

Review Article

Investigating the Role of Probiotics in Coping with Cancer and Health in Society

Hasan Albookarami*

ABSTRACT

Probiotics are alive microorganisms which have useful effects on health of host by balancing its intestinal micro flora. Nowadays probiotics are known as a factor for prevention from infectious disease and cancer. Anticancer properties of probiotics exert with the toxicity of materials that cause genetic damages. The aim of this study is systematic review on studies in checking positive effects of probiotics on health and their relationship with cancer. Related articles were searched in English at Springer, Science Direct, Google Scholar, clinical trials and systematic review literatures that have assessed effects of probiotics at prevention and treatment of cancer, enrolled in this study. There was a wide variation among studies in imaging parameters, type of used probiotics, host type and test conditions. The results imply that probiotic bacteria and yeasts can eliminate toxicity of carcinogens and induce cancer cell death in vitro. Also consumption of probiotics causes reduced cancer risk, stimulation of immune system and struggle to carcinogens. Despite acceptable evidence about their anti cancer properties, studies in humans are still limited. Therefore, there is a need to plan for detailed clinical studies in human in such a way obtained information can be used to treat.

Keywords: Probiotics, Cancer, Immune System, Treatment

Probiotics are living and non-pathogenic microorganisms found in some foods that, when fed in sufficient amounts, have a positive effect on the health of the host. The history of probiotic products dates back to 100 years ago. This product was first used by a Russian scientist, Raizada, in the early 20th century, it was believed that it was possible to support the intestinal microbial flora by prescribing useful germs against harmful microbes, and that the

Bulgarian peasants, using local yogurt, produced. They have a longer life span (1). Most probiotics belong to Group B Gellings are the main bacteria of the human intestinal microbial flora. And in this case, the living environment is harmless. The most common probiotic microorganisms are divided into three groups with yeasts, fungi and larvae. Some of these microorganisms are selective strains with *Lactobacillus* and *Bifidobacterium* cetera, although

Author Information

*Nutrition Sciences Sciences With
A Focus On Food Microbiology, Abadan
School Of Medical Sciences, Abadan, Iran.*

*Submitted: 25-10-2017
Accepted : 27-11-2017
Published : 29-12-2017*

References

1. Morseli P. The role of probiotics in health. *AJA University of Medical Sciences*. 2008; 3(2): 21-7.(Persian).

strains of Enterococcus, Streptococcus vehshia coli It is also used for this purpose; the yeasts of sarumaria sarosisia, saccharomyces bularia and candida intinyase can be identified. They are most commonly detected with ketchup lactobacillus and bifidobacterium, and with the exception of the petococcus and antrococco esophagus, others with ketchup of lactic acid production in Diets for humans and animals are pathogenic and their use has long been proven to produce food products without causing adverse effects (2). They will have shown probiotics play an important role in controlling cancer by affecting the digestive enzymes of animals and humans, inhibition of carcinogenic agents in the body and in laboratory conditions, suppression of lotions, and cancer-inducing compounds and tomorrows in laboratory animals (1,3,4). Features uses of probiotics were i n c l u d e :

Ability to maintain genetic stability.

Have the ability to move the immune system without causing inflammation.

Have anticancer effects.

Ability to deal with pathogens.

The ability to maintain the health of mucus and

improve the vital access of food components.

Have the ability to reduce serum cholesterol.

Have the ability to increase bowel movement.

The purpose of the present study was to review the systematic approach to previous studies in evaluating the positive effects of probiotics on health and their relationship with cancer. At first, a history and general definition of the perspiration was presented, and then the causes of probiotics selection were considered as a factor in health. Subsequent stages of probiotic geneotonic properties and relationships between ketones and probiotic tumors with cancer were investigated (5).

History:

The history of these probiotic products dates back 100 years ago. It was recommended by Roman historian to use fermented milk products for gastric ulcer (Gastrpenteritis) before the age of 76 BC (6).

