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HEALTH AND NUTRITION NEWS ABOUT SOY

New Spin on an Old Story: Fiber (soy and other) in the Diet

By Joanne L. Slavin, Ph.D., R.D.

In 300 B.C., Hippocrates noted that coarse brown bread produced a lot of feces and that this was good for us. Since that time we have accepted that roughage, or fiber in the diet, is important, but have a difficult time defining and measuring fiber.

In 2002, the Dietary Reference Intakes (DRIs) for the first time included fiber as a nutrient.[1] Prior to the DRI report, a National Academy of Sciences expert panel was appointed to define fiber.[2] "Dietary fiber" was defined as nondigestible carbohydrates and lignin that are intrinsic and intact in plants. Foods high in dietary fiber include whole grains, legumes, vegetables and fruits. Another class of fiber, "functional fiber" was defined as nondigestible carbohydrates extracted from foods that have beneficial physiological effects in humans. "Total fiber" was then defined as the sum of dietary fiber and functional fiber.

Why the new definitions? The physiological effect of fiber in intact foods is often greater than that found with isolated fiber fractions. In epidemiologic studies, whole grains, legumes, vegetables and fruits are often more protective against diseases than fiber intake alone.[3] Thus, fiber intake may be a marker of a healthy diet, rather than just a nutrient that can be isolated and added back to foods.

Additionally, certain isolated fibers that are chemically measured as dietary fiber, and can make label claims as dietary fiber, have minimal physiological effects. Examples of these would be purified celluloses and other fibers that are not fermented in the large intestine and thus have little effect on gut metabolism.[4] In contrast, non-digestible carbohydrates like inulin and polydextrose have positive physiological effects such as fermentation and enhancement of the gut microflora, but are not considered dietary fibers since the accepted Association of Analytical Chemists fiber methods do not isolate these compounds.[5]

Previously, dietary fiber was divided into soluble and insoluble fiber in an attempt to assign physiological effects to chemical types of fiber. The disparities between the amounts of "soluble" and "insoluble" fiber measured chemically and the magnitude of their physiological effects led the dietary fiber panel to recommend that the terms soluble and insoluble fibers gradually be eliminated and be replaced by specific beneficial physiological effects of a fiber, perhaps viscosity and fermentability. Viscosity is an important property of fibers that lower serum lipids and modulate glucose response.[6] Fermentability in the gut is associated with short chain fatty acid production and changes in gut microflora, properties known to be important for gut health and in disease prevention.[7]

The actual physiological effects that functional fiber must impart to be considered functional are yet to be defined, although in other countries isolated fibers have had to prove their effectiveness in increasing stool size, lowering blood cholesterol or modulating blood glucose. Functional fiber is found in bulk laxatives, fortified foods, beverages and dietary supplements.

Soy Fiber

There are three basic types of isolated soy fiber: okara, soy bran and soy isolate fiber. Okara is a pulp fiber by-product produced in the manufacture of

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Research Updates

By Mark Messina, Ph.D.

Cancer Risk Markers

Identifying dietary factors that affect cancer risk is more difficult than for other chronic diseases such as coronary heart disease (CHD) and osteoporosis because of the lack of well-defined intermediary markers that can be non-invasively measured. For CHD there are an assortment of such markers, including serum cholesterol, C-reactive protein, blood pressure and endothelial function. For osteoporosis, not only can urinary markers of bone turnover be assessed, but the gold standard, bone mineral density, can be easily measured.

Scientists are continually trying to identify new cancer markers. The two studies below utilized two groups of cancer patients that were scheduled for surgery to test the effects of soy on markers of cancer risk. In the first case, total and free prostate specific antigen (PSA) levels were used to assess prostate tumor characteristics, and in the second, tumor cell proliferation and apoptosis (cell death) were used to assess breast tumor characteristics.

