

Flax Lignans

*What You Need to Know About This
Emerging Ingredient*

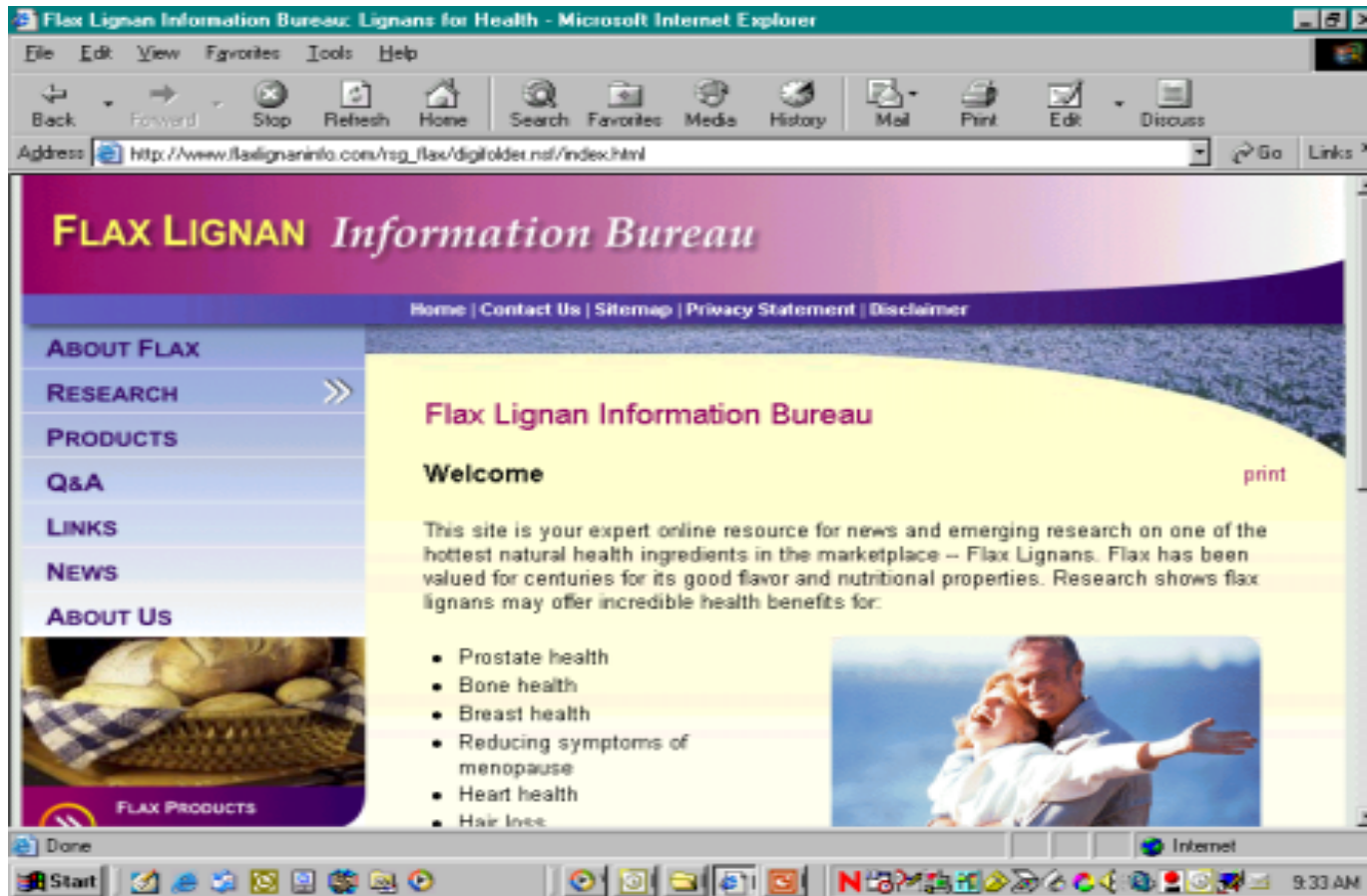


By Jocelyn Mathern, R.D.
Flax Lignan Information Bureau
Advisory Board Member
Natural Products Expo West
March 19, 2005

Outline

- The story behind flax lignans
- Health benefits and science
- Where to find flax lignans and how to get the benefits
- Where to go for more information
- Questions

New Consumer Education Resource



The screenshot shows a Microsoft Internet Explorer browser window displaying the website http://www.flaxlignaninfo.com/rsg_flax/digitolder.nsf/index.html. The website has a purple and yellow color scheme. The main header reads "FLAX LIGNAN *Information Bureau*". Below the header is a navigation bar with links: Home | Contact Us | Sitemap | Privacy Statement | Disclaimer. A left sidebar contains a menu with the following items: ABOUT FLAX, RESEARCH (highlighted with a double arrow), PRODUCTS, Q&A, LINKS, NEWS, and ABOUT US. Below the menu is a section titled "FLAX PRODUCTS" with an image of bread. The main content area features the heading "Flax Lignan Information Bureau" and a "Welcome" message. The text states: "This site is your expert online resource for news and emerging research on one of the hottest natural health ingredients in the marketplace – Flax Lignans. Flax has been valued for centuries for its good flavor and nutritional properties. Research shows flax lignans may offer incredible health benefits for:". A "print" link is visible to the right of the text. Below the text is a bulleted list of health benefits: Prostate health, Bone health, Breast health, Reducing symptoms of menopause, Heart health, and Hair loss. To the right of the list is a photograph of a man and a woman embracing outdoors. The browser's taskbar at the bottom shows the Start button, several application icons, and the system tray with the time 9:33 AM.

FLAX LIGNAN *Information Bureau*

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RESEARCH >>

PRODUCTS

Q&A

LINKS

NEWS

ABOUT US

FLAX PRODUCTS

Flax Lignan Information Bureau

Welcome [print](#)

This site is your expert online resource for news and emerging research on one of the hottest natural health ingredients in the marketplace – Flax Lignans. Flax has been valued for centuries for its good flavor and nutritional properties. Research shows flax lignans may offer incredible health benefits for:

- Prostate health
- Bone health
- Breast health
- Reducing symptoms of menopause
- Heart health
- Hair loss

