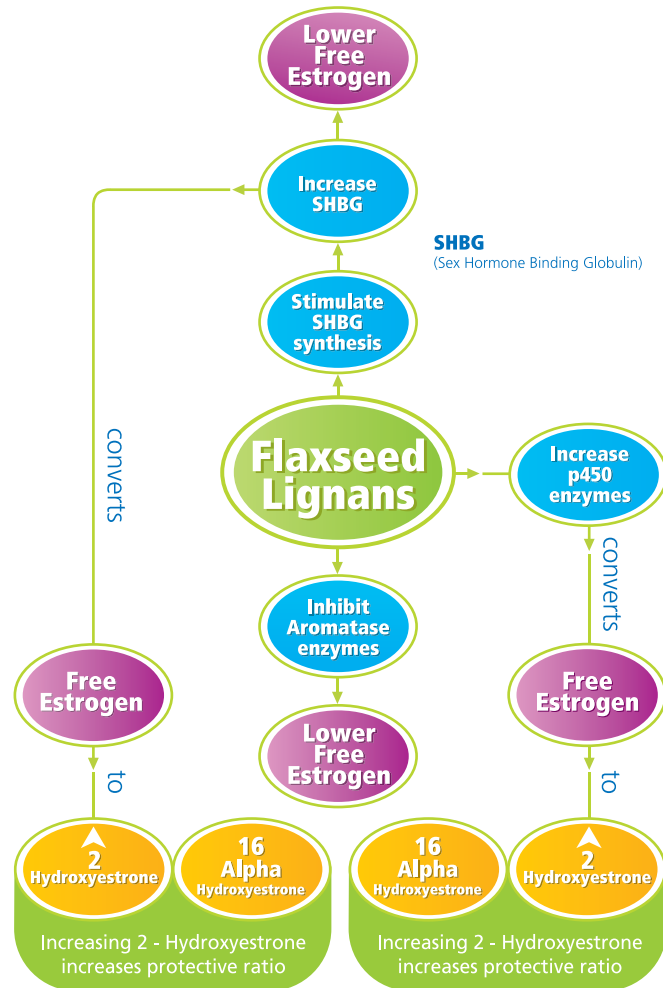


Biochemical Pathways responsible for Flax Lignan's role in altering the hormone ratios to those thought to offer health benefits.



## References

1. Thompson LU, Flaxseed, Lignans and Cancer, In: Thompson LU and Cunnane SC, ed Flaxseed in Human Nutrition 2nd ed. Champaign, IL: AOCS press 2003:194-222.
2. Thompson LU, Robb P, Serrano M and Cheung F Mammalian lignan production from various foods *Nutr Cancer* 16:43-52 1991.
3. Mazur W, Phytoestrogen content in foods. *Baillieres Clin Endocrin Metab* 12:729-742 1998.
4. Thompson LU, Flaxseed, Lignans and Cancer, In: Thompson LU and Cunnane SC, ed Flaxseed in Human Nutrition 2nd ed. Champaign, IL: AOCS press 2003:194-222.
5. Prasad K, Antioxidant activity of secoisolaricresinol diglucoside derived metabolites. *Int J Angiol* 9:220-225,2000.
6. Prasad K, Hydroxyl radical-scavenging property of secoisolaricresinol diglucoside (SDG) isolated from flaxseed. *Mol Cell Biochem* 168: 117-123 1997.
7. Prasad K, Antioxidant activity of secoisolaricresinol diglucoside derived metabolites. *Int J Angiol* 9:220-225,2000.
8. Thompson LU, Li T, Chen J, Goss PE, Biological effects of dietary flaxseed in patients with breast cancer. *Breast Cancer Res Treat* 64:50,2000.
9. Wang L. Mammalian phytoestrogens: enterodiol and enterolactone *J Chromatogr B* 777:289-309 2002.
10. Thompson LU, Flaxseed, Lignans and cancer, In: Thompson LU and Cunnane SC, ed Flaxseed in Human Nutrition 2nd ed. Champaign, IL: AOCS press 2003:194-222.
11. Boccardo F, Lunardi G, Guglielmini P, et al Serul enterolactone levels and the risk of breast cancer in women with palpable cysts. *Eur J Cancer* 40:84-9,2004.
12. Lord RS, Bongiovanni B, Bralley JA., Estrogen metabolism and the diet-cancer connection: rationale for assessing the ratio of urinary hydroxylated estrogen metabolites. *Altern Med Rev* 7:112-29,2002.
13. Haggans CJ, Hutchins AM, Olson BA et al. Effect of flaxseed consumption on urinary estrogen metabolites in postmenopausal women. *Nutr Cancer*. 33:188-195,1999.
14. Haggans CJ, Travelli EJ, Thomas W, et al. The effect of flaxseed and wheat bran consumption on urinary estrogen metabolites in premenopausal women. *Cancer Epidemiol Biomark Prev* 9:719-25,2000.
15. Adlercreutz H, Banwart C, et al. Effect of dietary components, including lignans and phytoestrogens on enterohepatic circulation and liver metabolism of estrogens and on sex hormone binding globulin (SHBG). *J Steroid Biochem* 27:1135-44,1987.
16. Aldercreutz H, Mousavi Y, Clark J et al. Dietary phytoestrogens and cancer: in vitro and in vivo studies. *J Steroid Biochem Mol Biol* 41:331-7,1992.