Prostate

Australian researchers randomized 29 prostate cancer patients scheduled to undergo a radical prostatectomy to one

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Focus on Soy Constituents

Fiber in the Diet (Continued from Page 1)

soymilk, tofu, and fried bean curd, especially in Asian areas.[8] It has less protein than whole soybeans, but the protein remaining is of high quality. Okara tastes similar to coconut and can be baked or added as fiber to granola and cookies. Okara also has been made into sausage. The fiber in okara is considered resistant to fermentation and most okara is still an agricultural waste product.

Soy bran is made from hulls (the outer covering of the soybean), which are removed during initial processing.[9] The hulls contain a fibrous material that can be extracted and then refined for use as a food ingredient. Fiber from soy hulls is also considered resistant to fermentation, although functional fibers from soy hulls have been prepared which provide more functional properties.

Soy isolate fiber, also known as structured protein fiber (SPF), is soy protein isolate in a fibrous form.[9] Additionally, other soy fiber fractions are isolated and sold as functional fibers. Some of these specially made soy fiber products are derived from the cotyledon portion of the seed and contain up to 75 percent dietary fiber.

Soybeans provide both dietary fiber and functional fiber to our diet. (See Table 1 on page 5.) Soy bran is produced from the seed coat portion of the soybean. It has a total dietary fiber content of 76 percent.[10] Tofu contains 2.3 percent dietary fiber and soy flour is 17.5 percent dietary fiber.[10] Dry roasted soybeans are 8.1 percent dietary fiber while green, boiled soybeans are 4.2 percent dietary fiber.[10]

In our research with soy polysaccharide (a commercial form of soy fiber), we found significant increases in stool weight with the fiber, as well as high fermentability of the fiber.[11] Soy fiber is also a weight loss aid.[12] Although soy protein is known for its lipid lowering effects, recent studies find that the soy with both the protein and fiber fractions is more potent in reducing serum lipids than just the soy protein fraction alone.[13] Thus, the soy fibers available commercially have a broad range of positive functional, nutrition and physiologic effects and are routinely used as fiber supplements.

Recommended Intakes of Dietary Fiber

The Adequate Intake (AI) for fiber defined by the DRIs is 38 g/day for adult men and 25 g/day for adult women.[1] There was insufficient evidence to set a Tolerable Upper Intake Level (UL) for dietary fiber or functional fiber. The 2005 Dietary Guidelines support a fiber intake of 14 grams per 1000 kcal to reduce the risk of cardiovascular disease and promote healthful laxation.[14] Average fiber intakes in the United States are only about 14 g/day, so most of us fall woefully short on fiber intake.[15] In contrast, the vegetarians among us routinely consume 50 g/day of fiber, and fiber intake of Paleolithic man (the fruit and nut gatherer and wild game slayer) has been estimated at 100 g/day.

Many of the diseases of public health significance – obesity, cardiovascular disease, type 2 diabetes, constipation and colon cancer can be prevented or treated by increasing the amounts and varieties of fiber-containing foods.[15] Promotion of such a food plan, with the inclusion of soy and other plant foods, by health care professionals and implementation by our population should increase fiber intakes across the life cycle.

ABOUT THE AUTHOR

Joanne L. Slavin, Ph.D., R.D., is a professor in the Department of Food Science and Nutrition at the University of Minnesota, St. Paul. She received her doctorate in nutritional sciences from the University of Wisconsin, Madison. Her research interests include dietary fiber, whole grains and phytoestrogens.

REFERENCES

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Research Updates (Continued from Page 1)

of three groups: 1) high soy (50 g soy grits providing 117 mg isoflavones) diet; 2) high soy and linseed (20 g) diet; or 3) a diet containing wheat (control). The test foods were incorporated into bread. Baseline and preoperative levels of total and free PSA were examined. Statistically significant differences were detected between the wheat group and the soy (but not the soy/linseed) group; PSA decreased 12.7 percent and increased 40 percent in the soy and control groups, respectively. Also, the free/total PSA ratio increased 27.4 percent in the soy group and decreased 15.6 percent in the control group. The authors of this study suggested that the fall in total PSA indicates the tumor had become smaller, and the increase in free PSA more differentiated, both changes representing favorable outcomes. These findings suggesting soy beneficially affects prostate tumor growth in cancer patients are intriguing and consistent with animal studies, but because of the short duration of the study and small number of subjects, they primarily provide a justification for continued research. Data on the effects of these diets on tumor proliferation and apoptosis, which are to be reported at a later time, should provide more definitive data.