Done

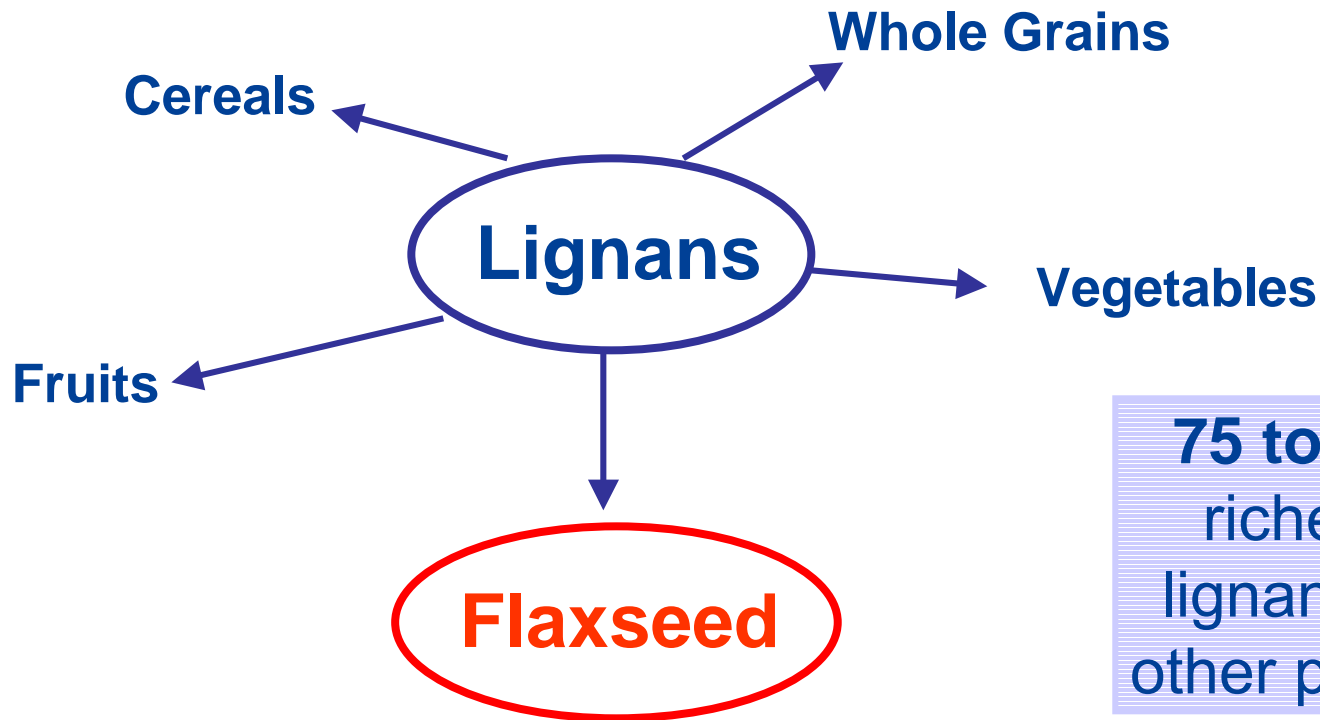
Start

Internet

9:33 AM

The Story Behind Flax Lignans

- Lignans are phytonutrients found widespread in plant foods



75 to 800 times
richer in plant
lignans than any
other plant source!

Lignan Content of Selected Foods

SECO content of selected foods -- μg / 100 grams dry weight

Oil, seeds and nuts

Flaxseed	370,000
Peanut	298
Caraway seed	221

Fruits

Banana	3040
Guava	700
Cantaloupe	184

Berries

Strawberry	1500
Cranberry	1054
Red raspberry	139

Legumes

Soybean	273
Kidney bean	153

Grains and cereals

Barley	58
Rye	47
Oats	13

Vegetables

Broccoli	414
Garlic	379
Carrot	192

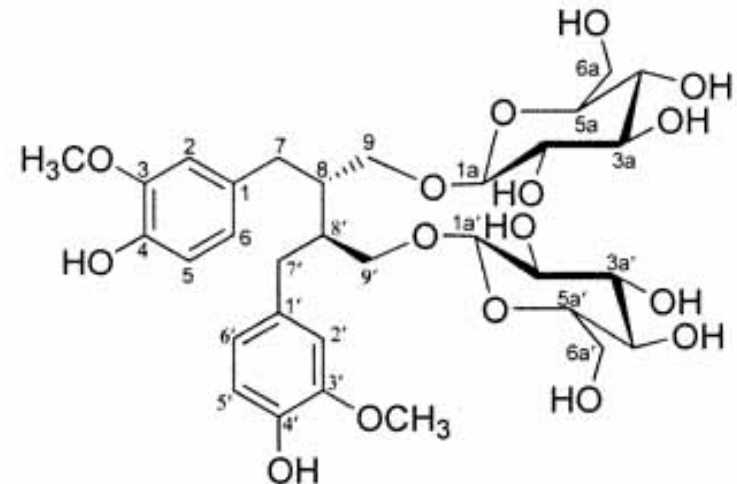
Source: Adapted from Mazur W. Bailliere's Clin Endocrin Metab. (1998) Vol 12 pp.729-42.

The Story Behind Flax Lignans

- High lignan diet is linked with health benefits
 - Lower risk of certain cancers
 - Lower risk of heart disease
- Most Americans do not get enough lignans
 - < 1 mg / day
 - Processing of foods
 - Low fruit, vegetable and whole grain intake
- Research suggests we need more to achieve health benefits

Lignan Basics

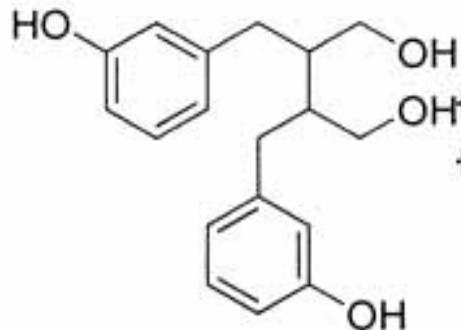
- Different types of lignans:
- **Plant lignans:** as present in the plant
 - The main flax lignan is Secoisolariciresinol diglucoside **(SDG)**
 - When eaten plant lignans get converted into “mammalian lignans” in the colon



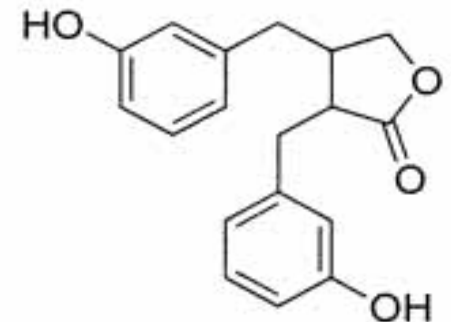
1: Secoisolariciresinol diglucoside (SDG)

Lignan Basics

- Mammalian lignans
 - Made from plant lignans by bacteria in the colon
 - The mammalian lignans are **Enterodiol** and **Enterolactone**
 - Bio-active forms present in the body