### WARNING

LignanLife® has not been evaluated in pregnant, lactating or women with breast cancer.

The use of LignanLife® should be based on relevant scientific and clinical data.

**melrose**

Melrose Laboratories Pty Ltd  
4 Redland Drive Mitcham Vic 3132 Australia  
Telephone 61 3 9874 7800  
info@melrosehealth.com.au  
www.melrosehealth.com.au

FSO B14

**melrose**

**LignanLife**®

A wellness product that influences the biomarkers of healthy breast tissue in postmenopausal women

This information is prepared for health care professionals



## Research Supporting the Use of Flax Lignans for Women's Health

One in twelve Australian women will develop unhealthy breast tissue. It more frequently affects postmenopausal women, but many sufferers are unfortunately premenopausal.

Men are also susceptible to unhealthy breast tissue. Although the precise development of unhealthy breast tissue is not known, evidence suggests that estrogens have a direct effect on the preservation of healthy breast tissue.<sup>1</sup>

## Estrogen

Estrogen is critical to women's physical development and functions. Every cell in the body has estrogen receptors and estrogen replenishment is essential for the body to function normally. Because women are exposed to varying levels of estrogen throughout adulthood, maintaining a hormonal balance to enable a healthy lifestyle is a complex challenge.

Estrogen levels are typically high in women during the childbearing years and then fall away through the perimenopausal and postmenopausal years. With inadequate estrogen a woman can experience symptoms such as hot flushes, mood changes and a loss of bone density. On the other hand, with too much estrogen, symptoms can range from PMS to more critical events such as unhealthy breast tissue.

Breast cells contain specific estrogen receptors that are designed like a 'lock' and only the right shaped key will fit the lock. In this case, the key is "free" estrogen. Normally, the body's free estrogen (in the blood) attaches to a breast cell and naturally occurring enzymes cause the breast cell to grow and divide in an orderly manner so that worn out or injured tissue is replaced or repaired. The more estrogen that is available, the more rapid the growth and division of breast cells. If cells duplicate or grow in an abnormal way a mass (lump) may develop.

**LignanLife® has been researched and developed for the preservation of healthy breast tissue. The principal active ingredient is Secoisolariciresinol Digluconate (SDG) obtained from flaxseed. The SDG content is 50mg per tablet.**

## Phytoestrogens — Plant Lignans

Management of estrogen levels with plant phytoestrogens has been a topic of research for a number of years. Isoflavonoids and lignans are two commonly occurring phytoestrogens. Isoflavonoids occur principally in soy whilst lignans occur in most plants. The richest source is in flaxseed (*Linum usitatissimum*), also known as Linseed, with 70-800 times more lignans than any other plant.<sup>2,3</sup>

Flaxseed has been shown to have numerous protective effects in epidemiological, animal and cell studies of breast tissue.<sup>4</sup>

The major lignan in flaxseed is secoisolariciresinol (SDG). When SDG is ingested, it is transformed into the mammalian lignans Enterodiol and Enterolactone by gut bacteria.<sup>5,6</sup> Mammalian lignans are believed not only to have chemoprotective properties, but to be potent antioxidants.<sup>7</sup>

## Flaxseed Lignan Research

Encouraged by results in animal models, Thompson et al conducted a randomized double-blind placebo-controlled trial to determine the effect of flaxseed on 39 women with newly diagnosed breast cancer. Patients received 25 grams of flaxseed, or a placebo, daily for an average of 39 days before surgery. The patients who received the flaxseed had reduced tumor cell proliferation at a rate similar to the effects shown with Tamoxifen®.<sup>8</sup>

Many epidemiological studies have found that women with a high urinary excretion of lignans have lower risk of breast cancer than women who excrete low amounts of lignans.<sup>9,10,11</sup> The protective effects of flaxseed lignans on breast cancer may be due to several mechanisms including the ability to interfere with estrogen metabolism. Experiments over the past 20 years have shown that a large part of the cancer inducing effect of estrogen involves the formation

of antagonistic metabolites of estrogen, especially 16-alpha-hydroxyestrone. **Other metabolites, such as 2-hydroxyestrone offer protection.**<sup>12</sup> Studies in both peri- and postmenopausal women have shown that daily consumption of ground flaxseed increased 2-hydroxyestrone.<sup>13,14</sup>

Mammalian lignans have a similar structure to estrogen which means that they can fit the same lock on the breast cells and block the entry of free estrogen. It is thought that the mammalian lignans increase the naturally occurring enzyme that directs the break-down of free estrogen to the 2-hydroxyestrone.

In addition, observation and in vitro studies suggest lignans may stimulate the synthesis of sex hormone binding globulin (SHBG), a protein that binds more than 95% of steroid sex hormones circulating in the body. An increase in SHBG would lead to lower free estrogen concentrations, providing a chemoprotective effect.<sup>15,16</sup>

The pathways showing the possible effect of lignans on the production of SHBG and especially 2-hydroxyestrone is illustrated overleaf.

