

Nutritional and Therapeutic Significance of Fermented Milk Products

Fermented Milk Products

- Improve digestibility
- Enhance nutritional profile
- Influence organoleptic properties
- Reduce gastric complications in lactose intolerants

Enzymes

- Improves lipid profile
- Prevents cardiovascular diseases and cancer
- Influences central nervous system
- Regulates mood and appetite

GABA, CLA

Organic Acids

- Improve shelf life of fermented food
- Prevent pathogen
- Regulate pH in gut

- Regulate mineral absorption
- Boost up metabolism
- Improve hypotensive action
- Immunomodulation

Vitamins

- Strain specific metabolites
- Enhance folate production
 - Increase riboflavin content

Bile Salt Hydrolase

- Regulate triglyceride profile
- Exert hypocholesterolemic effect

Bioactive Peptides



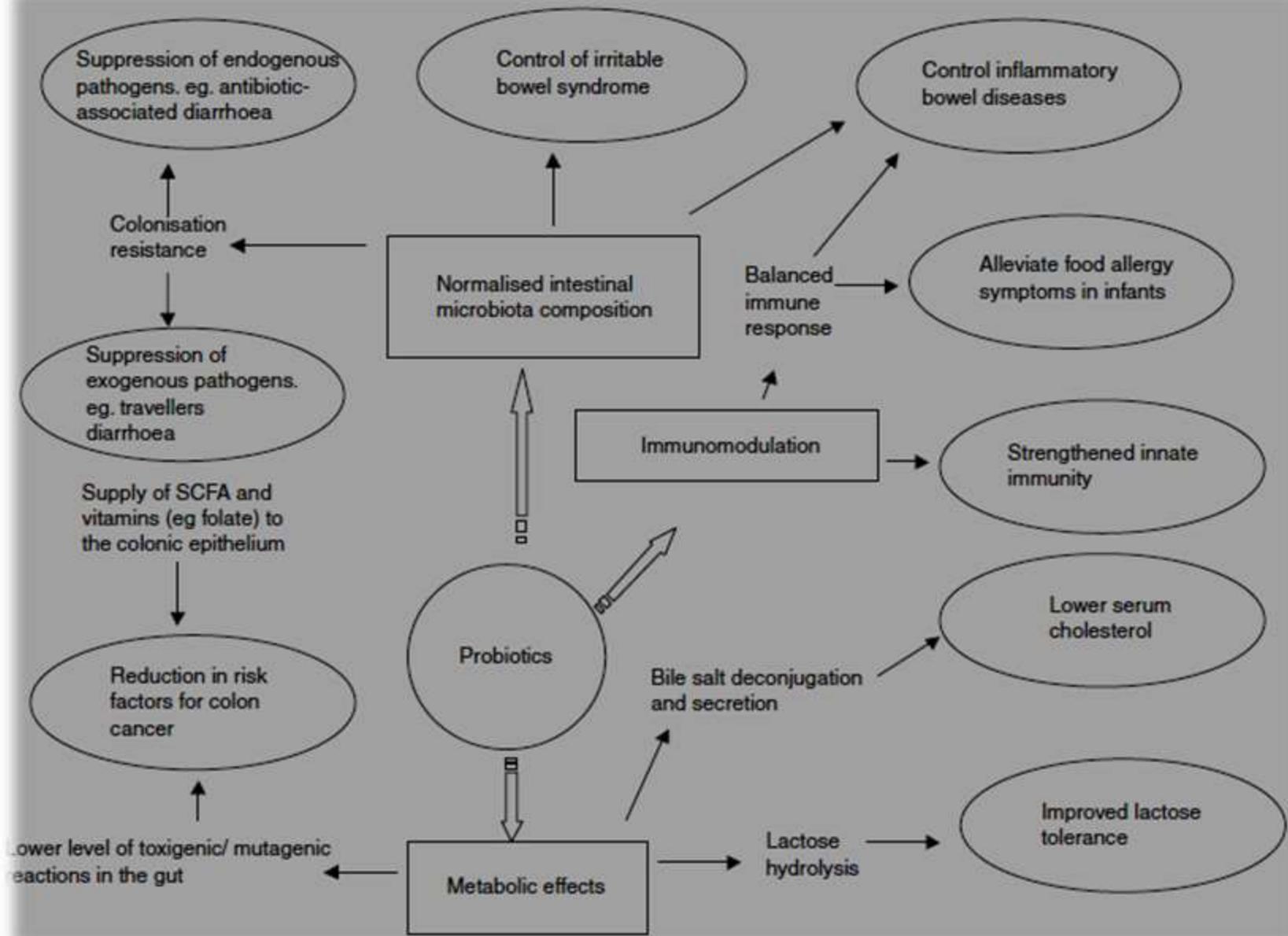
- **Fermented milk in human nutrition have long been an important component of nutritional diet.**
- **Medicinal and nutritional properties of various fermented foods have been experienced by several generations.**
- **In 1910, Elie Metchnikoff suggested that man should consume milk fermented with lactobacilli to prolong his life.**



