CAHN-Pro Nutrition News & Views
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The Fountain of Youth?

If you are a practicing Buddhist, you will probably live longer according to a study by UC Davis Center for Mind and Brain. The 2010 study links intense meditation with increased immune cell activity. While yoga, meditation and Mindfulness-Based Stress Reduction (MBSR) encourage relaxation and help to relieve stress, this is the first study to link meditation and psychological change with cellular activity (1).

The study examined the effects of the enzyme telomerase which decreases with chronic psychological stress. When activated, telomerase lengthens the ends of telomeres, preventing chromosomal damage. Telomeres are strands of DNA capped at the ends of all 46 chromosomes in each cell. They shorten each time the DNA replicates, and once telomeres reach a certain length, cells can no longer multiply. The progressive shortening of telomeres appears to be associated with the risk for developing certain diseases, such as diabetes, cardiovascular disease, depression and some cancers (2). Researchers examined telomerase activity on Buddhists participating in a three-month meditation retreat.

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To Fluoridate or not to Fluoridate?

Fluoride, the trace element ion of fluorine, is in approximately 1.5 milligrams of every litre of Canadian drinking water. In natural bodies of water, fluoride dissolves from sedimentary rock layers with a content range of between 0.05 and 14 ppm. Although fluoride affects bone formation and dental enamel, it is not an essential element to the human diet; furthermore no deficiency signs are found when fluoride is excluded from one's diet (1). Other fluoride sources in the environment come as a by-product of chemical manufacturing plants and waste ponds, including the manufacture of aluminium, steel, glass, and cement, and the production of fluorinated chemical and phosphate fertilizer (2). Many studies have shown that fluoridated drinking water significantly reduces the number of cavities in children's teeth." (3) This information is, in part, due to a study conducted in Scotland in 2002 which showed that children in communities with fluoridated water of 1ppm had significant "caries" benefits as opposed to their similar counterparts in another town without fluoridated water (4). Health Canada's argument remains that "the caries preventative effects of fluoridated drinking water are still evident in modern studies of fluoridated versus non-fluoridated communities." (5) **CONTINUED ON PG 5 …**

Probiotics & the Cancer Connection

Probiotics date back to the late 19th century when early microbiologists first identified microorganisms in the gastrointestinal (GI) tract of healthy subjects that were different than the microorganisms found in the GI tract of non-healthy subjects. The microbiota found in the healthy individuals were termed 'Probiotics', which literally translates to 'for life'.

Probiotics have a variety of functions, most notably in the process of fermentation where they help preserve food by generating lactic acid and antimicrobial compounds. They also produce flavour compounds (e.g. acetaldehyde in yogurt and cheese) and other metabolites to improve the nutritional value of food by releasing free amino acids and/or the synthesis of vitamins. Probiotics have been shown to have numerous health benefits, (see figure 1 [5]), including prevention against intestinal infections (1), improved digestibility of lactose (2), control of serum cholesterol levels, and cancer prevention (1,3,4).

In 2010 there was a 1.6 percent increase in new cancer diagnoses and a 1.2 percent increase in cancer deaths from 2009 (6), translating to an estimated 178,300 new cancer diagnoses and 76,200 cancer deaths in Canada in 2010 alone (7). Cancer incidence and deaths from cancer are on the rise. If healthy bacteria in fermented food do have properties that can help prevent cancer in the human body, it could offer yet another simple approach to a healthier, cancer-free life.

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Probiotics & the Cancer Connection

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The health benefits of probiotics (figure 1) have led to a resurgence of the popularity of naturally-fermented foods, as well as functional foods with added probiotics. They are fed by prebiotics – non-digestible food ingredients that encourage the growth and activity of favorable intestinal bacteria and as such, prebiotics are also added to functional foods. The question is: do healthy bacteria actually provide protection against cancer - and if so, how do they do it?