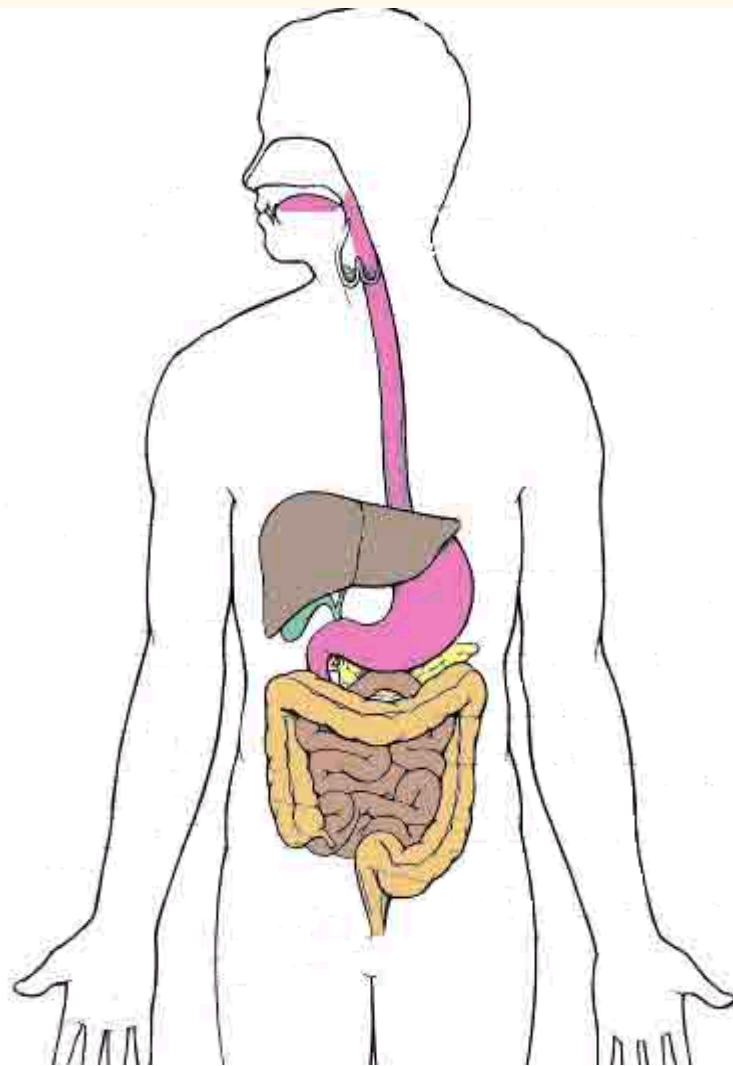


2: Enterodiol



3: Enterolactone

Formation of Mammalian Lignans



Eat ground flax

Flax lignan supplement

SDG

SECO (aglycone)

Enterodiol (END)

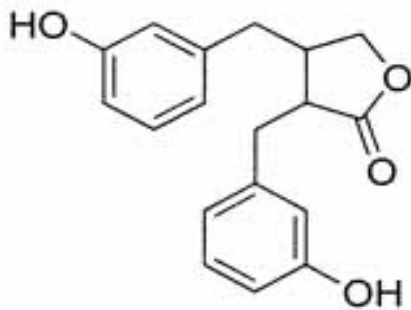
Enterolactone (ENL)

How Lignans Work in the Body

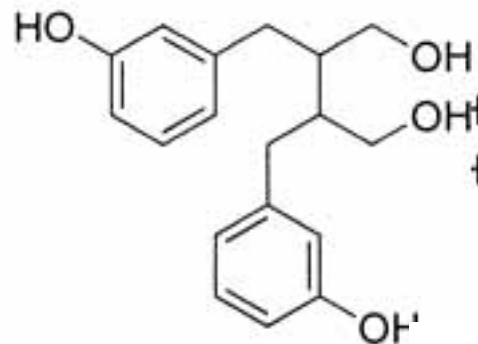
- Phytoestrogens – balancing effects on hormone levels
- Antioxidants – quench free radicals
- Interfere with enzymes involved in hormone metabolism

