

# Nutritional and Therapeutic Significance of Fermented Milk Products

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

## Enzymes



## GABA, CLA

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

## 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

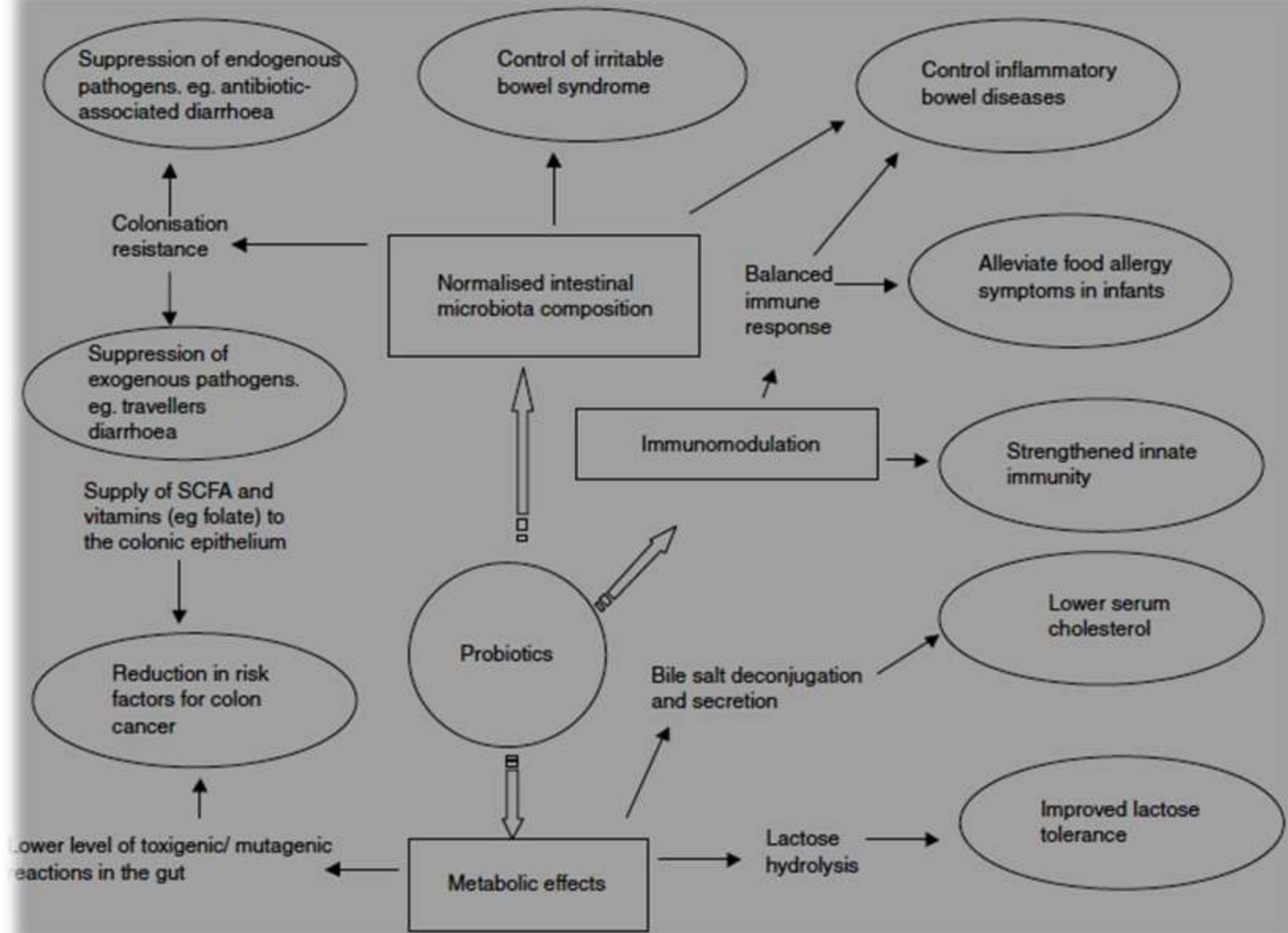
- **Fermented milk in human nutrition have long been an important component of nutritional diet.**
- **Medicinal and nutritional properties of various fermented foods have been experienced by several generations.**
- **In 1910, Elie Metchnikoff suggested that man should consume milk fermented with lactobacilli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



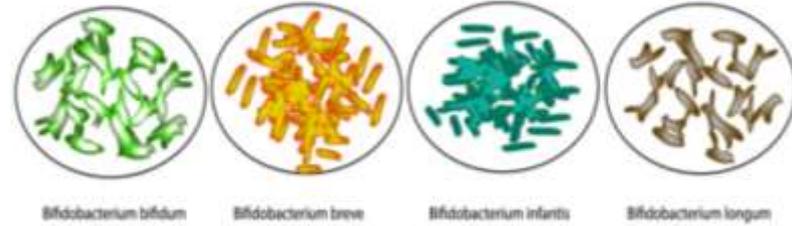
# Élie Metchnikoff's Contribution

- ▶ 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.