Various species of probiotics work together to uphold the delicate balance between the GI tract and the immune system (8). In order to understand how probiotics promote health, a brief understanding of the physiology and microbiology of the GI tract is necessary. Food enters the mouth and travels to the stomach where microbes in the small and large intestine complete the digestive process (5). Some intestinal bacteria produce vitamins: they are nonpathogenic, their metabolism is non-putrefactive and their presence encourages the growth of healthy bacteria (5). The metabolic end products of their growth are lactic and acetic acids which tend to lower the pH of the intestinal contents, creating conditions that are undesirable for the proliferation of harmful bacteria (5). Probiotics may also influence other protective functions of the intestinal cells, including the synthesis and secretion of antibacterial peptides (5). The GI tract is a large mucosal surface that bridges the gap between "inside" the body and "outside" the body. It is along this intestinal membrane that microbes and foreign antigens colonize or pass through the GI tract to interact with the immune system. This interaction stimulates the immune system to function optimally (5). Healthy bacteria in the GI tract also reinforce the barrier function of the intestinal lining, reducing the passage of harmful bacteria or other antigens from the intestine into the blood stream. This has been suggested as the mechanism by which the body wards off infections and allergic reactions to foods (5). In fact, in 1994 the World Health Organization (WHO) declared probiotics to be the next most important immune defense system when overly-prescribed antibiotics are rendered useless by antibiotic resistance (9,10).

Lactic acid bacteria are the most commonly used organisms in probiotic preparation, as they are found in large numbers in the gut of healthy animals*. Probiotics have been shown to improve the quantity, availability and digestibility of nutrients. For example, fermentation of food with lactic acid bacteria increases the amount of folic acid in yogurt and the quantity of bifidus in milk and kefir. Similarly, niacin and riboflavin levels in yogurt are also increased with fermentation (11,12).

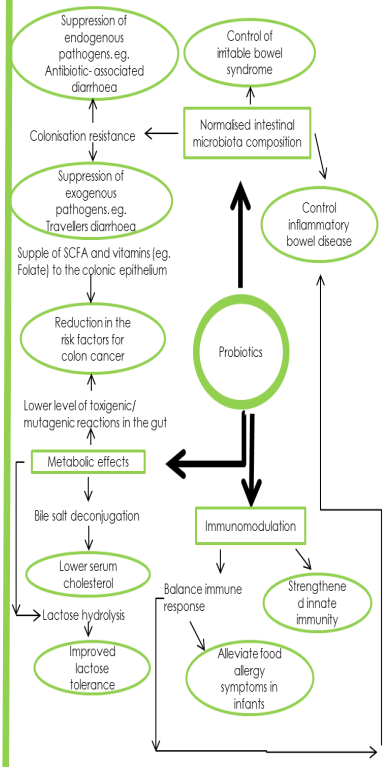
Lactic acid bacteria release various enzymes and vitamins into the intestinal lumen which exert a synergistic effect on digestion, alleviating symptoms of intestinal malabsorption and producing lactic acid which helps lower the pH of the intestinal content to inhibit the invasion of foreign pathogens, such as *Salmonella* spp. or *E.* coli strains into the intestinal lumen (13,14). Bacterial enzymatic hydrolysis, the breakdown of nutrients by bacterial enzymes, improves the bioavailability of protein and fat (1) and increases the production of short chain fatty acids (SCFAs) - lactic acid, propionic acid and butyric acid. When absorbed, these SCFAs contribute to the available energy pool of the host (35) and protect against pathological changes in colon cells (15). SCFA concentration, in particular, helps to maintain a pH level in the colonic lumen that is critical in the expression of many bacterial enzymes and in targeting foreign materials, as well as for the metabolism of carcinogens in the gut (14).

Kefir and ayran, two popular fermented milk drinks originating in Russia and the Middle East, have been shown to significantly decrease induced DNA damage in human colon cells, in a dose-dependent manner, compared to non-fermented milk (16). Kefir and ayran contain high amounts of acetic and lactic acid and a small amount of caproic and butyric acid, and have also shown significantly greater antioxidant capacity than milk. These findings suggest kefir and ayran may reduce cancer risk by limiting DNA damage via antioxidant capabilities (16).

Symptoms that have reportedly been treated with probiotics include: diarrhea, gastroenteritis, irritable bowel syndrome, inflammatory bowel diseases (IBD; Crohn's disease and ulcerative colitis), depressed immune function, inadequate lactose digestion, infant allergies, failure-to-thrive, hyperlipidaemia, hepatic diseases, *Helicobacter pylori* infections and cancer (13,17-19).