Urology 2004;64(3):510-5

Breast

Researchers from the University of California at Los Angeles administered 200 mg (approximately four times typical Japanese adult intake) isoflavones for approximately two weeks following the diagnosis of breast cancer in 17 patients. Breast tissue and blood were obtained prior to and after isoflavone

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Potential of Bioactive Peptides in Prevention of Chronic Disease

By Elvira de Mejia, Ph.D.

Dietary proteins can be important sources of bioactive peptides with specific biological activities. As such, they can potentially be used in the prevention and treatment of age-related chronic diseases like cardiovascular disease, cancer and obesity. During gastrointestinal digestion or food processing, these peptides are released from the parent protein and act as regulatory compounds with hormone-like activities.[1]

In 1950, Mellander[1] first suggested that casein-derived phosphorylated peptides enhanced vitamin D-independent bone calcification in rachitic infants. Since then, numerous peptides with various bioactive functions have been identified. In a database developed by Dziuba *et al.*,[2] more than 1,500 different bioactive peptides have been presented. The most common are angiotensin converting enzyme (ACE) and dipeptidyl peptidase IV inhibitors, which show antihypertensive activity. Other biological peptide activities include opioid agonistic and antagonistic function, antioxidative activity and anticancer and immunomodulatory properties.

Milk and other dairy products are regarded as the best precursors of bioactive peptides.[3] Other sources include eggs,[4] fish,[5] sardines,[6] some cereal grains[7] and soybeans.[8] Food processing, particularly fermentation in which microorganisms and enzymes are involved, may also lead to the formation of bioactive peptides. Most bioactive peptides commonly contain two to nine amino acids. Others, such as the anti-carcinogenic peptide lunasin, may contain up to 43 amino acids.[9] The peptides may be present as independent entities or encrypted in the parent protein and are resistant to digestion by peptidases.

Biological Utilization

Depending on the exerted function, bioactive peptides may not need to be absorbed by the intestine or pass into systemic circulation. In the case of anorectic peptides, their action is at the intestinal level where they stimulate opioid and hormonal receptors, which induce satiety.[10-12] However, other functions such as hypotensive or anti-cancer activities would require passage of the bioactive peptides through the intestinal barrier and their transport to target organs. Studies of the kinetics of digestion of milk peptides in animals have shown that active peptides can still be present in the intestine even after the action of pancreatic enzymes.[13] These observations suggest the availability of these substances for intestinal absorption. Chabance *et al.*[14] demonstrated that peptides are released and passed to the blood with human digestion of milk or yogurt. In this study, two long peptides, the κ-casein-glycopeptide and the N-terminal peptide from α-S1-casein, were detected in plasma. It is also known that due to a more efficient and rapid absorption of peptides in comparison to free amino acids, peptide mixtures and protein hydrolysates are recommended to deliver nitrogen to patients suffering from malnutrition or problems of protein digestion and absorption.[15] Although more mechanistic studies are needed, these results support the concept that food-born peptides can be absorbed and have physiological activities in various human organs.