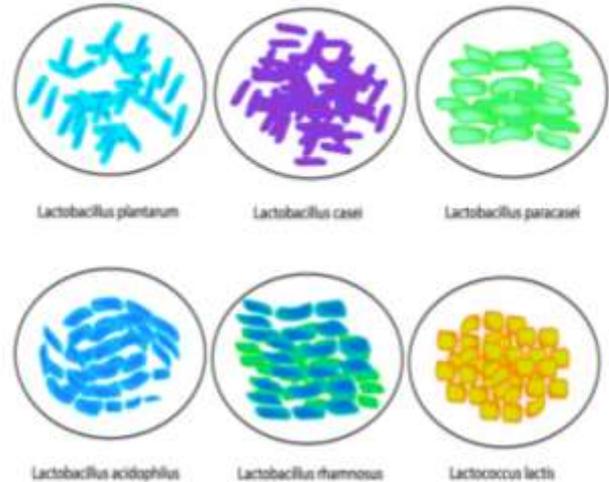




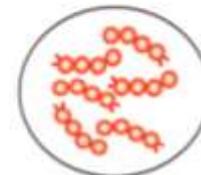
## TYPES OF BIFIDOBACTERIA



## 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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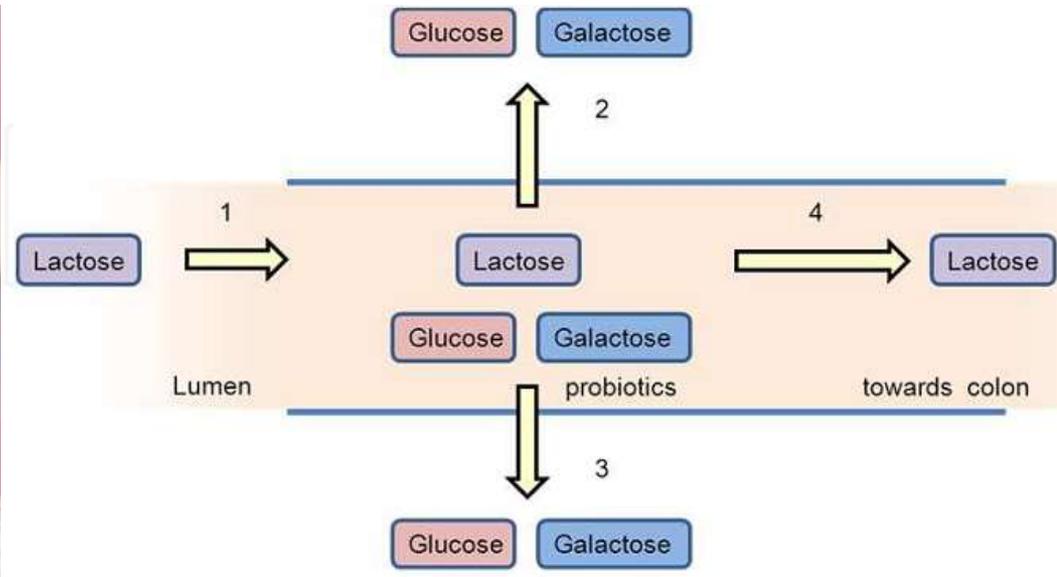
▶ **Bacterial enzymatic hydrolysis may enhance the bioavailability of protein and fat and increase the production of:**