In the 1930s, the Japanese physician Minoru shirota suggested that the proper microbial balance in the intestine could prevent the disease, and the lack of balance of the intestinal flora caused various diseases, including diarrhea (due to the use of antibiotics, travel, intestinal infections Intravenous inflammation, constipation, irritable bowel

References

2. Tukmechi A, Morshedi A, Delirezh N. Changes inIntestinal Microflora and Humoral ImmuneResponse Following Probiotic Administration in Rainbow Trout (Oncorhynchus mykiss). Journalof Animal and Veterinary Advances. 2007; 6(10):1183-9.
3. Stanton C, Gardiner G, Meehan H, Collins K, Fitzgerald G, Lynch PB, et al. Market potential forprobiotics. Am J Clin Nutr. 2001; 73(2 Suppl):476S-83S.
4. Bottazzi V. Food and feed production with microorganisms. Biotechnology. 1983; 5: 315-63.
5. Kopp-Hoolihan L. Prophylactic and therapeuticuses of probiotics: a review. J Am Diet Assoc. 2001; 101(2): 229-38. 2011;39(6):1075-91.
6. Mattila-Sandholm T, Myllärinen P, Crittenden R, Mogensen G, Fondén R, Saarela M. Technologicalchallenges for future probiotic foods. International Dairy Journal. 2002; 12(2-3): 173-82.

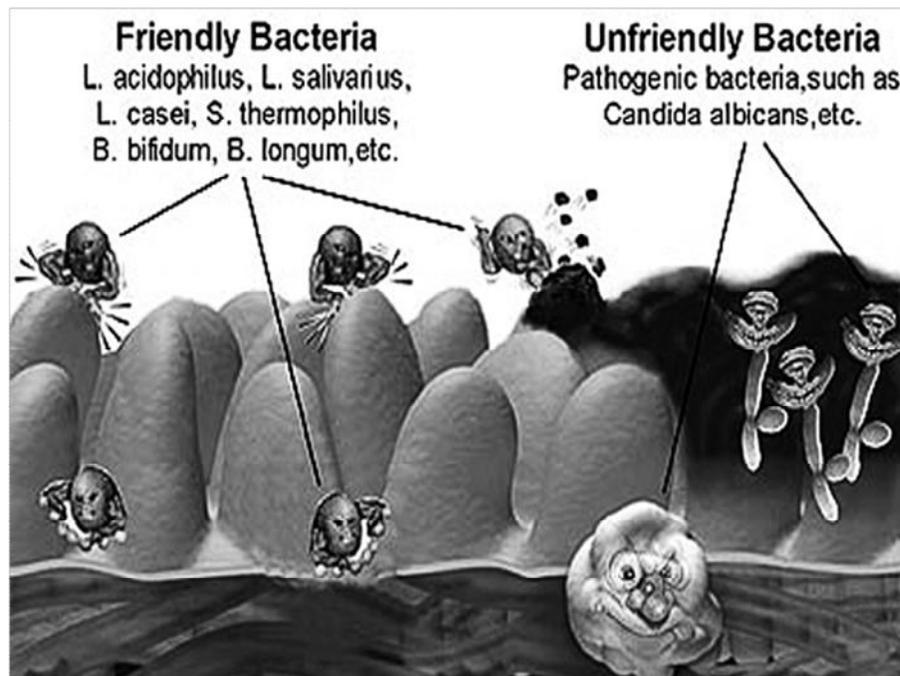
syndrome, Crohn's disease, colon inflammation, food allergy, and many other cancers (7). Adding a kettle to a meal has a long history and it is back to the beginning of the last century that Metchnikoff at the Pasteur Institute has made important research in this regard.

In the 1980s, active supermarket foods were introduced in Japan. These foods were called FOSHU's foods for specified health use. In 1989, Fuller called probiotics "food supplements." The consumption of probiotic foods in Europe, Asia, and the United States has gradually increased, and today these foods are being offered in most supermarkets around the world. Metchnikoff

realized that having a long life span in Bulgarian villagers was caused by the high consumption of fermented milk. Other scientists during the 1920s and 30s used microorganisms in the human digestive system, which were the natural flora of the digestive tract, most of the animals (1).

What is probiotic?

Probiotics include living microbial supplements that produce inhibitory and inhibitory compounds, competing with pathogenic agents for chemicals and binding sites, stimulating and regulating the immune system and improving the microbial balance of the intestine, have beneficial effects on the host. Definition of probiotics has always been



References

7. Lilly DM, Stillwell RH. Probiotics: growthpromotingfactors produced by microorganisms. *Science*. 1965; 147 (3659): 747-8.

over time in It has already been modified and completed. Initially, they have defined them as a kind of microbial substance that stimulates the growth of microorganisms. Today, probiotics are used not only as growth promoters, but also for stimulating the immune system and preventing the spread of many infectious diseases. Also, according to Fuller, probiotics should have beneficial effects on the host body and be present in the host gastrointestinal tract. Live and live for a long time (5).