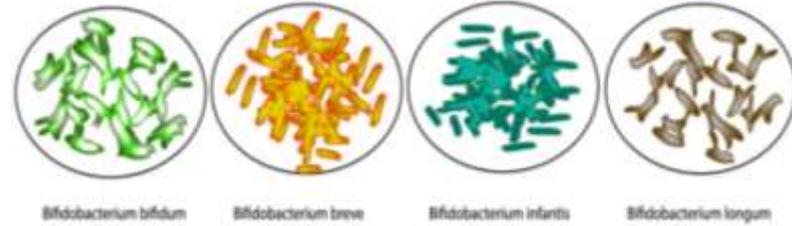
Élie Metchnikoff's Contribution

- ▶ Russian scientist and Nobel laureate Élie Metchnikoff in the beginning of 20th century suggested to replace harmful microbes with useful microbes.
- ▶ Metchnikoff proposed that consumption of fermented milk would "seed" the intestine with harmless lactic-acid bacteria and decrease the intestinal pH thus, suppressing growth of proteolytic bacteria.
- ▶ This inspired Japanese scientist Minoru Shirota to begin investigating the relationship between bacteria and good intestinal health thus, launching of "Yakult" in 1935.

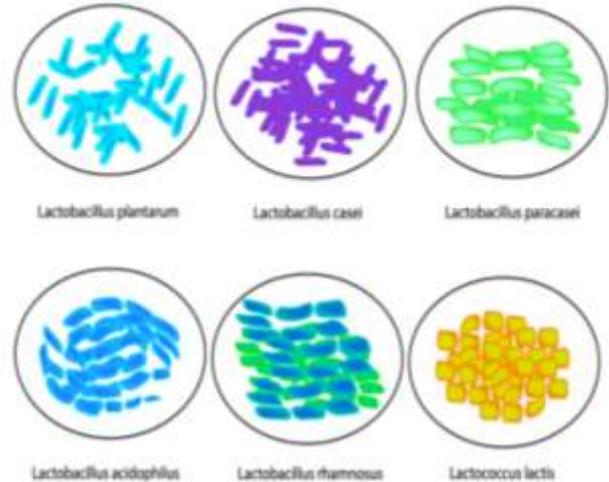




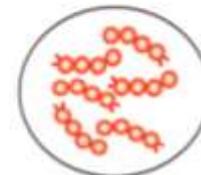
TYPES OF BIFIDOBACTERIA



TYPES OF LACTOBACILLUS



STREPTOCOCCUS



Streptococcus thermophilus

Nutritional Benefits

- ▶ Nutrient synthesis and bioavailability
- ▶ Alleviation of Lactose Intolerance
- ▶ Protection against Gastrointestinal Infection
- ▶ Anticarcinogenic Effect
- ▶ Immune System Stimulation
- ▶ Lowering of Serum Cholesterol
- ▶ Alleviation of Constipation
- ▶ Antihypertensive Activity
- ▶ Antiallergenic Qualities

