

Modulation of the gut microbiome

MyNewGut's implications for public health policy and dietary guidelines, and perspectives for health claims

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Gut microbiota in health and disease

- Gut microbiota plays a pivotal role in host metabolism and health, which revealed the possibility of a **plethora of associations** between gut bacteria and human diseases.
- The intestinal microbiota, **as a whole**, provides additional metabolic functions and regulates the host's gene expression, impacting on the ability to extract and store energy from the diet and contributing to body-weight maintenance/gain.

“Fiber gap” - diversity

Consuming a modern diet low in fiber contributes to the loss of taxa over generations and may be responsible for the lower diversity microbiota observed in the industrialized world compared to present-day hunter-gatherers and rural agrarians.

(Sonnenburg et al., Nature. 2016 January 14; 529(7585): 212–215).

Dietary fiber & diversity gut microbiota

- Microbiota-accessible carbohydrates (MACs), which are abundant in dietary fiber, serve as the primary source of carbon and energy for the distal gut microbiota
- One possible explanation for the greater microbiota diversity seen in hunter-gatherers and agrarians is the large quantity of dietary fiber they consume relative to Westerners.

(Sonnenburg et al., Nature. 2016 January 14; 529(7585): 212–215).

Diversity gut microbiota

- Loss of diversity of gut microbiota plays a pivotal role in host metabolism and health, which revealed the possibility of a **plethora of associations** between gut bacteria and human diseases
- Possible that **rewilding** the modern microbiota with extinct species may be necessary to restore evolutionarily important functionality to our gut.

(Sonnenburg et al., Nature. 2016 January 14; 529(7585): 212–215).

- Recommendation intake of dietary fiber > 50g/d

(O’Keefe et al. Nat Commun. 2015 Apr 28;6:6342).

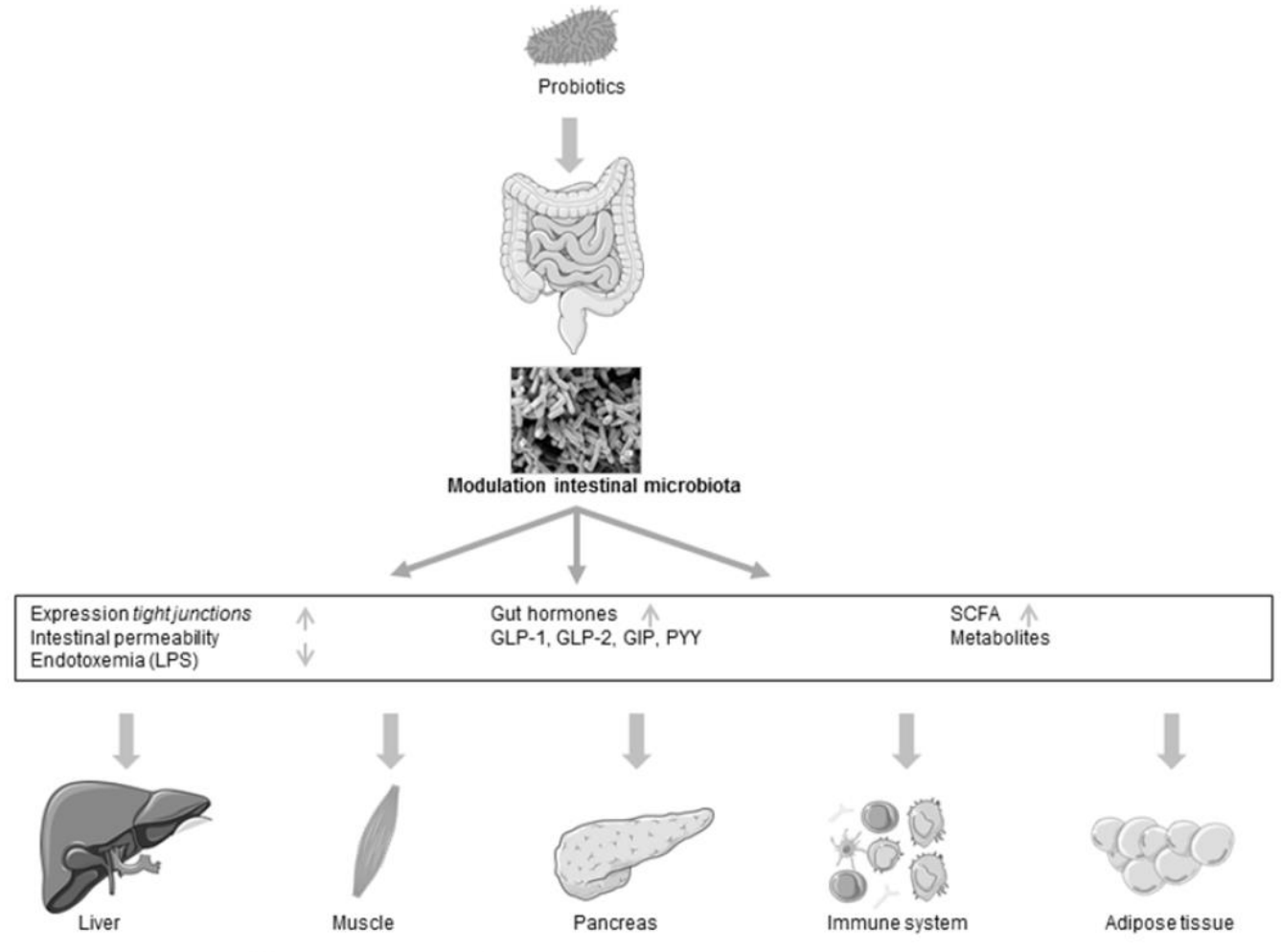
Probiotics in the development of Insulin Resistance & Obesity

