

Difference Between Lactobacillus and Bifidobacterium

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Key Difference - Lactobacillus vs Bifidobacterium

In the context of modern microbiology, different bacterial species with symbiotic associations with the human body are currently being investigated to identify different beneficiary factors. These bacterial species provide different benefits to the host that include the upregulation of host growth and development. *Lactobacillus* and *Bifidobacterium* are such two bacterial species that are recognized as probiotics. Probiotics are beneficiary bacteria that are present in the gut microbiota that provides different benefits to the host. ***Lactobacillus* is a facultative anaerobic bacterial species whilst *Bifidobacterium* is an obligate anaerobic bacterial species.** This is the **key difference** between *Lactobacillus* and *Bifidobacterium*.

What is *Lactobacillus*?

Lactobacillus belongs to the group of gram-positive bacteria that are facultative anaerobic organisms. Considering other features of *Lactobacillus*, they are rod-shaped microaerophilic bacteria. They do not form any spores during reproduction. This species of bacteria is considered as the major species that belongs to the group lactic acid bacteria. In the context of human gut microbiota, *Lactobacillus* is abundantly present. Not only in the human gut, but *Lactobacillus* also resided in places such as genital system and urinary system etc. In the context of females, *Lactobacillus* is also present as a major microbial component in the vagina.

These bacteria have the ability to form biofilms in the gut and vagina and thereby prevail during harmful environmental condition. *Lactobacillus* present in the human body exists as mutualistic organisms that protect the body from different pathogenic intrusions. The human body provides ample of nutrients for the growth and development of the bacterial species and to reproduce successfully within the body. In the context of dairy products, *Lactobacillus* is considered as probiotics. These probiotics uplift human health and involve in the treatment of diarrhoea and different vaginal infections. *Lactobacillus* could also be used as a treatment strategy for skin infections such as eczema.