Nutrient synthesis and bioavailability

- ▶ **The action of micro-organisms during the preparation of cultured foods or in the digestive tract has been shown to improve the quantity, availability and digestibility of some dietary nutrients.**
 - ▶ **Fermentation of food with LAB increases folic acid in yoghurt, bifidus milk and kefir**
 - ▶ **Similarly, niacin and riboflavin levels in yoghurt are increased with fermentation.**
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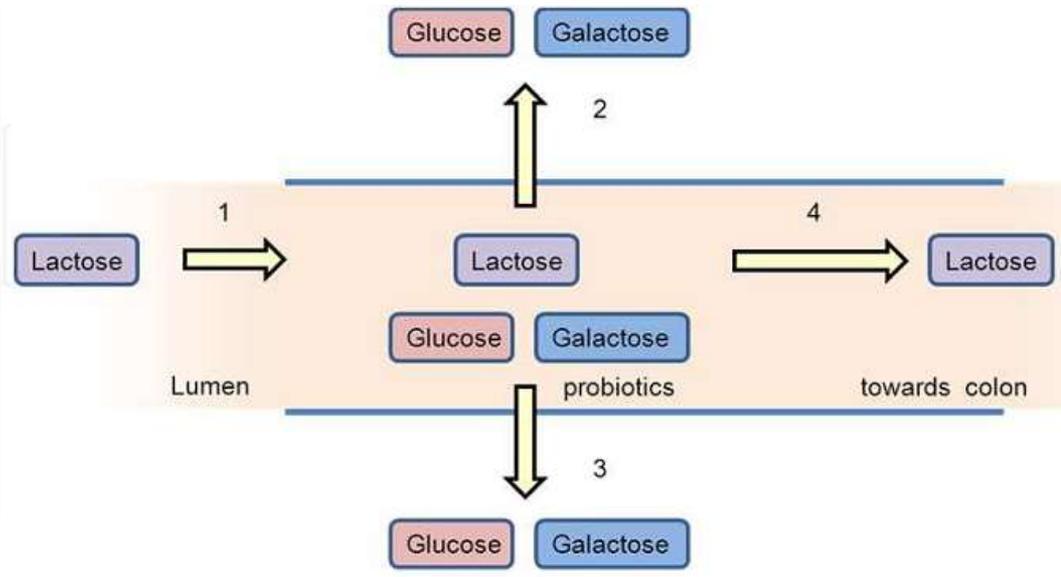
▶ **Bacterial enzymatic hydrolysis may enhance the bioavailability of protein and fat and increase the production of:**

- **free amino acids**
- **short chain fatty acids (SCFA)**
- **lactic acid**
- **propionic acid**
- **butyric acid**

SCFA maintain an appropriate pH in colonic lumen, which is critical in expression of many bacterial enzymes and carcinogen metabolism in the gut.

