

Probiotics

The word “probiotic” is derived from the Greek word for “For Life”. According to the definition of the United Nations Food and Agriculture Organization and the World Health Organization (FAO/WHO)’s report, **probiotics** are: “Live microorganisms which, when administered in adequate amounts, confer a health benefit on the host” ⁽¹⁾.

Live microorganisms can be yeast or bacteria, where each is defined by a specific strain name and registered in an international culture collection.

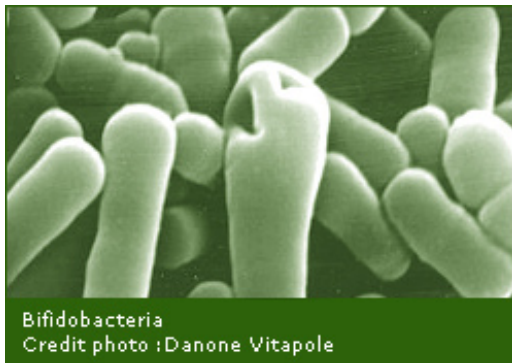
For instance, for the probiotic strain *Bifidobacterium lactis* DN 173-010 contained in ACTIVIA®:

Genus: Bifidobacterium

Specie: animalis subspecies lactis

Registered collection name: DN 173-010

The probiotic definition adopted by the ILSI (International Life Science Institute) has been extended to probiotic food as “a food containing live microorganisms in amounts sufficient to confer a health benefit on the host”⁽¹⁾.



A microorganism strain has a proven probiotic status if/when¹:

- 1- The strain has been **identified** by phenotypic and genotypic methods (Genus, species, strain), and it is deposited in an international culture collection.
- 2- The strain has been the object of a **safety assessment** (*in vitro* and/or animal studies, and human studies), from which it results that the strain does not present any pathogenic properties, virulence properties, toxin production, transferable antibiotic resistance. A long history of safe use is a good indicator of the safety of a probiotic strain.
- 3- If the probiotic is intended to have an effect in the gut, it has to be **able to reach the gut**. This means that probiotic bacteria should be resistant to stomach acid, bile salts, several digestive enzymes such as pepsin and pancreatin, and able of growing in anaerobic conditions.
- 4- A **benefit for the host has been demonstrated** by a

double blind, randomized, placebo-controlled human trial or other appropriate design.

In recent years, the studies of the health benefits that result from ingesting probiotics and the mechanisms of action of probiotics have become an active field of research.

Each strain and/or combination of strains must be assessed for its own health benefits proven by clinical trial because different strains of probiotics have different properties⁽¹⁾.

The survival of the probiotic strain throughout the entire digestive tract of the host is not currently part of the definition, but it is considered, an important criterion for determining whether a given probiotic strain is in fact able to exert its health effects. Indeed during the course of gastrointestinal transit, bacterial strains undergo drastic physiological stress (acidity, digestive enzymes and bile salts), which affects their survival and so their health benefits.

The human gastrointestinal tract contains an average of 10^{14} microorganisms, varying from more than 1.000 different species. While the majority of these bacteria are non-pathogenic, some may potentially cause diseases. **In healthy individuals, when the intestinal flora is in balance, both beneficial and harmful microorganisms (pathogens) are present.** This microflora has a symbiotic relationship with the host organism and protects the body against infections, assists digestion, produces nutrients, and plays an important role in the immune system.

An optimal microflora balance in the intestine is essential for keeping all these functions, as well as for the health of the host. This balance can be disturbed by some factors, such as the use of antibiotics, diarrhoea, stress or an unbal-



anced diet. Disrupting the balance creates a risk of lowering the levels of beneficial intestinal bacteria, and that the pathogenic bacteria would become dominant.

Interest in the role of probiotics for human health dates back to the beginning of the 20th century (1908), when the Nobel Prize winning Russian **scientist Elie Metchnikoff** linked the long, healthy life of Bulgarian peasants to their high intake of fermented milk products containing lactic acid producing microorganisms. **His hypothesis was that the lactic acid bacteria in the fermented milk could displace undesirable bacteria normally present in the intestine, resulting in a healthier life.** He stated that the responsible was the “*Bulgarian bacillus*” in the yogurt.

Nowadays, this “*Bulgarian bacillus*” is called *Lactobacillus bulgaricus*, and it is used in the production of the yogurt.

Although the interest in probiotics dates back to the beginning of the 20th century, it is only in recent years that a considerable progress has been made on identifying its potentially beneficial roles in the human health.

[While lactic acid bacteria and bifidobacteria have been scientifically important for over a century, it is only recently that few of them are marketed as probiotics. Probiotics benefits to the human health are broadly recognized today.]

The safety of probiotic organisms is an important criterion for the use of these strains into food products⁷. In the great majority of controlled studies with probiotics performed with children and adults, no adverse effects have been observed, not even in studies in which probiotics were administered to humans suffering from a severely compromised immune system^(3,6,8). In addition, probiotics were not found to have any toxic effects in animal tests⁽⁸⁾.

In recent years, there has been a plethora of published scientific studies examining the health attributes of probiotics, especially those related to gastrointestinal health and immune system modulation. While there is a growing list of health benefits provided by the consumption of probiotics, their precise mechanisms of action remain largely unknown.

The ability of lactic acid probiotics to confer health benefits to the intestine and to other sites via the gut has been studied. The FAO/WHO expert report states that “good clinical data, obtained in many cases from randomized, double-blind clinical trials shows that certain strains of probiotics can reduce the risk and duration of diarrhea,

lower the incidence of pouchitis and allergic dermatitis, decrease toxic effects of small bowel overgrowth, lower serum cholesterol, inhibit cancer-producing enzymes, reduce the risk of urogenital infection, and potentially stimulate the host’s immune response”⁽¹⁾.

The health benefits depend on the strain of the probiotics, for example:

- Some strains of probiotics have demonstrated the ability to inhibit the reproduction of many harmful bacteria^(10,11) Lactobacilli and Bifidobacteria by producing organic compounds -such as lactic acid, hydrogen peroxide, and acetic acid- that increase the acidity of the intestine. Probiotic bacteria also produce antimicrobial substances called bacteriocins, which act as natural inhibitor to kill undesirable microorganisms.

- Some strains of probiotics have demonstrate the ability to effectively participate in the digestive process by improving the digestibility of certain components found in our diet, by releasing various enzymes into the intestinal lumen and exerting potential synergistic effects on digestion and alleviating symptoms of intestinal malabsorption. For instance, beta-galactosidase (lactase), which is secreted by certain probiotics, aids in the hydrolysis of ingested lactose^(12,13).

Author: Redaction

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