

What is Gut Health?

Gut health can be defined as a state of well-being and absence of gastro-intestinal distress ⁽¹⁾. It is determined by numerous factors and largely by the gut microbiota.



Gut Microbiota

Trillions

of microorganisms live inside the gut! ⁽²⁾



The gut microbiota includes bacteria, viruses and non pathogenic fungi. It plays a key role in digestive, metabolic, immune and neurological functions. ^(4,15)

95% of the body's microbiota is found in the gut ⁽³⁾

(1) Bischoff SC. 'Gut health': a new objective in medicine?. BMC Med. 2011;9:24. Published 2011 Mar 14. doi:10.1186/1741-7015-9-24

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(4) Hollister EB et al. Structure and function of the healthy pre-adolescent pediatric gut microbiome. Microbiome. 2015;3:36.

(15). Goulet O et al, Paediatricians play a key role in preventing early harmful events that could permanently influence the development of the gut microbiota in childhood, Acta Pædiatrica 2019 108, pp. 1942-1954

Functions of the gut ⁽⁴⁾

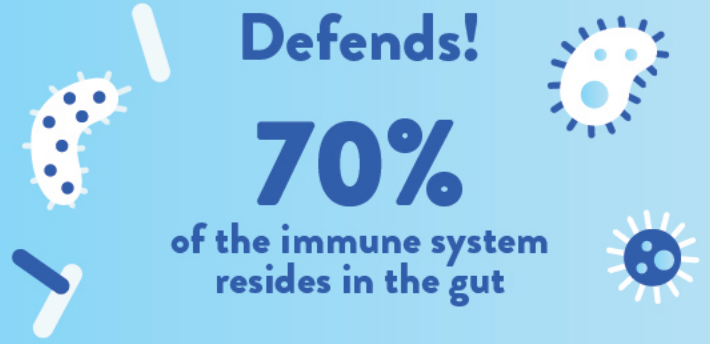
Fuels!



Absorption and production of nutrients

Nutrients needed to support growing bodies are absorbed in the gut. Macronutrients (carbohydrates, fats and proteins) and micronutrients (vitamins, minerals, and trace elements, like iron) are digested and absorbed in the small intestine. Some components of food, like fibers, are not digested and pass into the large intestine, where microbes can metabolize those components and produce trophic factors.

Defends!



70%
of the immune system
resides in the gut

A strong gut barrier plays a key role in protecting tissues and the circulatory system from exposure to microorganisms, antigens and allergens. The gut barrier is essential for the maintenance of health and well-being.

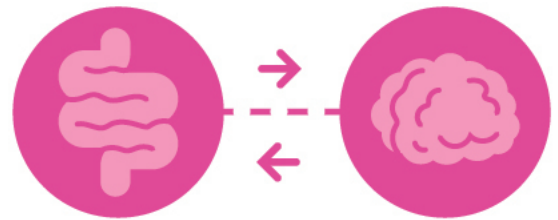
Eliminates!



Waste removal

After metabolizing food into energy, food residue is processed by the colonic bacteria producing in turn trophic factors for gut health before the gut removes the waste elements.

Communicates!



Gut-Brain Axis

The gut brain axis is a bidirectional communication between the central and the enteric nervous system, linking emotional and cognitive centers of the brain with peripheral intestinal functions. The gut microbiota influences these interactions, playing as the third actor.

! What may be the signs of a poorly functioning gut? ^(5,6,7,8)

uncomfortable digestion

transit disorders: diarrhoea and/or constipation

poor nutrient absorption

poor immunity

mood fluctuations

general fatigue and sleep disorders

abdominal pain and discomfort

(4) Hollister EB *et al.* Structure and function of the healthy pre-adolescent pediatric gut microbiome. *Microbiome*. 2015;3:36.

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Factors that can influence the colonization process in infants ⁽¹⁵⁾

EARLY PROGRAMMING

- ✓ Term of birth
- ✓ Mode of delivery
- ✓ Environment
- ✓ Medications (PPI, ATB...)
- ✓ Dietary influence (Breast or formula feeding)

INFANT'S GUT MICROBIOTA



SYMBIOSIS

- Immune tolerance
- Intestinal homeostasis
- Healthy metabolism

DYSBIOSIS

- Immune/allergic diseases
- Intestinal diseases: inflammatory bowel disease (IBD)
- Metabolism disorders

Children vs. Adults ⁽⁴⁾

The average child's gut microbiota shows greater abundance of *Bifidobacteria*, *Faecalibacteria*, and members of the *Lachnospiraceae*, while adults harbor greater abundances of *Bacteroidetes*. Children's gut communities seem to be enriched in functions which may support ongoing development.

Diversity in individual microbiota ⁽¹⁴⁾

Differences in lifestyle, westernization in particular, strongly influence the composition and diversity of gut microbial populations in children as well as the development (or multiplication) of potential protective bacteria.

(4) Hollister EB *et al.* Structure and function of the healthy pre-adolescent pediatric gut microbiome. *Microbiome*. 2015;3:36.

(14). Derrien M, Alvarez AS, de Vos WM. The Gut Microbiota in the First Decade of Life. *Trends Microbiol*. 2019 Dec;27(12):997-1010.

(15). Goulet O *et al.* Paediatricians play a key role in preventing early harmful events that could permanently influence the development of the gut microbiota in childhood, *Acta Pædiatrica* 2019 108, pp. 1942-1954.

Children's gut health and microbiota - the specificities

Formation and composition during early childhood



Gut health and immunity could begin in utero ^(12,13)

The development of the foetus may be influenced by the metabolic products of the mother's microbiota. However, additional data is needed to confirm this mechanism.



Establishment of the infant's microbiota starts immediately at birth and is influenced by the mother's vaginal and fecal microbiota ^(10,11)

Infants microbiota implementation starts immediately at birth and lasts several weeks and months. The bacterial colonization is largely influenced by the intestinal and vaginal bacteria of the mother and other perinatal factors.



Gut microbiota evolves during childhood ⁽¹⁴⁾

Children's gut microbiota is highly dynamic and is positively influenced by breast feeding. External factors such as proton pump inhibitors (PPI) and/or antibiotics (ATB) may be detrimental during the early phases of colonization.

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Dietary influence

Know what type of food can benefit children's gut health

Dietary fibers ^(16,17)

Foods rich in fibers provide substrates for colonic bacteria. Dietary fibers are considered as "prebiotics", i.e. factors that promote the multiplication and the diversity of the gut microbiota.



Probiotics ⁽¹⁶⁾

Live microorganisms that, when administered in adequate amounts, confer a health benefit to the host



A discussion with your patients

Patient care can have an important impact on the development of gut microbiota and its diversity mainly through appropriate feeding and preserving protective bacteria (limiting use of PPI and ATB). Considering these parameters might have long term metabolic effects and could contribute to prevent NCDs such as diabetes, obesity, cardiovascular diseases, IBD,...⁽¹⁵⁾

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