

ESU 009– Prebiotics and their role

Lecture 25



Prebiotic

- 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."

Properties:-

- Limited hydrolysis and absorption in the upper GIT(gastro-intestinal tract).
- Selective growth stimulation of beneficial bacteria in the colon.
- Immuno stimulation.
- Stimulation of beneficial flora that promotes colonization resistance.

SOURCES OF PREBIOTICS:-

Prebiotics factor	Origin
Oligosaccharides	Onion, garlic, chicory root, asparagus, soybean, wheat bran.
Fructo-oligosaccharides (oligofructose, inulin)	Same as for oligosaccharides.
Fructans	Ash free white powder from the tubers of jerusalem artichoke.
Human kappa casein and derived glycomacropeptide	Human milk: chymotrypsin and pepsin hydrolysate.
Stachyose and raffinose	Soybean extract.
Lactitol (4-O- β -D- galactopyranosyl)/ D- glucitol	Synthetic sugar alcohol of lactose.
Lactulose (4-O- β -D- galacyopyranosyl) / D-fructose	Synthetic derivative of lactose.

Top 10 food containing prebiotics

Food	Prebiotic fiber content by weight
Raw Chicory root	64.6 %
Raw Jerusalem artichoke	31.5 %
Raw Dandelion greens	24.3 %
Raw Garlic	17.5 %
Raw Leek	11.7 %
Raw Onion	8.6 %
Cooked Onion	5 %
Raw Asparagus	5 %
Raw Wheat bran	5 %
Raw Banana	1 %

- 😊 Oligosaccharide is the main constituent of prebiotic food products.
- 😊 Oligosaccharides stimulate the growth of beneficial bacteria and increase the resistance to invading pathogens.
- 😊 **The functional oligosaccharides include;**
 - ❖ **Fructooligosaccharides (FOS).**
 - ❖ Glucooligosaccharides (GOS)
 - ❖ **Inulin**
 - ❖ Isomaltooligosaccharides (IMO)
 - ❖ **Soybeanmeal oligosaccharides (SMO)**
 - ❖ Mannan oligosaccharides (MOS)
 - ❖ **Galactooligosaccharides**
 - ❖ Maltooligosaccharides (MO)
 - ❖ **Xylooligosaccharides (XOS)**
 - ❖ Pectin-derived acidic oligosaccharides (pAOS).

FRUCTO-OLIGOSACCHARIDE

- Fructooligosaccharides is a group of oligosaccharides, or a group of connected simple sugars.**
- Sources include onions and chicory root also garlic.**
- It helps in the stimulate production of beneficial bacteria, minimal effect on blood sugar, also help strengthen the immune system.**

INULIN

- **Inulin is a dietary fibre that is found in many common foods such as leeks, kiwi, asparagus, onions, garlic, bananas, wheat, dairy products etc.**
- **There are several benefits of inulin apart from weight-management, it even increases calcium absorption, improved bone health. It can also be used to replace sugar and fat as a food additive to improve taste.**

SOYBEAN-OLIGOSACCHARIDE

- They found in soy milk, soy oil, bean curd, ice cream.
- Promote the growth of Bifidobacteria in the intestinal tract, lowering cholesterol.

XYLO-OLIGOSACCHARIDE

- They are naturally present in fruits, vegetables, bamboo, milk and honey.
- It help to improve blood sugar levels and fat absorption, re-establish normal colonic flora, it also increase mineral absorption and vitamin B creation.

GALACTO-OLIGOSACCHARIDE

- **Galacto-oligosaccharides, otherwise called(GOS), are found naturally in breast milk but are added to foods such as infant formula, fruit drinks, dairy products, breakfast cereals and biscuit crackers.**
- **Increased the good bacteria boosts the immune system.**
- **promote intestinal health by keeping unfriendly bacteria such as E.coli, vaginal, urinary infections at bay.**

How do they work?

- Increase a number of bifidobacterium and lactic acid bacteria.
- Effect on the metabolism of lipids.
- Suppression of putrefactive bacteria.
- Growth of bifidobacteria.
- It helps to lower colon cancer risk.

Role of prebiotic

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

USES OF PREBIOTIC

- **Enhance bone density and increase Calcium absorption.**
- **Improve immune function in both the gut and body.**
- **Establish a healthier balance of bacteria in the gut.**
- **Promote regular bowel movements.**
- **Suppress appetite.**
- **Reduces the risk of an intestinal infection.**
- **Increase in mineral absorption and improvement of bone health.**
- **Modulation of gastro-intestinal peptides production, energy metabolism and satiety.**
- **Initiation (after birth) and regulation/modulation of immune functions.**

Health Benefits Prebiotic

- **Immune System Strength:** Prebiotic fiber promotes the growth and colonization of beneficial bacteria in the gut. These bacteria aid the immune system in fighting illness-causing bacteria and viruses.
- **Normal Bowel Function:** Irritable bowel syndrome, which is characterized by bloating, gas, stomach pain, cramping, bouts of constipation and diarrhea, is caused by food being digested improperly. prebiotic fiber causes foods to be digested normally, over a normal period of time, not too quickly or too slowly.
- **Cancer Prevention:** Bifidobacteria digests inulin in the gut flora and produces short chain fatty-acids: acetic acid, propionic acid, and butyric acid. Within the intestine, it is believed that these acids can help prevent certain forms of cancer.
- **Colon cancer:** The insoluble fiber from prebiotics, some experts believe, are actually doing a part in preventing colon cancer by sweeping up carcinogens and other dangerous toxins before they can be absorbed into the bloodstream where they can do damage.

Thank you

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