Soybean Peptides

Soybeans are an important protein source and thus also a potential source of bioactive peptides. Interest in the composition of soy and its fermented products has grown since potential anti-carcinogens and other therapeutic agents have been identified.[16] Using soy protein hydrolysis by several processing methods, numerous bioactive peptides with various specific biological activities have been found. These include peptides with the following properties: antihypertensive,[17-18] hypocholesterolemic,[19-21] antiobesity,[22-25] opioid agonistic and antagonistic,[12] antioxidant,[26] anticancer,[27] immunomodulatory[28-30] and antimicrobial.[31]

Antihypertensive peptides execute their action by inhibiting the angiotensin-converting enzyme (ACE), a dipeptidyl carboxypeptidase associated with blood pressure regulating the rennin-angiotensin system. This enzyme increases blood pressure by converting the decapeptide angiotensin I into the potent vasoconstricting octapeptide angiotensin II, which leads to an increase in blood pressure. Thereore, inhibition of ACE will result in a hypotensive effect. Most studies that evaluate the role of soy bioactive peptides in hypertension have been conducted using spontaneously hypertensive rats (SHR) as an experimental model.[5] Using this approach, ACE inhibitory soy bioactive peptides have been found to lower systolic blood pressure and ACE activity in the aorta of SHR.[17] Similar results have been reported by Wu and Ding.[32] Fitzgerald *et al.*[33] have recently summarized the effect of milk bioactive peptides on blood pressure. In this review, the hypotensive action of peptides in various animal and human clinical studies is presented.

A large body of literature also indicates that soy proteins can reduce blood cholesterol concentrations in animals and humans.[34] However, it is not clear whether the proteins or other soy phytochemicals are the hypocholesterolemic components. Some researchers believe that the cholesterol-lowering effect of soy is the result of natural compounds known as isoflavones, while others believe that the lowered cholesterol may be due to a reduction in cholesterol absorption by the protein.[35] An alternative possibility could be the modulation of cholesterol homeostasis by bioactive peptides at a level other than intestinal. *In vitro* studies have shown that soy peptides can regulate cholesterol homeostasis in a hepatoma cell line (Hep G2).[20] In addition, animal studies have revealed that most of the peptide fractions isolated after trypsin or pepsin digestion of a purified protein product were able to lower cholesterol and to up-regulate the uptake and degradation of LDL by HepG2 cell receptors.[21] Since these fractions did not contain isoflavones, the cholesterol-lowering properties of soybean-based foods were believed to be due to peptides formed during their digestion. More recently Leu-Pro-Tyr-Pro-Arg, a fragment peptide derived from soybean glycinin subunit, was found to lower serum cholesterol in mice. It was observed in

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Edamame: What is it? How do I cook with it?

By Chef Elaine R. Cwynar, M.Ed.

The culinary world has discovered edamame, the Japanese name for fresh soybeans. These young pods of the soybean plant may have originated in eastern China and Manchuria. Not particularly popular in ancient times, Chinese emperors relegated edamame as food for the masses.[1] Innovative farmers domesticated varieties so successfully that travelers, soldiers, and even Buddhist monks adopted soybeans as their dietary staple, which helped spread them around the world.[2]

Smaller than a lima bean, edamame are jade green and plump. With a creamy texture and pleasant crunch, they have jumped over the vegetarian fence and enticed cooks to include them in other menu items. Although dry beans have more dietary fiber per serving than almost any other unprocessed food, 1/2 cup of edamame (boiled, drained, without salt) will provide 4 g fiber, 11 g protein, 130 mg calcium and 140 IU Vitamin A.[3]

Cooking with Edamame

It is best to buy fresh, green pods, but frozen edamame is available all year round at oriental food markets, health and natural food stores, and even supermarkets. Remember, edamame must be simmered, steamed, microwaved, boiled or sautéed before eating. Try these suggestions:

- For the purist, edamame can be steamed or blanched, in or out of the pod, (just pop them out), and served with spicy sauces of soy, sesame oil, ginger, garlic and sambal (a spicy Thai pepper sauce) for a pleasant kick.
- Add edamame to soups during the last 10 minutes of simmering for a splash of color. They will cook in that time and remain a vivid green hue.
- Incorporate steamed edamame into fresh or root vegetable salads for extra crunch.
- Toss fettuccini with steamed edamame, vegetables, salmon, olives, garlic, basil and soybean (vegetable) oil, for extra protein, flavor and fiber.
- Edamame hold up well in cooked Jasmine or sticky rice. Brown rice serves as a great base for hearty legumes like edamame. Just fluff the cooked rice and add steamed edamame at the last minute.
- Oriental sticky rice can be rolled and stuffed with edamame as the crunchy center. Roll in toasted sesame seeds and serve with sesame/soy-based sauces, or smooth, reduced, vegetable purees, like red, yellow or purple pepper and wasabi.
- Substitute cooked edamame for lima beans in succotash for added protein.
- Use edamame in a shepherd's pie rather than peas. They hold up better and contribute to satiety.
- Puréed edamame can be flavored with garlic, tahini and lemon, like hummus, and used as a dip with whole-wheat or sesame crackers, or vegetable crudités. Add a little lime juice to lighten the texture.

ABOUT THE AUTHOR

Chef Elaine R. Cwynar, M.Ed., is an associate professor and chef in the College of Culinary Arts at Johnson & Wales University in Providence, R.I., where she received her M.Ed. in culinary education. She teaches vegetarian cuisine, nutrition and sensory analysis, and sanitation management. Also, she conducts healthy food demonstrations for elementary and high school students.

REFERENCES

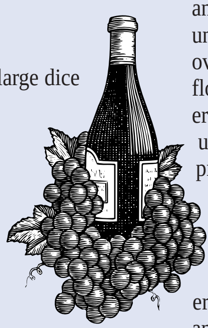
Complete references for this article can be found on page 8 of this version.

Chicken Bourguignon

CHEF ELAINE R. CWYNAR, M.ED.

Yield: 10-6 oz. servings

Ingredients:



1 lb. chicken breast, skinned, fat removed, large dice
1 1/4 cups red wine
5 Tb. mirin (rice cooking wine)
5 Tb. light soy sauce
2-3 Tb. miso paste
2 garlic cloves, minced
2 Tb. red wine or balsamic vinegar
1/2 cup whole wheat or all-purpose flour
3 Tb. soybean (vegetable) oil
1 medium onion, peeled, small dice
12 oz. crimini, shiitake or button mushrooms, quartered
1 cup frozen edamame
2/3 cup soymilk or rich soycream
1-2 tsp. kuzu, arrowroot or cornstarch to thicken, if necessary

Preparation: Gather all the ingredients and equipment. Dice chicken into 1-inch squares and hold. Mix the red wine, mirin, soy sauce, miso, garlic, and vinegar, and marinate the chicken in this mixture for at least 30 minutes. Place the flour in a bowl, remove the chicken from the marinade, and flour the chicken lightly. Heat a sauté pan and add 2 Tb. of oil. Sauté the chicken until golden brown. Remove from the pan and set aside. Wipe out the skillet with a paper towel and add another Tb. of oil. Add the chopped onion, cover, and sauté until tender, then add the mushrooms and cover again. Cook over low heat about 5 minutes until the mushroom juices flow out. Add the remaining marinade and simmer for another 10 minutes. Add the edamame and cook for another 2 minutes. Temper the soymilk, (add some hot pan juices to it to prevent curdling), add to onion mixture, and cook another 1-2 minutes. It should thicken, but if it does not, dissolve a tsp. or two of arrowroot, kuzu or cornstarch in a little more soymilk and add to it, stirring constantly, until the sauce has some body. Add the chicken pieces, cook another 3 minutes, then check the flavor, adjusting the seasonings and adding more soymilk, if necessary. Serve immediately over pasta, rice or orzo.

Chef's Note: This rich, tasty, creation brims with mushrooms. For a vegetarian twist, add drained, marinated tofu pieces in place of chicken. Kuzu is a thickener from the kuzu root and is used like arrowroot or cornstarch.

Nutrition Facts per Serving: **Calories** 215, **Total Fat** 7 g, **Saturated Fat** 1 g, **Carbohydrates** 15 g, **Protein** 17 g, **Cholesterol** 26 mg, **Dietary Fiber** 3 g, **Sodium** 590 mg

Nutritional Analysis was performed with The Food Processor Program, Version 7.82, 2001 ESHA Research, Inc.

