This monograph was prepared by The Ottawa Integrative Cancer Centre (OICC), in collaboration with the Complementary Medicine Education and Outcomes (CAMEO) Research Program. It is part of a series of monographs being developed to share results of a review of the research evidence related to common therapies and products used within cancer patient care.

The following monograph is designed to summarize evidence-based research and does not advocate for or against the use of a particular therapy. Every effort is made to ensure the information included in this monograph is accurate at the time it is published.

Please note that this monograph does not include an exhaustive list of all potential adverse events; individuals may experience unique side effects. The information in this monograph should not be interpreted as medical advice nor should it replace the advice of a licensed health care provider. Prior to using a new therapy or product, always consult a licensed health care provider.

For the safe use of natural health products, please consider the following:

- Consult a licensed health care provider prior to using a natural health product and make a plan to monitor its effectiveness and any side effects. This is particularly important for pregnant or breast-feeding women and people with serious medical conditions.
  - To help prevent interactions with your prescribed medication, ensure your health care provider is aware of any drugs or natural health products you may be using. Make sure to note all natural health ingredients listed in compound products.
  - Read and follow all instructions on the product label.
- If purchasing natural health products in Canada, look for Health Canada approved products. Look for Natural Product Number (NPN) or Homeopathic Medicine Number (DIN-HM) on the label to identify licensed products. Avoid internet pharmacies, as the quality of products cannot be guaranteed and products might not be licensed for sale through Health Canada. For more information, visit http://www.hc-sc.gc.ca/dhp-mps/prodnatur/about-apropos/cons-eng.php

Please note: While the aim was to draw from the most extensive research, in some circumstances the information used was limited by the selection and caliber of available research studies. Full references are available in the corresponding full-length monographs found on the CAMEO website.

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FLAX

Proper Name
Linumusitatissimum

Common Name
Flax,flaxseed, linseed

Related Terms
***Lignans**: phenolic compounds including enterolactone (ENL) and enterodiol (END) that are produced by the metabolism of flax by bacteria in the gut; they are thought to be responsible for anti-cancer effects and possible hormone modulating effects of flax.*
***Secoisolariciresinoldiglycoside (SDG):** a specificlignan precursorcontained in flaxseed.*

Common Uses in Cancer Care
Treatment of hot flashes
Prevention ofbreast cancer development
Prevention of breast cancer recurrence
Inhibition oftumor growth

Route of Administration
Oral

Mechanism of Action
Anti-proliferative, pro-apoptotic effects; reduces HER2 expression
Weak aromatase inhibitor;
Some evidence suggests that flax may be a weak estrogen receptor agonist resulting in a net decrease in the activity of endogenous estradiol.

Clinical Evidence related to Effectiveness for Hot Flashes
Based on 1 uncontrolled study, ground flaxseed at a dose of 40g (4 tbsp) per day may decrease hot flash scores by up to 50% within 6wk(1). The same study also reported a significant improvement in the impact of hot flashes on overall quality of life ($p<0.001$). Based on 1 RCT utilizing a low dose of flaxseed (7.5g), there was an approximate 30% decrease in hot flash frequency, but this was not significantly different from placebo(2).

Clinical Evidence related to Effectiveness forPrevention of Breast Cancer

Flax may possess anti-tumor effects. One uncontrolled trial found that 50mg per day of SDG, a metabolite of flaxseed, resulted in significant decreases in Ki-67 (a marker of cell proliferation), and reduced the percentage of women with atypical cells from 62% to 42% ($p<0.035$) (3).

Higher dietary intake of lignans(≥5.355mg/d) has been associated with a 19% reduction in the risk of developing breast cancer (4). One prospective study showed no association between flaxseed intake and risk of breast cancer related death (5).

Clinical Evidence related to Effectiveness for Prevention of Recurrence

Based on 1 RCT, consumption of 25g flaxseed per day (50mg SDG) for 32 days prior to surgery for removal of primary breast cancer was found to show the following benefits on markers of tumor proliferation, as measured through tumor biopsy before and after flax supplementation(6):
a) increased tumor apoptotic index (+30.7%) compared to +8.0% in the placebo group
b) decreased HER2 expression (-71.0%), compared to +55.0% in the placebo group
c) decreased Ki-67 index (-34.2%), a marker of proliferation, but not in the placebo group.

Based on 1 uncontrolled study including women at increased risk of breast cancer incidence or recurrence, 50mg SDG for 12 months significantly decreased Ki-67 as well as the percentage of women with abnormal cytomorphology (abnormal cells) present in benign (non-tumor) breast tissue (3). The same study also found a non-significant decrease in mammographic density by 6.3% and no change in circulating estradiol.

Clinical Evidence related to Estrogenic Effects

Flax does not have estrogenic effects based on one study in patients with breast cancer (3) and seven studies in healthy women (7-13). Black cohosh had no significant effect on circulating estradiol in breast cancer patients in one study (3), or in five studies in healthy women (7-11). Two studies in healthy women found a decrease in circulating estradiol levels instead, suggesting a reduction in exposure to estrogen associated with flax consumption (12, 13). Flax does not appear to have estrogenic effects on breast tissue (3).

Adverse Events and Side Effects

Adverse events reported by intervention trials were largely gastrointestinal (GI), including: abdominal fullness, flatulence, nausea, and altered bowel habits; however there was no significant difference in the frequency of these between participants receiving flax or placebo(2, 6). One uncontrolled trial reported bloating in 50% of participants, with discontinuation of the intervention in 3 participants due to GI side effects(1).

Interactions with other Therapies, including Drugs and Natural Health Products

There is no human level data describing possible interactions between flaxseed and selective estrogen receptor modulators (SERMs) or aromatase inhibitors. Animal studies show an additive anti-tumor effect

when flax was combined with tamoxifen, with reductions in tumor size and cell proliferation, and increased apoptosis (7-10).

Cautions and Contraindications

None applicable.

Dosing, frequency and length of treatment

25-40mg ground flaxseed per day (2-4 tbsp), intended for long term use.

Disclaimer

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