How do propyoles apply their effects?

The physiological effects associated with probiotics include intestinal pH reduction, the production of certain digestive enzymes and vitamins, the production of anti-kettering agents, such as organic acids, with cetriosin, hydrogen peroxide, di-acetyl, acetaldehyde, lactoperoxidase, lactones, intestinal microbial flora regeneration After therapeutic antibiotic therapy, reduction of blood cholesterol, immune stimulation, inhibition of chest infections, carcinogenesis, calcium absorption and decreased fecal enzymes activity (8).

Causes of Probiotics Selection as a Health Factor:

The selection of probiotic species is mainly based on the historical history of their use for a long time without any harmful side effects. Other criteria for the use of suitable bacterial species are: 1. Resistance to staying in the production stages. Living and staying in the gastrointestinal tract, which means stomach resistance and bile ducts. 3-Ability to connect to the epithelial cells of the intestine. 4-Ability to cope with pathogens through the production of anti-kettle combinations Their competitive elimination or the reduction of pH inside the colon. Probiotics, especially with ketchairs with different mechanisms, can have beneficial effects in their host, such as balancing the intestinal flora and preventing connective tissue from infectious ketones The mucosal wall of the intestine, suppresses inflammation, and reduces the incidence of cancer, all of which are based on the factor regulating the immune system by them (9, 10).

Extensive research on perbiotics and their effects on humans has been carried out in humans and more often in laboratory animals, including aquatic plants, including the effects of probiotics, and in particular LaCoBacillos, on improving growth indices and improving system performance. Safety and resistance against diseases in rainbow trout. Tukema and colleagues conclude that in addition to probiotic kettles,

References

8. Ehsani A, Mahmudi R, Tokmechi A, Pajohi MR. Iranian white cheese as a food carrier for probiotic bacteria. *Journal of Food Science and Technology*. 2011; 8(3): 77-83.
 9. Tukmechi A, Rahmati Andani HR, Manaffar R, Sheikhzadeh N. Dietary administration of betamercaptobetamercapto-ethanol treated *Saccharomyces cerevisiae* enhanced the growth, innate immune response and disease resistance of the rainbow trout, *Oncorhynchus mykiss*. *Fish Shellfish Immunol*. 2011; 30(3): 923-8.
 10. Fuccio L, Guido A, Eusebi LH, Laterza L, Grilli D, Cennamo V, et al. Effects of probiotics for the prevention and treatment of radiation-induced diarrhea. *J Clin Gastroenterol*. 2009; 43(6): 506-13.
- (FIRE-3): a randomised, open-label, phase 3 trial. *Lancet Oncol*. 2016; 17(10): 1426-34.

probiotic yeasts also have the same effects in aquatic animals.

Research on other laboratory animals, including rats, showed that the use of probiotic lactobacilli plus rafiloz increased the activity of liver enzymes in normal conditions.

Studies have shown that the antitumor effect of probiotics on enzymes from the intestines of humans and animals, inhibition of toxicity from carcinogens in the in vitro conditions, as well as laboratory conditions by them, results in the suppression of cancer-inducing damage and tumors *in vitro*. To make Studies in laboratory animals suggest the treatment of diarrhea with probiotics, but the results for humans are not completely stable and there is a need for controlled drug studies. The use of probiotic therapy has some limitations; however, probiotic treatment is more prevalent in Diseases of children and patients with immunocompromised conditions have been reported (11).

Probiotics and diarrhea treatment:

Probiotics are effective in treating and preventing certain types of diarrhea. Antibiotics are caused by antimicrobial insufficiency caused by antimicrobial flora. Studies have shown that 20% of patients after taking antibiotics have a balance The bacteria lose their colon. Antibiotics also increase growth with pathogenic kettles, especially Klebsiella oxytoca, clostridium difficile. Probiotics, while

