



## REVIEW ARTICLE ON PROBIOTICS

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Article Received on 19/03/2018

Article Revised on 09/04/2018

Article Accepted on 29/04/2018

### ABSTRACT

Probiotics are defined as live microbial food ingredients that have a beneficial effect on human health. They can improve intestinal function and maintain the integrity of the lining of the intestines. Probiotics are naturally found in many fermented food products for example, sauerkraut, kefir (fermented milk) and kimchi (Korean side dish). The history of probiotics is derived from Latin (pro) and Greek (bios) meaning literally "for life". Lily and Stillwell explain in their article Science 1962 wherein they expanded the definition of probiotics to include "the anaerobic bacteria that are able to produce lactic acid and stimulate the growth of other organisms. It is useful for the health like increase secretory IgA production and it may seem new to the food and supplement industry, but they have been present in food from our first breath. In this review study about the probiotic and their history, health benefit of probiotics, product of probiotics and their mechanism of action etc.

**KEYWORDS:** sauerkraut, kefir (fermented milk) and kimchi (Korean side dish).

### INTRODUCTION

The term "good bacteria" that they are in yogurt. These "good bacteria" are called probiotics and are found in our digestive system. Probiotics can be found in certain foods that have them added to them (yogurt, milk and cheese), as well as some fermented foods. Two common strains (types) of probiotics that have been found beneficial are *Lactobacillus* and *Bifidobacterium*.

Probiotics are naturally found in many fermented food products contain various types of "good" bacteria. Some examples are sauerkraut, kefir (fermented milk) and kimchi (Korean side dish). Although these contain good bacteria they cannot be called "probiotics" as there is no guarantee in the amount of bacteria they provide.<sup>[1]</sup>



Fig. 1: Bacteria.

### History of probiotics

The term probiotic is derived from Latin (pro) and Greek (bios) meaning literally "for life". It was first used by

Kollath in 1953 to generically describe various organic and inorganic supplements that were believed to have the ability to restore the health of malnourished patients. In

1954, the German researcher Ferdinand Vergin proposed the term probiotika to describe “active substances that are essential for a healthy development of life”. Lily and Stillwell explain in their article Science 1962 wherein they expanded the definition of probiotics to include “the anaerobic bacteria that are able to produce lactic acid and stimulate the growth of other organisms. Parker in 1974 proposed that the term probiotic should include not only microbial organisms but also other substances that contributed to intestinal microbial balance. In 1907, a German chemist named Eduard Buchner received the Nobel Prize for proving that enzymes in yeast cells cause fermentation. Arthur Harden and Hans Euler-Chelpin received the Noble Prize in 1929 for elucidating how such enzymes cause fermentation. Probiotic therapy took a major step towards reality in 1930 when the Japanese microbiologist Minoru Shirota first discovered bacterial flora that survived passage through the gut after ingestion. Shirota was subsequently able to isolate and cultivate what is now known as *Lactobacillus casei* strain shirota. These efforts led to the first fermented bacteria-containing drink, which was commercially marketed as Yakult in 1935 — a product that continues to be manufactured and sold worldwide today.<sup>[2]</sup>

### Types of Probiotics

There are several types of probiotics with *Lactobacillus acidophilus* being the most well-known. They come from the *Lactobacillus*, *Bifidobacterium*, *Saccharomyces* and *Streptococcus* families with one or two less well known individuals from other families.