The etiology of cancer is multi-factorial and very complex, but it is widely believed at a cellular level to be the result of a genetic mutation or caused by the activation of abnormal genes that control cell growth and division. **CONTINUED ON PG 5 …**

Figure 1.



*The selection criteria for a bacteria to be used as a 'probiotic' include the following:
1) can exert a beneficial effect on the host
2) can remain viable throughout the shelf-life of the product
3) can withstand transit through the GI tract
4) ability to adhere to the intestinal epithelium cell lining and colonize the lumen of the tract
5) ability to produce antimicrobial substances towards pathogens; and they can
6) stabilize the intestinal microflora and be associated with health benefits (5).

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The Fountain of Youth?

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Participants meditated for approximately six hours daily during the three months and were compared with a control group matched for age, sex, body mass index, and prior meditation experience. Following the retreat, blood samples were collected. The results showed that telomerase activity was greater in the retreat participants than in the control group. In addition, researchers used meditation models to test whether changes in perceived control and neuroticism explained the increase in telomerase activity.

They discovered that increases in perceived control, mindfulness, and purpose in life, and decreases in neuroticism were greater in the retreat group. The study concluded that, psychologically, an increase in perceived control and decrease in negativity contribute to heightened telomerase activity, thereby lengthening telomeres and extending immune cell life.

The question must then be asked: Can positive emotional health actually create an environment in the body where cancer and other diseases cannot thrive? In a 2003 study by the Laboratory for Affective Neuroscience, researchers found that mindfulness-based meditation altered brain and immune system functions. (3) More recently, in May 2010, another study concluded that positive psychological well-being, as a result of MBSR, increased natural killer cell activity and decreased levels of C-reactive protein (4). It appears that positive psychological health *does* have an impact on disease.

Yoga is the most popular program at the Wellsprings, the Canadian cancer support center. "We offer it every morning and night, on weekends, and we are still being asked to have more classes," remarks Pamela Bowes, Assistant Coordinator of the Coping Skills program. The next most popular program is Healing Journey, followed by exercise, discussion groups and Reiki. Other programs include Drumming, Art Therapy, Music Therapy, and Relaxation and Visualization. Pamela explains that while there has been no research to show that if someone took a quilting class they would have better quality of life, the intention is to regain control of one's life. At Wellsprings, "We listen to what our patients want, and they want to focus on the body-mind-spirit-connection."

Isn't it interesting that when science integrates what is known about the body with the mind, it discovers the spirit? An increasing number of doctors are studying spiritual modalities such as meditation and MBSR as a way to understand disease, improve quality of life and promote longevity.

As you're breathing through downward dog and lengthening your spine, take pleasure in the knowledge that your telomeres are also lengthening, while reducing your risk of disease. If we focus on the spiritual, we can reduce our stress and meditate our way to better health!

The Importance of Seed Saving

The world's food crops are being lost at an unprecedented and accelerating rate (1). Heirloom varieties – seeds and crops which have been cultivated and passed down for many generations - are rapidly decreasing in number. In Europe alone, it is estimated that over 2,000 varieties have been lost since the 1970s (2). The disappearing heirlooms are due in large part to the introduction and popularity of hybrid and genetically modified seeds provided by multinational companies that produce the genetically-identical foods we have become so familiar with. A grocery store might carry only four or five varieties of apples and one type (and colour) of carrot. With heirloom seeds, however, there are 10,000 varieties of apples (3) and carrots that come in an array of colours besides orange – white, purple, yellow, and pink. Seeds Savers Exchange (www.seedsavers.org) states that heirloom vegetables and fruits "were developed over thousands of years of adaptation and selection in diverse ecological niches around the world. Each variety is genetically unique and has developed resistance to the diseases and pests with which it evolved" (5).

