Chapter 7

Other Health Benefits of Flax

Previous chapters examined the benefits of flax and its key constituents – the lignan secoisolariciresinol diglucoside (SDG), dietary fibre and alpha-linolenic acid (ALA), the essential omega-3 fatty acid – in helping reduce the risk of coronary heart disease, stroke and cancer. This chapter reviews the evidence supporting other health benefits of flax.

Bone Metabolism

Phytoestrogens may help prevent osteoporosis (411). Osteoporosis is a disease in which bone mass is low and the risk of bone fractures is high (412-415). The study of flax and bone metabolism is in its infancy. Researchers at Oklahoma State University reported that flax may have a positive effect on bone in postmenopausal women by enhancing antioxidant activity. They noted that free radicals generated in bone tend to cause bone resorption, which increases bone loss (416). A role for flax in blocking the formation of free radicals in bone is plausible, because the main flax lignan SDG and its mammalian metabolites are antioxidants (169,171,172).

ALA may help prevent bone loss and osteoporosis by blocking the production of cytokines, especially tumor necrosis factor α (TNF-α), which promotes bone resorption and inhibits bone formation (417,418). A study of overweight or obese adults (20 men and 3 women) found

significant reductions in TNF-α when the volunteers consumed for 6 weeks a diet rich in ALA obtained from walnuts, walnut oil and flax oil compared with when they consumed an average American diet (99). When bone metabolism was measured in these same volunteers, the high-ALA diet reduced bone resorption without reducing bone formation. The decrease in bone resorption may have been due to a decrease in the dietary n-6/n-3 ratio as a result of the high-ALA diet (419).

Three studies found no effect of flax consumption on measures of bone formation and resorption among postmenopausal women whose diets were supplemented with 25-40 g (~3-5 tbsp) of milled flax daily for 3-12 months (156,185,208). The observation that flax had no effect on bone metabolism in the studies of postmenopausal women suggests that any potential benefit of flax on bone metabolism is not sufficient to overcome the bone remodeling that occurs with estrogen deficiency during menopause.

Diabetes

Flax contains three components that may protect against diabetes in animals – protein (420), SDG (421-423) and ALA (424). In humans, flax consumption lowers blood glucose in healthy young adults (204) and postmenopausal women with high blood cholesterol levels (184). In one study, 6 healthy volunteers fasted overnight and, in the morning, consumed in random order a test meal containing 50 g of carbohydrate as bread made from milled flax or white flour. The blood glucose response was 28% lower after eating the flax bread test meal compared with the standard white bread test meal. In the same study, volunteers who consumed flax mucilage gums mixed with glucose showed a 27% decrease in the blood glucose response compared with consuming glucose alone (79). In another study, glycemic response was improved when healthy volunteers ate bread made with milled flax compared with bread made of regular wheat flour (307).

Kidney Disease

Milled flax reduces inflammation and improves kidney function in patients with systematic lupus erythematosus (SLE). SLE is a chronic, inflammatory autoimmune disease with major health consequences, including renal failure, arthritis, seizures and an increased risk of premature cardiovascular disease (425,426). The cause of SLE is not known, but oxidative stress (427), cytokines (428), platelet-activating factor (429) and certain eicosanoids (430) appear to be involved in the pathology of the disease. In rats and mice, milled flax and flax oil reduced kidney inflammation and improved kidney function (101,301,431-433). In people with SLE, consumption of milled flax (15 g, 30 g or 45 g daily) for 4 weeks improved kidney function and reduced inflammation (206).

In a rat model of polycystic kidney disease, flax oil with or without added SDG improved kidney function by reducing the activities of immune cells and inflammation (434). Feeding flax oil throughout pregnancy and lactation to rats with inherited cystic kidney disease decreased oxidative stress and kidney injury in offspring. Including flax oil in the maternal diet reduced the progression of this chronic kidney disease in offspring (435).

Laxation

Flax, like cereals and legumes, has the potential to increase laxation because it provides dietary fibre which increases intestinal bulk and decreases intestinal transit time. The benefit of milled flax for laxation has been demonstrated in healthy adults and the institutionalized elderly. In one study of 10 healthy young adults, bowel movements per week increased by 30% when subjects ate two muffins providing 50 g of milled flax daily (204). In another study, 26 healthy adults, consuming an average of 9 g of dietary fibre provided by milled flax daily for 3 weeks significantly increased fecal weight (307).

Elderly adults often have chronic difficulties with laxation due to their inactivity, low-fibre diet and/or use of medications. In a study of seven volunteers whose average age was 78 years, the daily frequency of bowel movements and the number of consecutive days with bowel movements increased among subjects who complied with the dietary regimen of eating 50 g of milled flax daily. The flax was provided in muffins and consumed for 4 weeks (436). Twenty-one residents of a personal care centre in Winnipeg, Manitoba, experienced an increase in bowel frequency of 30-54% after consuming 1 tbsp of milled flax at breakfast every day for 2-3 weeks (437). The use of suppositories decreased by 35%, while the use of fleet and micro enemas decreased 40% and 33%, respectively, in this study population.

Menopause Symptoms

There have been anecdotal reports that flax helps relieve menopausal symptoms such as hot flashes. One study provided support for these reports. Twenty-five menopausal women with mild symptoms either ate 40 g (5 tbsp) of milled flax daily or took an oral estrogen-progesterone hormone replacement (0.625 mg conjugated estrogens per day) for 2 months. After a 2-month period free of treatment, each group crossed over to the other intervention for 2 months. In this trial, flax was as effective as hormone replacement therapy in improving mild menopause symptoms. The Kupperman index was used to measure the 11 most common menopausal complaints in this study (184). In two other studies flax consumption reduced the severity of menopausal symptoms but the severity scores for flax did not differ from those of the placebo (158,208).

Vegetarian Nutrition

Vegetarians living in affluent countries enjoy good health with low rates of cancer and cardiovascular disease (438) and a substantially lower mortality rate than national rates (439). Their good health is due, in part, to their eating diets rich in fruits, vegetables and whole-grain breads and cereals. However, there is a concern that some vegetarians may not be getting enough omega-3 fatty acids in their diets. Vegans, whose diets are totally lacking in meat, fish, poultry and dairy products, obtain omega-3 fatty acids only from plants, which are a source of ALA but not the long-chain omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

Strict vegans have lower levels of omega-3 fatty acids and higher levels of linoleic acid, the essential omega-6 fatty acid, in their red blood cells, platelets and serum phospholipids than omnivores (440,441). Vegans have significantly lower plasma concentrations of EPA and DHA than meat-eaters and vegetarians who eat some fish (442). In an Australian study, vegan and ovolactovegetarian men had significantly lower intakes of ALA, EPA and DHA compared with men who had a high meat intake. Their lower intakes of EPA and DHA were reflected in lower concentrations of these omega-3 fatty acids in plasma phospholipids, whereas the ALA content of plasma phospholipids was higher in vegan and ovolactovegetarian men than in men who ate meat (400).

Some experts suggest that vegetarians at least double the recommended intake of ALA (443). Adding flax oil to the vegetarian diet can increase ALA intake and improve the omega-3 fat content of their tissues. In vegetarian men, for example, consuming flax oil and margarine made with flax oil daily for 28 days increased the ALA, EPA and total omega-3 fatty acid content of their platelet phospholipids (233).