

## **PROBIOTICS – A BIOTECHNOLOGY PRODUCT FOR HEALTH CARE**

### **INTRODUCTION**

Recent advancement in biotechnology has made the success in the development of certain food products that have the capacity to reduce the disease risk. In this context, probiotics are one of the product that contain live microorganisms which, when administered in adequate amount confer health benefits on the host.

### **HISTORY**

The term probiotics was first used by Werner Kollath in 1953 to describe food supplements applied to restore health to patients suffering from malnutrition. Later, this definition was greatly improved by Fuller (1989) as a live microbial feed supplement which beneficially affects the host animal by improving its intestinal microbial balance.

### **PROBIOTICS**

Probiotics are live microorganisms that are similar to beneficial microorganisms found in the human gut. They are also called “friendly bacteria” or “good bacteria.

The world health organization (WHO) defines probiotics as live microorganisms, which when administered in adequate amounts confers a health benefit on a host. The term probiotic comes from the Latin or Greek pro, “before, forward”, and bios, or “life” thus probiotics are life-promoting. In this case, we use the term probiotics to refer to beneficial bacteria. The most common types of these beneficial bacteria are Lactobacilli and Bifidobacteria but certain yeasts may also be used.

### **CHARACTERISTICS OF PROBIOTICS**

1. Probiotics should be able to create a beneficial effect on host animal by increasing resistance to diseases.
2. Probiotics needed to have excessive cell viability.
3. Probiotics should be non-pathogenic and non-toxic.
4. It should be able enough to interact or send signals to immune modulator activity.

***Madam Farhat Rashid***  
***Food Biotechnology***

5. It must have ability to positively influence local metabolic activity.
6. Probiotics must be stable, safe, effective and equipped for staying viable for periods under storage and field conditions.
7. It must have power of restore and replace the intestinal micro flora.
8. It should have anti-carcinogenic and anti-mutagenic activity, cholesterol lowering effects and can maintain mucosal integrity.
9. It should be able to speed up, facilitate and colonize/maintain the digestive tract.
10. They must have the ability to resist gastric juices and the exposure to bile acid which seems to be crucial for oral administration.
11. Antimicrobial activity against pathogenic bacteria.
12. Antibiotic resistance may help them to survive in the presence of administered drugs and other antimicrobial compounds.
13. Fast multiplication, with either permanent or temporary colonization of the gastrointestinal tract.
14. Stabilization of the intestinal micro flora and nonpathogenicity.
15. Survival on passing through gastrointestinal tract at low pH and in contact with bile.

### **IDENTIFICATION OF STRAINS OF PROBIOTICS**

Effects of probiotics are strain specific.

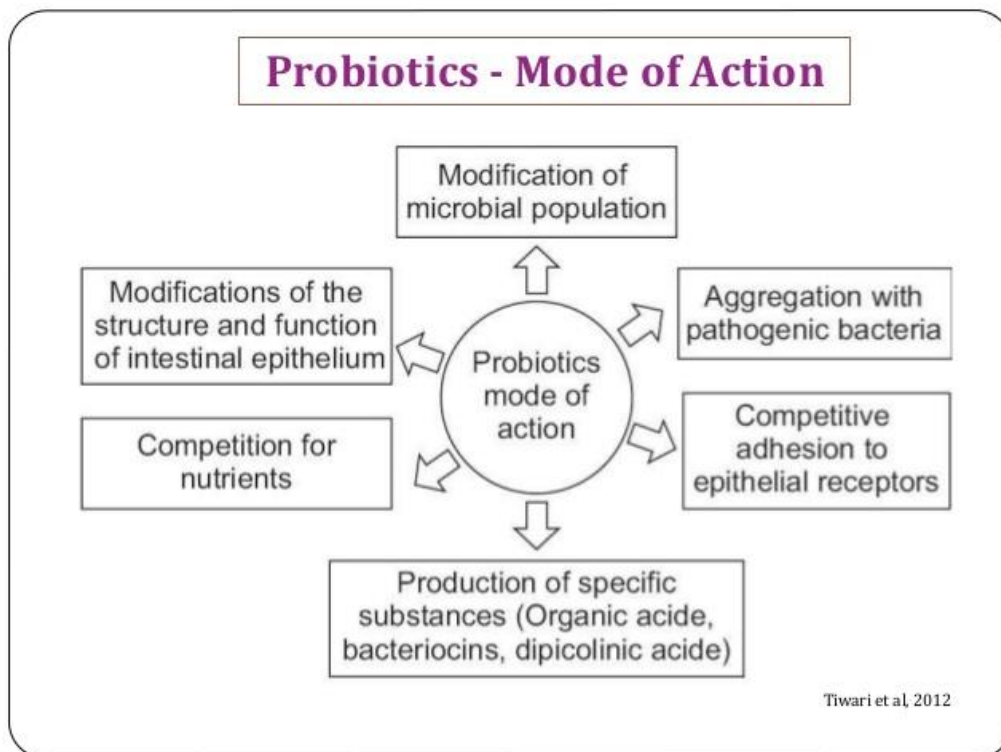
1. Assessment of strain identity (genus, species and strain level).
2. In vitro tests to screen potential probiotics: such as resistance to gastric acidity, bile acid, and digestive enzymes as well as antimicrobial activity against potentially pathogenic bacteria.
3. Both phenotypic and genotypic tests should be done using validated standard methodology.
4. Safety assessment requirements for proof that a probiotic strain is safe and without contamination in its delivery form.
5. In vivo studies for proof of the health effects in the target host.

