Prebiotics & Probiotics

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Introduction

- Your large intestine contains 100 trillion "good" bacteria that are essential to health.
- Called the microbiome, these beneficial microbes help maintain healthy bowel function, and may even help with conditions like inflammatory bowel disease.
- Research suggests they may even play a role in regulating weight and mood.
- Everyone starts with their own unique microbiome at birth.
- We add to these through the foods we eat.

- **Prebiotics** are non-digestible fibres that act as food for microorganisms, promoting their growth and activity.
- **Probiotics** on the other hand, are living microorganisms that, when consumed in adequate amounts, can provide health benefits.
- In simpler terms, prebiotics are the food source for our gut bacteria, while probiotics are the live bacteria that offer health benefits when consumed.
- Think of your gut as a garden: probiotics are the seeds you plant, while prebiotics are the fertilizer that helps them grow.

Prebiotics

- The concept of prebiotic was introduced by Gibson & Roberfroid, in 1995
- Prebiotics are an alternative for probiotics or their cofactors
- "Non-digestible food ingredients that beneficially affect the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon that can improve host health."

Prebiotics: how do they work?

- Prebiotics are non-digestible food components, such as certain dietary fibres.
- Once they arrive in the intestine, they become food for beneficial microorganisms in the gut and are broken down into chemicals that stimulate their growth and activity.
- By eating a variety of prebiotic foods, we can feed the beneficial microorganisms in our gut, helping to create a healthier and more diverse microbiota.
- This can lead to better intestinal health and metabolism and also help prevent harmful bacteria ("pathogens") from growing in our gut.
- Some functions of prebiotics include supporting nutrient metabolism and regulation of our immune system, and influencing our disease risk.
- Prebiotics boost the production of health-promoting substances like short-chain fatty acids (SCFAs), that have been linked to reduced risk of **colorectal cancer**.
- Evidence suggests that prebiotics also help with **constipation** by promoting more regular, frequent and well-formed bowel movements.

Role of prebiotic

Prebiotic factor	Origin	Microbes stimulated	Effects
Oligosaccharides	Onion,garlic, chicory root, burdock, asparagus, Jerusalem artichoke, soybean, wheat bran.	*Bifidobacterium* species	Increase in bifidobacterium, suppression of putrefactive bacteria, prevention of constipation and diarrhea.
Fructooligosaccharides (inulin, oligofructo)	Same as for oligosaccharides	*Bifidobacterium* species *Lactobacillus acidophilus, Lactobacillus casei, Lactobacillus plantarum*	Growth of bifidobacteria and acid promotion.
Fructan	Ash-free white powder from tubers of Jerusalem artichoke.	*Bifidobacterium* species	Growth of bifidobacteria
Human kappa casein and derived glycolmacropeptide	Human milk: chymotrypsin and pepsin hydrolysate.	*Bifidobacterium bifidum*	Growth promotion.
Stachyose and raffinose	Soybean extract	*Bifidobacterium* species	Growth factor.
Casein macropeptide	Bovine milk	*Bifidobacterium* species	Growth promotion.
Lactitol(4-O-β-D-galactopyranosyl)D-glucitol	Synthetic sugar alcohol of lactose	*Bifidobacterium* species	Growth promotion.
Lactutose(4-O-β-D-galactopyranosyl)D-fructose	Synthetic derivative of lactose	*Bifidobacterium* species	Growth promotion.

History

- The concept of probiotics was first introduced in the 20th century by Noble prize winner, Elie Metchnikoff(1845-1916).
- He suggested that long and healthy life of Bulgarian peasants resulted from their consumption of fermented milk products.
- He himself introduced in his diet sour milk fermented with bacteria he called "Bulgarian Bacillus, later called as *Lactobacillus delbrueckii subsp.*" and found his health benefited.
- He proposed that consumption of fermenting food products positively influenced the microflora of the colon, decreasing toxic microbial activity, decrease intestinal pH, suppress the growth of proteolytic bacteria,etc.

"PROBIOTICS"

- The root of the word ' probiotic' comes from the Greek word ***pro***, meaning *"promoting"* and ***biotic***, meaning *"life"*.
- The Food and Agriculture Organisation of the United Nation (FAO) defines probiotics as" live micro-organisms, which, when administered in adequate amount produce beneficial effect to the host when taken orally".

Probiotics: what do they do and how do they work?

- Probiotics are microorganisms that can benefit our health in many different ways.
- There are seven commonly used types of probiotic microorganisms: *Lactobacillus, Bifidobacterium, Saccharomyces, Streptococcus, Enterococcus, Escherichia, and Bacillus*.
- Each of these also consists of dozens of strains which can positively affect the gut microbiota, boost the immune system or have other health benefits.
- To be considered a probiotic, a food or product should contain a specific minimum amount of microorganisms, the so-called colony-forming units (CFU), for its claimed health benefit.
- For example, consuming yoghurt with at least 10^8 CFU of living *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus thermophilus* bacteria, commonly used microorganisms as yoghurt starter cultures, has been found to improve digestion of lactose in people with lactose maldigestion.

LIST OF PROBIOTIC CANDIDATE:-

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

Properties of probiotics

- It should be safe to the host.
- It should not produce any pathogenic or toxic effect.
- It must be resistance to hydrochloric acid, bile and pancreatic juice.
- It should have anti-carcinogenic activity.
- It should produce lactic acid.
- It should retain viability during storage and use.
- It should stimulate the immune system of the body.
- It should have the ability to colonize the gastrointestinal tract.

Probiotic foods

- Food manufacturers may also call probiotics “live culture” or “active cultures.” Many fermented products contain probiotics, which means the bacteria in them are still living.
- Examples of dairy products that contain probiotics include:
- aged cheeses, such as cheddar, gouda, or mozzarella
- kefir, a probiotic milk drink
- traditional buttermilk (must not be cultured)
- yogurt
- Not all foods must be dairy to contain probiotics. Examples of other probiotic foods include:
- non-dairy yogurts
- fresh, sour dill pickles
- kimchi
- kombucha, a fermented tea
- miso
- natto, a food made from fermented soybeans
- sauerkraut
- tempeh, a popular meat substitute
- water or brine-cured olives