"There are less than 3 percent of 250,000 plant varieties available to agriculture in use today," says Cate Henderson, Gardener and 'Seed Saver' for the Heirloom Seed Sanctuary of the Sisters of Providence of St. Vincent de Paul (4). Plant breeders use the old varieties to breed resistance into modern crops that are constantly being attacked by rapidly evolving diseases and pests. Without these infusions of genetic diversity, food production is at risk from epidemics and infestations (5).

The purpose of saving seeds is to preserve open-pollinated seeds so that they can be planted and saved each year to grow, harvest, sort and store as organically as possible in order to protect food crops, rare plants and biodiversity (1, 2, 4).

CONTINUED ON PG 4 …

Why choose Heirloom seeds over Hybrids or Genetically Modified Organisms (GMOs)?

Exceptional taste is the primary reason many farmers choose heirloom varieties, since modern hybrid breeding programs can affect taste and nutritional value. Recent research reveals that newer breeds of vegetables and grains can be significantly less nutritious than heirlooms. (9).

Many gardeners prefer heirloom vegetables because they are open-pollinated and are almost always less expensive than hybrids. The other advantage of heirloom vegetables is that they are "less uniform" than hybrids, which means they typically don't all ripen at once (9). Heirloom vegetables have been grown for

Buy heritage/heirloom seeds here!

Seeds of Diversity

Plant derived essential phytonutrients, also known as Salvestrols, play an integral role in the destruction of unhealthy cells

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The Importance of Seed Saving

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Experts predict that by the end of the 21st Century, fully half of the world's plants will be doomed to extinction (2).

There may come a time when we can no longer take our food supply for granted because of economic breakdown, environmental destruction and climate changes. The two most important keys to food security are local production and crop diversity (6).

Currently, there are only ten countries worldwide that help farmers save their seeds, but local gardeners and farmers can play an important role in saving our rich genetic heritage by learning to save their own seeds from varieties that perform best in their own mini-ecosystems. This will guarantee diversity in the same way that it was promoted and protected instinctively throughout the history of agriculture (7).

As consumers, we can purchase seeds of local, open-pollinated plants that can grow locally, organically and naturally. Save the seeds, pass them on, and find (or form) a Local Seed Network in your city (8).

The largest private seed collection in Canada is the Heirloom Seed Sanctuary run by the Sisters of Providence of St. Vincent de Paul in Kingston, Ontario. Since 1930, the Sisters tended gardens to provide vegetables for those who resided on the property. In 1994, recognizing their responsibility, an Environment/Ecology Committee was formed, and their location eventually became a safe place for organic gardening and seed saving. The seeds in the collection are open-pollinated (which means that you can save your own seed to replant from year to year) as part of sustainability (4).

The Heirloom Seed Sanctuary of Canada has approximately a hundred varieties of tomatoes, forty varieties of potatoes, and seventy types of beans, some dating back to the 1500s. Also in the collection are cucumbers, lettuce, peas, Swiss chard, eggplant, garlic, carrots, beets, spinach, celery, parsnip, watermelons, melons, squash, pumpkin, corn, radish, turnips, and peppers.

Dilemmas in Breast Cancer Prevention & Treatment

Each year, over 23,000 Canadian women are diagnosed with breast cancer. It is estimated that the dreaded disease will affect 11 percent of females, making it the most commonly diagnosed form of cancer in women in Canada (1).

Prevention is clearly a key priority and a new study suggests that 1 in 10 women over the age of 50 would benefit from taking regular Tamoxifen for this purpose (2-4); however, even in countries where the drug is licensed for prevention, the take-up is extremely low (5). This is due to concerns about the drug's side effects. In fact, 50 percent of women identified to be at high risk for developing breast cancer stop taking Tamoxifen for this reason (6). This leads to a significant "at risk" population without any preventative strategy other than that offered by diet.

Green tea consumption is associated with a low incidence of breast cancer. Studies of over 11,500 women showed a 20 percent lower risk of breast cancer, together with a reduced risk of recurrence and metastases. (7-16) Other studies suggest that omega-3 fatty acids have an inhibitory effect on breast cancer in conjunction with specific levels of omega-6 fats (17,18). The avoidance of exogenous estrogen sources, such as soy products, is also well recognized, as is the consumption of a diet rich in cancer preventative compounds such as Salvestrols which are found in fresh fruit and vegetables (19-22).