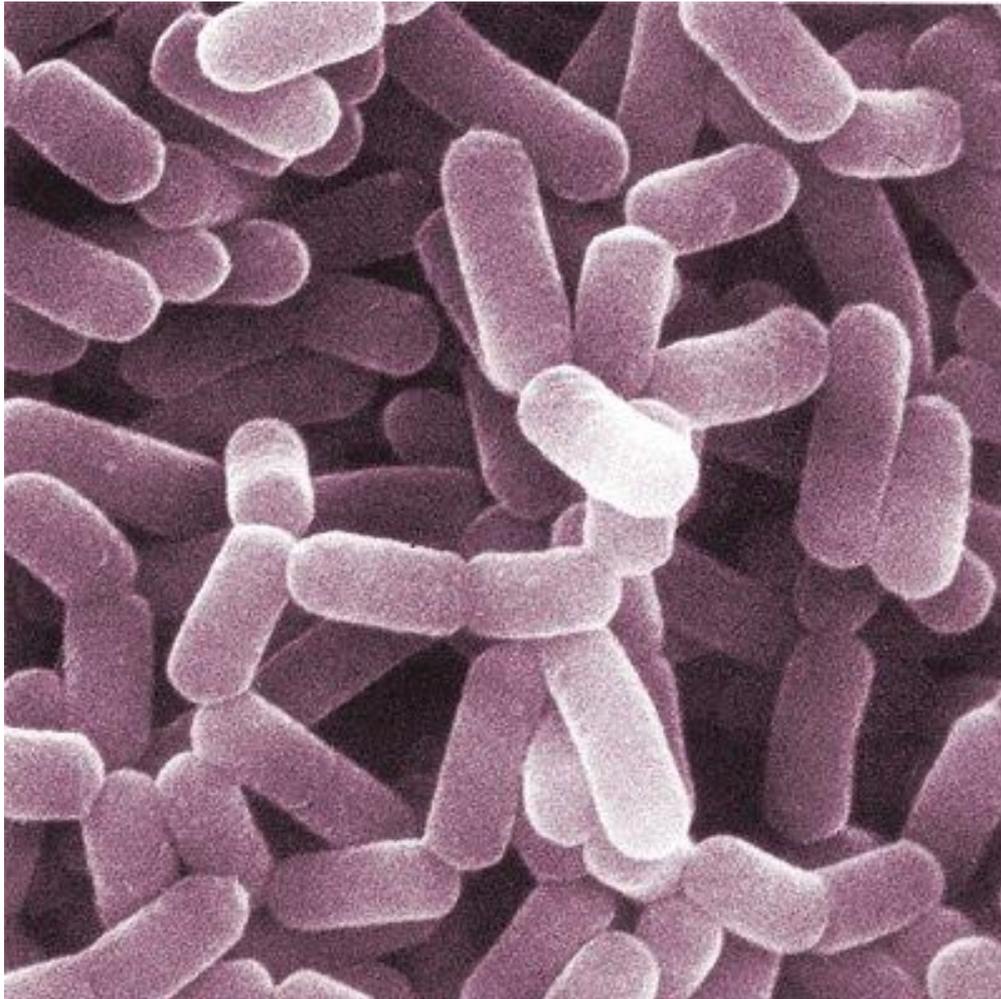


Figure 01: Lactobacillus

In the context of *Lactobacillus* metabolism, most of the species involved in homofermentative metabolism, and a minority of species involve in heterofermentative metabolisms. Homofermentative describes the production of only lactic acid from sugars whilst heterofermentative refers to the production of lactic acid or alcohols from sugars.

What is *Bifidobacterium*?

Bifidobacterium is a non-motile, gram-positive, rod-shaped (branched) obligate anaerobic bacterium that is primarily present in the intestines of animals and humans. These bacteria are considered as the major type of organisms that inhabits the colon of mammals. Similar to *Lactobacillus*, *Bifidobacterium* is also used as a probiotic. In the context of fermentation of carbohydrates, *Bifidobacterium* utilizes the fructose-6-phosphate phosphoketolase pathway. These bacteria that present in the human gut involves in a symbiotic relationship with the host and provides beneficiary factors such as good digestion, production of lactic acid and acetic acid and promotes immunity through boosting up the immune system. It was revealed that *Bifidobacterium* has the ability to compete with other gut microorganisms actively and occupy a larger fraction of the gut microbiota.

