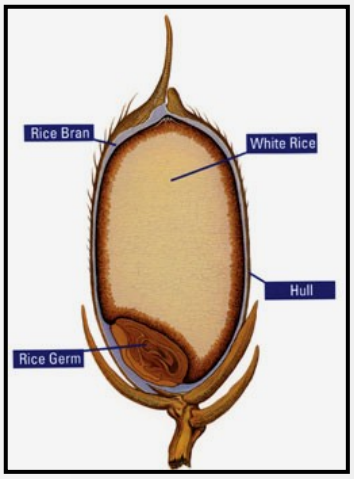
Pennington Nutrition Series
Healthier lives through education in nutrition and preventive medicine
2005 No. 8

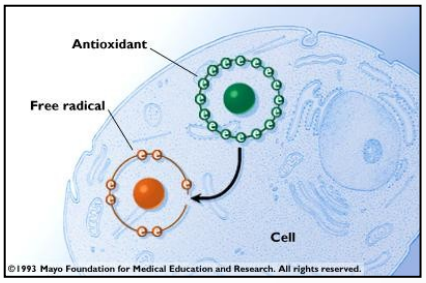
Rice Bran



Rice bran and its oil contain large concentrations of several compounds that could potentially prevent chronic diseases such as coronary heart disease and cancer.

The LSU AgCenter faculty have been actively identifying, extracting, purifying, and evaluating the functionality of several of these compounds.

Their initial studies with rice bran focused on stabilizing lipid degradation that leads to flavor problems. During these studies, it was found that rice bran contained high levels of both tocopherols and tocotrienols, which compromise vitamin E and act as antioxidants in the body. Also, high levels of a mixture of compounds referred to collectively as oryzanol were identified within rice bran.

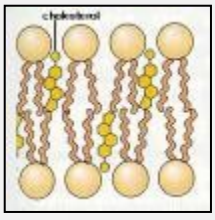


Oryzanol components are complex compounds that can act as an antioxidant, improving solubility in cell membranes and potentially lowering cholesterol by competitive inhibition of absorption and synthesis.

The individual components of the oryzanol can be separated, leading to the identification of 3 major fractions of oryzanol:

- Cycloartenyl ferulate
- 24-methylene cycloartanyl ferulate
- Campesteryl ferulate

Rice Bran and Cholesterol Oxidation



The antioxidant activities of four of the vitamin E and three oryzanol components purified from rice bran were investigated in a chemical model of cholesterol oxidation. All components exhibited significant antioxidant capacity and inhibited cholesterol oxidation. All three oryzanol components had higher antioxidant capability than any of the four vitamin E components.

Rice Bran and Osteoporosis

Osteoporosis affects more than 20 million older Americans, with the number increasing every year. Because of the risk for cancer associated with hormone replacement therapy in women, alternative methods to reduce bone loss are currently being investigated. Studies on rice bran and its role in osteoporosis have been conducted.

Ovariectomized rats (who typically lose substantial bone mineral density after the ovariectomy) were used as a model for postmenopausal osteoporosis. It was found that the addition of a 7% oryzanol rice bran oil (RBO) concentrate to the diets of ovariectomized rats resulted in less bone loss at several bone sites than control rats .

Currently it is not known what the active elements in rice bran oil are that are beneficial in reducing bone loss. The mode of action is unknown. RBO concentrate primarily acts in preserving the cortical bone in the long bones, which is replaced very slowly. Other functional foods, such as soy protein, act on the trabecular bone in the vertebrae, which is replaced rapidly. The possibility of using soy protein with RBO is currently under investigation.

More on Rice Bran

In the past, human consumption of rice bran has been limited, primarily because rice bran spoils quickly, but methods to preserve rice bran have been developed. Additionally, methods for extracting rice oils were developed. Interest in rice bran grew when studies showed that the inclusion of oat bran in the diet lowers serum cholesterol.

In a 10-week controlled feeding trial, rice bran was as effective as oat in lowering blood cholesterol concentrations in men and women with moderately high blood cholesterol concentrations. Rice bran consumption has shown to be successful in reducing cholesterol levels in pigs, hamsters, rats, humans, and non-human primates.

What exact components found in rice bran is (are) responsible for its cholesterol-lowering effects?

Possible suggestions have included:

- The fiber or
- The unsaponifiables present

Unsaponifiables include oryzanol, and the phytosterols campesterol and β-sitosterol.