### **ACTIONS OF PROBIOTICS**

1. The first one is a competition for nutrients and for ecological niche at this time the indigenous anaerobic flora limits the concentration of potentially pathogenic flora in the digestive tract. Restore the balance b/w 'Good' and 'bad' bacteria in gut by secrete bactericidal proteins and decrease the pH.

2. The second mechanism is involved in the production of anti-microorganism substances, bacteriocins, toxins, organic acids, short chain fatty acid production, lowering of gut pH. These substances are responsible for inhibit the growth of other harmful microbes such as food borne pathogens and spoilage organisms in GIT environment then lead to the death of the pathogen by creating antagonistic condition, and such action may result in the inactivation of toxins.

3. The third mechanism is the stimulation/modulation of specific and nonspecific immune response by T-cell activation, to cytokine production/throughout immunomodulation by inducing phagocytosis. This mode of action is most likely important in the prevention and therapy of infectious diseases.



## **FACTOR AFFECTING PROBIOTICS BACTERIA**

Intrinsic as well as extrinsic factors may influence the survival of probiotics in food.

Importance factor affecting viability of probiotics are:

1. Physical conditions (temperature and humidity).

2. Chemical condition (content of oxygen nitrogen or pH).

## **LIST OF PROBIOTICS CANDIDATE**

### **1. Lactobacillus**

There are more than 50 species of lactobacilli. Foods that are fermented, like yogurt, and dietary supplements also contain these bacteria. It helps in preventing yeast infections, urinary tract infection, diarrhea, treating lactose intolerance, skin disorders (eczema, acne) and prevention of respiratory infections.

### **2. Bifidobacteria**

There are approximately 30 species of bifidobacteria. They are found in the intestinal tract within days of birth, especially in breastfed infants. They help in the improvement of abdominal pain, bloating, bowel dysfunction, straining, and the passage of gas.

### **3. Saccharomyces**

It is effective in treating diarrhea associated with the use of antibiotics. It has also been reported to prevent the reoccurrence of diarrhea, to treat acne, and to reduce side effects of treatment for *Helicobacter pylori*.

### **4. Streptococcus**

This produces large quantities of the enzyme lactase which helps in the prevention of lactose intolerance.

### **5. Enterococcus**

This is normally found in the intestinal tract of humans. *Enterococcus faecium* is a specific probiotic strain that has been used in the management of diarrhoeal illnesses.

### **6. Leuconostoc**

Members of *Leuconostoc* spp. are very often used in production of fermented foods because of their ability to produce lactic acid bacteria and diacetyl.

Microorganisms	Genus	Species
Bacteria	<i>Lactobacillus</i>	<i>L.acidophilus, L.brevis, L.reuteri, L.casei, L.rhamnosum, L.bulgaricus, L.cellobiosus, L.delbrueckii, L.fermentum.</i>
	<i>Bifidobacterium</i>	<i>B.thermophilus, B.infantis, B.longum, B.bifidum, B.animalis.</i>
	<i>Streptococcus</i>	<i>S.lactis, S.thermophilus, S.cremonis, S.alivarius.</i>
	<i>Bacillus</i>	<i>B.Coagulans</i>
	<i>Pediococcus</i>	<i>P.acidilactici</i>
	<i>Leuconostoc</i>	<i>L.mesenteroides</i>
	<i>Enterobacter</i>	<i>E.faecium, E.faecalis.</i>
	Fungi	<i>Aspergillus</i>
Yeast	<i>Saccharomyces</i>	<i>S.bouardii, S.cerevisiae, S.carlsbergensis.</i>

## **SOURCES OF PROBIOTICS**

1. Yogurt that contains live bacteria culture
2. Cheese that is NOT baked
3. Fermented milk
4. Kefir
5. Soy beverages and unfermented milk
6. Pickle
7. Coconut Kefir
8. Raw Cheese
9. Traditional Buttermilk

## **PROBIOTICS IMPORTANT FOR HUMAN HEALTH**

Probiotics were identified to beneficially affect the host by improving its intestinal microbial balance, thus inhibiting pathogens and toxin producing bacteria.

Today, specific health effects are being investigated and documented including,

***Madam Farhat Rashid***  
***Food Biotechnology***

1. Interfere with the treatment and prevention of intestinal affection.
2. They contribute to the improvement of the immune system.
3. They reduce the risk of cholesterol level.
4. They interfere in the cancer prevention.
5. They have the favorable effect in liver illness.
6. They prevent alimentary allergy.
7. They deliver vitamins for the organisms, they synthesis thiamine, riboflavin, pyridoxine.
8. Prevention and treatment of pathogen-induced diarrhea.
9. Control blood pressure, inflammatory bowel disease and dental caries.
10. Lactose intolerance

**DISADVANTAGES OF PROBIOTICS**

1. Taking them in larger amounts might produce digestive issues, such as gas and bloating, but they are usually temporary.
2. Discomfort in the gastrointestinal tract.
3. Cause Allergic reaction.