- **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.**

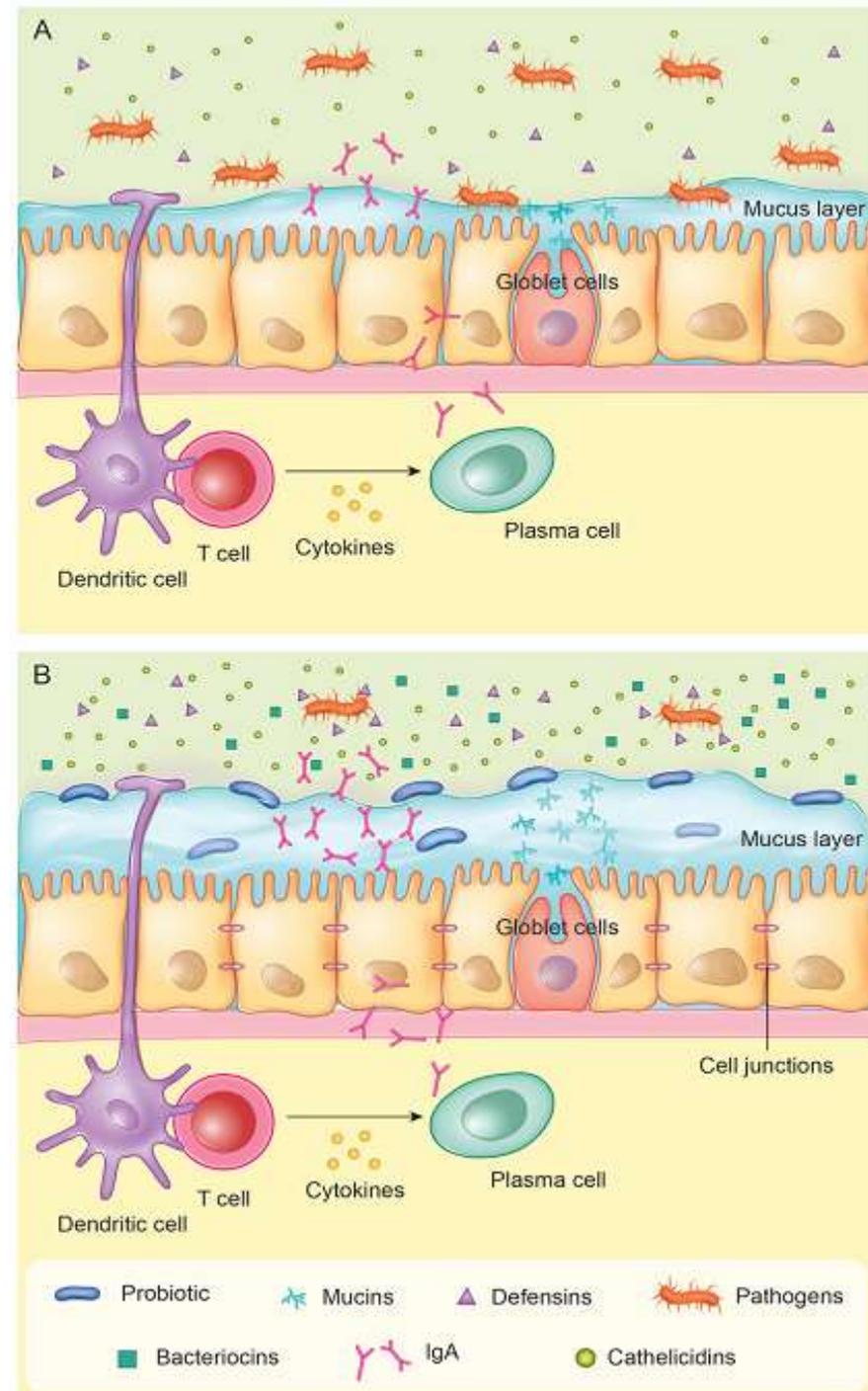
# Alleviation of Lactose Intolerance

- ▶ 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.