Certainly those first four families of bacteria are the ones that the majority of medical trials and studies have been done on. They are:

1. *Lactobacillus* species
2. *Bifidobacterium* species
3. *Saccharomyces* species
4. *Streptococcus* species

### Other bacterium are

- *L. acidophilus*, *B. bifidum*, *S. boulardii*, *S. thermophilus*, *Bacillus cereus*
- *L. reuteri*, *B. infantis*
- *S. salivarius* subsp
- *Thermophilus*, *Propionibacterium freudenreichii*
- *L. plantarum*, *B. lactis*
- *Enterococcus*
- *L. casei*, *B. longum*
- *Escherichia coli*
- *L. salivarius*, *B. breve*
- *L. bulgaricus*, *B. adolescentis*
- *L. fermentum*
- *L. gasseri*
- *L. johnsonii*
- *L. lactis*
- *L. paracasei*
- *L. rhamnosus*<sup>[3,4]</sup>

### Health benefits of probiotics

Probiotics may seem new to the food and supplement industry, but they have been present in from of our first breath. During a delivery through the birth canal, a newborn picks up the bacteria *Bacteroides*, *Bifidobacterium*, *Lactobacillus*, and *Escherichia coli* from his/her mother. These good bacteria are not transmitted when a Cesarean section is performed and have been shown to be the reason why some infants born by C-section have allergies, less than optimal immune systems, and lower levels of gut microflora.

They are believed to protect us in two ways. The first is the role that they play in our digestive tract. We know that our digestive tract needs a healthy balance between the good and bad bacteria, so what gets in the way of this? It looks like our lifestyle is both the problem and the solution. Poor food choices, emotional stress, lack of sleep, antibiotic overuse, other drugs, and environmental influences can all shift the balance in favor of the bad bacteria.<sup>[4]</sup>

### Probiotic mechanisms of action

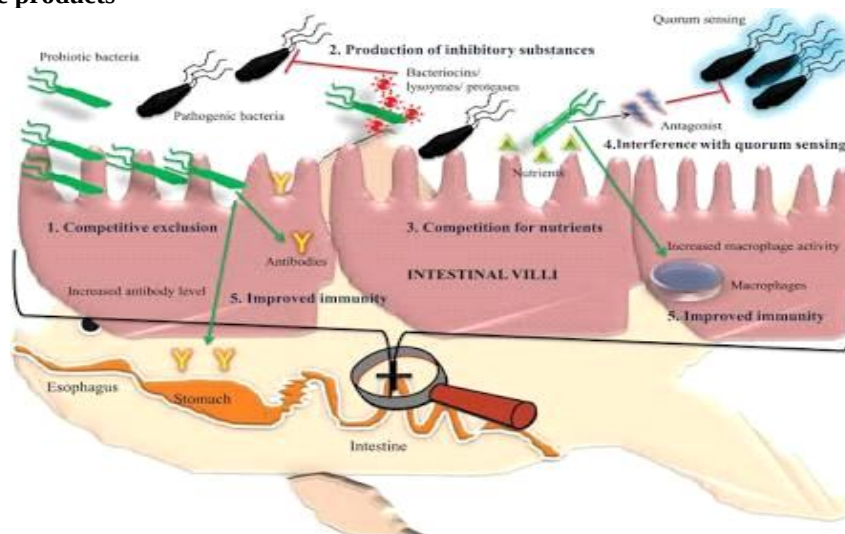
There are a number of mechanisms of action for probiotics that confer potential beneficial effects on the gut. By transiently colonizing the gastrointestinal tract, probiotics serve to correct dysbiosis that contributes to underlying disease. This may occur as the consequence of colonization resistance, a term that refers to the ability of certain bacteria to interact with gut epithelial cells to prevent adherence of enteric pathogens to binding sites on the epithelial surface. Colonizing probiotics may also exert a direct antimicrobial effect by secreting products such as bacteriocins that inhibit the growth and virulence of enteric pathogens. Certain probiotics have been demonstrated to increase the release of antibacterial peptides called defensins from Paneth cells (a type of epithelial cell present in the crypts of the small intestine). Lactic acid-producing probiotics (e.g., *Lactobacillus* spp. and *Bifidobacterium* spp.) may exert an antimicrobial effect on pathogens by reducing the local pH of the gut lumen. Some strains of probiotics have been discovered to interfere with quorum sensing, a mechanism by which bacteria enhance their virulence. Probiotics have also shown the ability to enhance the production of mucins from gut epithelial cells. Mucins serve as an antibacterial barrier that prevent binding of pathogens. Probiotics promote the production of secretory IgA in gut that binds to pathogens; they also exert an anti-inflammatory effect in the gut by preventing the activation of NFκB (a pro inflammatory transcription factor) and IL-8 (a neutrophil chemoattractant). Finally, it has been noted that some probiotics may activate opioid and cannabinoid receptors in gut that could prove useful in ameliorating visceral pain, which is a prominent feature in some patients with irritable bowel syndrome.