Lignans are Phytoestrogens

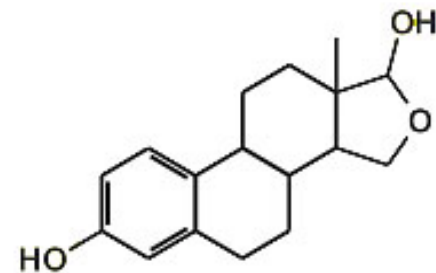
Mammalian Lignans



3: Enterolactone



2: Enterodiol

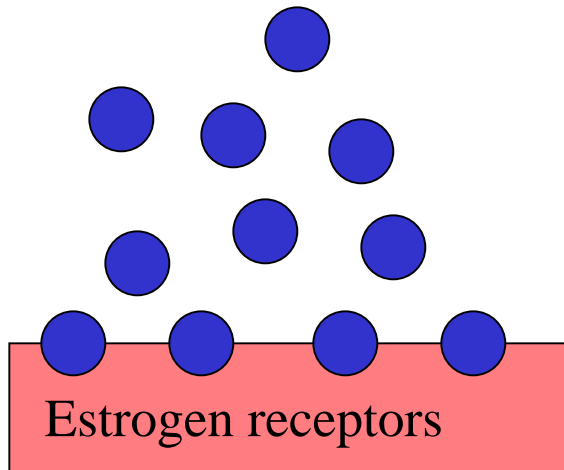


Estradiol

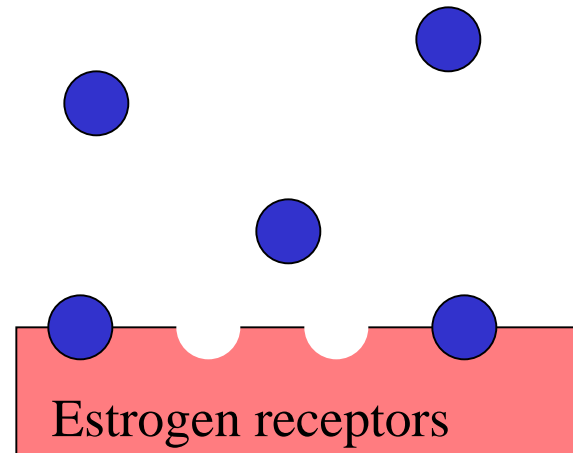
Human estrogen

Lignans Have Weak Estrogenic Effects

Pre-menopause



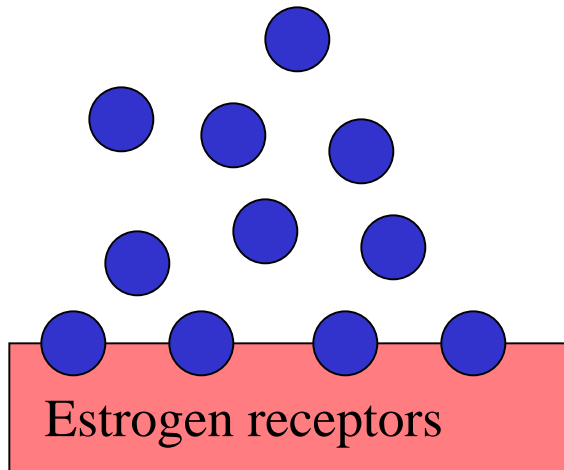
Post-menopause



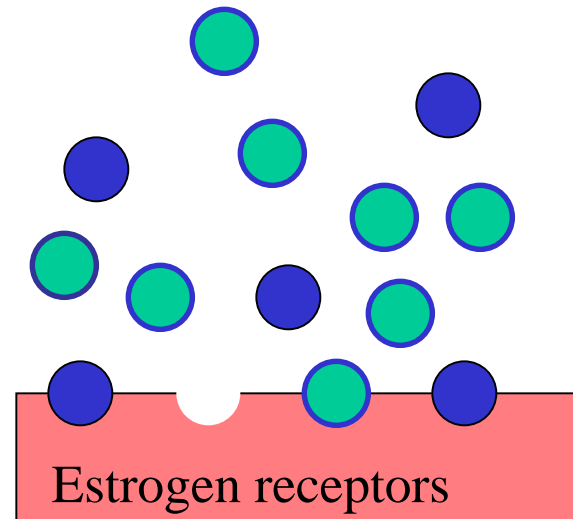
● estrogen

Lignans Have Weak Estrogenic Effects

Pre-menopause



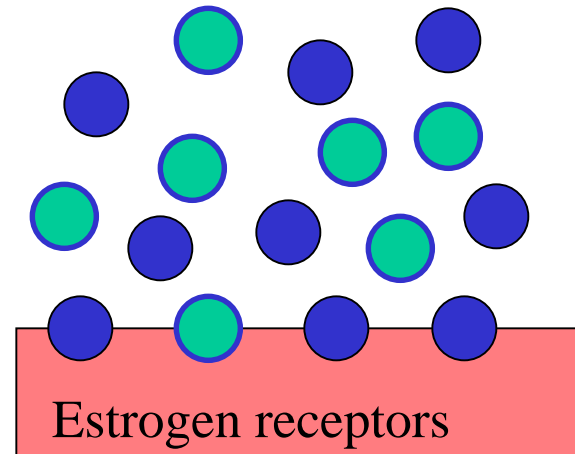
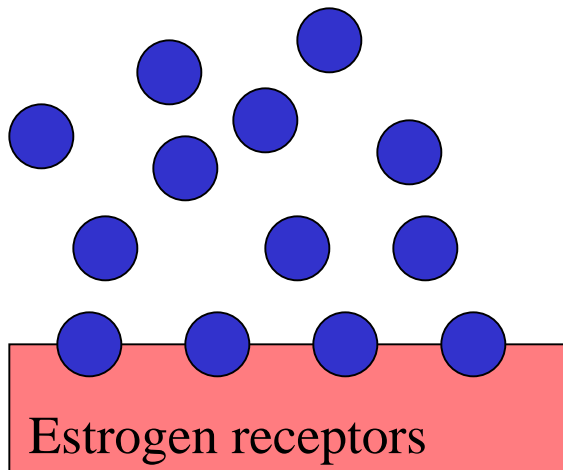
Post-menopause



● estrogen

● lignans

Lignans Have Weak Estrogenic Effects



 lignans

 estrogen

Lignans are Strong Antioxidants

“SDG, Enterodiol and Enterolactone are better antioxidants than vitamin E”

Prasad (2000) *Int. J. Angiology.* 9:220-25.

Relative antioxidant activity	
Vitamin E	1
SDG (flax lignan)	1.27
SECO (aglycone)	4.86
Enterodiol (mammalian lignan)	5.02
Enterolactone (mammalian lignan)	4.35

Lignans Inhibit Enzymes

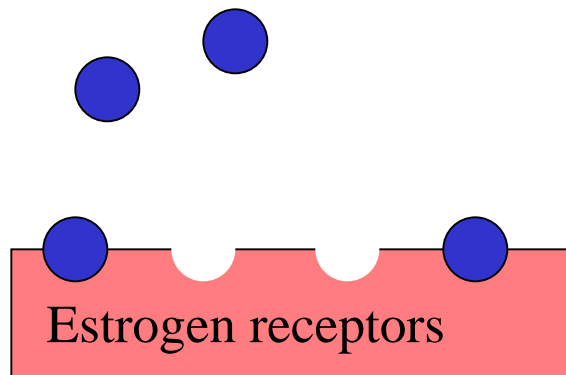
- Inhibit enzymes involved in hormone metabolism
 - **5 alpha-reductase**: involved in testosterone metabolism
 - **Aromatase**: key enzyme in the body involved in estrogen synthesis

Health Benefits of Lignans

- 
- **Women**
 - Menopause
 - Breast health
 - **Men**
 - Prostate health
 - **Cardiovascular Health**
 - **Hormone Related Conditions**
 - Hair Loss
 - Acne

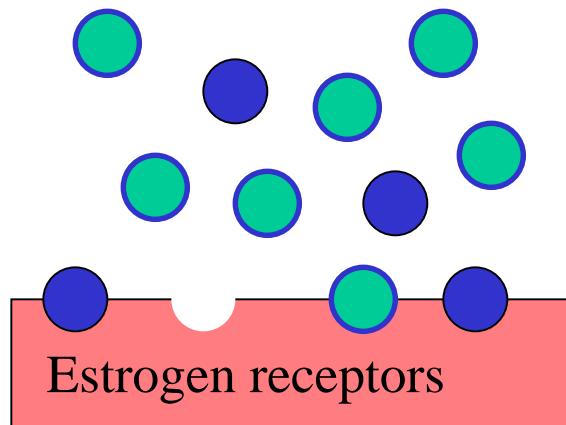
Lignans and Women's Health

❖ Menopause



- Loss of estrogen
- Cessation of periods
- Complaints
- Loss of protective effects (bone, heart)

Lignans and Menopause



Flax lignans may help relieve menopausal symptoms by their estrogenic effects.

 lignans

 estrogen

Lignans and Menopause

- Flaxseed was as effective as hormone replacement therapy in reducing mild menopausal symptoms in menopausal women.
 - Lemay et al (2002) *Obstet Gynecol* 100(3): 495-504.
- HRT has been shown to increase risk of breast cancer and is unlikely to benefit heart
- Millions of women looking for alternatives

Lignans and Breast Health

- Populations who eat diet rich in lignans have lower risk of breast cancer
- Animal models of breast cancer:
 - Purified SDG reduced tumor size and number of breast tumors
- Human studies:
 - Studies of women with and without breast cancer indicate that flax lignans may have protective benefits against breast cancer