maintaining microbial balance, stick to the intestinal wall and grow and connect with kettles Prevents the bowel wall (10) . Probiotics, by producing some antimicrobial agents, such as hydrogen peroxide and yosin cholesterol, prevent the host cell's protective barrier and prevent the release of contaminants such as toxins by kettles. Probiotics are used to treat diarrhea of passengers with infectious origin, especially Diarrhea with rotavirus origin is also effective in children (12) . Probiotics such as Lactobacillus rhamnosus and Lictibula sylluses reduce the risk of diarrhea in children. Inflammation of the mucous membrane of the intestine or gastroenteritis is one of the main causes of acute diarrhea, which usually lasts for a few days. Viruses, kettles and donkeys can cause gastroenteritis . In children, rotavirus is the cause of this disease. Although oral administration of oral valctolit is the most commonly used treatment, this treatment does not reduce the duration of the disease, evidence suggests that consumption of probiotics has reduced the duration of diarrhea Although probiotics have been effective in the treatment of children with viral gastroenteritis, they are not effective in the treatment of diarrhea caused by enteropathogens. It should be noted that the sooner the treatment with probiotics starts, the result will be better and when the patient finds need for intravenous treatment, probiotic use will not be very beneficial (11).

References

11. Koebnick C, Wagner I, Leitzmann P, Stern U, ZunftHJ. Probiotic beverage containing Lactobacilluscasei Shirota improves gastrointestinal symptoms inpatients with chronic constipation. *Can J Gastroenterol*. 2003; 17(11): 655-9.
12. Abrahamse SL, Pool-Zobel BL, Rechkemmer G.Potential of short chain fatty acids to modulate theinduction of DNA damage and changes in theintracellular calcium concentration by oxidativestress in isolated rat distal colon cells. *Carcinogenesis*. 1999; 20(4): 629-34.

Probiotics and Cancer:

Since uncontrolled cell proliferation and its resilience to planned death are a major feature of cancer cells, the factor that causes apoptosis in cancer cells can be recognized as cancerous substance. However, in Recent decades of resistance to chemotherapy is a big problem. It has been said that at least one-second of all cancers is due to the compounds in the diet. The combination of these nutrients and their association with the health of individuals has attracted the attention of many scientists that probiotics are among these substances and, as it was said, are non-biologically active microorganisms present in the digestive system of humans and have beneficial effects on the host. It is said that certain probiotics have anticancer activity (13).

Probiotics play an effective role in preventing the disease by reducing the concentration of enzymes and bile ducts and reducing the absorption of harmful mutagens that contribute to colon cancer (14).

Consumption of probiotics leads to the production of a wide range of fermentative products such as

high concentrations of short-chain fatty acids. In addition, probiotics in the mouse colon have been observed to induce a glutathione transferase II protective enzyme. It also increases the production Factors that disable toxic compounds. For example, butyrate is one of these protective factors that reduces the risk of cancer (15). The best laboratory evidence for anticancer activity of probiotics is from laboratory studies, and in-vivo studies have suggested the prevention of chemical induction of colon tumors in rodent models (16). In recent decades, human studies have been conducted to prove the anticancer properties of probiotics, as shown in Table 1 in several examples.

Boosting immunity system:

Proiotics stimulate the immune system by increasing the secretion of immunoglobulin A and tyolidecytokines, as well as stimulating and enhancing the nonspecific immune system through increased phagocytosis of their pathogens (17). The benefits of probiotics in stimulating the immune system are not inflammation.

Inhibition of cancer by probiotic bacteria:

Studies show that cytoplasmic and peptidoglycan

References

13. Altonsy MO, Andrews SC, Tuohy KM. Differential induction of apoptosis in human colonic carcinoma cells (Caco-2) by Atopobium, and commensal, probiotic and enteropathogenic bacteria: mediation by the mitochondrial pathway. *Int J Food Microbiol.* 2010; 137(2-3): 190-203.
14. Wollowski I, Reckemmer G, Pool-Zobel BL. Protective role of probiotics and prebiotics in colon cancer. *Am J Clin Nutr.* 2001; 73(2 Suppl):451S-5S.
15. Baldwin C, Millette M, Oth D, Ruiz MT, Luquet FM, Lacroix M. Probiotic *Lactobacillus acidophilus* and *L. casei* mix sensitize colorectal tumoral cells to 5-fluorouracil-induced apoptosis. *Nutr Cancer.* 2010; 62(3): 371-8.
16. Le Leu RK, Hu Y, Brown IL, Woodman RJ, Young GP. Synbiotic intervention of *Bifidobacterium lactis* and resistant starch protects against colorectal cancer development in rats. *Carcinogenesis.* 2010; 31(2): 246-51.
17. Lee JW, Shin JG, Kim EH, Kang HE, Yim IB, Kim JY, et al. Immunomodulatory and antitumor effects in vivo by the cytoplasmic fraction of *Lactobacillus casei* and *Bifidobacterium longum*. *J Vet Sci.* 2004; 5(1): 41-8.