Tamoxifen or aromatase inhibitors used to treat breast cancer survivors are now recommended for five years after remission to prevent a recurrence of the disease (23, 24). Given the enhanced five year survivorship (87 percent) which patients in Canada now experience, one would expect that a significant number of women would be taking Tamoxifen since there is up to a 50 percent likelihood of recurrence should the program not be completed (1, 25, 26, 27). However, despite the recognized negative consequences of stopping Tamoxifen use, up to 50 percent of women cease treatment due to side effects (28). Thus, survivors represent another population in need of a preventative strategy with a clear role for positive dietary interventions.

Reduction of dairy consumption is recommended in this context (29), and again, green tea has been shown to have aromatase-inhibitory effects, thereby preventing the cancer-promoting effects of natural estrogen production within the cell (30). Compounds with a similar effect have been identified in extracts of propolis, which also contain other ingredients that modulate the production of proteins with abnormal activities typical of cancer (31-42). DHA in fish oil (a form of omega-3) has been shown to decrease estrogen receptor activity, and the fatty acid profile of the adipose tissue may well be related to the prognosis of the disease (43, 44).

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Jerusalem Artichoke & Celery Seed Bread

1 small yellow onion, minced
1/2 tbsp celery seeds or more to taste
Olive oil to sauté
3/4 cup hot water (not boiling)
1 tsp sucanat
1 package active dry yeast
4 Jerusalem artichokes, mashed (about 1/2 cup)
2 tbsp olive oil
1/2 cup coconut milk
1 cup rye flour
1 cup kamut
1 cup whole wheat flour
1 tsp sea salt

Scrub the artichokes. Trim off any dark spots and cut into small pieces. Place in a double boiler and steam the artichokes until soft. Remove from the stove and mash. Set aside to cool. Sauté the onion in a little olive oil (about 1 tsp). Once the onions are soft, add the celery seeds. Set aside. Measure out the hot water in a measuring cup. Water should not be hotter than what comes from the hot water tap, even if you are not using tap water. Add yeast and olive oil and set aside. Put the flours into the mixer bowl and add the sea salt. Add the mashed Jerusalem artichoke, onions, celery seeds and yeast/water mixture. Pour the coconut milk into the liquid measure that had the yeast in it and use it to get any residue yeast from the measuring cup. Add it to the mixer bowl. Using the paddle blade, mix everything together. Once it is mixed, remove the paddle blade and attach the dough hook; knead for five minutes. This dough is best made with a mixer with a paddle blade as whole grain breads are best if the dough is much stickier than white flour dough. Grease your fingers with olive oil and remove dough from the bowl. Grease the inside of the bowl and put the dough back into the bowl. Cover with a damp cloth and put in a warm place to proof. Let it double in size. Punch down. Shape into a round loaf and place on a prepared baking tray or in an 8 inch round cake pan. Bake at 325 degrees F for 35 minutes. Remove from the oven and turn out onto a wire rack to cool. Serve warm by cutting into thin slices and spreading either hummus or olive tapenade lightly on each slice.

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Dilemmas in Breast Cancer Prevention & Treatment

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Cancer survivors are highly motivated to implement strategies which will prevent recurrence, with exercise and nutrition at the forefront of any positive protocol (45). Increased consumption of fresh fruit and vegetables, preferably organic, together with a decreased intake of red meat and alcohol have known positive outcomes (46). In some instances where there are known to be nutritional deficiencies which the dietary interventions cannot overcome, such as with Salvestrols, there is a good rationale for supportive supplement strategies (47-50).

To Fluoridate or not to Fluoridate?

CONTINUED FROM PG 1 …

On the other hand, an analysis of data of 39,000 American school children showed no significant difference in the decay rate of teeth in fluoridated and non-fluoridated communities (6). Many European countries do not fluoridate their water and never have. Even within Canada, there are marked differences in opinion. In February of 2011, Calgary government officials voted against fluoride in the water and are in the process of amending the water licensing. This decision came about due to environmental and health concerns over fluoride use.