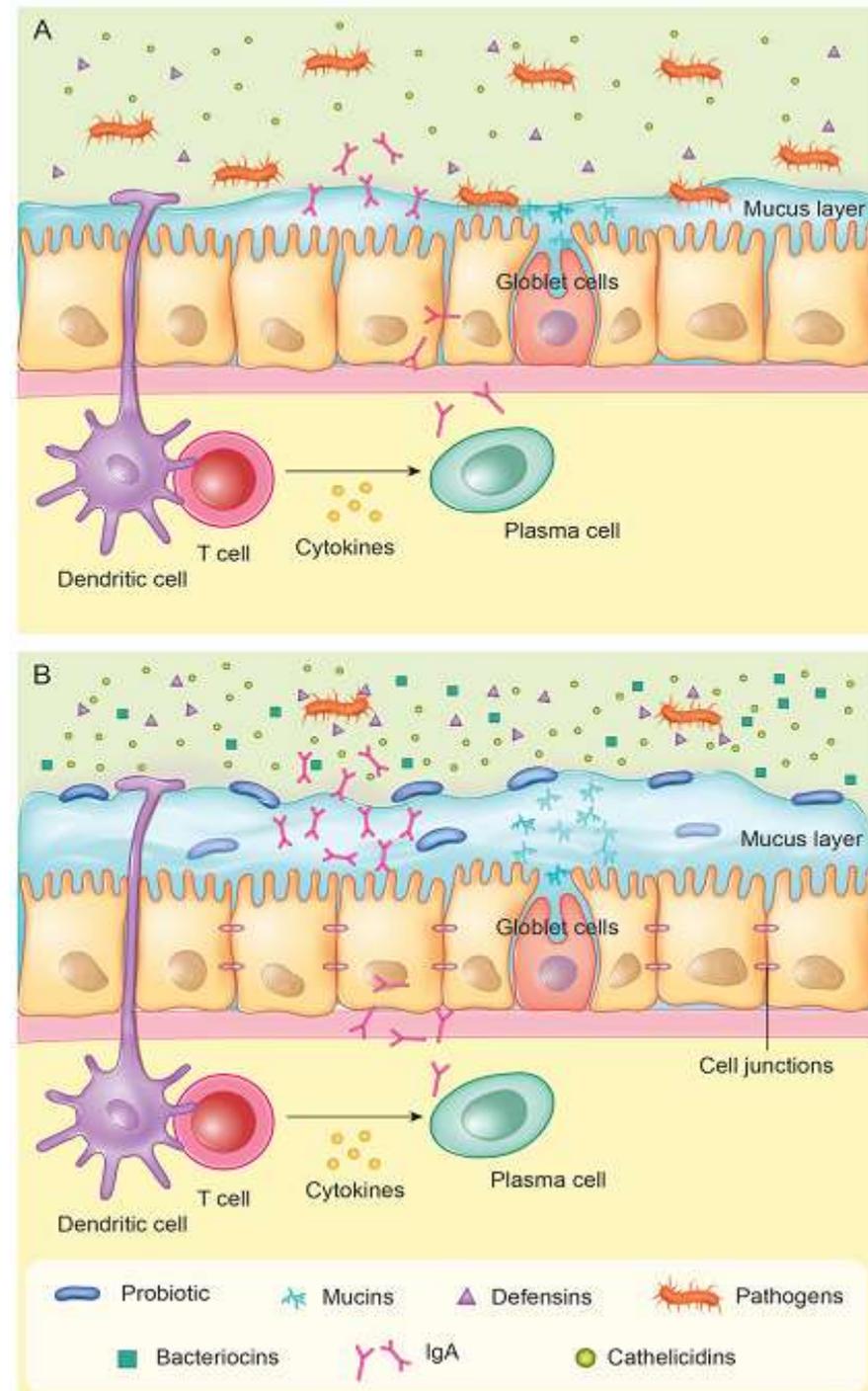
Alleviation of Lactose Intolerance

- ▶ Inability of adults to digest lactose (milk sugar) is prevalent worldwide.
- ▶ Consumption of lactose by those lacking adequate levels of lactase produced in the small intestine can result in symptoms of diarrhea, bloating, abdominal pain and flatulence.
- ▶ Lactose intolerant individuals consume fermented dairy products such as yoghurt.



Protection against Gastrointestinal Infection

- ▶ LAB interfere with the colonization of food borne pathogens thus, preventing manifestation of infection. eg., *L. bulgaricus*, *L. acidophilus*, *S. thermophilus* and *B. bifidum*
- ▶ Cultured milk products suppress growth of pathogens either directly or through production of antibacterial substances and regulate intestinal population.

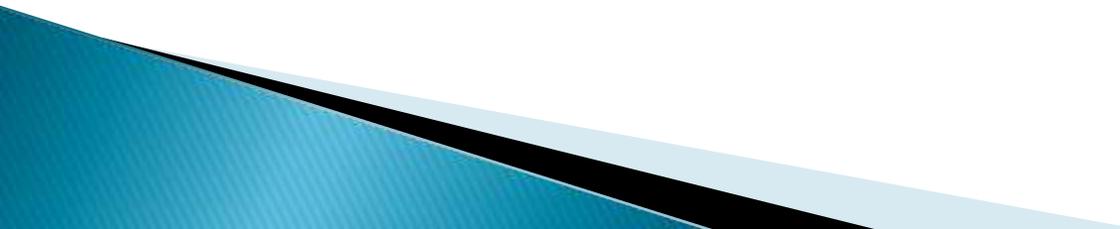


Preventative and therapeutic effects against diarrhoea

- ▶ *Lactobacillus* GG, *Lactobacillus reuteri*, *S. boulardii* etc. have significant benefits for diarrhoea in young children caused by rotaviruses.
- ▶ LAB release various enzymes into the intestinal lumen that exert synergistic effects on digestion, alleviating symptoms of intestinal malabsorption.



