

## Making a case for flax lignans

Some may know flaxseed is the most readily available plant source of the essential omega-3 fatty acid, alpha-linoleic acid (ALA), and is rich in both soluble and insoluble fiber.

Fewer, however, are aware of the potentially wholesome effects of the phytoestrogen lignans found so abundantly in flaxseed.

Lignans are related to lignins, which are structural elements in plants.(1) Lignans, which act as antioxidants in plants and animals, are most abundant in high-fiber plants, such as flax and sesame seeds, nuts, cereals, grains, legumes and soy products, vegetables, and dried fruits.(2,3)

Phytoestrogens are plant chemicals that can have estrogen-like actions. They include:

- Isoflavones (legumes, especially soy);
- Coumestans (split peas, pinto beans, lima beans, alfalfa, and clover sprouts);
- Polyphenols (resveratrol from wine, vines, and peanuts); and
- Lignans (seeds, brans, and beans).

Phytoestrogens can act in a dual capacity — like weak estrogens by binding estrogen receptor sites on cell membranes, and as estrogen antagonists by competing with the much more powerful human estrogens for the same sites.(4)

Currently flax is one of the richest sources of lignans identified. As an example, on an equal weight basis, flax has 4,700 percent more total lignans than sesame seeds.(5) Specifically, flaxseed is very rich in the lignan secoisolariciresinol diglucoside (SDG) and contains matairesinol, pinoresinol, lariciresinol, isolariciresinol, and secoisolariciresinol (SECO).(6,7,8)

Whole flaxseed contains about 42 milligrams of total lignans per tablespoon.(9) Flax oil generally does not contain lignans unless they are added back in, but adding the main lignan, SDG, to flax oil is difficult, since SDG is not soluble in oil and tends to settle at the bottom of the container.(10)

Generally, whole, crushed, or milled seeds are best for lignan supplementation. They contain more fiber and micronutrients than the oil as well.

Most of the lignans in flax are converted by bacteria in the colon to the mammalian lignans, enterodiol and enterolactone.(11) The biologic activity of plant lignans is dependant on the presence of the proper alimentary bacteria.(12)

Not all persons have the right type or sufficient number of gut bacteria to convert plant lignans to mammalian lignans.(13) And antibiotics can stop the endogenous production of enterodiol and enterolactone for several weeks.(14)

## FLAXSEED FOR BREAST AND PROSTATE HEALTH

The downstream metabolites of human-flax lignan, enterodiol and enterolactone, have numerous health and wellness potentials. Various studies suggest lignan-rich diets:

- May reduce breast cancer risk(15);
- Help maintain cognitive function in postmenopausal women(16);
- Protect the liver from hepatotoxins(17);
- Reduce the risk of uterine fibroids(18);

- Reduce the risk of acute fatal coronary events(19); and
- Decrease the risk of prostate cancer in men.(20)

Free radical damage is perhaps the major cause of such common diseases of aging as cancer, atherosclerosis, and senile dementia.<sup>21</sup> Flax lignans are powerful scavengers of peroxy- and hydroxyl-free radicals.<sup>(22)</sup> Indeed, the antioxidant action of flax lignans is greater than that of vitamin E.<sup>(23)</sup>

One hundred grams of flaxseed has an ORAC (oxygen radical absorbance capacity) score of approximately 8,000 TE mmol per milliliter.<sup>24</sup> (ORAC measures antioxidant capacities of food sources.)

Enterodiol and enterolactone affect receptors found on the surface of cell membranes which are involved in the metabolism of bile acids, steroid hormones, and many medicines.<sup>(25)</sup> Perhaps most importantly, lignan phytoestrogens are understood to modulate human hormone physiology by binding to estrogen receptors on cell membranes.

Of course, no phytoestrogen is nearly as powerful as the endogenous estrogens. Nonetheless, lignans can act as weak estrogens in low-estrogen states, such as menopause. They can also oppose the actions of estrogen in high-estrogen states, such as PMS, or compete with endogenous estrogens for receptor sites and estrogen sensitive states, such as estrogen-responsive breast cancer.<sup>(26,27)</sup>

In crossover studies with oral estrogen–progesterone hormone replacement (0.625 milligrams conjugated estrogens per day), flax was as effective as hormone replacement therapy in improving mild menopause symptoms. This demonstrates a mild estrogenic effect.<sup>28</sup> At 10 grams per day, it has been shown to lengthen the luteal phase in premenopausal women with normal cycle, demonstrating an anti-estrogen effect.<sup>(29)</sup>

Specifically, enterodiol and enterolactone can affect hormone receptors in breast tissue. Among women who did not regularly consume soy foods, a high dietary intake of lignans has been found to be associated with a reduced risk of breast cancer. The benefit was limited to women with estrogen receptor positive (ER+) and progesterone receptor positive (PR+) tumors, suggesting that the biologic effects of lignans derive in part from their effects on cell hormone receptors.<sup>(30)</sup>

Enterodiol and enterolactone also stimulate the synthesis of sex hormone binding globulin.<sup>(31)</sup> SHBG binds sex hormones, reducing their circulation in the bloodstream. Low blood levels of SHBG have been found in postmenopausal women with breast cancer.<sup>(32)</sup>

#### FLAX AND HORMONE METABOLISM IN MEN

Based on the scientific research, it appears flax lignans may also be important in inhibiting uncontrolled cell proliferation in the prostates of men.

The mammalian lignans inhibit the activity of aromatase, an enzyme involved in the production of estrogens,<sup>(33)</sup> and decreased aromatase activity may be one way in which lignans protect against breast cancer.<sup>(34)</sup>

However, aromatase enzyme in men converts testosterone to estrogen. Prostate cancer is hormonally a multigenic disease related to absolute estrogen levels as such and relative levels of estrogen to the other sex hormones.<sup>(35)</sup>

Acting as an anti-estrogen, binding free estrogen and inhibiting conversion of testosterone to estrogen are all potentially supportive of normal cellular prostate health.

#### WHAT DOES ALL OF THIS MEAN?

Researchers believe consuming more lignans is beneficial. Authors of a study on phytoestrogens published in *The Lancet* (Oct. 4, 1997) said, "A cultural movement towards increased consumption of phytoestrogen containing foods is taking place, encouraged by magazines and other lay media. Our findings go some way towards providing a rationale for these changes."

Because of the growing scientific evidence for omega-3, high antioxidant, high fiber, phytonutrient-rich foods, doctors who promote wellness might do well to consider recommending to their patients ways to enjoy more flax in their diets.

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