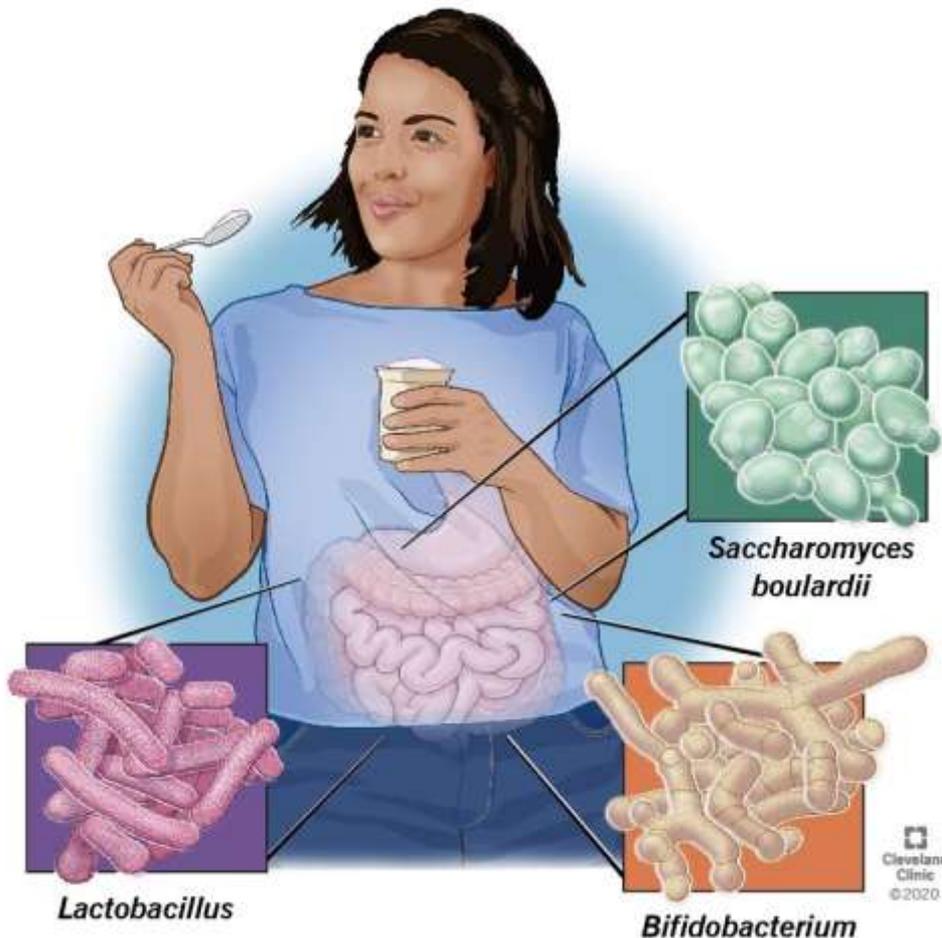
# Protection against Gastrointestinal Infection

- ▶ 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

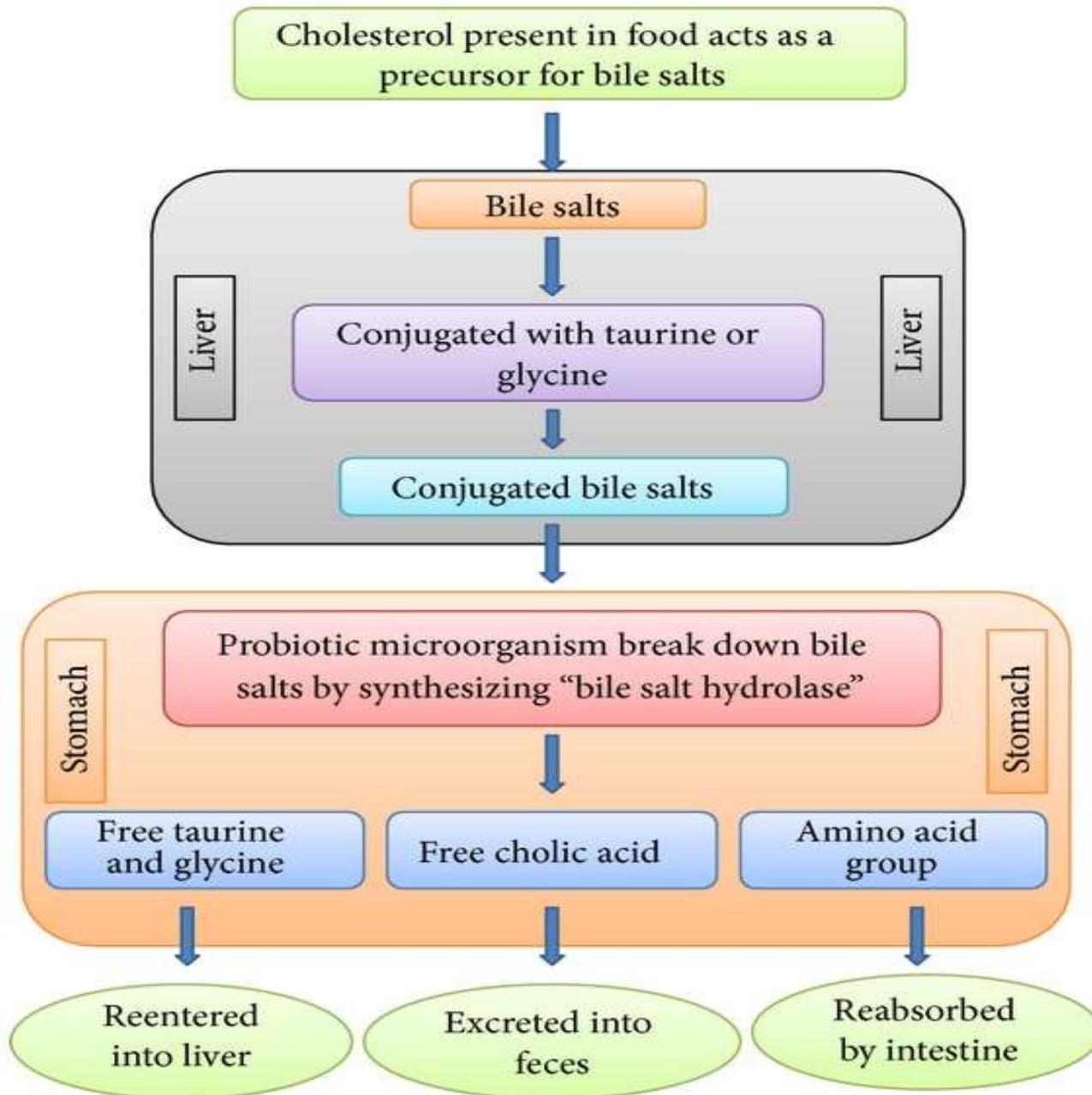
- ▶ Fermented milk products can help in control of secondary infections.
  - ▶ Probiotic cultures might decrease the exposure to chemical carcinogens by:
    - (i) detoxifying ingested carcinogens.
    - (ii) altering the environment of the intestine thus, decreasing metabolic activities of bacteria 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