Anticarcinogenic Effect

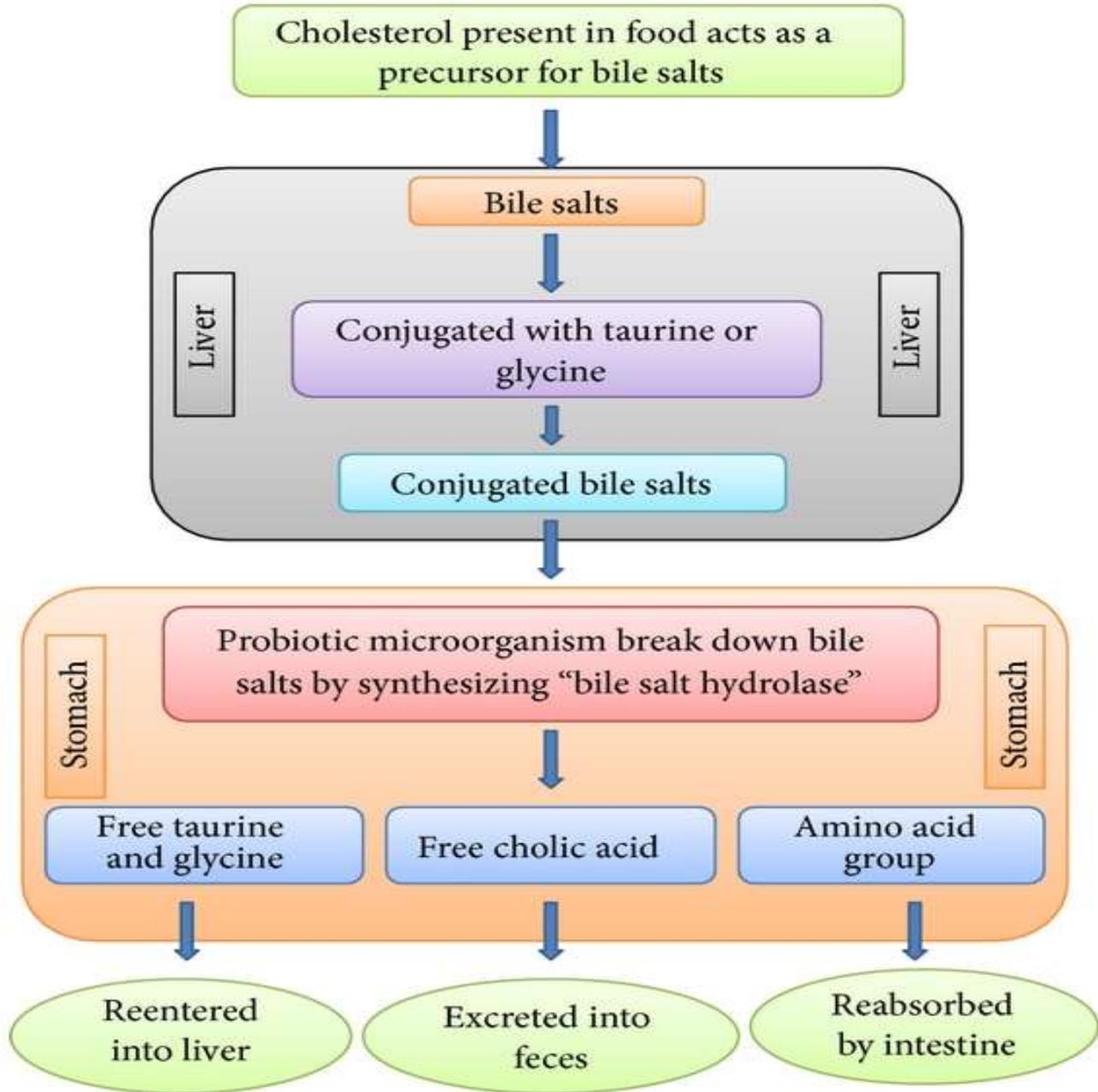
- ▶ Fermented milk products can help in control of secondary infections.
 - ▶ Probiotic cultures might decrease the exposure to chemical carcinogens by:
 - (i) detoxifying ingested carcinogens.
 - (ii) altering the environment of the intestine thus, decreasing metabolic activities of bacteria that may generate carcinogenic compounds.
 - (iii) producing compounds that inhibit the growth of tumour cells.
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Immune System Stimulation

- ▶ Immune system provides primary defense against microbial pathogens in body.
 - ▶ Animal and human studies indicated an effect of yoghurt on enhancing levels of certain immunoreactive cells.
 - ▶ Whey protein, calcium, certain vitamins and trace elements are also capable of influencing immune system.
 - ▶ Consumption of yoghurt or LAB results in intestinal antibody production, increase macrophage activity etc.
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Lowering of Serum Cholesterol

- ▶ Fermented milk products have hypocholesterolaemic effect that impairs the synthesis of cholesterol.
 - ▶ Deconjugated bile salts are less soluble and less efficiently reabsorbed from intestinal lumen than their conjugated counterparts, which results in excretion of larger amounts of free bile acids in faeces.
 - ▶ Deconjugation of bile acids by LAB bacteria could lead towards a reduction in serum cholesterol.
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Alleviation of Constipation

- ▶ Constipation is common problem in subjects consuming the western diet and in elderly people.
- ▶ Reported benefits include alleviation of constipation using *L. acidophilus* NCDO 1748, *L. casei* Shirota and *Lactobacillus* GG.