extracts derived from lactic acid bacteria inhibit proliferation of cancerous cells (15, 17). In this regard, Kim and colleagues analyzed the effect of the ten cell types of different probiotic agents on the type of cancer. The results of these studies indicated the effect of probiotics on inhibition of cancer cells and attributed this effect to their peptidoglycans. Lee. Researchers and colleagues reported that the cytoplasmic extract of *Lactobacillus casey* *Bifidobacterium* (*Bifidobacterium*) had a direct effect on inhibition of tumor cell growth (18).

The best mode of inhibiting or suppressing cell proliferation is the induction of planned cell death or apoptosis, since it will not cause the ingestion of the body and adjacent tumors and will therefore be a safety factor for suppressing tumors. Altonsy

and colleagues in their study pointed to the induction of mitochondrial pathway of apoptosis in human colon carcinoma cells (Caco- 2) by probiotic bacteria and *Lactobacillus rhamnosus* and *bifidobacterium lactis* (13).

However, probiotics increase cellular activity and are used as drugs along with chemotherapy. Fermentable milk with probiotics can prevent cancer and cause treatment in people with cancer. It has been reported that isolated tetanus *lactobacillus* had an antitumor effect and had a high cancer status and in fact strengthened the system Safety comes from probiotics. Another study indicates this. The polysaccharides produced by *Lactobacillus acidophilus* cause the death of cancer cells through autophagy (15) .

Table 1: The Effects of Probiotics on Cancer / Biomarkers of Cancer in Interventional Studies on Human Behavior

Group	Subject matter studied	Probiotic	Results
6 healthy people	Carcinogenicity of urine after consumption of fried cow meat	<i>L. casei</i>	Reduction in urinary cancers
11 healthy people	Carcinogenicity of urine and stool after consumption of fried beef	<i>L. acidophilus</i>	Excretion of urine leakage 70 50% and excretion - fecal mutation, 30%
20 patients with large intestine adenoma	Cell proliferation in recto mucosal biopsy	<i>L. acidophilus</i> and <i>B. bifidum</i>	The presence of <i>Lactobacillus</i> that reduces rectal inflammation only in patients with major inflammation

References

18. Kim Y, Oh S, Yun HS, Oh S, Kim SH. Cell boundexopolysaccharide from probiotic bacteria induces autophagic cell death of tumour cells. *Lett Appl Microbiol.* 2010; 51(2): 123-30.

Kabiri et al., In their experiments, were able to inhibit the growth of the cancerous group (k562 of chronic myeloid leukemia) by probiotic cytoplasmic extracts such as *Lactobacillus caesium* and *Lactobacillus paracasia* in vitro (19).

Reduce blood cholesterol:

Studies show that fermented dairy products and probiotics reduce blood fat. By using these substances, short chain fatty acids are produced that stop cholesterol synthesis in the liver and cause the movement of plasma cholesterol to the liver, as well as some bacteria through preventing the binding of cholesterol to bile salts prevents it from absorbing it (20).

Treatment of female patients, stomach and blood pressure:

Probiotics are also useful in preventing and treating diseases of women. Probiotics are bind to vaginal pituitary cells and prevent the colonization of pathogenic bacteria. Probiotics also stopped the growth of *Helicobacter pylori*, and its connection to the cell line stomach epithelial stones are prevented. Studies show that probiotic bacteria produce protein-based peptides that can lower blood pressure through proteolytic action on milk casein, which is carried out during milk

fermentation (21).

The role of probiotic yeasts in controlling cancer:

As mentioned, yeasts are also part of the probiotics and, like probiotic bacteria, have a significant effect on the health and well-being of the body, the most important of which are *Saccharomyces*. Extensive research has been carried out to prove this.