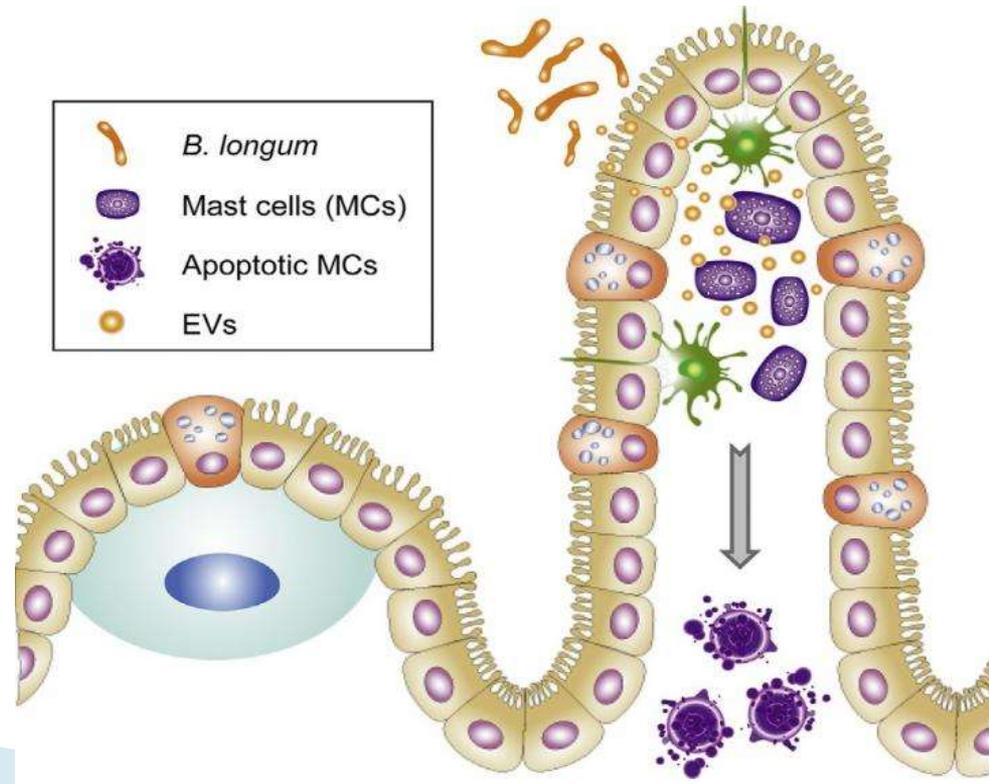
PROBIOTIC FOOD  
**Yakult**  
Light  
Probiotic Fermented Milk Drink

# 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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