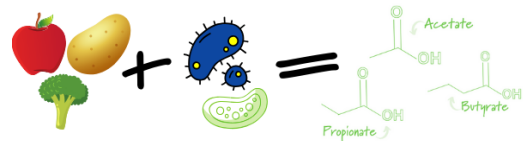


The Microbiome

Microbiome: A dynamic and interactive micro-ecosystem (Ex. Found within digestive tract) that is prone to change.

Microbiota: The individual components of a microbiome, such as the microorganisms belonging to different biological kingdoms (Ex. Prokaryotes [Bacteria, Archaea], Eukaryotes [e.g., Protozoa, Fungi, and Algae]).

Microbiota help you to digest your food, and in return they serve your body in a variety of ways, including maintaining your gut lining/mucosa, protecting against harmful pathogens, immune functions, and the synthesis of helpful products such as vitamins, minerals and short chain fatty acids (SCFAs).



Prebiotics: Usually fibers (non-digestible food ingredients) that beneficially affect the host's health by stimulating the growth and/or activity of microorganisms in the colon.

Probiotics: Living non-pathogenic (not harmful) organisms and their derived beneficial effects on hosts.

Symbiotics: Prebiotics which *selectively* improve growth and activity of specific microorganisms.

Antibiotics: Medications that non-selectively destroy/slow down the growth of bacteria (attacks harmful and non-harmful strains).

- Before making any dietary changes, it is important to consult with a Registered Dietician and/or your family doctor. -

Methods for improving & maintaining the microbiome

1. Eat a large variety of fruits and vegetables. Research indicates that high-fat and high-sugar diets may be linked to dysbiosis and increased gut-permeability (*Cani et al. 2008; Zangara & Macdonald, 2019*).
2. Microbiota help you to digest non-digestible fiber, which are found in foods such as fruits, vegetables, grains, nuts and seeds**. Just like humans, microbiota have their “food preferences”. A greater variety of fibrous foods means that a larger number of microbiota are being fed! How you cook your food does appear to change the microbiome, however researchers are still uncertain as to which foods are best eaten in raw form vs. cooked. At the time this summary is written (April 2021), the recommendation remains to eat a large variety (upwards of 30 different types per week!) of high-fibrous foods (*Bulsiewicz, 2020*).

****Important:** Although we want to improve our microbiome, we can't forget about other aspects of our health. Nuts and seeds are a great source of healthy fats, but they are higher in fat content. If you are working to reduce your fat intake, it may be best to eat less of high fiber-high fat foods (Ex. Avocados, coconut, nuts & seeds) in favour of high-fiber-low fat foods (Ex. fruits, vegetables & legumes).

3. Your gut is trainable! GI distress is commonly a result of not having adequate proportions of the appropriate microbiota (*Bulsiewicz, 2020*). But with each plant source you consume, you also consume the plant's microbiome. Similar to training your muscles to become stronger, you can train your gut to digest new foods. Start **low** and **slow**. Each time you re-introduce the food to your GI system, increase the amount of food
4. Red-wine can be beneficial for the microbiome, but NOT because of the alcohol content (*Moreno-Indias et al. 2016*). Research suggests that it is due to the polyphenol content, which can be found in higher concentrations in numerous different foods such as: non-berry fruits, berries, beans, soy and more!
5. Make exercise a priority! Low-intensity exercise has been shown to improve microbial biodiversity in the gut (*Monda et al 2017*). This is good!

Interested to learn more? Check out a few of the resources below!

Bulsiewicz, Will. *Fiber Fueled: The Plant-Based Gut Health Program for Losing Weight, Restoring Your Health, and Optimizing Your Microbiome*. Penguin Random House, 2020.

Cani PD, et al. Changes in gut microbiota control metabolic endotoxemia-induced inflammation in high-fat diet-induced obesity and diabetes in mice. *Diabetes*. (2008). 57(6),1470-1481.

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Fuller, Stacey, et al. "New horizons for the study of dietary fiber and health: a review." *Plant foods for human nutrition* (2016). 71(1),1-12.

General Information on Fiber. Harvard T.H. Chan School of Public Health, The President and Fellows of Harvard College, <https://www.hsph.harvard.edu/nutritionsource/carbohydrates/fiber/>.

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Moreno-Indias I, Sánchez-Alcoholado L, Pérez-Martínez P, Andrés-Lacueva C, Cardona F, Tinahones F, Queipo-Ortuño MI. Red wine polyphenols modulate fecal microbiota and reduce markers of the metabolic syndrome in obese patients. *Food Funct*. (2016). 7, 1775–87.

Mudgil, D., and Sheweta B. "Composition, properties and health benefits of indigestible carbohydrate polymers as dietary fiber: A review." *International journal of biological macromolecules* (2013). 61, 1-6.

Pandey, K. R., Naik, S. R., & Vakil, B. V. Probiotics, prebiotics and synbiotics- a review. *Journal of food science and technology*, (2015). 52(12), 7577–7587. <https://doi.org/10.1007/s13197-015-1921-1>

Sivaprakasam, Sathish, Puttur D. Prasad, and Nagendra Singh. "Benefits of short-chain fatty acids and their receptors in inflammation and carcinogenesis." *Pharmacology & therapeutics* (2016). 164, 144-151.

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