For Canadian provinces that add fluoride to water, the amount is determined by each municipality in conjunction with provincial committees. These committees work to provide Canadians with the Guidelines for Canadian Drinking Water Quality (7). For example, the fluoride content in Toronto is 0.6 ppm, "a level which is less than the naturally occurring fluoride levels from a number of European and North American water sources, including parts of Ontario." (8) There is no explanation in the literature as to why Toronto chooses to fluoridate less than the Federal Canadian recommendation of 1.5 mg/L (converts the same into ppm). According to an analysis of urban and rural areas of Ontario, the range is all over the map with urban areas having higher levels of fluoride in the water overall (9). Click here to see the fluoride content of your community in Ontario: http://www.cda-adc.ca/jcda/vol-75/issue-10/707.html

There is controversy on the topic of an irreversible condition called Fluorosis caused by excessive ingestion of fluoride with symptoms of mottled teeth and in more severe cases, skeletal fluorosis (calcification of the ligaments and brittle bones). Keep in mind that water fluoridation is not the only source of fluoride. In fact, items such as toothpaste and professionally applied gels contain between 1,000 to 22,000 ppm of fluoride (1).

Perhaps it's time to get back to basics and take charge of our oral health. From a nutritional perspective it is well known that candy and sugar contribute to tooth decay and cavities. Foods high in simple sugars, such as simple carbohydrates (cookies, refined sugar, white bread) stimulate oral bacteria. The oral bacteria produces dental plaque and acid which damage and erode tooth enamel. Normally, saliva will dilute the acidity and remineralize the tooth surface (1). One may then suggest that a diet that includes fewer simple carbohydrates and more alkaline foods, such as green leafy vegetables and whole grains will keep the saliva "normal" and the tooth enamel intact. Therefore, dietary controls along with flossing and regular brushing may eliminate the need to debate how much fluoride is needed in our drinking water.

Probiotics & the Cancer Connection

CONTINUED FROM PG 2 …

Most of these abnormal cells do not result in cancer because normal cells usually outcompete abnormal cells and the immune system is designed to recognize and destroy most of those abnormal cells (5).

Many variables and chemical exposures can increase the incidence of abnormal cells, leading to an increased risk of cancer. Cancer-causing chemicals, known as carcinogens, can either be ingested, or are the result of the metabolic activity of microbes that live in the GI tract (5). Probiotics may also suppress the growth of bacteria that convert procarcinogens into carcinogens, thereby reducing the number of carcinogens in the intestine. The activity of the enzymes that convert procarcinogens into carcinogens is often used as an indicator of the effect of probiotics on the intestinal microflora (20). It is believed that lactobacilli offer anti-carcinogenic and anti-mutagenic properties (31-33) by binding to mutagenic compounds in the intestine to prevent or delay the tumor growth (21,22) to prevent cancer from developing. **CONTINUED ON PG 6 …**

A 2007 study from the University of Leipzig in Germany found that adding Jerusalem artichoke or chicory to baked goods, increased the good bacteria levels in the colon in the participants who ate the baked goods. Both foods are good sources of inulin fiber, a prebiotic that good bacteria can feed on. Other good sources are onions, garlic, and grains including whole wheat. The significance of this study is that the effect of the inulin, for promoting good bacteria levels, is maintained while cooked and used in recipes with other ingredients, allowing for new ways to consume prebiotic foods.

It has been hypothesized that probiotic cultures may decrease the exposure to chemical carcinogens by: 1) detoxifying ingested carcinogens 2) altering the environment of the intestine to decrease populations or metabolic activities of bacteria that may generate carcinogenic compounds 3) producing metabolic products (e.g. butyrate) which improve a cell's ability to die when it should die, a process known as apoptosis or programmed cell death 4) producing compounds that inhibit the growth of tumour cells or 5) stimulating the immune system to better defend against cancer cell proliferation (5).