Sartorial study and colleagues showed that *Saccharomyces cerevisiae* and *Saccharomyces boulard* yeast have the ability to inhibit growth in the cells of myeloid cancer cells in vitro. Another fundamental study by colleagues is the induction of apoptosis in leukemia cells Human myeloid blood by probiotic yeast *Saccharomyces cerevisia* has been proved (22). Other studies suggest induction of apoptosis in human breast cancer cells due to phagocytosis by yeast in laboratory conditions. According to research findings, probiotic yeasts such as probiotic bacteria can be a major step in the treatment of diseases and at the top of them, with emphasis on the fact that the mechanism of the effect of yeasts on the principle of induction of apoptosis in cancerous and tumor cells; therefore, yeasts Like probiotic bacteria, they

References

19. Kabiri F, Nejati V, Tukmechi A, Delirezh N, Nikbakhsh P. Inhibitory properties of cytoplasmic extract of *Lactobacilli* isolated from common carp intestine on human chronic myelocytic leukemia K562 cell line: an in vitro study. *Tehran Univ Med J*. 2011; 68(12): 691-8. (Persian).
20. Ooi LG, Liong MT. Cholesterol-lowering effects of probiotics and prebiotics: a review of in vivo and in vitro findings. *Int J Mol Sci*. 2010;11(6):2499-522.
21. Khalesi S, Sun J, Buys N, Jayasinghe R. Effect of probiotics on blood pressure: a systematic review and meta-analysis of randomized, controlled trials. *Hypertension*. 2014;64(4):897-903.
22. Iyer C, Kosters A, Sethi G, Kunnumakkara AB, Aggarwal BB, Versalovic J. Probiotic *Lactobacillus reuteri* promotes TNF-induced apoptosis in human myeloid leukemia-derived cells by modulation of NF-kappaB and MAPK signalling. *Cell Microbiol*. 2008; 10(7): 1442-52.

are safe and without any side effects on host health, they affect their effect, which greatly increases their importance (23, 24).

The role of probiotics in preventing colon cancer:

Consumption of probiotics can have anti-mutagenic effects of lactic acid bacteria. Mechanisms such as changing microbial metabolic activity, changing the physical and chemical conditions of the colon, attaching to carcinogens and their degradation, quantitative and qualitative changes in the intestinal microflora and prevention The production of cancerous derivatives such as ammonia and secondary bile acids, the production

of anticancer drugs, and the enhancement of host immune responses can prevent colon cancer. Studies have shown that the increase, the growth of bifidobacteria, which is a type of probiotics, can lead to inhibition of colon cancer. Colonial researchers assume with pH that the reduction of bifidobacterium levels can be the cause of inhibition of carcinogens. Probiotic bacteria, by creating acidity, prevent the growth and proliferation of pathogenic bacteria in the colon and at the level of bacterial enzymes (such as beta-glucuronidases) Which make carcinogens become carcinogens. More human studies are also needed on the effects of prophylaxis on colon cancer prevention (25, 26) .

Conclusion

Due to the therapeutic properties and beneficial effects on health, these products have a high status in the world, and its production has been highly welcomed in various ways. As stated, various studies suggest that cancer is inhibited by probiotics, also according to Clinical studies use probiotics to increase the activity of lethal cells and immunoglobulin levels. Despite the limited research done in humans, the results can be achieved for people with immunosuppressive function, It is useful. Among the potential benefits of using probiotics in the treatment of various diseases, they can be relatively inexpensive, lack of immunological response to them by the body and inhibition of pathogens by them. Although there is an acceptable evidence of the anticancer properties of probiotics in rodents and laboratory conditions, there is still little evidence for human studies. Many scholars have pointed out that there is a need for precise programs to make clinical trials for humans in this field so that available laboratory information can be used and used for therapeutic purposes. Probiotics are not likely to be used in all areas, but the amount of treatment depends on the microbial flora of the test individual. Meanwhile, the mechanism of the effect of different probiotics should be explained more clearly .

References

23. Ghoneum M, Gollapudi S. Modified arabinoxylanrice bran (MGN-3/Biobran) enhances yeast-induced apoptosis in human breast cancer cells in vitro. *Anticancer Res* 2005; 25(2A): 859-70.
24. Ghoneum M, Wang L, Agrawal S, Gollapudi S. Yeast therapy for the treatment of breast cancer: anude micemodel study. *In Vivo*. 2007; 21(2): 251-8.
25. Rafter J. Probiotics and colon cancer. *Best Pract Res Clin Gastroenterol* 2003; 17(5): 849-59.
26. Rafter J. Lactic acid bacteria and cancer: mechanistic perspective. *Br J Nutr*. 2002; 88(Suppl1): S89-S94.