

## **The Healing Power of Soy**

*By Monica Emerich*

In 1995, an analysis on the medicinal effects of soy hit the popular press. First, the story ran on the front page of the New York Times. From there the message quickly traveled the globe: soyfoods, including soy protein, may protect against some disease.

Since then clinical research continues on the potential of soy products to prevent and treat heart disease, cancer, osteoporosis, and the symptoms of menopause. Could this humble legume that has been a protein source in Asian countries for thousands of years really offer so much?

### **The Compound Connections**

What makes the soybean such a gold mine for good health? Soy protein contains all nine amino acids that our bodies cannot manufacture. As a protein, soy is as good as or better than animal protein because it lacks the cholesterol and much of the saturated fat of animal protein. For those who suffer from dairy allergies and lactose intolerance, soy products offer all the nutritional benefits of milk. . . .

Isoflavones, one of the chemically active compounds in soy, have shown great promise in the treatment and prevention of disease. The two most widely researched soy isoflavones are:

**\*\* Genistein --** According to research by Archer Daniel Midland (ADM), a manufacturer of soy protein products, genistein may be an effective inhibitor of cancer cells. Both genistein and the isoflavone daidzein are likely to play a role in the lowering of cholesterol, according to new research at Wake Forest University Baptist Medical Center in WinstonSalem, N.C.

**\*\* Daidzein --** This isoflavone may fight osteoporosis because it promotes bone development while reducing bone breakdown. Isoflavones have many biological and chemical similarities to the estrogen produced by humans, and estrogen is important to maintaining healthy bones.

Soy products vary in levels of isoflavones, according to the United Soybean Board (USB). For example, soy sauce and soy oil contain no isoflavones, but tofu, soy milk, tempeh, soy flour, textured soy protein and miso are rich sources as is soy protein isolate. The levels of isoflavones in soy protein concentrates vary depending on how the product was processed.

In addition to isoflavones, soy contains these active compounds:

**\*\* Saponins --** As antioxidants, saponins stimulate the immune system and may help to lower cholesterol. Preliminary research also suggests that they play a role in the reduced colon cancer rates among populations that eat soy regularly.

**\*\* Phytic Acids --** These plant fibers have free-radical scavenging activity. By binding to minerals, they can inhibit absorption, particularly of iron. In this case, phytic acids prevent oxidation of iron. . . .

**\*\* Plant sterols --** A 1977 study showed these cholesterol-like compounds might inhibit cholesterol absorption.

Soy byproducts include lecithin and choline. Lecithin is a phospholipid containing choline, and both have been shown to support the reproductive process, fetal development, liver and heart health, memory and physical performance, according to a clinical monograph "Lecithin and Choline: ResearchUpdate on Health and Nutrition," by David Canty, M.S., Steven Zeisel, M.D., Ph.D., and Amanda Jolitz, M.S. R.Ph.

### **Soy from the Heart**

"It is well-established that soy can reduce blood total cholesterol and low-density lipoprotein (LDL)

cholesterol levels particularly in individuals with modest to severe hypercholesterolemia (high blood pressure) and it can lower serum total cholesterol anywhere between 3.3 to 24 percent depending on initial blood cholesterol concentrations," says Bahram Arjmandi, Ph.D., R.D., associate professor of nutrition at Oklahoma State University in Stillwater, Okla., and adjunct associate professor at the University of Illinois, Chicago.

"Not only that but soy has been shown to increase the good cholesterol, HDL," he said. Arjmandi's research has focused on the beneficial effects of soy's phytoestrogens in relieving ovarian hormone deficiency-associated symptoms and their anticarcinogenic properties.

The 1995 meta-analysis of soy that eventually landed on the cover of the New York Times , noted that soy has been recognized for 80 years as being able to reduce cholesterol in animals. The meta-analysis of 38 clinical studies showed that eating an average of 31 grams of soy protein daily significantly lowered blood cholesterol levels in humans. Subjects participating in the studies ate isolated soy protein that has more than 90 percent protein; textured soy protein that has about 50 percent protein; and soy concentrate with 70 percent protein.

Recent research at Wake Forest University echoes the conclusion of the meta-analysis that soy can help lower cholesterol.

John R. Crouse, M.D., head researcher in the Wake Forest University study told the American Heart Association in Santa Fe, N.M., in March that isoflavones were indeed the active ingredients in soy that reduced total cholesterol and low-density lipoproteins (LDL, the bad cholesterol). In his study, Crouse gave 156 patients with moderately elevated cholesterol levels a soy drink containing 25 grams of soy protein with or without isoflavones. The isoflavone levels were 25, 42, 58 or 4 milligrams. Another group of patients received casein from cow's milk without soy protein or isoflavones.

The results showed that the higher the concentration of isoflavones, the greater the reduction in both total and LDL cholesterol. However, the soy drink with just 4 milligrams of isoflavone and the casein drink had no effect on cholesterol. In nine weeks, patients who started the study with high LDL cholesterol experienced a 10 percent reduction in LDL.

Reduction of cholesterol, however, may be just one way in which soy products can lower the risk of heart disease. Other data points to isoflavones' ability to relax and expand arteries and reduce clot formation and plaque development. Constriction of arteries can cause heart attack while clotting and plaque are also major contributors to heart disease.