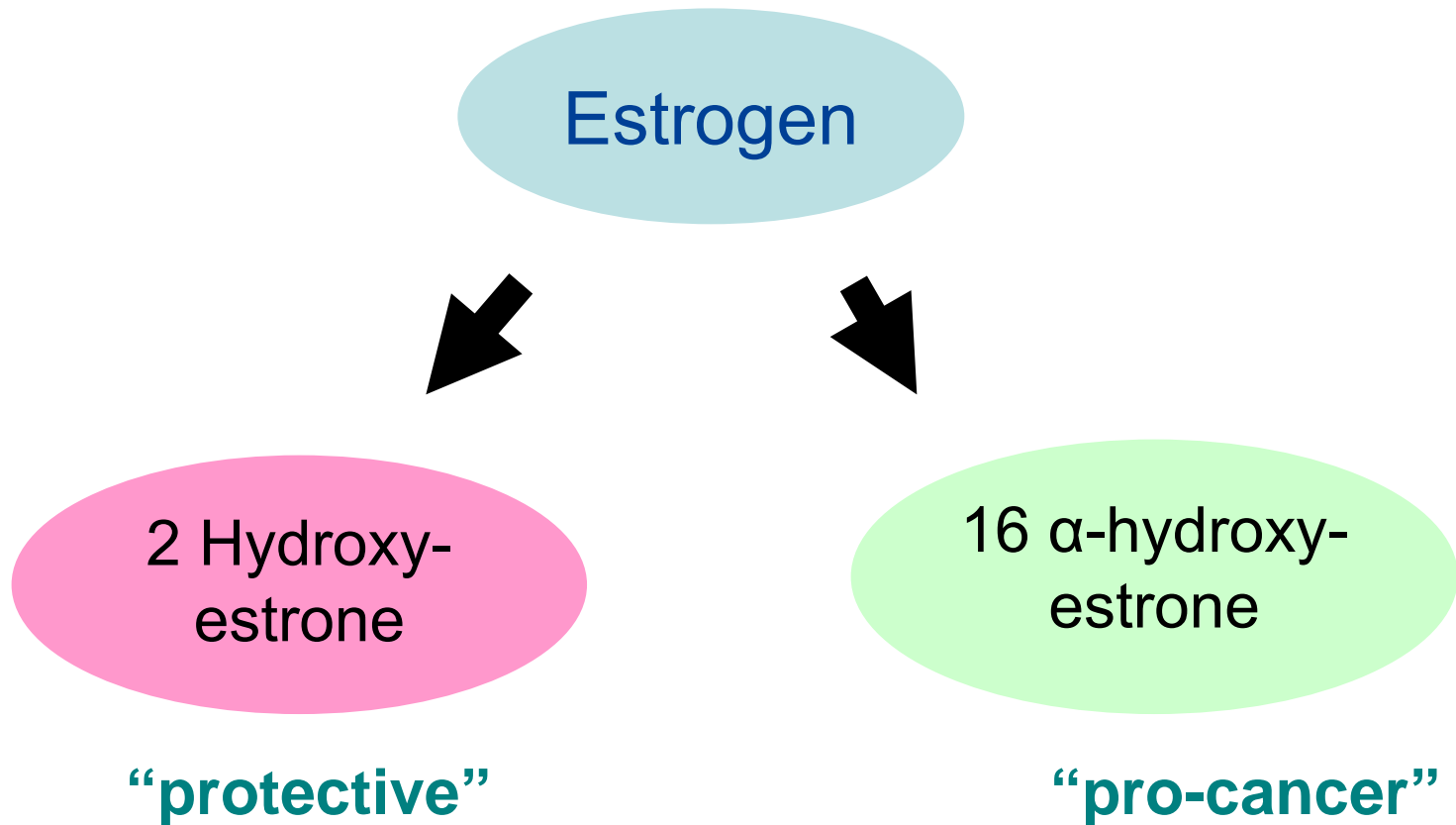
Lignans and Breast Health

- Women with newly diagnosed breast cancer ate 2 ½ tablespoons of flaxseed per day in a muffin
 - Reduced tumor cell growth
 - Effects were similar to tamoxifen (a breast cancer drug)
 - No significant side effects were reported

Thompson (2000) *Breast Cancer Res Treat.* 64:50.

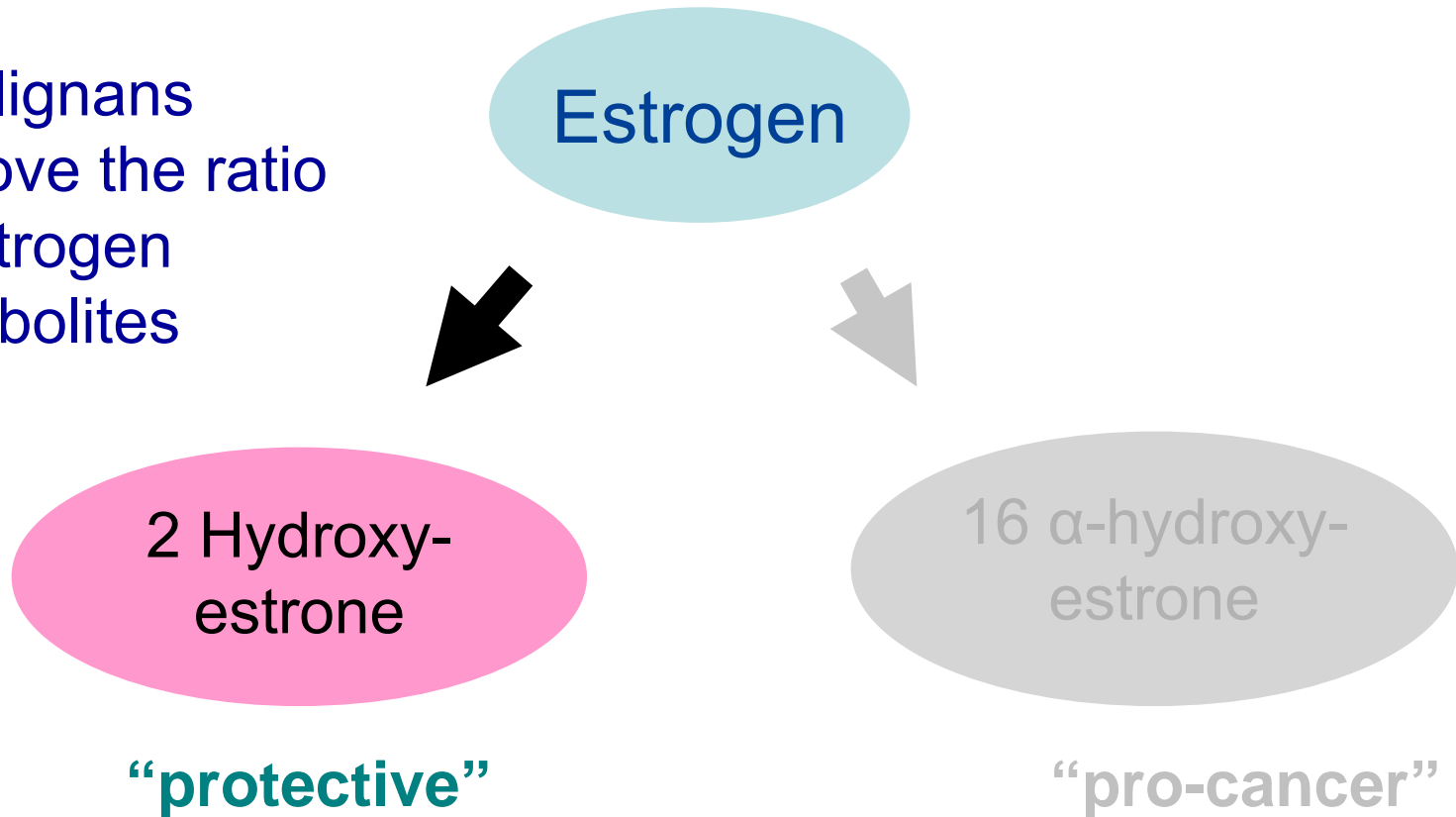


Lignans and Breast Health



Lignans and Breast Health

Flax lignans
improve the ratio
of estrogen
metabolites



Lignans and Breast Health

- In short term studies women who ate between 1 and 2 ½ rounded tablespoons of flaxseed a day had improved estrogen metabolism
- Suggests a protective effect against breast cancer

Haggans et al (1999) *Nutr Cancer*. 33:188-195.

