrediti zdravi individualni mikrobiom..
Kultivirati..
Disbioza- dati zdravu mikrobiotu+dodati posebne probiotske sojeve koji su u značajnom manjku uz prebiotke



Li D. et al. Diet-gut microbiota-epigenetics in metabolic diseases: From mechanisms to therapeutics. Biomedicine & Pharmacotherapy, 2022.

Zaključak

- mikrobiom je individualna karakteristika pojedinca
- mikrobiom ima metaboličku, imunološku i zaštitnu ulogu
- primjena višesojnih probiotika uz prebiotike ima višestruke benefite