

UC Berkeley Press Release

New study finds kelp can reduce level of hormone related to breast cancer risk

By Sarah Yang, Media Relations | 02 February 2005

BERKELEY – A type of vegetation that can often be found washed ashore on beaches may soon emerge as a new player in the field of cancer-fighting foods. A new study led by researchers at the University of California, Berkeley, has found that a diet containing kelp seaweed lowered levels of the potent sex hormone estradiol in rats, and raised hopes that it might decrease the risk of estrogen-dependent diseases such as breast cancer in humans.

"This study opens up a new avenue for research leading to cancer preventive agents," said Martyn Smith, UC Berkeley professor of environmental health sciences and co-author of the study. "Kelp is a little studied nutrient, but there's good reason to look at it more closely."

These new results, to be published Feb. 2 in the *Journal of Nutrition*, shine a new light onto the Japanese diet. Prior studies have shown that Japanese women have longer menstrual cycles and lower serum estradiol levels than their Western counterparts, which researchers say may contribute to their lower rates of breast, endometrial and ovarian cancers. Scientists have been searching Asian diets for clues to the lower rates of cancer, with the lion's share of attention being given to soy.

"Brown kelp seaweed makes up more than 10 percent of the Japanese diet," said Christine Skibola, assistant research toxicologist at UC Berkeley's School of Public Health and lead author of the study. "Soy has gotten most of the attention, but our study suggests that kelp may also contribute to these reduced cancer rates among Japanese women."

The researchers say that the type of kelp used in this study, bladderwrack seaweed (*Fucus vesiculosus*), is closely related to wakame and kombu, the brown seaweeds that are most commonly consumed in Japan. Bladderwrack seaweed is the primary form of kelp sold in the United States. They say these study results support the need for more research on wakame and kombu.

Skibola said she began the animal study after obtaining encouraging results from earlier case studies of women with highly irregular menstrual cycles.

"The most profound thing I found was that two women with endometriosis and a lot of menstrual irregularities experienced significant improvement in their symptoms after three months of taking 700 milligrams of seaweed capsules per day," said Skibola. "It reduced much of the pain associated with endometriosis and significantly lengthened the total number of days of their menstrual cycles. In one of these women with high estrogen levels, I also saw a drop in blood estradiol levels from 600 picograms per milliliter down to 90 picograms per milliliter after she included kelp in her diet. That led me to believe it was worth doing further controlled studies on kelp."

For the new study, the researchers randomly divided 24 female rats into three groups. One group was fed a high daily dose of 70 milligrams of dried, powdered kelp for four weeks, while a second group was fed a low daily dose of 35 milligrams. Both groups were compared with a third control group of rats that did not receive kelp. To ensure that all the kelp was eaten, Skibola and study co-author John Curry, a UC Berkeley post-doctoral fellow in molecular and cell biology, sprinkled the powdered kelp onto apple wedges, one of the rats' favorite foods.

The researchers said the experimental doses of kelp consumed by the rats were roughly equivalent to the amount of brown seaweed eaten by people in Japan.

Skibola and Curry took on the task of taking daily vaginal swabs to monitor the rats' menstrual cycles. The researchers found that the rats' estrous cycles increased from an average of 4.3 to 5.4 days for the low dose kelp group, and to 5.9 days for the high dose kelp group. Overall, dietary kelp resulted in a 37 percent increase in the length of the rat estrous cycle.

Studies in humans have linked longer menstrual cycle lengths to lower risk of breast, ovarian and endometrial cancers. "If you have longer cycles, you actually have fewer periods over a lifetime, which means less time is spent overall in the phases where hormone levels and breast and endometrial cell proliferation are at their highest," said Skibola.

During the early part of a woman's menstrual cycle, estradiol levels remain relatively constant. Almost halfway through the cycle, estradiol levels surge, peaking just before ovulation. These cyclic periods of high estrogen, which continues over a span of about 40 years from puberty to menopause,

stimulates the division of breast cells that already have DNA mutations, as well as increases the chances of developing new mutations, factors that may increase one's risk of breast cancer.

To test the impact of dietary kelp on estradiol levels, researchers took baseline blood samples from 19 rats immediately before their low dose diet of kelp began. After just two weeks of eating 35 milligrams a day, estradiol levels were reduced from an average of 48.9 nanograms per liter to 40.2 nanograms per liter. After four weeks, estradiol levels dropped further to 36.7 nanograms per liter.

In a separate test of human ovarian cell cultures, conducted in collaboration with colleagues at UC Davis, dosing with kelp extract led to a 23 to 35 percent decrease in estradiol levels.

"One possibility is that the kelp may be acting as an estrogen antagonist by preventing estradiol from binding with its estrogen receptors," said Skibola. "Our next step is to try to isolate the active compound in kelp that is having this hormone-modulating effect."

She noted that seaweed contains several complex compounds, including polyphenols that are considered antioxidants. Kelp supplements are available in health food stores since they are taken as a source of iodine by people with thyroid conditions. However, the researchers caution against a run on kelp because of these early results, particularly because kelp can accumulate heavy metals.

"People should be careful about excessive kelp intake," said Skibola. "The high levels of iodine and the low levels of heavy metals contained in kelp means that it's not recommended for people who are pregnant, nursing, or who have hyperthyroid conditions."

The researchers say they are working to isolate the active compounds in kelp that affect estradiol levels to avoid the possible toxicity of the iodine and metals. They say there is hope that kelp could eventually be used as an anti-estrogen in the treatment of hormone-dependent cancers if further tests demonstrate its effectiveness in humans.

"It's a study that points to the need for more studies," said Smith, the study co-author. "But this certainly suggests that there are other elements of the Asian diet beyond soy that should be explored."

Other study co-authors are Catherine VandeVoort, a UC Davis associate adjunct professor at the California National Primate Research Center, and Alan Conley, UC Davis associate professor of veterinary medicine.

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