LcS HELPS
Improve Digestion
Build Immunity

Love your Intestine with Yakult's exclusive probiotic - *Lactobacillus casei* strain Shirota (LcS)

PROBIOTIC FOOD

Yakult
LOW FAT PROBIOTIC
Probiotic Fermented Milk Drink

PROBIOTIC FOOD

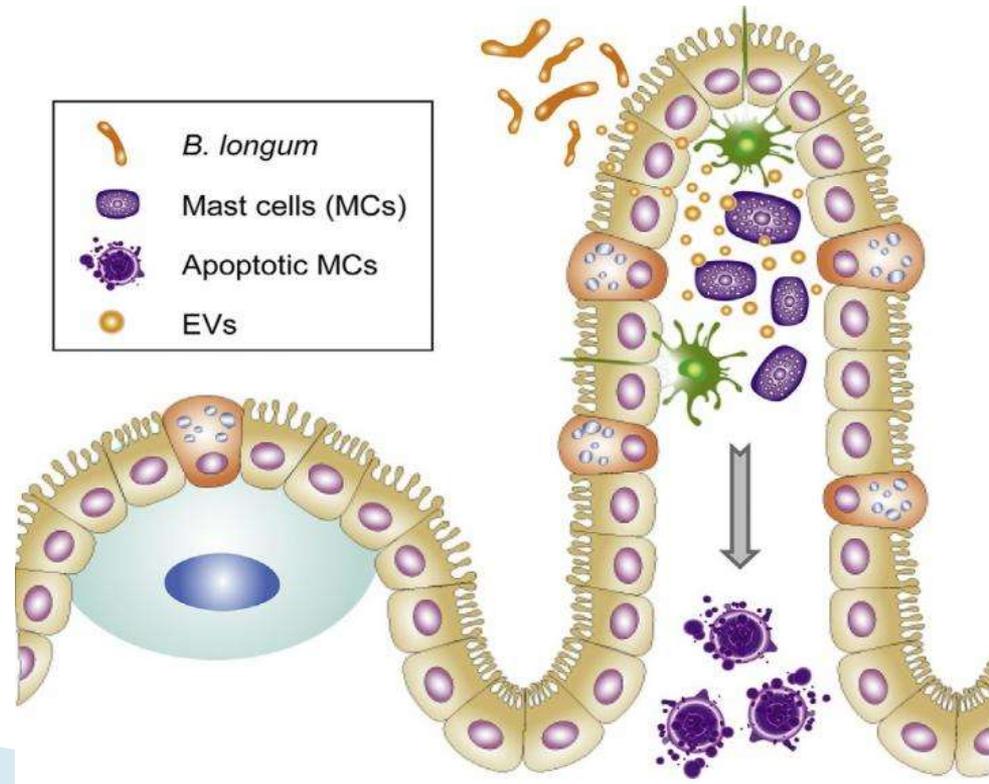
Yakult
Light
Probiotic Fermented Milk Drink

Antihypertensive Activity

- ▶ Casein hydrolysate, produced by an extracellular proteinase from *L. helveticus* (CP790) has been reported to show antihypertensive activity in rats.
- ▶ Two antihypertensive peptides have also been purified from sour milk fermented with *L. helveticus* and *Saccharomyces cerevisiae*. These two peptides inhibit angiotensin-converting enzyme that converts angiotensinogen I to angiotensinogen II, which is a potent vasoconstrictor.
- ▶ Consumption of certain lactobacilli, or products may reduce blood pressure in mildly hypertensive people.

Antiallergenic Qualities

- ▶ Probiotics may prevent allergic reactions in individuals having food allergies.
- ▶ Probiotic bacteria help to reinforce the barrier function of the intestinal wall, thereby possibly preventing the absorption of some antigens.



Other possible benefits

- ▶ **Control of urinary tract infections**
 - ▶ **Degradation of toxins**
 - ▶ **Low fat fermented dairy products lower risk of diabetes.**
 - ▶ **Local application for control of infection**
 - ▶ **Alleviation of depression**
 - ▶ **Food fermentations improve the balance of essential amino acids or their availability will have a direct curative effect on protein-calories deficiency nutritional diseases.**
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