Lecithin and choline may also protect us from heart disease. Choline helps to break down homocysteine, the heart-damaging amino acid, while lecithin helps the liver metabolize fat and cholesterol properly and lowers blood cholesterol levels.

### **Menopause and Osteoporosis**

While the results for soy as a modulator of menopausal symptoms are promising, no scientific conclusions have yet been drawn. Several studies have shown some ability to lessen the severity of hot flashes, but others have shown no significant effects.

While plenty of epidemiological studies show that women in populations who traditionally eat substantial amounts of soy products have up to 1/3 the menopausal complaints of their non-soy eating European counterparts, researchers have pointed out that these differences could be the results of cultural inhibitions about reporting such complaints rather than the result of

eating soy-based diets.

Some controlled studies, however, indicate soy may relieve hot flashes. Arjmandi says a recent controlled study in Italy showed a 45 percent reduction in occurrence of hot flashes among women who ate 40 grams of soy daily over three months of the study.

While the results are exciting, Arjmandi explains that more research will be needed to examine the placebo effect seen in the study -- the women in the study who received placebo also experienced a 30 percent reduction in hot flashes.

When it comes to osteoporosis, another symptom of menopause, soy has heavy support in the scientific literature.

Osteoporosis affects 15 million to 20 million Americans -- one of the highest rates in the world. This bone-thinning disease leads to fractures that can be devastating in the elderly. Women are particularly at high risk, especially those who do not meet the recommended daily allowance for calcium.

Soy offers high levels of calcium in a highly bioavailable form. Soy protein also exerts less of a loss of calcium through urine than that produced by other proteins.

"The research on soy for bone health is among the most exciting areas of soy research," says Mark Messina, Ph.D., a soy researcher, speaker and author of several books on soyfoods. "In a couple of years, we will have a much clearer picture of how well soy can support bone health because several studies will be concluding then."

Soy benefits bone health in a third way: soy's isoflavones are structurally similar to human estrogen -- a vital player in keeping women's bones strong. For post-menopausal women, soy's weak estrogens may offer some hope in keeping bones strong.

Arjmandi says that soy may behave in both an estrogenic and anti-estrogenic manner. Soy isoflavones (genistein) bind to estrogen receptors (ER), especially ER beta that is similar to estradiol. ER beta is predominant in tissues such as bone and bladder but not in well-known estrogen-responsive tissues such as the uterus. In this way, soy isoflavones may exert the beneficial effects of estrogens on bone similar to those of estrogens but without any effects on breast and uterus, where high levels of estrogens can promote cancer

### **Protecting against Cancer**

Genistein is a naturally occurring tyrosine kinase inhibitor (TKI), which is under study as a potential anti-cancer agent. Where synthetic TKIs have raised medical concerns about toxicity, the natural TKIs in genistein may have not shown the same toxic side effects. Nonetheless, studies of soy's anticarcinogenic properties are relatively young by medical standards.

A 1990 National Cancer Institute workshop identified five different chemical classes of anticarcinogens in soybeans -- phytosterols, phytates, saponins, protease inhibitors and isoflavones, according to the USB, but isoflavones have enjoyed the focus of the research.

"The studies are not finite on soy as a protecting agent against cancer," Messina says. "It is not proven that soy is anti-estrogenic and much of the evidence being cited in favor of soy as a cancer-fighter comes from epidemiological studies not controlled clinical studies."

The research that has been done, however, is promising. The epidemiological studies that have examined soy-consuming populations have found that eating just one serving of soy per day is associated with reduced risk of cancer according to the USB. Several studies show that genistein inhibits the activity of certain enzymes involved in controlling cell growth. These inhibiting effects point to soy as an anticarcinogen. Other studies have shown that genistein may have the ability to cut off new blood vessel growth, which feeds tumors; and it may also increase the effectiveness of other cancer drugs.

A study in the *Journal of Nutrition*, reviewed the results of studies that suggest that isoflavonoids and lignans (precursors of the active soy compounds) in soy are natural cancer-protective compounds. A British study on soy and breast cancer concluded that preclinical trials were positive enough to justify calling for soybean products to be given a priority for clinical trials in breast cancer protection.

### **Give Soy a Chance**

A 1996 study on consumer awareness of the health benefits of soy protein (Burke Marketing Research) showed that 50 percent of consumers nationally are aware of the health benefits of soy protein, but only half of those actively seek soyfoods to incorporate in their diet.

Why?

The researchers concluded that until lately there weren't many soy products that offered good taste and convenience. Today, soy couldn't be easier to integrate into a healthy diet.

For those in a hurry, there are many protein powders and bars on the market with varying amounts of soy protein. Look for those containing isolated soy protein that retain their naturally occurring isoflavones.

Both Arjmandi and Colwell say that research has not yet proven which form of soy product is best in terms of potential health benefits, but Arjmandi says consuming 50 milligrams of soy isoflavones a day has shown benefits and that this level is achievable with modest consumption of soy products.

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*Source: HEALTH FOODS BUSINESS, July 1998*

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