Haggans et al (2000) *Cancer Epidemiol Biomarkers Prev*. 9:719-25.

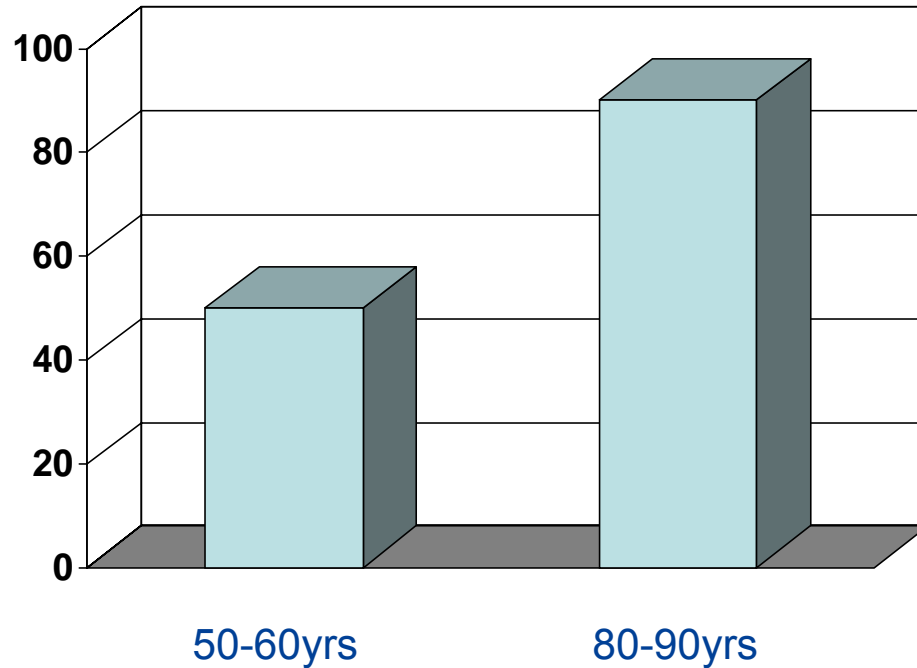
Brooks et al (2004) *Am J Clin Nutr*. 79:318-25.



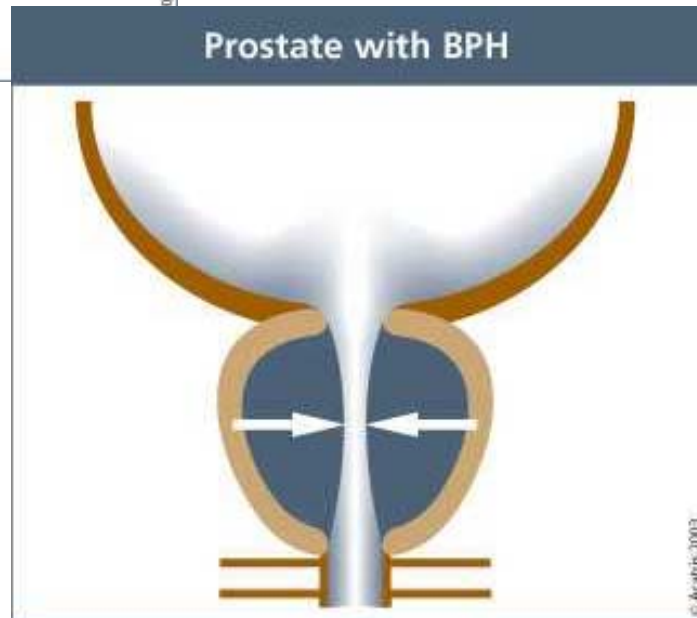
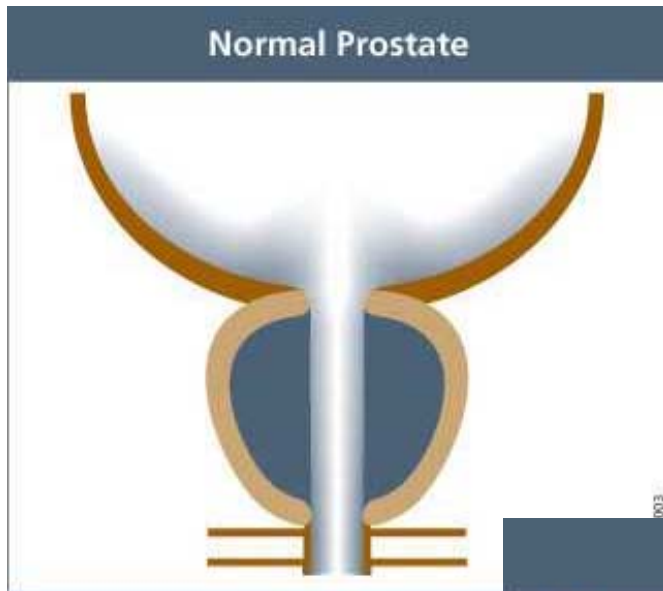
Lignans and Men's Health



- Prostate Enlargement (BPH)



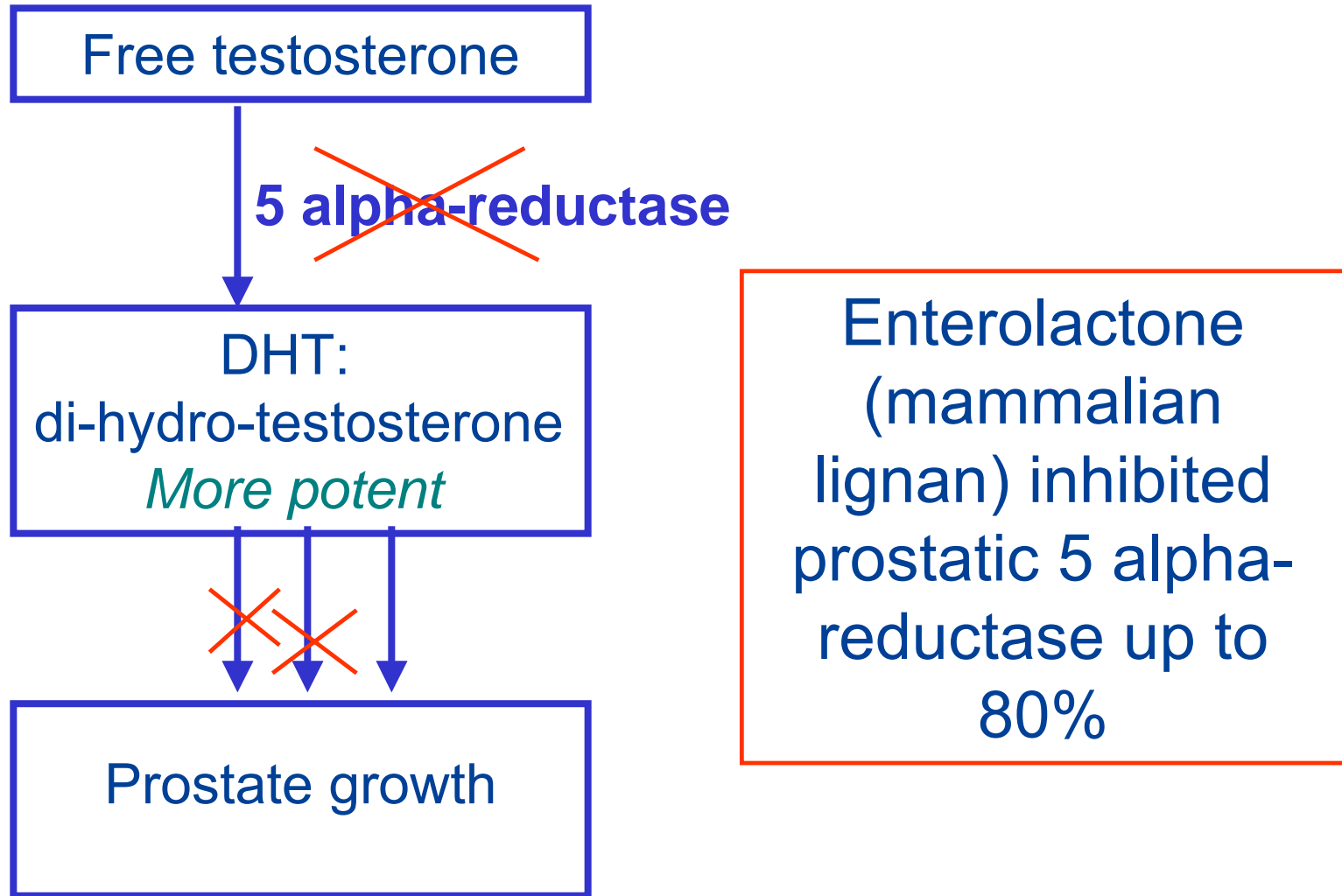
% of men with evidence of enlarged prostate.



