

THE MICROBIOTA

SERIES ONE: IDENTIFYING BACTERIA

The microbiota is the collective term for a group of microbes (bacteria, fungi, archaea and viruses) inhabiting an ecosystem, like the gastrointestinal tract (from mouth to anus).

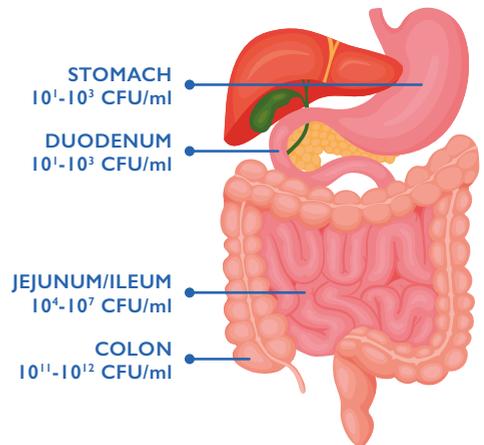
In humans, numbers of bacteria increase as you descend the gastrointestinal tract (GIT), and conditions become more anaerobic, so that there is very little oxygen present by the time they reach the large intestine.

Bacteria in the large intestine (colon) are obligately anaerobic (they cannot survive in oxygen). These bacteria are important for health, assisting in substrate utilisation and releasing important metabolites, including short chain fatty acids. In healthy adults, 90% of these bacteria fall into two main phylogenetic groups - Firmicutes and Bacteroidetes.

Within any individual there are up to 150 different bacterial species, with >500 species identified within human populations. There is huge variation in the analysed composition of the gut microbiota between individuals - everyone has their own unique fingerprint.

Bacteria in the gut are loosely described as 'good' bacteria and 'bad' bacteria. 'Bad' bacteria commonly cause disease – like *Salmonella* species. 'Good' bacteria tend to protect us against disease - either directly or indirectly.

Although it is hard to define the specific composition of a healthy microbiome in adults, many studies have established that a dense and diverse GIT bacterial population is important for health.



RARE STRAIN-SPECIFIC METABOLIC ACTIVITY

Production of shiga toxin by *Escherichia coli* O157:H7

Synthesis of Vitamin B₁₂ by *Limosilactobacillus reuteri* CRL1098

FREQUENTLY OBSERVED METABOLIC ACTIVITY

'Bad bacteria' characteristics

- Toxin production
- Translocation
- Virulence factors

'Good bacteria' characteristics

- Vitamin synthesis
- Bacteriocin production
- SCFA production

WIDESPREAD METABOLIC ACTIVITY

Metabolic activities which are part of the ecosystem of the gut microbiota e.g., starch degradation (mostly beneficial, but can be a risk in certain combinations/interactions)

IS STRAIN SPECIFICITY IMPORTANT?

Substrate utilisation, metabolism and surface protein expression are key functionality markers and differ between strains. These features affect the way in which bacteria interact with host cells and the immune system. Strains that belong to the same species can demonstrate different functions. Conversely, strains belonging to different species can demonstrate similar functions. It is important to identify if the function is strain-specific or widespread.

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