Lecture 92:

Probiotics and Prebiotics

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Definitions:

- **Probiotics** are live micro-organisms that confer health benefits on the host when administered in adequate amounts.

- **Prebiotics** are selectively fermented ingredients that probiotics need to grow and thrive.

- **Synbiotics** are the foods or nutritional supplements that have both probiotics and prebiotics.

Synbiotics:

- **Synbiotics contain live bacteria and the fuels they need to thrive.**

Fermented dairy products are considered synbiotic:

- **Yogurt.**
- **Kefir.**

Prebiotics:

- They are the fueling nutrients for probiotics that allow change in the composition and activity of the normal flora of the GI tract.

They include:

- Fructo-oligosaccharides (FOSs).
- Short chain fatty acids.
- Non-digestible fiber (Inulin).

Foods High in Prebiotics Are:

- Chicory root.
- Jerusalem artichoke.
- Jicama (Mexican turnip).
- Dandelion greens.
- Garlic.
- Onions.
- Leek.
- Asparagus.
- Wheat bran.
- Banana.

Garlic, onion, and leek are high in the phytonutrients alliin, allicin, and ajoene. *Image: Copyright©Depositphotos.com/Joachim Opelka*

- **Short chain fatty acids are produced in the colon during fermentation of dietary fiber.**

They include:

- **Butyric acid.**
- **Acetic acid.**
- **Propionic acid.**
- **Valeric acid.**

Butyric acid (Butyrate) is highly important for colon health, because:

- **It acts as a prebiotic for normal flora.**
- **It is the primary source of energy for the cells of the colon.**
- **It has an anti-inflammatory activity.**
- **It shows anti-cancer property by**

- **inducing apoptosis.**
- **blocking angiogenesis.**
- **inhibiting tumor cell growth.**

Probiotics:

- **The human body contain microorganisms that reside in the skin, saliva, and gastrointestinal tract. They are called "human microbiota", and are mostly bacteria and fungi.**

Normal flora of the gut are microorganisms that normally live in the digestive tract:

- **They help digestion.**
- **They help making vitamins, esp B and K.**
- **They have roles in immune function.**
- **They make enzymes that are not produced by GI system.**

- **There are normally over 500 different species of bacteria in the GI tract, both good and bad ones, with 30 – 40 species making about 99% of all!**

- **The number of bacteria in the GI tract is about 9 times more than total cells in human body.**

- **The type and number of normal flora and the balance between good bacteria and bad bacteria are highly important in determining health and diseases.**

Dysbiosis:

- **It is the state of altered normal flora in the GI system.**
- **It is an imbalance between friendly bacteria and pathogens.**
- **This term is used for the first by the Russian scientist Elie Metchnikoff.**

Causes of Dysbiosis:

- **Antibiotics.**
- **Poor digestion and absorption.**
- **Intestinal infections.**
- **Suppressed immune function.**
- **Altered pH.**
- **Stress.**
- **Alcohol.**
- **Dietary factors:**

- **Lowe fiber intake.**
- **Diets high in sugar, fat and protein.**
- **Food allergies.**

Out of those bacteria in the GI system, the three important ones are:

- **Lactobacillus acidophilus (the most famous one).**
- **Bifidobacterium bifidum (more common to the babys` colon).**
- **Streptococcus faecium .**

Indications and Benefits of Probiotics:

- **Promotion of colon health, strong immune system and healthy upper digestive tract.**

- **Prevention and treatment of:**

- **Diarrhea (infectious).**
- **Tooth decay.**
- **Vaginitis.**
- **Vaginal yeast infection.**
- **Urinary tract infection.**
- **Antibiotic-induced diarrhea.**

- **Colic.**
- **Cancer.**
- **Canker sores.**
- **Eczema.**
- **Food allergies.**
- **Inflammatory bowel disease.**
- **Irritable bowel syndrome (IBS).**
- **Lactose intolerance.**
- **Indigestion.**
- **HIV support.**
- **Parasite infections.**

- **Chronic kidney disease.**
- **Non – alcoholic fatty liver.**
- **Obesity.**
- **Diabetes.**
- **Depression.**
- **Anxiety.**
- **Respiratory disorders.**
- **High LDL cholesterol.**

Types of Probiotics:

- **The two famous probiotics are Lactobacillus and Bifidobacterium, and each of them has many strains.**
- **Each strain has actually a unique purpose.**

How Much to Take:

- **Probiotics must be taken in adequate numbers.**
- **Minimum dose is 2 billion CFUs (colony forming units) per day.**
- **Depending on the conditions for which is used, the dose could be from 5 billion to as high as 50 billion.**

- **Probiotics can be destroyed by stomach acid, decreasing the numbers to be reached to the intestine .**

- **To overcome this issue, patented technologies are used that protect probiotics from stomach acid on their way to the intestinal tract.**

Homework:

- **1) Describe the dysbiosis and its causes.**

- **2) Describe the indications that may benefit from probiotics.**