❖ May lead to urinary flow symptoms:

- frequency
- urgency
- pain
- nocturia

Prostate Growth – Mechanism of Action



Flax Lignans and Prostate Health

- Research at Duke University
- Men undergoing repeat prostate biopsy were given 3 Tablespoons flaxseed plus low fat diet for 6 months.
 - Decreased growth rates of benign prostate tissue
 - Decreased PSA levels

Demark-Wahnefried. (2004) *Urology*;63:900-904.

Flax Lignans and Prostate Health

- Research at Duke University
- Men with prostate cancer were given 3 Tbsp flaxseed per day plus low fat diet
 - Decreased cancer cell growth
 - Reduced other markers of cancer risk

Demark-Wahnefried. (2001) *Urology*;58:47-52.

Flax Lignans and Cardiovascular Health

- Over 64 million Americans have some form of cardiovascular disease.
- Higher levels of lignans in the blood of men is linked with less acute coronary events
- In women, higher intake of lignans has a protective effect on the risk of atherosclerosis



Flax Lignans and Cardiovascular Health

- Lignans are strong antioxidants
- Purified SDG (main flax lignan)
 - Reduced plaque build-up
 - Lowered total and bad cholesterol

Prasad (1999) *Circulation*. 99:1355-1362.

Flax Lignans and Cardiovascular Health

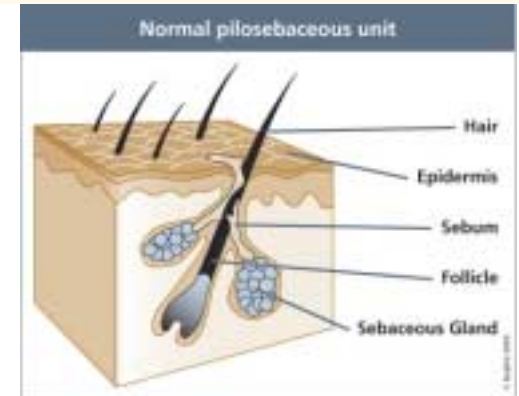
- Lignans may reduce stress response
- Postmenopausal women with vascular disease were given 3 different flax diets
- The flaxseed diet with highest level of lignans reduced high blood pressure and stress hormones in response to stressful tasks



Spence *et al.* (2003) *J Amer Coll Nutr* 22:494-501.

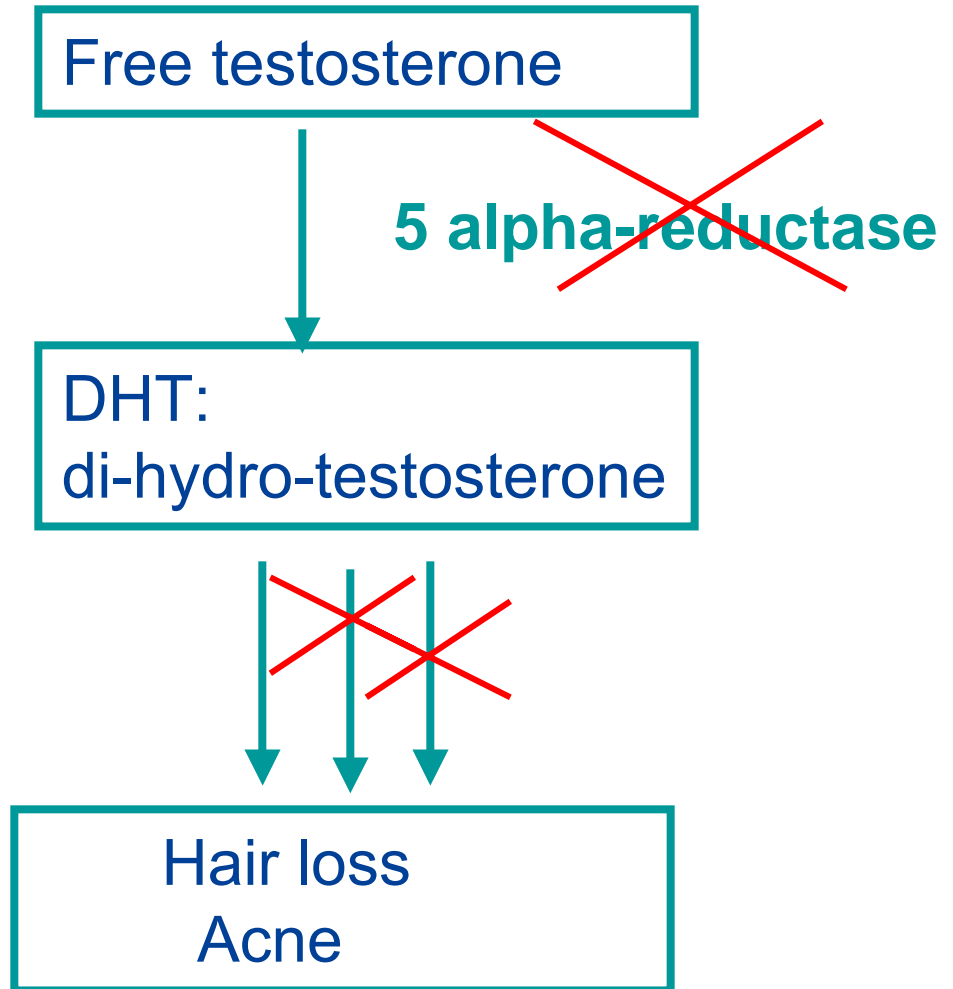
Hormone related conditions

- Hair loss
- Acne
- Hormones are major causes of both
 - **DHT** (potent form of testosterone) initiates a miniaturization of sensitive hair follicles
 - Elevated androgens (**DHT**) plays a role in acne by causing excess sebum production



Hormone related conditions

Lignans may influence the metabolic process involved in hair loss and acne



How Much Do You Need?