From Pennington Biomedical Research Center

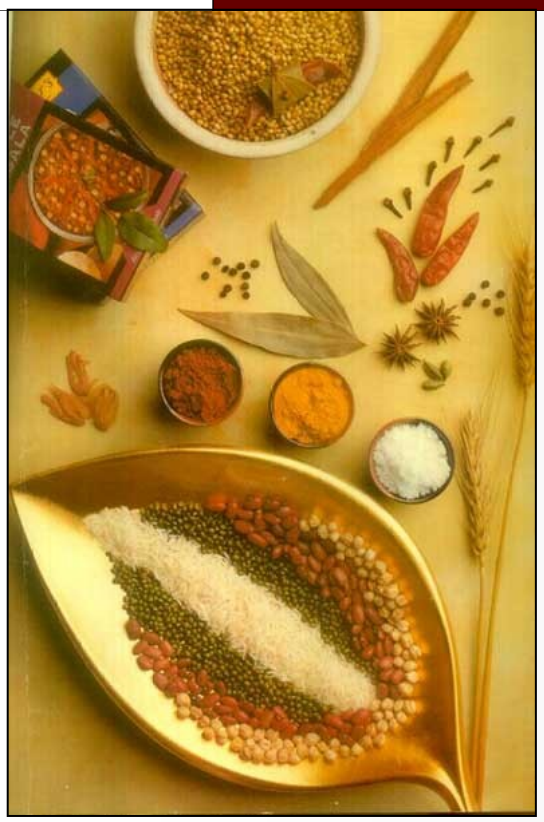
Evidence from 2 controlled human studies at Pennington Biomedical Research Center confirms that it is the RBO, and not the fiber, that lowers blood lipids in men and women with borderline high total cholesterol.

Fiber or Oil?

RBO does contains about 20% saturated fatty acids and approximately equal amounts of oleic and linoleic fatty acids. Other researchers studying RBO also found that its cholesterol lowering ability is due to its unsaponifiable components more so than its fatty acid composition.

A recent study matching the fatty acids of the rice bran oil with a control oil blend showed that the effect of RBO on serum cholesterol concentrations is due to the unsaponifiables present in it and not to its fatty acid profile!

It is believed that RBO containing oryzanol, campesterol and β-sitosterol could become an important functional food with cardiovascular health benefits.



Pennington Nutrition Series, Number 8, 2005

Authors:
Heli Roy PhD, RD
Shanna Lundy, BS
Beth Kalicki
Division of Education
Phillip Brantley PhD, Director
Pennington Biomedical Research Center
Claude Bouchard PhD, Executive Director

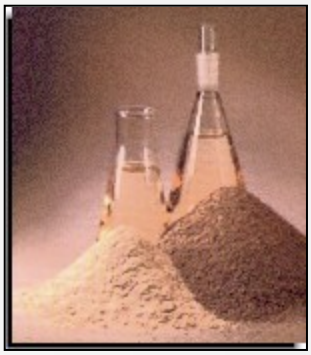
Edited : October 2009

References:

Godber S, Xu Z, Hegsted M, and Walker T. Louisiana Agriculture 45:4, 9-10, 2002

Gerhardt AL, Gallo NB. J. Nutr. 128: 865–869, 1998.

Most MM, Tulley R, Morales S, Lefevre M. AJCN, 81:1, 64-68, 2005.



The Pennington Biomedical Research Center is a world-renowned nutrition research center.

Mission:
To promote healthier lives through research and education in nutrition and preventive medicine.

The Pennington Center has six priorities in research:
1. Clinical Obesity Research
2. Experimental Obesity
3. Functional Foods
4. Health and Performance Enhancement
5. Nutrition and Chronic Diseases
6. Nutrition and the Brain

The research fostered by these divisions can have a profound impact on healthy living and on the prevention of common chronic diseases, such as heart disease, cancer, diabetes, hypertension and osteoporosis.

The Division of Education provides education and information to the scientific community and the public about research findings, training programs and research areas, and coordinates educational events for the public on various health issues.

We invite people of all ages and backgrounds to participate in the exciting research studies being conducted at the Pennington Center in Baton Rouge, Louisiana. If you would like to take part, visit the clinical trials web page at www.pbrc.edu or call (225) 763-2597.

Visit our Web Site: www.pbrc.edu