The efficiency of probiotics on IR/Obesity has been linked to:

- local changes of the gut environment and microbiota
- reduction of the intestinal permeability preventing translocation of bacterial lipopolysaccharides (LPS) in the systemic circulation
- stimulation of secretion of SCFA such as butyric acid in the colon and increased incretin secretion.

(Tian et al., Food Funct. 2016, 7, 3789–3797)

Plethora of effects of probiotics



Schematic view of postulated mechanism of probiotic action in type 2 diabetes (metabolic syndrome/obesity)



Food & Microbiome Public Health perspective

- The diet-microbiome interactions may be moderators of human metabolism.
- Does this mean that with the ingestion of a capsule with the mix of relevant bacterial strains we can colonize our gut with beneficial organisms that prevent us from obesity, cancer, cardiovascular or metabolic diseases as obesity, type 2 diabetes, etc.?



What a perspective!

What a brilliant
opportunity for decreasing incidences of public diseases!

History

- The history, however, has taught an important lesson to those working in the field of disease prevention.

There are no miracles!

Extensive research

Vitamin C, resveratrol, and several potentially cancer preventing/curing dietary supplements made from exotic plants, just to mention some such attempts. After **extensive research** these compounds found their appropriate roles in disease prevention, **but not as miracle molecules**, not as replacements of health lifestyle.

- Utilizing the preventive – and even possible therapeutic – power of modifications of the gut microbiome has to find its place as well.

Health claims Modulation of the Microbiome

- Cause and effect relationship established between food (ingredient) and health benefit
- Food sufficiently defined (FMT!)
- Claimed effect beneficial to human health
- Mechanism of action

Health Claim Substantiation pertaining to the microbiome

- Key to health claim substantiation is cause-and-effect relationship established in randomized, controlled clinical trials/nutrition intervention trials
- Proper design!
- Proper data analysis
- Significant result ($p < 0.05$)

Microbiome in health claim substantiation

- Modulation of microbiome → plethora of effects, mechanisms, etc.....
- No magic bullet
- MoA black box
- As long as health benefit is evident, hints at possible microbiome-related mechanisms of action would suffice for EFSA to conclude on cause-and-effect relationship

Taken together

- Utilizing the preventive – and even possible therapeutic – power of modifications of the gut microbiome has to find its place as well in dietary recommendations/public health messages
- Health Claims pertaining health effects due to putative modulation of the microbiome are already within scope



Thank you!

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