- Currently no set guidelines for lignan intake
- Human clinical trials used between 1 and 3 tablespoons of flaxseed safely
- Providing approximately **50 to 150 mg of SDG** (main flax lignan)

Where Do You Find Flax Lignans?

- Flaxseed is available in many forms
 - Ground Flaxseed
 - Whole Flaxseed
 - Flaxseed Oil
 - Capsules and Tablets



Where Do You Find Flax Lignans?

- Not all flax ingredients are created equal
- Whole seeds cannot be digested
- Lignan content of flaxseed varies widely from 0.5 % to 1.5 %
- 50 – 150 mg SDG per 1 rounded tablespoon flaxseed
- Lignans are concentrated in the fibrous hulls of flaxseed

Flax Oil Facts

- Flax oil does not contain lignans
- Traditional “high lignan” flax oils and softgels widely available
- Typically do not guarantee SDG
- Testing has revealed a wide range of lignan content
- Flax particulate settles to bottom



Traditional High Lignan Flaxseed Oil

Supplement Facts

Serving Size 1 Softgel

	Amount Per Serving	% Daily Value
Calories	10	
Calories from Fat	10	
Total Fat	1 g	< 2%
Flaxseed Oil	980 mg	*
Lignan Rich Fraction	20 mg	

1 soft-gel =
0.2 mg SDG

Percent Daily Values are based on a 2,000 calorie diet.
Daily Value not established

Flax Oil Facts

- Simple truth about flax oil
 - Great source of omega-3 fatty acids
 - May not provide therapeutic levels of SDG (main flax lignan)
 - The only way to know is to check the label

What to look for in the store



- New generation flaxseed oil with the amount of lignans stated on the label

Cholesterol	0 mg	0%
Sodium	0 mg	0%
Total Carb	0 g	0%
Protein	0 g	0%

SDG Lignans 30 mg*
(*Dihomo-~~g~~gammalinolenic acid*)
from 150 mg LinumLife™ Extra

*Percent Daily Values are based on a 2,000 calorie diet.

What to look for in the store

- **Flaxseed** – ground or grind at home
- Research suggests you need 1 – 3 Tablespoons to reach benefits found in clinical studies
- 1 Tablespoon provides 50 – 150 mg SDG



What to look for in the store

- Flax lignan supplements



SUPPLEMENT FACTS

Serving Size 1 Capsule

Amount % DV

Lignan (from 200 mg LinumLife™ Extra,
flaxseed extract standardized at 20%
SDG, *Linum usitatissimum*)

40 mg *

* Daily Value not established

New Consumer Education Resource

- Communicates the importance of a diet rich in lignans
- Delivers science and latest research
- Educates consumers on different lignan-rich flax products
- Tips for purchasing and how to read product labels

- Latest research for men and women

The screenshot shows a Microsoft Internet Explorer browser window displaying the Flax Lignan Information Bureau website. The address bar shows the URL: http://www.flaxlignaninfo.com/tsg_flax/digifolder.nsf/index.html. The website has a navigation menu on the left with categories: RESEARCH (expanded to show 'For Men and Women', 'For Men', and 'For Women'), PRODUCTS, Q&A, LINKS, NEWS, and ABOUT US. Below the menu is a 'FLAX PRODUCTS' section with a right-pointing arrow. The main content area features two articles. The first article is titled 'Men and Women' and has the sub-heading 'Lignans provide benefits for all'. The text states: 'Lignans can provides benefits for both men and women. The conditions that men and women have in common are heart health, hair loss and acne. Please click on the links below to learn more.' To the right of the text is a photograph of an older man kissing a woman on the cheek. A 'print' link is visible in the top right corner of the article. The second article is titled 'Cardio Health' and has the sub-heading 'More than 70 million Americans suffer from some form of cardiovascular disease, and although recent medical and health advancements have decreased the incidence of fatalities from cardiovascular disease, it remains a very real concern and many men and women are searching for safe and natural alternatives to maintain cardio health.' To the left of the text is a photograph of a man and a woman walking outdoors. The browser's status bar at the bottom shows 'Done' and 'Internet', and the Windows taskbar at the very bottom shows the Start button, system tray icons, and the time '9:34 AM'.

- Products that contain flax lignans

Flax Lignan Information Bureau: Lignans for Health - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss

Address http://www.flaxlignaninfo.com/tsq_flax/digifolder.nsf/index.html Go Links

RESEARCH >>

PRODUCTS

Q&A

LINKS

NEWS

ABOUT US

Lignan Rich Flax Products

Which product is best for you? [print](#)

Lignans can help us protect our health. Different products contain varying amount of lignans. But which one would fit best with your lifestyle? On this page you will find a few examples of products that contain lignans.

Flax Lignan Intake

Currently, there are no set nutrition guidelines for lignan intake, but science and research gives us some indication. Human clinical trials studying lignans for health have used 5, 10 and 25 grams of flaxseed per day, although some studies have safely used larger amounts (30 and 40 grams). One rounded tablespoon of flaxseed is equal to about 10 grams. This amount provides approximately 50 to 150 mg of lignans according to the Flax Council of Canada. Although this is a wide range, commercial ingredients that are standardized for lignan content will allow manufacturers to add a **daily intake of 50 mg of lignans** to their products more conveniently.

Flaxseed

Not all flax ingredients are created equal when it comes to lignan content. According to the Flax Council of Canada, flaxseed

search

Done Internet

Start 9:37 AM

- Answers to frequently asked questions

Flax Lignan Information Bureau: Lignans for Health - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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Address http://www.flaxlignaninfo.com/rsg_flax/digi/older.nsf/index.html Go Links

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- ABOUT FLAX
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Q&A

Questions and Answers print

1. What are flax lignans?

Lignans are phytochemicals widely distributed in the plant kingdom. They can be found in most unrefined grains, legumes, vegetables and fruits. Flaxseed has been recognized as the richest source of dietary plant lignans and contains from 75 to 800 times more than any other plant source.

The major lignan in flaxseed is secoisolariciresinol-diglucoside (SDG). SDG is converted into two other types of lignans in your intestines. These lignans (enterodiol and enterolactone) promote the beneficial health effects.

2. How do flax lignans work?

FLAX PRODUCTS

Done Internet

Start 4:50 PM

Summary

- Lignans (SDG) are an important flax component -- emerging health ingredient
- 50 mg SDG per day is safe and tested daily dose
- Consumers can get lignans:
 - Flaxseed, ground
 - Flax oil with standardized lignans
 - Flax lignan supplements
- Flax Lignan Information Bureau

Thank you for your attention

QUESTIONS?