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Potential of Peptides *(Continued from Page 3)*

this experiment that Leu-Pro-Tyr-Pro-Arg also increased the excretion of bile acids in feces, suggesting that the peptides modulated cholesterol metabolism in the liver.[36, 37] All these observations support the hypothesis that the action of bioactive peptides on cholesterol homeostasis is at the hepatic level.

Obesity Management

Promising results have been found in short-term clinical studies when using diets containing soy protein in the management of obesity.[38] With respect to the use of peptides, Fujita developed an antiobesity formula containing soy proteins, soy peptides and other ingredients.[22] Miura also formulated non-sugar beverages and diets containing soybean protein hydrolysates.[23] The beverages contained oligopeptides with three to six amino acid residues prepared by enzymatic hydrolysis of soybean protein. However, the effectiveness of these formulations has not been reported. In clinical studies, the consumption of sugar-free coffee containing Hinute, a soybean peptide, for eight weeks led to a 4-7 percent body weight reduction in human volunteers.[23] In addition, foods containing body fat-decreasing agents (a soybean peptide, collagen peptide and glutamine) have been used in humans to decrease body fat, serum glycerides, and cholesterol without decrease of body proteins.[39] In another study, a high dosage hydrolysate (20 ml/kg per day) lowered tryglycerides by 30 percent and decreased body weight of rats.[25] The antiobesity effects of soy proteins and soy peptides and their application in the treatment of obesity have been reviewed by Nakamori.[24] In regard to the mechanism, several studies have demonstrated that soybean peptides suppress food intake and gastric emptying by direct action on rat small intestinal mucosal cells by stimulating cholecystokinin (CCK) release.[10-12] These results suggest that the mechanism of action in soy peptides is to regulate food intake by inducing satiety through the activation of opioid and CCK receptors in the gut.[12] Although all these findings are encouraging, long-term clinical studies are needed to assess the true contribution of soy peptides to weight management.

Cancer

In relation to cancer therapy, hydrophobic peptides from soy proteins have been found to have anticancer activity. Galvez[9] discovered in 2002 a 43 amino acid peptide called lunasin that has a motif that binds specifically to non-acetylated H3 and H4 histones and can therefore be used for cancer therapy. This binding prevents acetylation of H3 and H4 and allows the targeting of lunasin to specific cancerous cells.[40] Lunasin is now considered a novel peptide that can suppress chemically-induced carcinogenic transformation in mammalian cells, and in the skin of mice.[41] The lunasin gene has now been cloned from the soybean, and the chemically synthesized form of the lunasin peptide is currently used experimentally.[42] The *in vitro* chemopreventive properties of lunasin have been described by Lam *et al*.[43] and its concentration in different soybean genotypes by Gonzalez de Mejia *et al*.[44]

Conclusions

Numerous bioactive peptide fragments with different physiological activities have been identified from diverse food sources. The activities of bioactive peptides have been demonstrated, but their molecular mechanism of action is not yet clear. Furthermore, the investigations have been focused mainly in *in vitro* studies and in animal models. Human clinical studies are limited or non-existing. Bioactive peptides are released from protein by either food processing or by GI digestion. Indirect evidence also suggests that these peptides can be absorbed by the gastrointestinal system, thus exerting their action on specific target organs. Other peptides do not need to be absorbed and act at the intestinal level. However, understanding whether digestion of food proteins *in vivo* releases the same peptide fragments as the ones in *in vitro* experiments is an important question. Also, the effective plasma levels of bioactive peptides are unknown and need to be determined. It is also important to discover new peptides with health benefits in soy-hydrolysates and fermented foods. The identification of these compounds will contribute toward a better understanding of soy and the development of new functional foods.