Probiotics & the Cancer Connection

CONTINUED FROM PG 5 …

Colorectal cancer is a major cause of death from cancer in the western world; in fact, according to Statistics Canada, it is the third most common form of cancer in Canada, and approximately 70 percent of all colorectal cancer is associated with environmental factors, mainly the diet (23,24). Some cohort studies have failed to detect significant effects, but most case-controlled studies show a protective role of fermented foods against colon cancer. Interventional studies have shown a shift of intermediate markers of colorectal cancer risk in human subjects from a high-risk to low-risk pattern after ingestion of fermented milks or probiotics (24). Interventions with probiotic yogurt, including the *L. acidophilus* 145 and *Bifidobacterium longum* 913, significantly lowered fecal water genotoxicitiy, a biomarker used to study the effects of diet on the colon (25), compared with standard yogurt (26). However, probiotic intervention also increased oxidative damage which may reflect either pro-oxidative activity of probiotics, or more likely an increased stimulation of the host's immune system. De Santis found that dietary supplementation with a strain of *L. acidophilus* significantly suppressed the total number of colon cancer cells in rats in a dose-dependent manner (27). Another study showed that *Lactobacillus GG* reduced the incidence and number of tumors in animals artificially induced with colon cancer (28). *Bifidobacterium longum* has also been shown to inhibit the incidence of colon, liver, small intestinal and mammary tumors in rats (29). There have also been some human clinical trials conducted and showed that *L. casei* consumption regularly for a year (three times daily) increased the recurrence-free period among subjects with bladder cancer (30).

There are many types of probiotic-containing fermented foods beyond the more common fermented milk product. These come from different cultures all over the world - Japan, Indonesia, Korea, Germany, and more. Japan is known for having one of the highest consumption rates of soy foods, including miso, a fermented soy paste, and one of the lowest incidence rates of breast cancer in the world. This link is evidenced by studies which have shown that the incidence of breast cancer in first-generation Japanese migrants to Hawaii is only 60% of the rate in subsequent generations of Japanese born in Hawaii (34). It is believed that this is due to the fact that soy consumption in Japan is five times that of the consumption among Japanese migrants living in Hawaii. Researchers believe that miso, natto, soy sauce and other traditionally fermented soy foods are likely contributing to this lower incidence of breast cancer (5). This hypothesis was then tested with lab animals and it was found that feeding the animals miso delayed the appearance of induced breast cancer compared with control animals (34). Animals fed miso showed a trend toward a lower number of cancers per animal, a trend toward a higher number of benign tumors per animal, and a trend toward a lower growth rate of cancers when compared to the animals on the control diet (34). Researchers concluded that the organic compounds found in fermented soybean-based foods may offer a chemoprotective effect and may be a contributing factor in the lower incidence of breast cancer in Japanese women (34). Other fermented foods that are believed to share the cancer-reducing effects of miso and fermented dairy are kimchi, a Korean fermented vegetable condiment (usually made from cabbage), tempeh, a fermented soybean meat substitute from Indonesia, and sauerkraut, a German condiment made from cabbage in a process similar to kimchi. Research on these specific foods is limited, but given the research on lactic acid bacteria and fermented foods in general, this will be an exciting area of research in the future.

Despite some difficulties establishing good measures of probiotic efficacy (35), studies on lactose intolerance, diarrhea and colon cancer have shown that a daily dose of lactic acid bacteria provides measurable health effects (36). Unfortunately the concentration of probiotics in food products varies enormously and there is currently no industry standardization or national standards for the levels of bacteria required in yogurt or other fermented products. Ongoing research continues to identify and characterize existing strains, strain-specific outcomes, optimal dosage, and improved stability through processing and digestion. Despite issues with dosage and viability of certain strains, there are many benefits of probiotics over a wide range of conditions – specifically cancer prevention as evidenced by the studies outlined above.

150 Consumers Road,
Suite 210
Toronto, Ontario,
M2J 1P9
info@cahnpro.org
www.cahnpro.org
416.499.2660

Editor:
Lisa Tsakos R.H.N.
Content Manager:
Lorene Sauro R.H.N.
Writers:
Lorene Sauro R.H.N.
Meredith MacKay R.H.N.
Mitra Jahani-Hivehchi R.H.N.
Eleanor Healy R.H.N.
Ingrid Davis R.H.N.
Mike Wakeman BSc, MSc
Designers:
Olga Bromberg R.H.N.

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