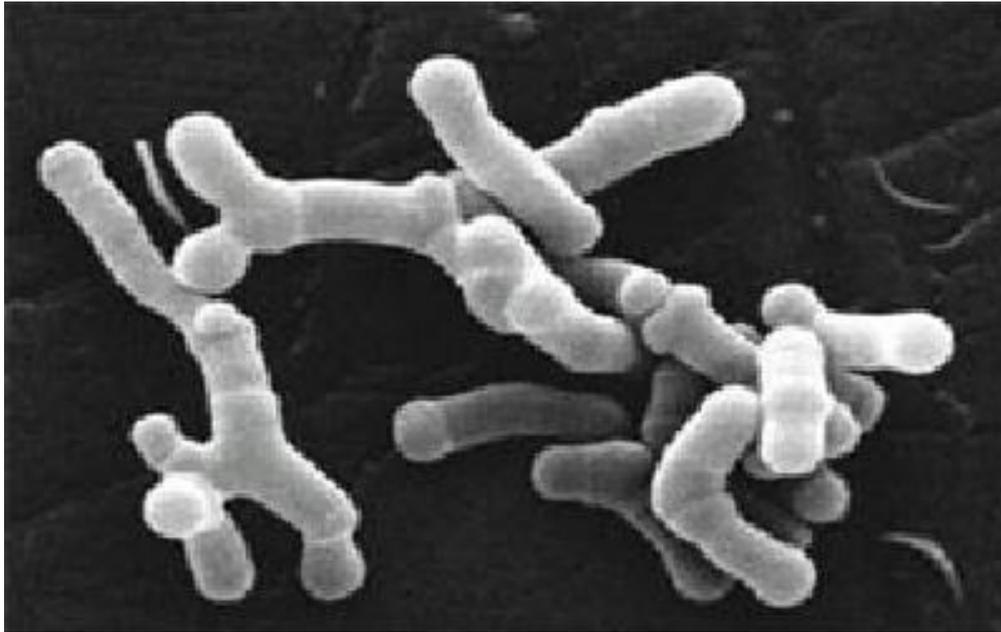


Figure 02: Bifidobacterium

Out of the *Bifidobacterium* group, *Bifidobacterium longum* is the most common type of species. It has a genome which is circular that contains a length of 2,260,000 bp (base pairs) and with a GC (Guanine and Cytosine) content of 60 %. This species is currently under thorough research in order to identify the probiotic qualities. *Bifidobacterium* has a unique pathway for hexose metabolism that is driven by a phosphoketolase pathway. This unique pathway is referred to as the bifid shunt. During this pathway, the bacteria utilize the enzyme fructose-6-phosphate phosphoketolase. This is also used as a diagnostic tool since this phenomenon is not found in other species of gram-positive bacteria.

What are the Similarities Between *Lactobacillus* and *Bifidobacterium*?

- Both *Lactobacillus* and *Bifidobacterium* are gram-positive.
- Both *Lactobacillus* and *Bifidobacterium* produce lactate.
- Both *Lactobacillus* and *Bifidobacterium* organisms are susceptible to antibiotics.
- Both *Lactobacillus* and *Bifidobacterium* share a common habitat, which is the intestines of animals and humans.
- Both *Lactobacillus* and *Bifidobacterium* are utilized as probiotics.

What is the Difference Between *Lactobacillus* and *Bifidobacterium*?

Lactobacillus vs Bifidobacterium	
<i>Lactobacillus</i> belongs to the group of gram-positive bacteria that are facultative anaerobic that converts	<i>Bifidobacterium</i> is a non-motile, gram-positive, rod-shaped (branched) obligate anaerobic bacterium that is primarily

sugars into lactic acid.	present in the intestines of animals and humans.
Habitat	
Milk and dairy products, animal and human intestines, fermented foods are the habitats of <i>Lactobacillus</i> .	Human and animal gastrointestinal tract (intestines) is the habitat of <i>Bifidobacterium</i> .
Cellular Morphology	
<i>Lactobacillus</i> can be cocci or rods.	<i>Bifidobacterium</i> is present as branched rods or club-shaped.
Major Metabolites	
Lactic acid is the major metabolite of <i>Lactobacillus</i> .	Lactic acid and acetic acid are the major metabolites of <i>Bifidobacterium</i> .
Oxygen Sensitivity	
<i>Lactobacillus</i> is a facultative anaerobe (has the ability to live even in the presence of oxygen).	<i>Bifidobacterium</i> is an obligate anaerobe (cannot live in the presence of oxygen).

Summary - Lactobacillus vs Bifidobacterium

Lactobacillus belongs to the group of gram-positive bacteria that are facultative anaerobic that converts sugars into lactic acid. This species of bacteria is considered as the major species that belongs to the group lactic acid bacteria. *Lactobacillus* present in the human body exists as mutualistic organisms that protect the body from different pathogenic intrusions. Most of the species involve in homofermentative metabolism, and a minority of species involve in heterofermentative metabolisms. These probiotics uplift human health and involve during the treatment of diarrhoea and different vaginal infections. *Bifidobacterium* is a non-motile, gram-positive, rod-shaped (branched) obligate anaerobic bacterium that is primarily present in the intestines of animals and humans. *Bifidobacterium* has the ability to compete with other gut microorganisms actively and occupies a larger fraction of the gut microbiota.

Reference:

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APA: Difference Between Lactobacillus and Bifidobacterium.(2018 February 20). Retrieved (date), from <http://differencebetween.com/difference-between-lactobacillus-and-vs-bifidobacterium/>

MLA: "Difference Between Lactobacillus and Bifidobacterium" Difference Between.Com. 20 February 2018. Web.

Chicago: "Difference Between Lactobacillus and Bifidobacterium." Difference Between.Com. <http://differencebetween.com/difference-between-lactobacillus-and-vs-bifidobacterium/> accessed (accessed [date]).



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