ABOUT THE AUTHOR

Elvira de Mejia, Ph.D., is an assistant professor of food chemistry and food toxicology at the University of Illinois at Urbana-Champaign. She received her doctorate in plant biotechnology from the National Polytechnic Institute in Mexico. Her research focuses mainly on food components with health benefits, and she is currently working with bioactive proteins and peptides in soybeans.

REFERENCES

Complete references for this article can be found on page 7 of this version.

Table 1. Dietary Fiber in Soyfoods

Soyfood	Serving Size	Fiber (g)	Soyfood	Serving Size	Fiber (g)
Edamame – raw	1 cup	10.8	Soymilk – fluid	1 cup	3.2
Edamame – cooked, boiled, drained	1 cup	7.6	Soynuts – roasted	1/2 cup	15.2
Miso	1/2 cup	7.4	Soy protein isolate	1 oz.	1.6
Soy flour – defatted	1/2 cup	8.8	Tofu – raw, firm	1/2 cup	2.9

Source: USDA Nutrient Data Laboratory, available on-line at www.nal.usda.gov/fnic/foodcomp/index.html

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A Soy Solution to Trans Fat

Agricultural technology leaders have begun to reap the harvest of years of research into ways to defeat the trans fat problem using better soybeans.

Recently Monsanto, Iowa State University and the alliance of Bunge and DuPont have all announced the availability of soybean varieties with low-linolenic acid. At a joint news conference in Washington sponsored by the QUALISOY™ program, an agricultural initiative focused on improving the quality and competitiveness of U.S. soybean varieties, representatives discussed the benefits of their new oils, which reduce the amount of linolenic acid from a current average of 7 percent to anywhere from 1 to 3 percent, depending on the formula used by each entity. The brand names for the new oils are VISTIVE™, Monsanto; Asoyia™, Iowa State; and NUTRIUM™ Low Lin, Bunge and DuPont.

Low-linolenic soybeans will bring healthier soybean oils and food products to the table because they will not need to undergo hydrogenation, a chemical process used to extend the life of frying oils and the freshness of food products, which causes trans fats to form. Many baked and fried food products currently contain hydrogenated oil, but trans fats account for less than 3 percent of the average American's total caloric intake. The new low-linolenic soybean oils are especially suited to frying applications, and will help replace partially hydrogenated oil used in fried foods.

Soybean Oil

Although partially-hydrogenated oils were introduced to help decrease saturated fats in food, the trans fats created by this hydrogenation have recently been implicated in raising LDL (bad) cholesterol levels in the blood while lowering HDL (good) cholesterol levels. Beginning January 1, 2006, all food products and dietary supplements regulated by the Food and Drug Administration (FDA) and bearing a nutritional facts panel will be required to list trans fat content.

In the hydrogenation process, hydrogen molecules are added directly to the poly- or monounsaturated fatty acid. This process reconfigures some molecular bonds, and hydrogen atoms end up on different sides of the chain, leading to the term "trans." Hydrogenation converts liquid oil to a more solid state for stability and functionality. Trans fatty acids do not occur naturally in liquid soybean oil, but are a byproduct of the hydrogenation process.

Soybeans with low-linolenic acid profiles eliminate the need for hydrogenation and the creation of trans fats while at the same time, retaining the characteristics needed by the food industry to continue to produce aesthetically-appealing food demanded by consumers.

Research Updates (Continued from Page 2)

supplement treatment in the same patient. Historical control cases with similar characteristics to the experimental patients were selected for comparison. There were not statistically significant effects of isoflavones. However, there appeared to be a statistically nonsignificant trend towards cancer growth inhibition in the isoflavone treatment group, as manifested by higher apoptosis/mitosis ratios compared with those from the control untreated group. As in the previous study, the short duration and small subject normal limit the interpretation of these findings, but they suggest that isoflavones do not adversely affect breast tumors and may in fact be beneficial. Clearly, more research of this type is needed to address the effects of isoflavones on existing breast tumors.

Nutr Cancer 2004;49(1):59-65

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POTENTIAL OF PEPTIDES

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