### Therapeutic used of probiotics in specific disease

1. Increase secretory IgA production.
2. Maintenance of gut barrier function.

3. Direct antimicrobial effect.
4. Colonization resistance
5. Anti-inflammatory effect.
6. Interference with quorum sensing.<sup>[6]</sup>

### Common probiotic products



| Products                                                        | Contents                                                                                                                                                                                 |
|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Culturelle (ConAgra Foods)                                      | LGG<br>10 Billion bacteria þ 200 mg insulin/capsule                                                                                                                                      |
| DanActive (Dannon, Canada)                                      | L. bulgaricus, S. thermophiles, L. casei<br>410 Billion L. casei/bottle                                                                                                                  |
| Florajen (American Lifetime, Inc., US)                          | L. acidophilus<br>20 Billion bacteria/capsule                                                                                                                                            |
| Florastor (Biocodex)                                            | S. boulardii<br>250 mg/capsule or packet                                                                                                                                                 |
| Howaru, Howaru Protect (Danisco)                                | L. acidophilus NCFM, B. lactis Bi-07<br>10 Billion bacteria/capsule or stick<br>5 Billion bacteria/tablet                                                                                |
| Jamieson Probiotic Sticks<br>(Jamieson Natural Sources, Canada) | L. helveticus and B. longum<br>1 Billion CFU/powder stick                                                                                                                                |
| Kefir (Lifeway)                                                 | L. rhamnosis, L. plantarum, L. casei,<br>L. acidophilus,<br>L. reuteri, Leuconostoc cremoris,<br>B. brevis, and B. lactis<br>7—10 Billion CFU/cup                                        |
| Lactinex (Benton, Dickinson & Co.)                              | L. acidophilus and L. bulgaricus<br>1 Million CFU/tablet, 100 million CFU/packet                                                                                                         |
| VSL#3 (Sigma-Tau Pharmaceuticals)                               | L. acidophilus, L. plantarum, L. paracasei,<br>L. bulgaricus, B. breve, B. infantis, B. longum,<br>and Strep thermophilus<br>450 Billion bacteria/packet<br>225 Billion per two capsules |
| Yakult (Yakult USA, Inc.)                                       | L. casei Shirota<br>8 Billion Actives bacteria per 80 ml<br>bottle.                                                                                                                      |

[5]

### Carriers for probiotics

Probiotics are normally added to foods as a part of the fermentation process. The emphasis for prolonged survival of probiotics in the food matrix has resulted in

the alteration in the functionality and efficacy of the food product. In order to exert health benefits, probiotic bacteria must remain viable in the food carriers and survive the harsh condition of GI tract, with a minimum

count of 106 CFU The nature of food carrier can affect the stability of the probiotic microorganisms during GI transit. Although dairy-based products are suggested to be the main carriers for the delivery of probiotics, other nondairy based products such as soy and fruits can be exploited as a potential carrier of probiotic microorganisms because of the increasing demand for new flavor and taste among consumers.<sup>[6]</sup>

## CONCLUSION

Probiotics are now being study in various gastrointestinal and non-gastrointestinal disorder. There is considerable interest in probiotic for a variety of medicine conditions, and millions of people around the world consume probiotic daily for perceived health benefits. Probiotic are the one of the fastest growing food segments in North America, so stay tuned to hear more great things these little bacteria power houses can do for our health.

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